ELECTRONIC FUSE
8X 24V, NEC CLASS 2

- Eight Current Controlled Outputs
- NEC Class 2 Compliant
- Adaptive Voltage-dependent Current Limitation for Maximal Output Power According to NEC Class 2
- Selective Tripping of Overloaded Channels
- Compatible even with large Capacitive Loads
- Output Currents Displayed Live on LED Matrix
- Remote Reset or Reset via Pushbuttons
- Common Signaling Relay Contact for Tripped Channels (PISA-B-8CL2-B1)
- Digital Coded Signal Output for Tripped Channels (PISA-B-8CL2-B4)
- Parameter Settings can be Locked by PIN-Code
- ON/OFF Feature for Each Individual Output
- Easy Wiring - Distribution Terminals for Negative Pole
- 3 Year Warranty

GENERAL DESCRIPTION

The PISA-B devices are DIN rail mountable eight channel protection modules with integrated electronic fuses for 24V systems. They distribute the current from one large power source to eight NEC Class 2 output circuits, which results in reduced fire safety efforts and easier regulatory testing as well as approval processes for the end equipment.
Channel 1 and 2 are optimized for loads with large input capacitances. Connect such loads to these channels to avoid false tripping or unexpected switch-off such loads.
The PISA-B-8CL2-B1 is equipped with a common tripping signaling relay contact that reports tripped channels, while the PISA-B-8CL2-B4 has a digital coded signal output built in for this function.
All PISA-B devices are equipped with push-in terminals, which are optimized for automated wiring. The mechanically robust housing is made of a high-grade, reinforced molded material on the front and of an aluminum body, which permits surrounding temperatures up to +70°C.

SHORT-FORM DATA

Input voltage	DC 24V	-20%/+25%
Required input voltage for turning-on of outputs	19.6Vdc	
Input current	40A	
Internal consumption	40mA	PISA-B-8CL2-B1
	35mA	PISA-B-8CL2-B4
Nominal output current	3.75A	Per channel
Current limitation	5.7A	CH1 and CH2
	50A	CH3 to CH8
Tripping characteristics	Slow or Fast	Selectable
Tripping delay		
CH1-CH2	2ms – 1.1s	At short circuit
CH3-CH8	<10ms	At short circuit
CH1-CH8	1.1s	For slow tripping at 1.5x nominal current
CH1-CH8	0.22s	For fast tripping at 1.5x nominal current
Max load capacitance capability		
CH1-CH2	100mF	Per channel
CH3-CH8	20mF	Per channel
Voltage drop per channel		
CH1-CH2	45mV	For 3.75A load
CH3-CH8	60mV	For 3.75A load
Standby losses	1W	
Power losses	7W	At 8x 3.75A load
Temperature range	-25°C to 70°C	
Size (w x h x d)	52x124x130mm	Without DIN rail
Weight	370g / 0.82lb	

ORDER NUMBERS

Description: Electronic Fuse PISA-B-8CL2-Bx-xx
Order Number:
PISA-B-8CL2-B1 Common signaling relay contact
PISA-B-8CL2-B4 Digital coded signal output

Accessories:
BUS-BAR1-L102: A set for 2 modules
BUS-BAR1-L155: A set for 3 modules
BUS-BAR1-L500: Single piece L=500mm

MAIN APPROVALS

For details and a complete approval list, see chapter 20.

UL 2367 | UL 61010-2-201 | CB Report Available (IEC 61010, IEC 62368 planned)

NEC CLASS 2

All parameters are specified at 24Vdc input voltage, 8x3.75A output currents, 25°C ambient and after a 5 minutes run-in time unless otherwise noted.

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Packaging and packaging aids can and should always be recycled. The product itself may not be disposed of as domestic refuse.

TERMINOLOGY AND ABBREVIATIONS

NEC Class 2	NEC Class 2 power sources provide limited output power of less than 100 VA and output current of less than 8 A. They are considered safe in terms of fire ignition and provide acceptable protection against electric shock. The benefits of using NEC Class 2 circuits are reduced and less costly requirements for wiring and fire protection. In addition, the end-use regulatory testing and approval process is simpler.
DC 24V	A figure displayed with the AC or DC before the value represents a nominal voltage with standard tolerances (usually ±15%) included. E.g.: DC 12V describes a 12V battery disregarding whether it is full (13.7V) or flat (10V)
24Vdc	A figure with the unit (Vdc) at the end is a momentary figure without any additional tolerances included.
may	A key word indicating flexibility of choice with no implied preference.
shall	A key word indicating a mandatory requirement.
should	A key word indicating flexibility of choice with a strongly preferred implementation.

All parameters are specified at 24Vdc input voltage, 8x3.75A output currents, 25°C ambient and after a 5 minutes run-in time unless otherwise noted.

1. Intended Use

This device is designed for installation in an enclosure and is intended for commercial use, such as in industrial control, process control, monitoring and measurement equipment or the like.

Do not use this device in equipment, where malfunctioning may cause severe personal injury or threaten human life without additional appropriate safety devices, that are suited for the end-application.

If this device is used in a manner outside of its specification, the protection provided by the device may be impaired.

2. Installation Instructions

⚠ DANGER **Risk of electrical shock, fire, personal injury or death.**

- Turn power off before working on the device. Protect against inadvertent re-powering.
- Do not open, modify or repair the device.
- Use caution to prevent any foreign objects from entering the housing.
- Do not use in wet locations or in areas where moisture or condensation can be expected.
- Do not touch during power-on, and immediately after power-off. Hot surfaces may cause burns.

Obey the following installation instructions:

This device may only be installed and put into operation by qualified personnel. This device does not contain serviceable parts. If damage or malfunction should occur during installation or operation, immediately turn power off and send unit to the factory for inspection.

Install the device in an enclosure providing protection against electrical, mechanical and fire hazards. Install the device onto a DIN rail according to EN 60715 with the input terminals on top of the unit.

Up to eight devices can be connected via two power-bus-bars, where only one device is connected to the power supply. The power-bus-bars must be long enough to make a connection to all contacts of the devices.

Use an appropriately sized 24V power supply, which can deliver the peak current required to trip the load channels. If peak currents are too low, the supply voltage for the protection module can no longer be maintained, which results in a malfunctioning of the protection module.

Make sure that the wiring is correct by following all local and national codes. Use appropriate copper cables that are designed for a minimum operating temperature of 60°C for ambient temperatures up to +45°C, 75°C for ambient temperatures up to +60°C and 90°C for ambient temperatures up to +70°C. Ensure that all strands of a stranded wire enter the terminal connection.

The device is designed for pollution degree 2 areas in controlled environments. No condensation or frost is allowed. The enclosure of the device provides a degree of ingress protection of IP20. The housing does not provide protection against spilled liquids.

The isolation of the devices is designed to withstand impulse voltages up to 1.5kV according to IEC 60664-1.

The input can be powered from a regulated power supply or a similar DC source.

The input must be powered from a PELV or SELV source in order to maintain a SELV or PELV output. Check for correct input polarity. The device will not operate when the voltage is reversed.

A disconnecting means shall be provided for the input of the device.

The device is designed as “Class of Protection III” equipment according to IEC 61140.

The device is designed for convection cooling and does not require an external fan. Do not obstruct airflow and do not cover ventilation grid!

Keep the following minimum installation clearances: 40mm on top, 20mm on the bottom, 5mm left and right side. Increase the 5mm to 15mm in case the adjacent device is a heat source. Between multiple PISA-B modules, no clearance is needed.

The device is designed for altitudes up to 5000m (16 400ft).

The maximum surrounding air temperature is +70°C (+158°F). The operational temperature is the same as the ambient or surrounding air temperature and is defined 2cm below the device. The device is designed to operate in areas between 5% and 95% relative humidity.

All parameters are specified at 24Vdc input voltage, 8x3.75A output currents, 25°C ambient and after a 5 minutes run-in time unless otherwise noted.

3. Typical Wiring Scheme

One fuse module is suitable to distribute the current to 8 consumers. If there are more than eight consumers, up to eight fuse modules can be used (64 consumers). The supply of the individual fuse modules can be done by means of power-bus-bars, which are available as accessory parts. The supply of the 24V is then only done by one fuse module, preferably in the middle, because the current is then better distributed in both directions and the permissible current of the power-bus-bar of 32A is not exceeded.

Fuse modules can be lined up on the DIN rail without spacing. The power-bus-bars can be plugged in from the front and must have a length that all plug contacts of the modules make a contact.

The (+) pole terminals of the loads must be connected to the outputs of the fuse module. The fuse module also has a distribution for the (-) pole connection. This internal distribution can be used and reduces the wiring effort. However, an external distribution of the (-) pole connection may also be used, as shown in Fig. 3-2.

The channel 1 and 2 are optimized for loads with large input capacitances. Connect such loads to these channels to avoid a false tripping or unexpected switch-off of these channels.

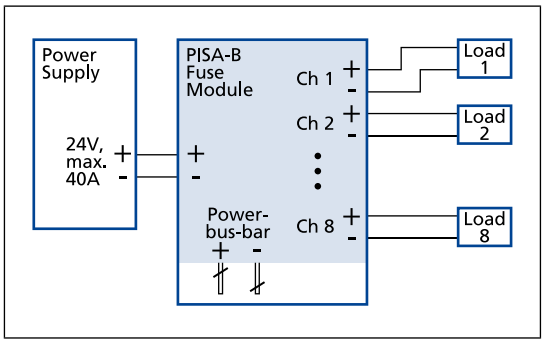

Fig. 3-1: Typical wiring scheme for one fuse module (8 loads)

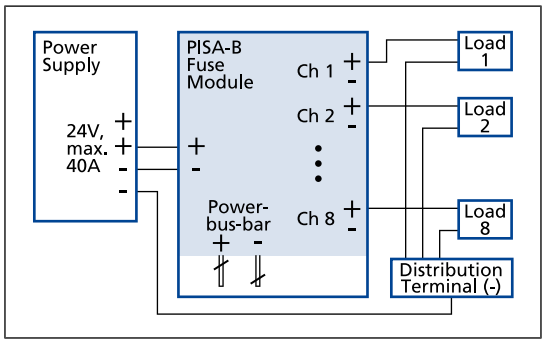

Fig. 3-2: Typical wiring scheme utilizing an external distribution terminal for the negative pole

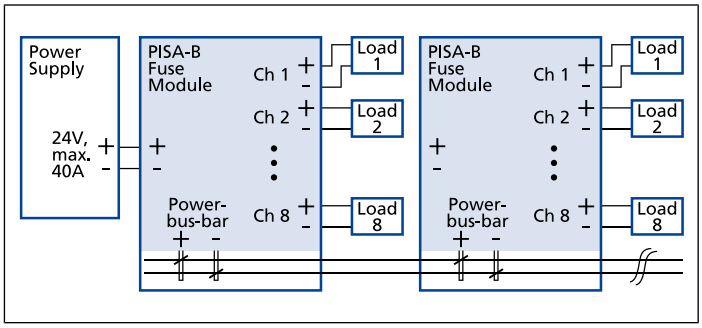

Fig. 3-3: Typical wiring scheme for multiple modules

All parameters are specified at 24Vdc input voltage, 8x3.75A output currents, 25°C ambient and after a 5 minutes run-in time unless otherwise noted.

4. DC-Input

The input can be powered from a regulated power supply or a similar DC source. Use an appropriately sized power supply, which can deliver the required output current.

If a power supply with a continuous output current greater than 50A is used, a fuse or circuit breaker with 63A (B- or C-Characteristic) must be connected between the power supply and the electronic fuse module.

The continuous voltage between the input and ground must not exceed 60Vdc.

The input must be powered from a PELV or SELV source or an “Isolated Secondary Circuit” in order to maintain SELV or PELV outputs.

Check for correct input polarity. The device will not operate when the voltage is reversed.

Input voltage Input voltage range	nom.	DC 24V 19.2-30Vdc	-20%/+25%
Input voltage required to switch on the outputs	typ. max.	19Vdc 19.6Vdc	
Input current	max. max.	40A 30A	For multiple modules connected via power-bus-bar For a single module at fully loaded outputs
Internal current consumption	 typ. typ.	 40mA 35mA	Stand-by current with no load current on the outputs For PISA-B-8CL2-B1 For PISA-B-8CL2-B4

5. Output

The output can supply any kind of loads, including inductive and capacitive loads. The maximum size of capacitive loads is specified in the table below (see Tab. 5-1). Larger load capacitors might result in an unintended turn-off of the channel. More detailed information regarding allowable capacitive loads is available on request. If in doubt or when you do not know the input capacitance of your load, we recommend to perform tests with the real load.

The outputs of each channel fulfil the requirements for a limited power source acc. to NEC Class 2.

Output channels can be switched on and off separately by pushing the corresponding control button for longer than 50ms. A switched off channel is displayed with the uppermost red LED of the LED bar graph. Factory setting is that all channels are switched on.

Channels 1 and 2 have a current limited output, while channels 3 to 8 have an overcurrent shutdown behaviour only.

- Do not apply reverse voltages from the load to the output terminals that are higher than 30V and last longer than 1s.
- Do not parallel outputs for higher output currents.
- Do not connect outputs in a series connection for higher output voltages.
- Do not connect batteries for charging purposes to the output of the device.

In order to avoid too high peak currents on the 24V supply when applying the 24V supply voltage, the output channels are switched on in delayed steps. Channel 1 switches on after 50ms followed by the remaining channels with a delay of 100ms each. This scheme applies when all channels are switched on. Channels that are switched off are skipped.

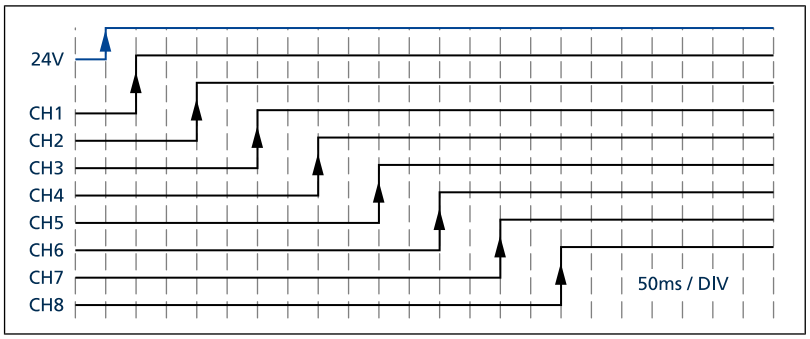

Fig. 5-1: Turn-On sequence after applying an input voltage

All parameters are specified at 24Vdc input voltage, 8x3.75A output currents, 25°C ambient and after a 5 minutes run-in time unless otherwise noted.

Output voltage	nom.	DC 24V	The output voltage is equal to the input voltage minus the voltage drop of the module.
Output current	nom.	3.75A	+/-100mA, at 24V per channel
	nom.	3A	+/-100mA, at 30V per channel
		Adaptive voltage-dependent current limitation for maximal output current according to NEC Class 2 requirements.	
Voltage drop per channel	typ.	45mV	For CH1 or CH2 at 3.75A load when all other channels are not loaded
	typ.	120mV	For CH1 or CH2 when all channels are loaded with 3.75A
	typ.	60mV	For CH3 to CH8 at 3.75A load when all other channels are not loaded
	typ.	135mV	For CH3 to CH8 when all channels are loaded with 3.75A
Current limitation	typ.	5.7A	For CH1 and CH2
	typ.	50A	For CH3 to CH8
		Channels 1 and 2 have a current limited output, while channels 3 to 8 have an overcurrent shutdown behaviour only.	
Load capacitance capability	max.	100mF	For CH1 and CH2 per channel
	max.	20mF	For CH3 to CH8 per channel
Output leakage current	max.	2mA	Per channel, when CH1 and CH2 are switched off
	typ.	1.2mA	Per channel, when CH1 and CH2 are switched off
	max.	50µA	Per channel, when CH3 to CH8 are switched off
Turn-on delay of outputs	typ.	750ms	Period between applying the input voltage and turning on all output channels.

Tab. 5-1: Output data

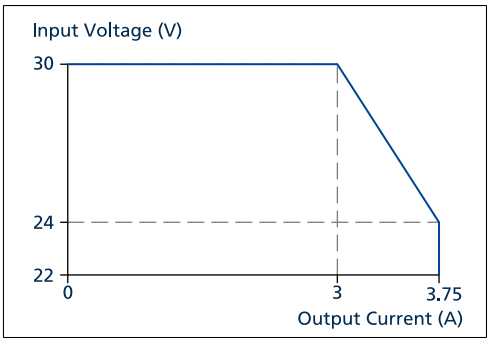

Fig. 5-2: Output Current vs. Input Voltage

All parameters are specified at 24Vdc input voltage, 8x3.75A output currents, 25°C ambient and after a 5 minutes run-in time unless otherwise noted.

6. Output Tripping Characterstics

The tripping characteristic can be set to Slow or Fast as a common parameter for all channels.

Tripping characteristic		Slow / Fast	selectable, factory setting is Fast
Tripping delay	typ.	1.1s	For all channels in Slow mode at 1.5x nominal current
	typ.	0.22s	For all channels in Fast mode at 1.5x nominal current
	typ.	2ms – 1.1s	For CH1 and CH2 in short circuit
	max.	10ms	For CH3 to CH8 in short circuit

The following curves show the let-through current areas, which are located to the left of the curves, and the tripping areas, which are located to the right of the curves.

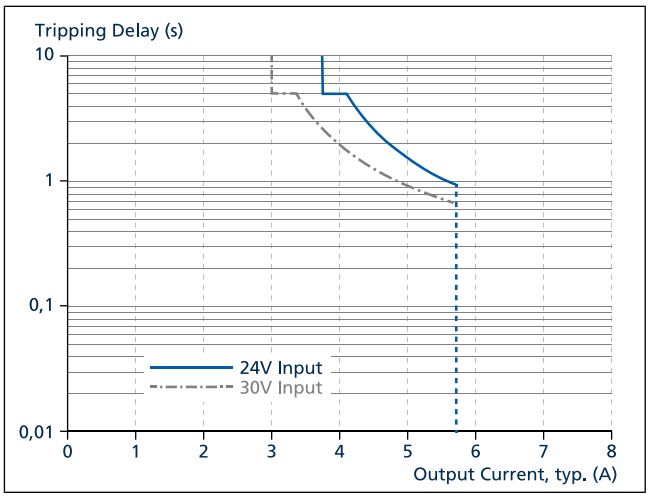

Fig. 6-1: CH1 and CH2 tripping diagrams in Slow mode

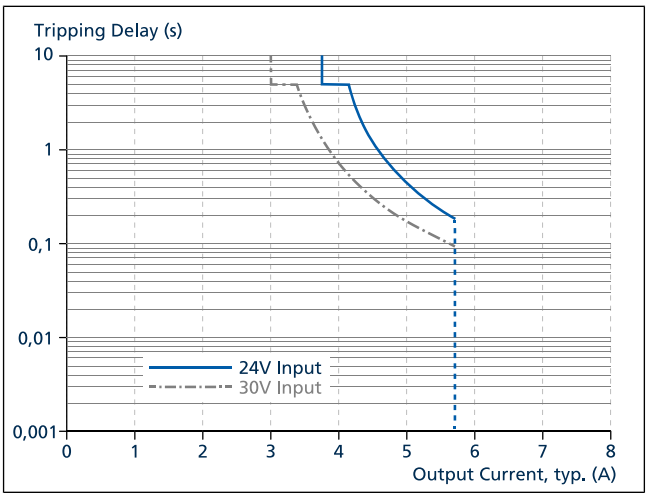

Fig. 6-2: CH1 and CH2 tripping diagrams in Fast mode

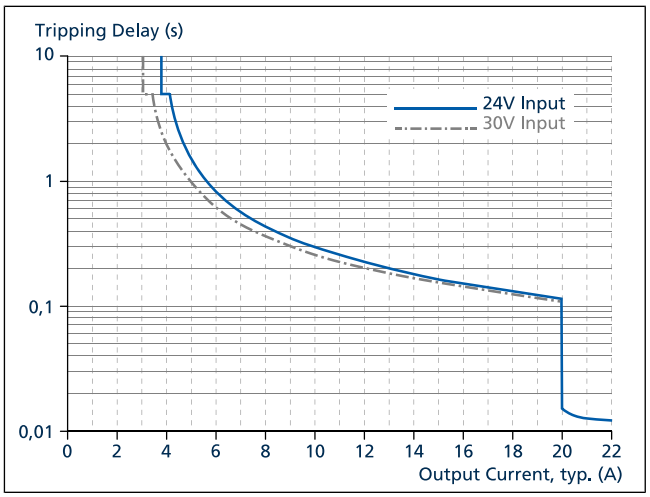

Fig. 6-3: CH3 to CH8 tripping diagrams in Slow mode

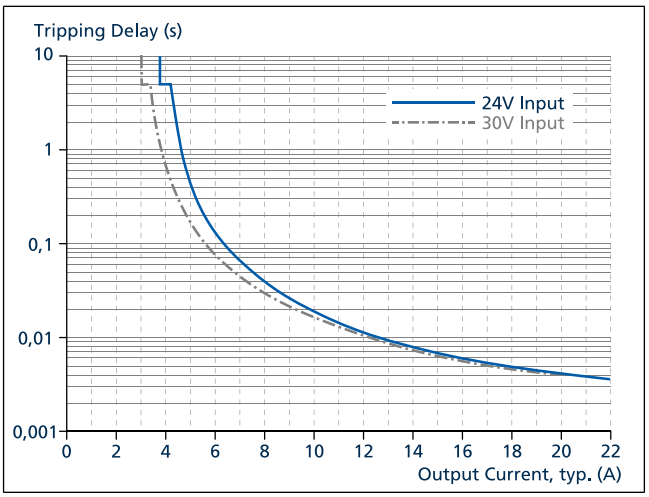

Fig. 6-4: CH3 to CH8 tripping diagrams in Fast mode

All parameters are specified at 24Vdc input voltage, 8x3.75A output currents, 25°C ambient and after a 5 minutes run-in time unless otherwise noted.

7. Control And Monitoring Features

The LED matrix display provides information about the actual current values (average and peak) of the individual output channels, reports faults and helps to parameterise the device. The green and yellow LEDs indicate the actual channel current in percent of the nominal value. Peak values are stored in a peak detector and are additionally shown with one LED for a short period of time. Red LEDs (regardless of whether they are flashing or solid on) indicate that the output is switched off.

The tripping characteristic can be set as a common parameter for all channels. To change the characteristic alternately push the SET and channel control button for channel 3 at the same time. The selected option is shown on the LED matrix for 2 seconds. Letter F indicates the fast and the letter S the slow tripping characteristic. If only the SET button is pressed, the characteristic is displayed for 2s. Tripping characteristic can be changed regardless of whether a channel is switched off or not.

Tripping characteristic setting can be protected against changes with a PIN code. To lock the settings push the SET and channel control button 1 until the unit shows a moving text “PIN TO LOCK”. Enter a 4-digit PIN by pushing any combination of channel control buttons 1-8. Push the SET button to save the PIN, the unit shows a moving text “LOCKED”. To unlock settings push the SET and channel control button 1, the unit shows a moving text “PIN TO UNLOCK” and enter the 4-digit PIN you selected and confirm it by pushing the SET button.

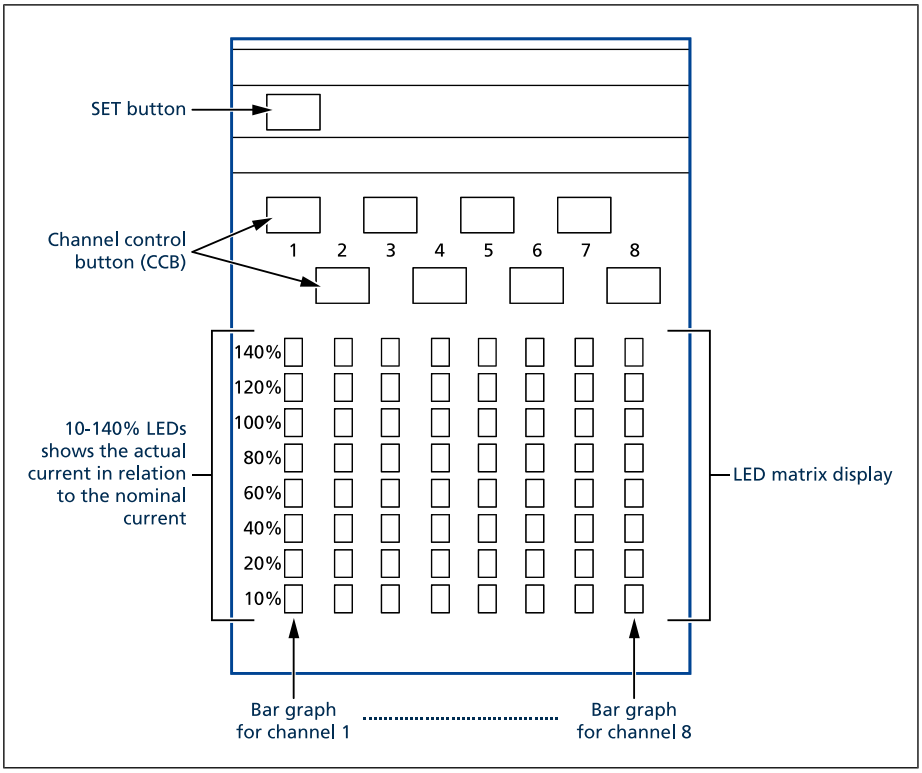

Fig. 7-1: Control and monitoring elements

Special Key Combinations

Special shortcuts allow quick access to certain information:

Press **SET + CCB1** button: Lock/Unlock setting with PIN

Press **SET + CCB2** button: Show FW version

Press **SET + CCB3** button: Slow/Fast mode

All parameters are specified at 24Vdc input voltage, 8x3.75A output currents, 25°C ambient and after a 5 minutes run-in time unless otherwise noted.

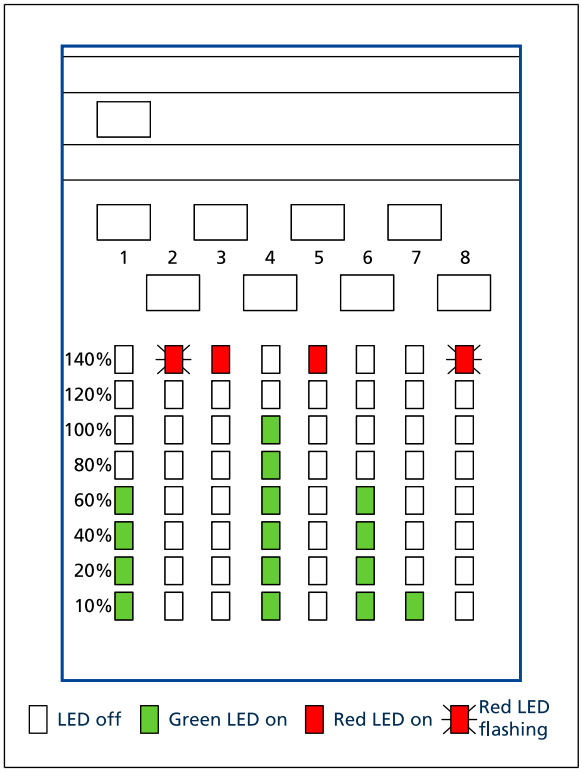

Fig. 7-2: LED pattern example

Description:
Channel 1 is loaded with 40-60% of the nominal current
Channel 2 has tripped due to over current
Channel 3 is turned off on purpose (with push-button)
Channel 4 is loaded with 80-100% of the nominal current
Channel 5 is turned off on purpose (with push-button)
Channel 6 is loaded with 40-60% of the nominal current
Channel 7 is loaded with 0-10% of the nominal current
Channel 8 has tripped due to over current

8. Digital Coded Interface (PISA-B-8CL2-B4)

The device is equipped with a "Digital Coded Alarm Signal" output (pins 13 and 14), which provides information about individual channel tripping. The signal is an opto-coupler-type output which is low ohmic for start bit and for tripped channels.

Threshold value for start	typ.	0.7V @ 1mA, 1.1V @ 5mA
Signal voltage	max.	+35Vdc
Signal current	max.	10mA
Isolation voltage	see chapter 19	

The signal sequence starts with 200ms start bit followed by a 100ms gap and 100ms signal related to CH1 etc. The whole sequence is periodically repeated every 1900ms.

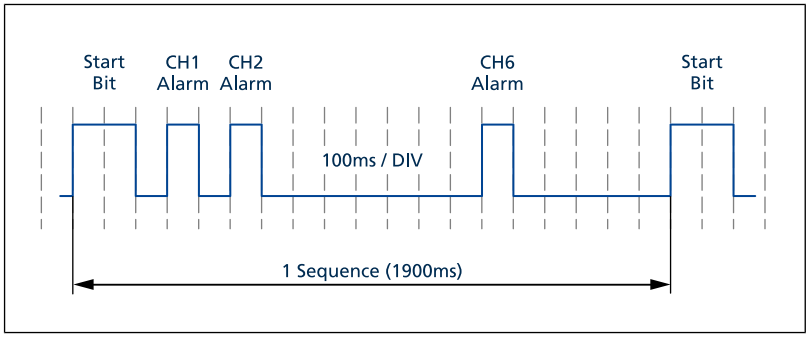

Fig. 8-1: Digital Coded Alarm Signal – Signal Sequence

All parameters are specified at 24Vdc input voltage, 8x3.75A output currents, 25°C ambient and after a 5 minutes run-in time unless otherwise noted.

9. Alarm Relay Contact (PISA-B-8CL2-B1)

The device is equipped with an alarm contact. The normally closed (NC) contact closes as soon as one output channel has switched off (common signalling) or the input voltage is lower than 19Vdc.

Contact ratings	max.	60Vdc 0.3A, 30Vdc 1A, 30Vac 0.5A, resistive load
	min.	Permissible load: 1mA at 5Vdc
Isolation voltage	see chapter 19	

10. Reset Input

A restart of switched-off channels can be done either by a button on the unit or by a control signal on the reset input (pins 11-12). Therefore, push the corresponding channel control button for longer than 1s or apply a voltage between 10 and 30Vdc for longer than 1s to the reset input. The reset input is galvanically isolated from the rest of the device.

Reset voltage	min.	10Vdc
	max.	30Vdc
Reset delay	min.	1s - apply the reset voltage for at least this time to restart switched-off channels
Signal voltage	min.	-35Vdc
	max.	+35Vdc
Signal current	max.	6mA, current limited
Isolation voltage	see chapter 19	

11. Efficiency And Power Losses

Efficiency	typ.	99%	At 8x 3.75A output load
Power losses	typ.	1W	At no output loads
	typ.	7W	At 8x 3.75A output load

All parameters are specified at 24Vdc input voltage, 8x3.75A output currents, 25°C ambient and after a 5 minutes run-in time unless otherwise noted.

12. Functional Diagram

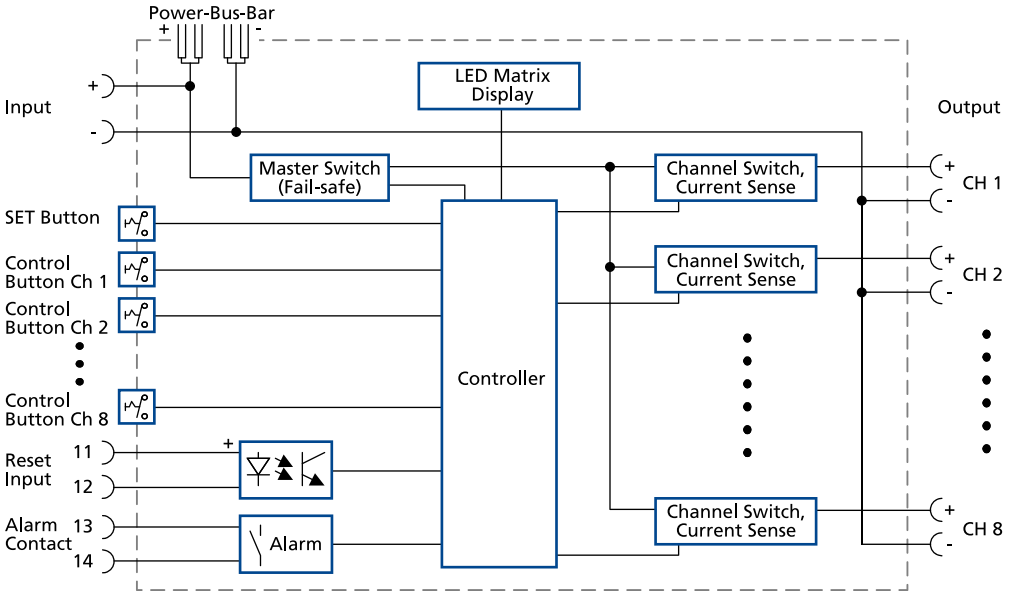

Fig. 12-1: Functional diagram PISA-B-8CL2-B1

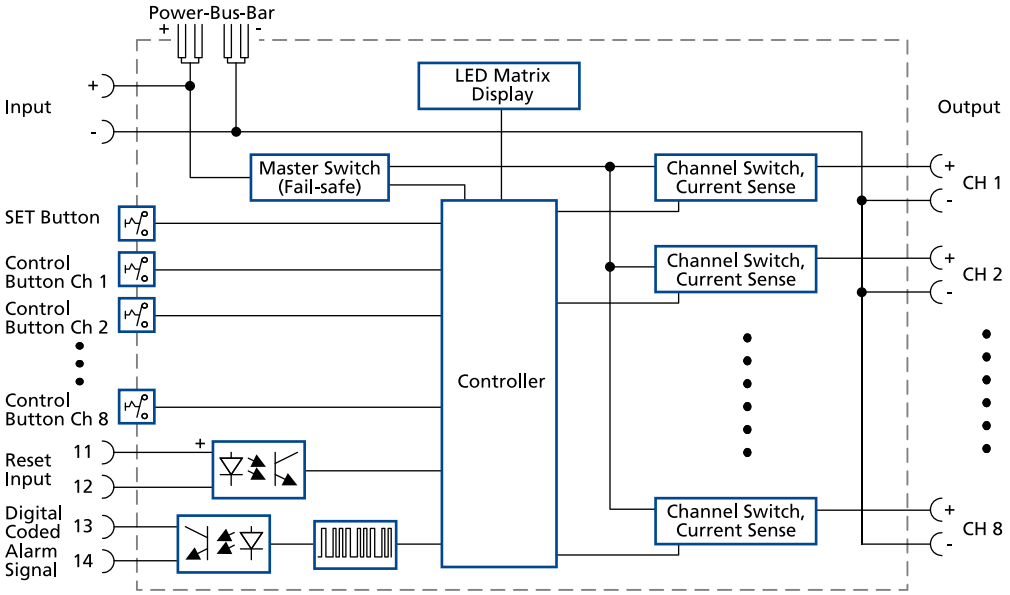

Fig. 12-2: Functional diagram PISA-B-8CL2-B4

All parameters are specified at 24Vdc input voltage, 8x3.75A output currents, 25°C ambient and after a 5 minutes run-in time unless otherwise noted.

13. Front Side And User Elements

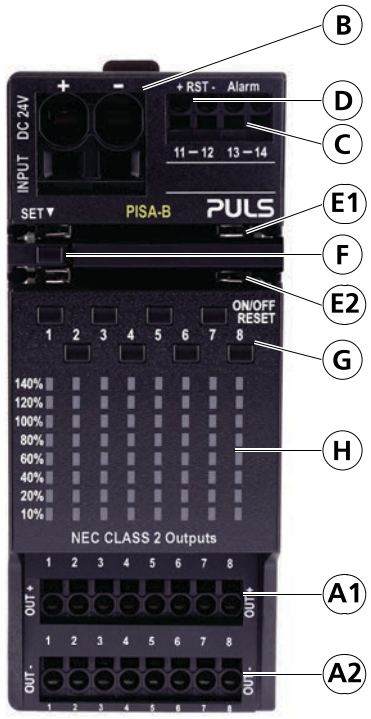

Fig. 13-1: Front side

A **Output terminals CH1 – CH8**
- **A1: (+)** Positive output poles
- **A2: (–)** Negative (return) output poles

B **Input terminals**
- **(+)** Positive input pole
- **(–)** Negative (return) input pole

C **Alarm signal** (pin 13-14)
PISA-B-8CL2-B1: Relay contact
PISA-B-8CL2-B4: Digital coded signal

D **Signal input to restart switched-off channels** (pin 11-12)

E **Slot for interconnecting power-bus-bar for supply voltage**
E1: Interconnection for positive input power-bus-bar
E2: Interconnection for negative (return) input power-bus-bar

F **Set button required for controlling the unit**

G **Channel control buttons**

H **LED matrix display**

14. Terminals And Wiring

The terminals are IP20 Finger safe constructed and suitable for field- and factory wiring.

	Input Terminals	Output Terminals	Signal Terminals
Type	Push-in terminals	Push-in terminals	Push-in terminals
Solid wire	Max. 16mm²	Max. 2.5mm²	Max. 2.5mm²
Stranded wire	Max. 16mm²	Max. 2.5mm²	Max. 2.5mm²
Stranded wire with ferrules	Max. 10mm²	Max. 1.5mm²	Max. 1.5mm²
American Wire Gauge	AWG 20-4	AWG 24-12	AWG 24-12
Max. wire diameter (including ferrules)	6.1mm	2.3mm	2.3mm
Wire stripping length	19mm / 0.75inch	10mm / 0.4inch	10mm / 0.4inch
Screwdriver	5mm slotted to open the spring	3mm slotted to open the spring	3mm slotted to open the spring

All parameters are specified at 24Vdc input voltage, 8x3.75A output currents, 25°C ambient and after a 5 minutes run-in time unless otherwise noted.

15. Lifetime Expectancy

The Lifetime expectancy shown in the table indicates the minimum operating hours (service life) and is determined by the lifetime expectancy of the built-in electrolytic capacitors. Lifetime expectancy is specified in operational hours and is calculated according to the capacitor's manufacturer specification.

Please note: The manufacturer of the electrolytic capacitors only guarantees a maximum life of up to 15 years (131 400h). Any number exceeding this value is a calculated theoretical lifetime which can be used to compare devices.

Lifetime expectancy	t.b.d.	At 24V, 8x3.75A and 40°C
	t.b.d.	At 24V, 8x1.88A and 40°C
	t.b.d.	At 24V, 8x3.75A and 25°C
	t.b.d.	At 24V, 8x1.88A and 25°C

16. MTBF

MTBF stands for **M**ean **T**ime **B**etween **F**ailure, which is calculated according to statistical device failures, and indicates reliability of a device. It is the statistical representation of the likelihood of a unit to fail and does not necessarily represent the life of a product.

The MTBF figure is a statistical representation of the likelihood of a device to fail. A MTBF figure of e.g. 1 000 000h means that statistically one unit will fail every 100 hours if 10 000 units are installed in the field. However, it cannot be determined if the failed unit has been running for 50 000h or only for 100h.

For these types of units the MTTF (**M**ean **T**ime **T**o **F**ailure) value is the same value as the MTBF value.

MTBF SN 29500, IEC 61709	t.b.d.	At 24V, 8x3.75A and 40°C
	t.b.d.	At 24V, 8x3.75A and 25°C
MTBF MIL HDBK 217F	t.b.d.	At 24V, 8x3.75A and 40°C; Ground Benign GB40
	t.b.d.	At 24V, 8x3.75A and 25°C; Ground Benign GB25
	t.b.d.	At 24V, 8x3.75A and 40°C; Ground Fixed GF40
	t.b.d.	At 24V, 8x3.75A and 25°C; Ground Fixed GF25

All parameters are specified at 24Vdc input voltage, 8x3.75A output currents, 25°C ambient and after a 5 minutes run-in time unless otherwise noted.

17. EMC

The EMC behavior of the device is designed for applications in industrial environment as well as in residential, commercial and light industry environment without any restrictions.

The device complies with EN 61000-6-1, EN 61000-6-2, EN 61000-6-3, EN 61000-6-4.

The device complies with FCC Part 15 rules. Operation is subjected to following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

The chassis of the device is earthed through the DIN rail mounting connection to a grounded metal plate.

EMC Immunity	**Power lines and housing**			
Electrostatic discharge	EN 61000-4-2	Contact discharge	8kV	Criterion A
		Air discharge	8kV	Criterion A
Electromagnetic RF field	EN 61000-4-3	80MHz - 6GHz	10V/m	Criterion A
Fast transients (Burst)	EN 61000-4-4	Input lines	2kV	Criterion A
		Output lines	2kV	Criterion A
Surge voltage on input lines	EN 61000-4-5	(+) → (–)	500V	Criterion B
		(+) / (–) → housing	1kV	Criterion B
Surge voltage on output lines	EN 61000-4-5	(+) → (–)	500V	Criterion B
		(+) / (–) → housing	1kV	Criterion B
Conducted disturbance	EN 61000-4-6	0.15 - 80MHz	10V	Criterion A

EMC Immunity	**Signals lines**			
Electromagnetic RF field	EN 61000-4-3	80MHz - 6GHz	10V/m	Criterion A
Fast transients (Burst)	EN 61000-4-4	With coupling clamp	2kV	Criterion A
Surge	EN 61000-4-5	Signal → housing	1kV	Criterion A
Conducted disturbance	EN 61000-4-6	0.15 - 80MHz	10V	Criterion A

Performance Criterions:
A: The device shows normal operation behavior within the defined limits.
B: The device operates continuously during and after the test. During the test minor temporary impairments may occur, which will be corrected by the device itself.

EMC Emission			
Conducted emission	IEC/CISPR 16-1-2, IEC/CISPR 16-2-1	Input lines	Limits for local DC power networks fulfilled.
	IEC/CISPR 16-1-2, IEC/CISPR 16-2-1	Output lines	Limits for local DC power networks fulfilled.
	IEC/CISPR 16-1-2, IEC/CISPR 16-2-1	Signal lines	Limits for wired network ports fulfilled.
Radiated emission	EN 55011, EN 55032, CISPR 11, CISPR 32		Class B

Switching Frequencies		
Microcontroller	8MHz	Fixed frequency
Internal communication bus	400kHz	Fixed frequency
Internal auxiliary voltage	100kHz	Fixed frequency

All parameters are specified at 24Vdc input voltage, 8x3.75A output currents, 25°C ambient and after a 5 minutes run-in time unless otherwise noted.

18. Environment

Operational temperature	-25°C to +70°C (-13°F to 158°F)	The operational temperature is the ambient or surrounding temperature and is defined as the air temperature 2cm below the device.
Storage temperature	-40°C to +85°C (-40°F to 185°F)	For storage and transportation
Output derating	not applicable	
Humidity	5 to 95% r.h.	According to IEC 60068-2-30
Atmospheric pressure	110-54kPa	See Fig. 18-2 for details
Altitude	Up to 5000m (16 400ft)	See Fig. 18-2 for details
Over-voltage category	N/A	
Impulse withstand voltages	1.5kV	Between input and chassis (according to IEC 60664-1 over-voltage category II)
Degree of pollution	2	According to IEC 60664-1, not conductive
Vibration sinusoidal	2-17.8Hz: ±1.6mm; 17.8-500Hz: 2g 2 hours / axis	According to IEC 60068-2-6
Shock	30g 6ms, 20g 11ms 3 bumps per direction, 18 bumps in total	According to IEC 60068-2-27
	Shock and vibration is tested in combination with DIN rails according to EN 60715 with a height of 15mm and a thickness of 1.3mm.	

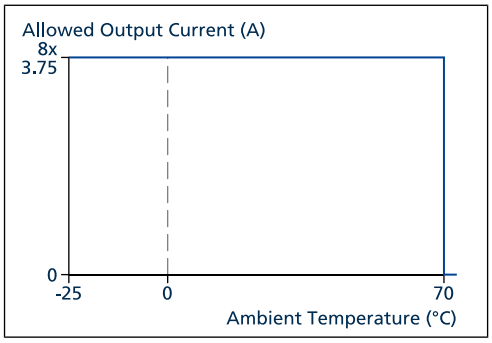

Fig. 18-1: Output current vs. ambient temp.

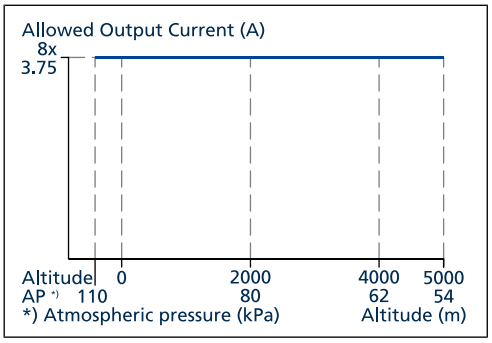

Fig. 18-2: Output current vs. altitude

All parameters are specified at 24Vdc input voltage, 8x3.75A output currents, 25°C ambient and after a 5 minutes run-in time unless otherwise noted.

19. Safety Features And Protection Features

Isolation resistance		>10MOhm	At delivered condition between power port and signals, measured with 500Vdc
		>10MOhm	At delivered condition between power port and housing, measured with 500Vdc
		>10MOhm	At delivered condition between signals and housing, measured with 500Vdc
Output over-voltage protection	max.	500Vac	Power port to signal port
	max.	500Vac	Power port / signal port to housing
Class of protection		III	A PE (Protective Earth) connection is not required
Degree of protection		IP20	According to EN/IEC 60529
Over-temperature protection		Not included	
Internal input fuse		Not included	
Internal output fuses		Not included	
Input over-voltage protection	max.	31.4Vdc	No harm or defect of the unit
Reverse input polarity protection		Not included	Make sure that the input voltage polarity is correct before applying the input voltage.
Touch current (leakage current)		The leakage current which is produced by the module itself depends on the input voltage ripple and need to be investigated in the final application. For a smooth DC input voltage, the produced leakage current is less than 100µA.	

All parameters are specified at 24Vdc input voltage, 8x3.75A output currents, 25°C ambient and after a 5 minutes run-in time unless otherwise noted.

20. Approvals And Fulfilled Standards

IEC 61010	CB Report Available	CB Scheme Certificate IEC 61010-2-201 - Electrical Equipment for Measurement, Control and Laboratory Use - Particular requirements for control equipment
IEC 62368 planned	CB Report Available	CB Scheme Certificate IEC 62368-1 - Audio/video, information and communication technology equipment - Safety requirements Output safety level: ES1
NEC Class 2	NEC CLASS 2	UL Certificate Limited Power Source Listed in the UL 61010-2-201 approval report, investigated according to UL 1310
UL 61010	c UL us LISTED	UL Certificate Listed equipment for category NMTR - UL 61010-2-201 - Electrical equipment for measurement, control and laboratory use - Particular requirements for control equipment Applicable for US and Canada E-File: E198865
UL 2367		UL Certificate Recognized component for category QVRQ - UL 2367 Standard for Solid State Overcurrent Protectors Applicable for US E-File: E342020
VDMA 24364	LABS VDMA 24364-C1-L/W	Paint Wetting Impairment Substances Test (or LABS-Test) Tested for Zone 2 and Test Class C1 according to VDMA 24364-C1-L/W for solvents and water-based paints

21. Regulatory Compliance

EU Declaration of Conformity	CE	The CE mark indicates conformance with the European – EMC directive – RoHS directive
REACH Directive	REACH	Manufacturer's Statement EU-Regulation regarding the Registration, Evaluation, Authorization and Restriction of Chemicals
WEEE Directive		Manufacturer's Statement EU-Regulation on Waste Electrical and Electronic Equipment Registered in Germany as business to business (B2B) products.
RoHS (China RoHS 2)	25	Manufacturer's Statement Administrative Measures for the Restriction of the Use of Hazardous Substances in Electrical and Electronic Products 25 years

All parameters are specified at 24Vdc input voltage, 8x3.75A output currents, 25°C ambient and after a 5 minutes run-in time unless otherwise noted.

22. Physical Dimensions And Weight

Width	52mm / 2.05''
Height	124mm / 4.88''
Depth	130mm / 5.12'' The DIN rail height must be added to the unit depth to calculate the total required installation depth.
Weight	370g / 0.82lb
DIN rail	Use 35mm DIN rails according to EN 60715 or EN 50022 with a height of 7.5 or 15mm.
Housing material	Body: Aluminium alloy Cover: High-grade polycarbonate material
Installation clearances	See chapter 2.
Penetration protection	Small parts like screws, nuts, etc. with a diameter larger than 3.6mm
All dimensions in mm unless otherwise noted.	

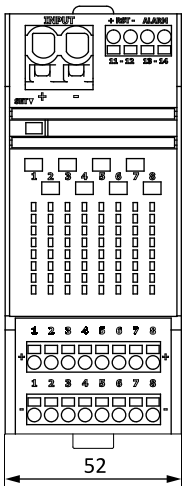

Fig. 22-1: Front view

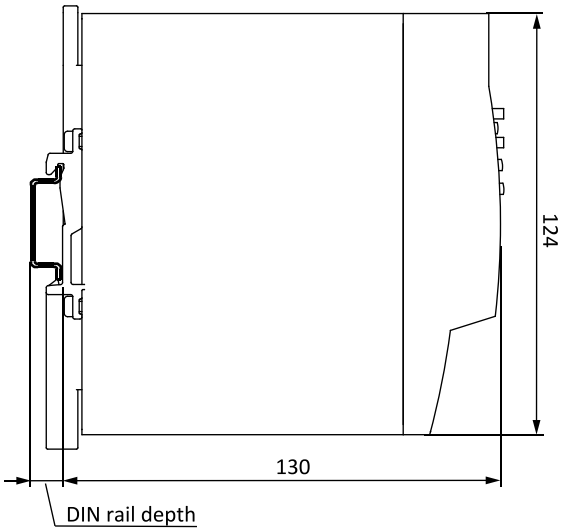

Fig. 22-2: Side view

All parameters are specified at 24Vdc input voltage, 8x3.75A output currents, 25°C ambient and after a 5 minutes run-in time unless otherwise noted.

23. Accessories

23.1. POWER CONNECTION - POWER-BUS-BARS

These power-bus-bars are used to connect several PISA-B modules electrically together. The power-bus-bars distribute the 24V supply voltage of the PISA-B modules.

The length of 102mm is suitable to connect two PISA-B modules together. The length of 155mm is suitable to connect three PISA-B modules together. If more than three modules need to be connected to another, appropriate pieces can be cut from the 500mm long rail.

The supply of the 24V is then only done by one fuse module, preferably in the middle, because the current is then better distributed in both directions and the permissible current of the power-bus-bars of 32A is not exceeded.

Fuse modules can be lined up on the DIN rail without spacing. The power-bus-bars can be plugged in from the front of the PISA-B modules and must have a length that all plug contacts of the modules make a contact.

Order number	**BUS-BAR1-L102**	**BUS-BAR1-L155**	**BUS-BAR1-L500**
Order number contains	2 pcs. (for + and - pole)	2 pcs. (for + and - pole)	1 pc.
Colour	Grey	Grey	Grey
Size (l x w x h)	**102** x 3.3 x 11.4mm (4.02 x 0.13 x 0.45'')	**155** x 3.3 x 11.4mm (6.1 x 0.13 x 0.45'')	**500** x 3.3 x 11.4mm (19.7 x 0.13 x 0.45'')
Weight	9g (0.02lb) per pc.	13g (0.03lb) per pc.	43g (0.1lb)
Suitable for	2x PISA-B modules	3x PISA-B modules	Up to 8x PISA-B modules (2 pcs. needed)
Max. current	32A	32A	32A

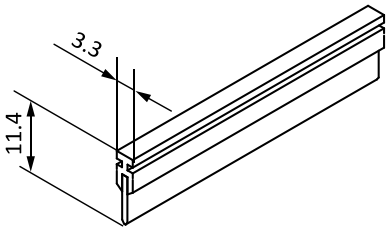

Fig. 23-1: Mechanical dimensions

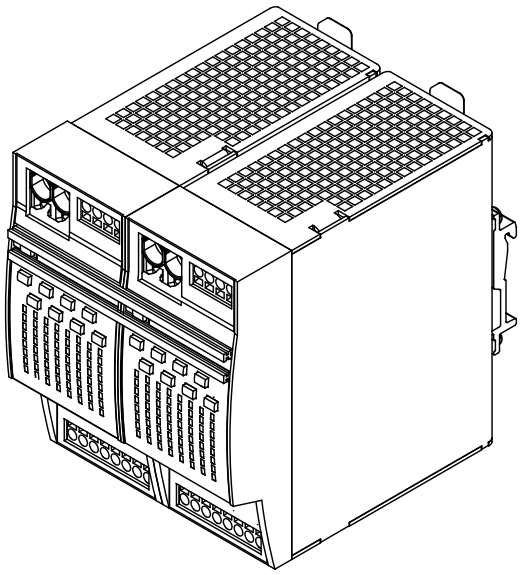

Fig. 23-2: Mounting example

All parameters are specified at 24Vdc input voltage, 8x3.75A output currents, 25°C ambient and after a 5 minutes run-in time unless otherwise noted.