

- ❖ 8x 12-bit Analog U/I Inputs
- ❖ 2x NOC 24V Relay Outputs
- ❖ 2x NO 230V Relay Outputs
- ❖ 1x Slot for IF Module
- ❖ Operating Range -40°C to +70°C
- ❖ 600 W Integrated Surge Protections

AI8.1 is an industrial module which can be easily adapted for a wide range of tasks. It can be used as IPLOG-G submodule or as standalone addressable module at MODBUS RTU bus.

PARAMETER	VALUES	NOTE
Power Supply	24, 48 VDC	20 to 60 VDC
Consumption	Max. 1.5 W	
Surge Protection	600 W	10/1000 μ s
Operating Range	-40 to +70 °C	
Storage Range	-40 to +70 °C	
Humidity	Max. 95 %	No-condensing
Dimension	35 x 110 x 119 mm	W x H x D
Weight	Max. 0.38 kg	
Installation	DIN35 or Flat Surface	
Device Class	I	EN 61140
Ingress Protection	IP 20	EN 60529
Degree of pollution	II	EN 60664-1
Connections	Screw Terminals	
Conduct. cross-section	Max. 2.5 mm ²	

PARAMETER	VALUES	NOTE
Series	32-bit MCU	
Frequency	64 MHz	
Flash	512 kB	
RAM	64 kB	

Safety Precautions



If dangerous voltage is applied to the terminals, only personnel with appropriate electrical education may perform installation and servicing of the equipment. In the event of a fault, the device must be sent to the producer for repair. The device must be earthed in accordance with national standards. We recommend the manipulation of terminal blocks, only in the event they are not in the presence of dangerous voltage. Failure to comply with this recommendation may result in the risk of electrical shock.



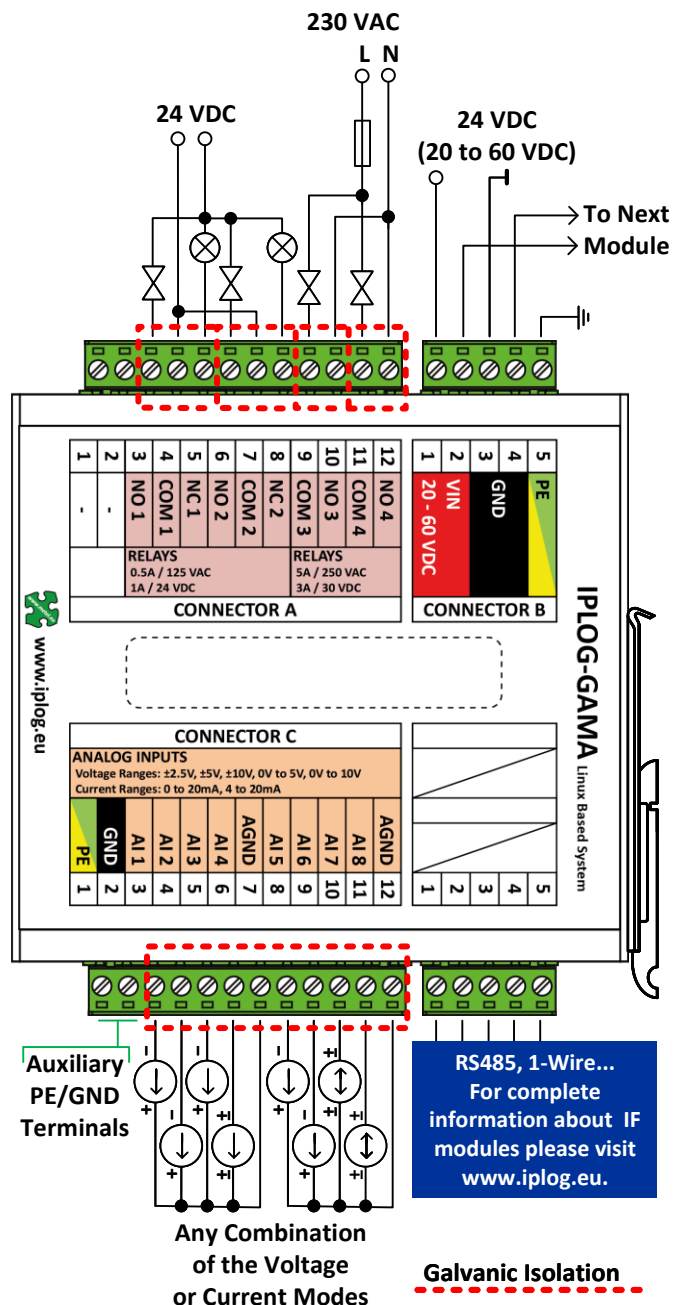
DIN35 Installation



PCB Version

PRODUCT NAME	CODE	NOTE
AI8.1-01-BOX	5000-0201	2x RS485
AI8.1-01G-BOX	5000-0202	2x RS485 (isolated)
AI8.1-05-BOX	5000-0207	1x RS485, 2x ALARM INPUT
AI8.1-PCB	0000-0200	PCB Module
For a Full Range of Interfaces Please Visit www.iplog.eu .		

ORDERING



Location and Designation of Connectors and LEDs

NOTE: The order of the terminal numbers in the table below corresponds to the order of the terminal numbers found on the device.

CONNECTOR A			LEDS	
12	NO 4	Normally Open High Voltage Relay	RE4	Closed = Log. 1 = Lights
11	COM 4	Common Terminal of NO 4 Relay		
10	NO 3	Normally Open High Voltage Relay	RE3	Closed = Log. 1 = Lights
9	COM 3	Common Terminal of NO 3 Relay		
8	NC 2	Normally Closed		
7	COM 2	Common Terminal of NOC Relay 2		
6	NO 2	Normally Open	RE2	Closed = Log. 1 = Lights
5	NC 1	Normally Closed		
4	COM 1	Common Terminal of NOC Relay 1		
3	NO 1	Normally Open	RE1	Closed = Log. 1 = Lights
2	-	Not used		
1	-	Not used		

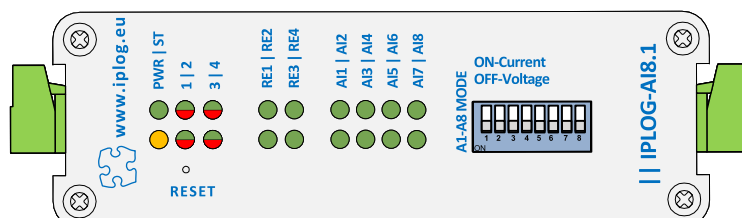
CONNECTOR B			LEDS	
5	PE	Earthing Terminal		
4	GND	Power Input – Minus Terminals	PWR	Power is Connected, LED Lights Up
3		Terminals are Internally Interconnected		
2	VIN	Power Input – Plus Terminals		
1	20-60 V DC	Terminals are Internally Interconnected		

CONNECTOR C			LEDS	
12	AGND	Analog Ground		
11	AI 8	Analog Input, Current or Voltage	AI8	Flashing = MODE ON or connected U
10	AI 7	Analog Input, Current or Voltage	AI7	Flashing = MODE ON or connected U
9	AI 6	Analog Input, Current or Voltage	AI6	Flashing = MODE ON or connected U
8	AI 5	Analog Input, Current or Voltage	AI5	Flashing = MODE ON or connected U
7	AGND	Analog Ground		
6	AI 4	Analog Input, Current or Voltage	AI4	Flashing = MODE ON or connected U
5	AI 3	Analog Input, Current or Voltage	AI3	Flashing = MODE ON or connected U
4	AI 2	Analog Input, Current or Voltage	AI2	Flashing = MODE ON or connected U
3	AI 1	Analog Input, Current or Voltage	AI1	Flashing = MODE ON or connected U
2	GND	Ground		
1	PE	Earthing Terminal		

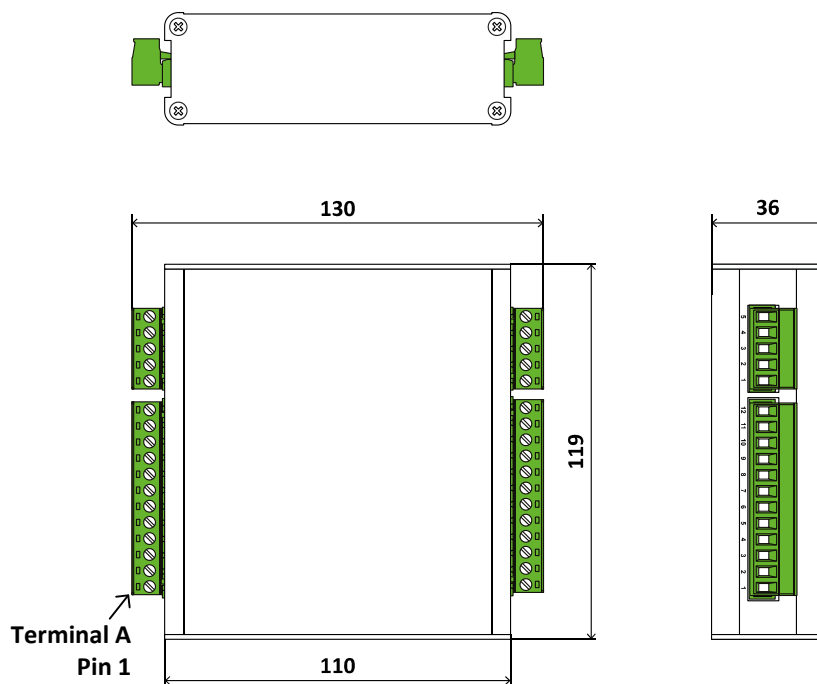
LED		LED	
1	BUS 1 (Tx = Red / Rx = Green)	3	IF05 Input BI1 Sabotage Short = Log. 1 = Lights
2	BUS 2 (Tx = Red / Rx = Green)	4	IF05 Input BI2 Sabotage Short = Log. 1 = Lights

LED 1 – 4 flashing red = power input of IO module is lower than 20VDC

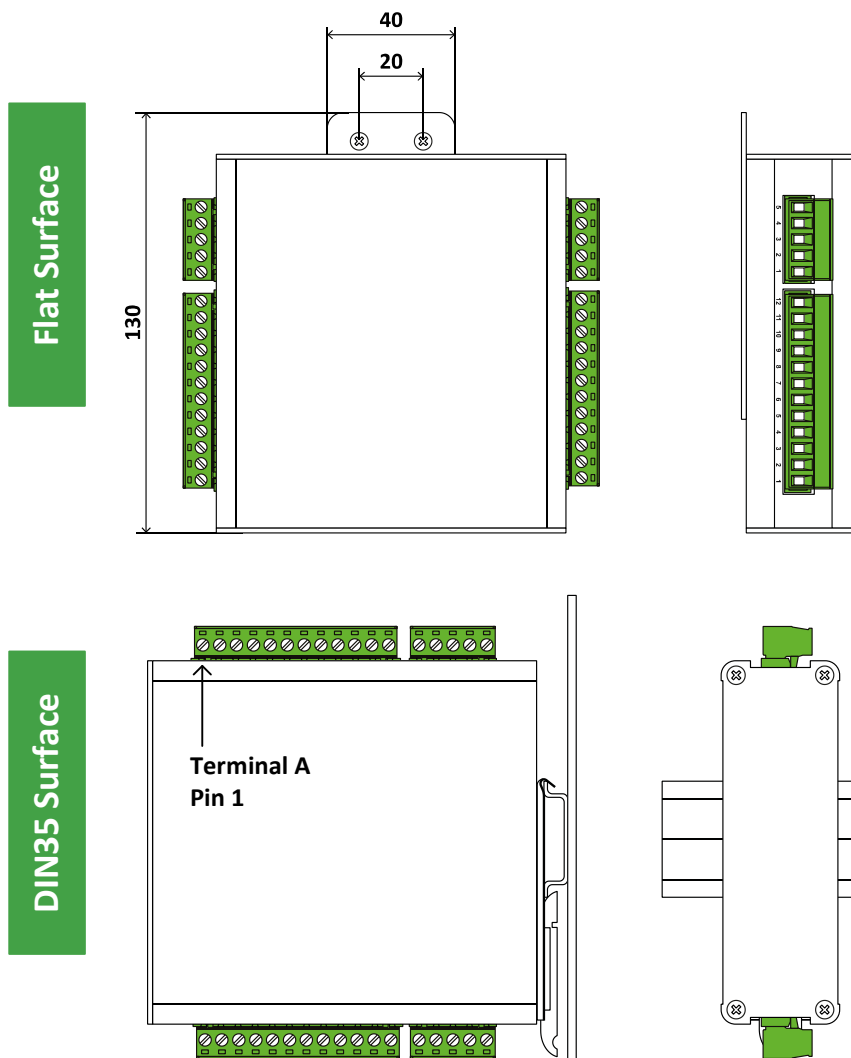
Galvanic Isolation



BOX Version Dimensions



BOX Version Installation



For installation we recommend using M3 screws and a flat surface holder from accessories.

For installation we recommend using M3 screws and DIN35 holder from accessories.

Default Settings of MODBUS Communication

Device ID: 1 | Speed: 115 200 | Parity: None | Data bits: 8 | Stop bits: 1

Modbus registers

	Subject	Type	R/W	Value	Offset
Device Identification	Product Type	u8[3]	R		1002-04
	Serial Number	u32	R		1005-06
	PCB Version	u32	R		1007-08
	PCB Revision	u16	R		1009
	FW Version Major	u16	R		1010
	FW Version Minor	u16	R		1011
	FW Version - Revision	u32	R		1012-13
	IF#01 Slot State	u16	R	0 = N/A 1 = IF#01 not Inserted 2 = IF#01 Inserted, CRC error 3 = IF#01 Inserted, CRC OK	1021
	IF#01 Product Type	u8[3]	R		1022-24
	IF#01 Serial Number	u32	R		1025-26
Device Control	Reset	u16	RW	55203 = To Reboot	1201
	Bootloader / Application	u16	R	0x00A – Application, 0x00B – Bootloader	1203
	Restart to Bootloader ⁽¹⁾	u16	RW	617 = To Bootloader else = deactivate bootloader	1204
Device Status	Board Power Voltage	u16	R	105 = 10,5V	1311
	Board Temperature	s16	R	-200 = -20,0°C 250 = 25,0°C	1321

⁽¹⁾ To activate the bootloader, it is necessary to write a value of 617 in the registry and restart the device. To reactivate the application, enter any value other than 617 in the appropriate registry and restart the device. If the device is in the bootloader, the LED 1 will flash red.

	Subject	Type	R/W	Value	Offset
BUS 1 Settings	Baudrate	u16	RW	192 = 19 200 bps 1152 = 115 200 bps 9216 = 921 600 bps 10000 = 1 000 000 bps	2110
	Databits	u16	RW	8 = 8b, 9 = 9b	2111
	Parity	u16	RW	78 = None 69 = Even 79 = Odd	2112
	Stopbits	u16	RW	10=1, 20=2, 15=1,5	2113
	MODBUS address	u16	RW	1 - 247	2120

	Subject	Channel	Type	R/W	Value	Offset
IF-05 States of Inputs	Balanced Input 1 _{BIN}	DI#33	bit	R	0 = inactive	3033
	Balanced Input 2 _{BIN}	DI#34	bit	R	1 = active	3034
	Balanced Input 1	AI#33	u16	R	1000 = 1000 Ω	5033
	Balanced Input 2	AI#34	u16	R	0 = 0 Ω	5034

	Subject	Channel	Type	R/W	Value	Offset
Measured Voltage Values	Analog Input 1	AI#01	s16	R	1000 = 1 V 0 = 0 V -1000 = -1 V	5001
	Analog Input 2	AI#02	s16	R		5002
	Analog Input 3	AI#03	s16	R		5003
	Analog Input 4	AI#04	s16	R		5004
	Analog Input 5	AI#05	s16	R	32767 = upper range limit exceeded -32767 = lower range limit exceeded	5005
	Analog Input 6	AI#06	s16	R		5006
	Analog Input 7	AI#07	s16	R		5007
	Analog Input 8	AI#08	s16	R		5008
Measured Current Values	Analog Input 1	AI#11	s16	R	1000 = 1 mA 0 = 0 mA -1000 = -1 mA	5011
	Analog Input 2	AI#12	s16	R		5012
	Analog Input 3	AI#13	s16	R		5013
	Analog Input 4	AI#14	s16	R		5014
	Analog Input 5	AI#15	s16	R	32767 = upper range limit exceeded -32767 = lower range limit exceeded	5015
	Analog Input 6	AI#16	s16	R		5016
	Analog Input 7	AI#17	s16	R		5017
	Analog Input 8	AI#18	s16	R		5018
Setting Input Ranges (Parameter 1)	Analog Input 1	AI#21	u16	RW	1 = ± 10 V / ± 30 mA ⁽¹⁾ 2 = ± 5 V / ± 20 mA 3 = ± 2.5 V / ± 10 mA ⁽¹⁾ - Default	5121
	Analog Input 2	AI#22	u16	RW		5122
	Analog Input 3	AI#23	u16	RW		5123
	Analog Input 4	AI#24	u16	RW		5124
	Analog Input 5	AI#25	u16	RW		5125
	Analog Input 6	AI#26	u16	RW		5126
	Analog Input 7	AI#27	u16	RW		5127
	Analog Input 8	AI#28	u16	RW		5128

	Subject	Channel	Type	R/W	Value	Offset
Voltage Correction (Parameter 1)	Analog Input 1	AI#01	s16	RW	1000 = 1 V 0 = 0 V -1000 = -1 V	5101
	Analog Input 2	AI#02	s16	RW		5102
	Analog Input 3	AI#03	s16	RW		5103
	Analog Input 4	AI#04	s16	RW		5104
	Analog Input 5	AI#05	s16	RW		5105
	Analog Input 6	AI#06	s16	RW		5106
	Analog Input 7	AI#07	s16	RW		5107
	Analog Input 8	AI#08	s16	RW		5108
Current Correction (Parameter 1)	Analog Input 1	AI#11	s16	RW	1000 = 1 mA 0 = 0 mA -1000 = -1 mA	5111
	Analog Input 2	AI#12	s16	RW		5112
	Analog Input 3	AI#13	s16	RW		5113
	Analog Input 4	AI#14	s16	RW		5114
	Analog Input 5	AI#15	s16	RW		5115
	Analog Input 6	AI#16	s16	RW		5116
	Analog Input 7	AI#17	s16	RW		5117
	Analog Input 8	AI#18	s16	RW		5118

	Subject	Channel	Type	R/W	Value	Offset
States of Relay Outputs	COIL Relay 1	DI#01	bit	R	0 = inactive 1 = active	3001
	COIL Relay 2	DI#02	bit	R		3002
	COIL Relay 3	DI#03	bit	R		3003
	COIL Relay 4	DI#04	bit	R		3004
	Inputs	DI#16 - DI#01	u16	R	0x0000 - 0x000F	3001

	Subject	Channel	Type	R/W	Value	Offset
Relay Outputs	Relay Output 1	DO#01	bit	RW	0 = inactive 1 = active	4001
	Relay Output 2	DO#02	bit	RW		4002
	Relay Output 3	DO#03	bit	RW		4003
	Relay Output 4	DO#04	bit	RW		4004
	Outputs	DO#16 - DO#01	u16	RW	0x0000 - 0x000F	4001

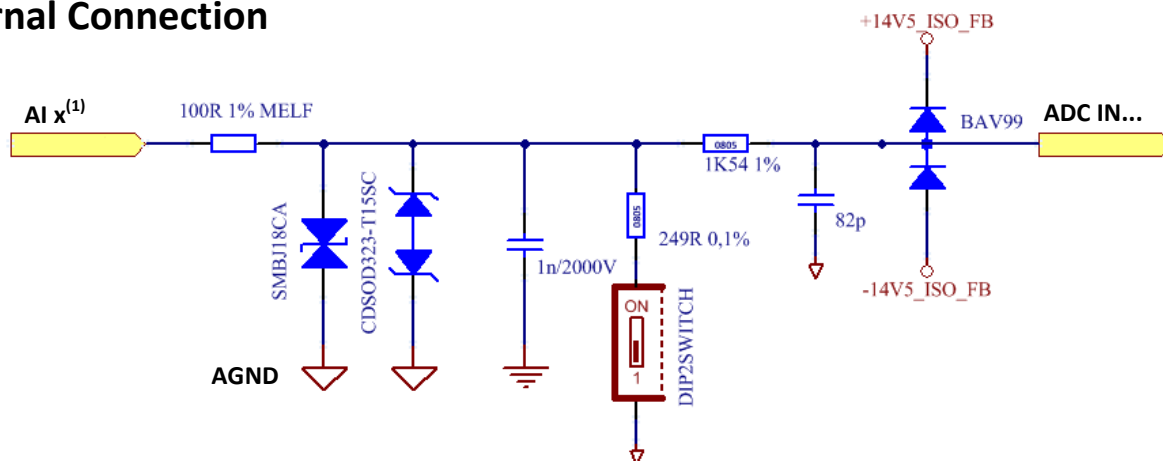
Analog inputs usually serve for the reading of voltages or currents from sensors. The inputs are galvanically isolated from the device, which increases measurement reliability and prevents ground loops in the system. Measurement modes and ranges are configured in two steps separately for each input.

❖ 1st STEP - Voltage or current mode is set by the DIP switch on the front panel.

❖ 2nd STEP - The measurement range is set in the SIMULand application.

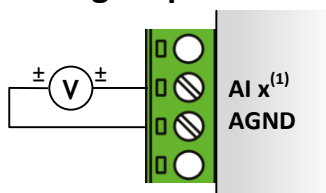
📖 Measured values are passed to the control program directly in mV or mA. Therefore, it is not necessary to recalculate measured values from the hexadecimal values in the program.

Internal Connection



Examples of Connections

Voltage Input Mode

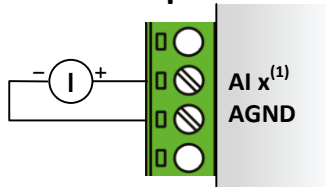


DIP Switch Configuration



In the voltage mode the relevant DIP switch should be in the OFF position.

Current Input Mode



DIP Switch Configuration



In the current mode the relevant DIP switch should be in the ON position.

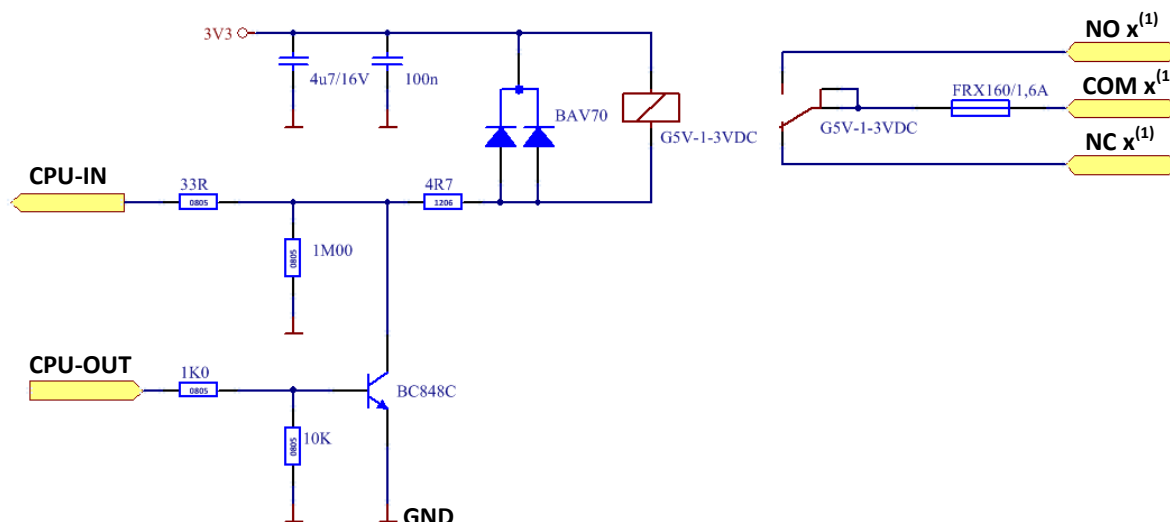
Technical Parameters

Parameter	Value	Note
Voltage Ranges	$\pm 2.5\text{ V}$, $\pm 5\text{ V}$, $\pm 10\text{ V}$	
	$0\text{ V to } 5\text{ V}$, $0\text{ V to } 10\text{ V}$	
Current Ranges	$0\text{ to } 20\text{ mA}$, $4\text{ to } 20\text{ mA}$	
Maximum Input Voltage	Up to $\pm 12\text{ V}$	
Sampling Rate	1 kSps	Adaptive
Resolution	12-bit	
Galvanic Isolation	$1.000\text{ V}_{\text{RMS}}$	AIx / CPU
	No	Between AIx
Surge Protection	600 W	$10 / 1000\text{ }\mu\text{s}$

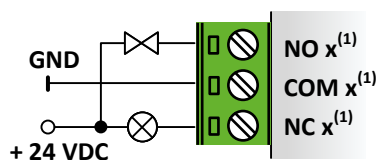
(1) The letter „x“ replaces the input number.

Relay outputs are capable of switching loads with either AC or DC voltage. Relay Outputs are accessible from METEL IEC 61131-3 IDE or directly from Linux scripts and can be configured independently of each other. Logic state of each output is signalized by a relevant LED diode on the front panel. For details please see the table „Location and Designation of Connectors and LEDs “.

Internal Connection



Examples of Connections



Relay NOC (Changeover) output has a common terminal COM. Two state relay can switch both AC and DC voltages to load. In the non-voltage state are the relay terminals NO $x^{(1)}$ – COM $x^{(1)}$ are disconnected and NC $x^{(1)}$ – COM $x^{(1)}$ are connected. The relay is turned on when the program set logic 1 at its coil. When the relay is turned on, corresponding REX⁽¹⁾ LED diode on the front side lights up (in default configuration).



Relay terminals must be protected with an external circuit breaker or fuse to prevent the rated current of the terminal or the load being exceeded. When switching the inductive load it is recommended to protect relay outputs with an appropriate external component (e.g. varistor, RC circuit, or diode).

Technical Parameters

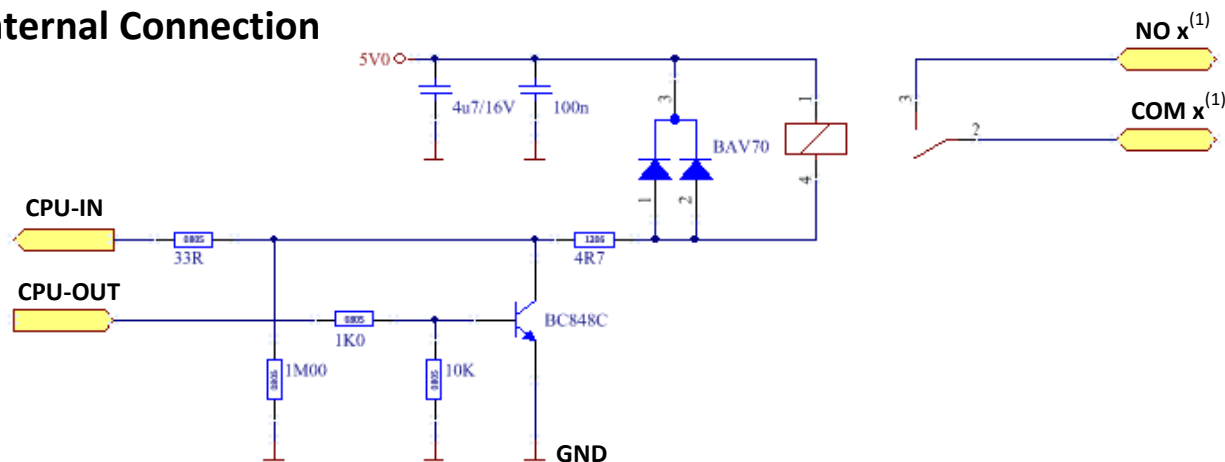
Parameter	Value	Note
Contact Type	NOC	Changeover Relay
Number of Poles	1	
Max. Load	0.5 A / 120 VAC	Resistive Load
	1 A / 24 VDC	Resistive Load
Electrical Lifetime	3,000,000 Operations	
Isolation Voltage	1.000 Vrms / 1 min.	Terminals to Electronic or Case

(1) The letter „x“ replaces the output number.

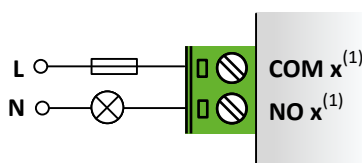
Relay outputs are capable of switching loads with either AC or DC voltage.

 In case of inductive load switching, it is recommended to use external snubber protection circuits

Internal Connection



Examples of Connections



Relay NO (Normally Open) output NO 3 has a common terminal COM 3, output NO 4 has a common terminal COM 4. Two state relays can switch both AC and DC voltages to load. In the non-voltage state the relay terminals NO x⁽¹⁾ - COM x⁽¹⁾ disconnected. The relay is turned on when the program set logic 1 at its coil. When the relay is turned on, corresponding REx⁽¹⁾ LED diode on the front side lights up.



Relay terminals must be protected with an external circuit breaker to prevent the rated current of the terminal or the load being exceeded.

When switching inductive load it is recommended to protect relay outputs with an appropriate external component (e.g. varistor, RC circuit, or diode).

Technical Parameters

Parameter	Value	Note
Contact Type	NO	Normally Open
Number of Poles	1	
Max. Load	5 A / 250 VAC	Resistive Load
	3 A / 30 VDC	Resistive Load
Electrical Lifetime	100,000 Operations	At 250 VAC / 5A
Isolation Voltage	2.500 Vrms / 1 min.	Terminals to Electronic or Case

(1) The letter „x“ replaces the output number.

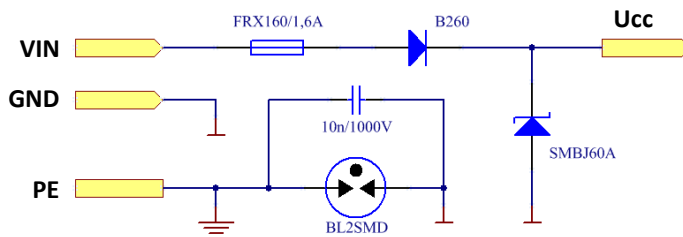


The PE terminal must be earthed according to the applicable standards in the country of installation. Correct grounding protects personnel against electric shock and improves device immunity from interferences. If dangerous voltage is applied to the terminals, only personnel with appropriate electrical education may perform installation and servicing of the equipment. Before any manipulation with the device, including disconnecting and connecting the terminals, the dangerous voltage must be disconnected.

POWER INPUT

The supply voltage is connected to VIN and GND terminals. The terminals are doubled for easier connection between the modules installed side by side.

Internal Connection of POWER INPUT



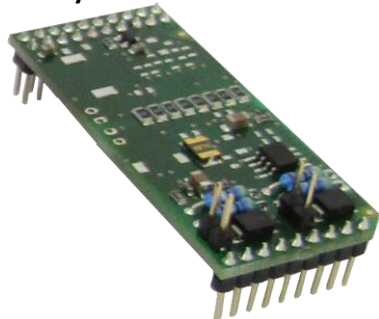
 The cover of the device is galvanically connected to the PE terminal which is galvanically isolated from the device electronic. It allows the user to use the device even in systems with a grounded + pole.

Parameter	Value	Note
Input Voltage Range	20 to 60 VDC	
Surge Protection	600 W	10 / 1000 μ s
Short Circuit Protection	Polyswitch	
Reverse Polarity Protection	Diode	

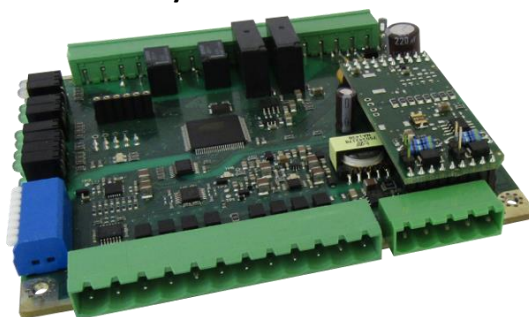
IO modules include one IF slot which can be used for IF modules. The main purposes of the IF modules are to provide:

- ❖ RS485 connectivity if the IO module board is used in the standalone addressable IO module communicating with PLC via the RS485 bus
- ❖ Provides serial interfaces for communication with other systems
- ❖ Additional inputs and outputs into system

Samostatný IF modul



IF modul osazený na IO modulu



- 📖 IF modules must be plugged into the IF slot when the power is turned off. After, the power is turned on the new IF module is automatically detected.
- 📖 When ordering, we recommend using the online configurator available at www.iplog.eu.

Overview Table of IF Modules

ORDERING NAME	DESCRIPTION	CONNECTOR D				
		1	2	3	4	5
IF-01	2x RS485	A1+	B1-	GND	B2-	A2+
IF-01G	2x RS485 ISO	A1+	B1-	GND-ISO	B2-	A2+
IF-02	2x RS232	Rx1	Tx1	GND	Rx2	Tx2
IF-02G	2x RS232 ISO	Rx1	Tx1	GND-ISO	Rx2	Tx2
IF-04G	RS485 ISO, DALI	A+	B-	GND-ISO	-D BUS	+D BUS
IF-05	RS485, 2x INPUTS ⁽¹⁾	A+	B-	GND	BI 2	BI 1
IF-06	AUDIO	OUT R	OUT L	GND	IN R	IN L
IF-07G	RS485 ISO, 1-Wire	A+	B-	GND-ISO	1-Wire	5V0-ISO
IF-09	RS485, M-Bus	A+	B-	GND	M-Bus+	M-Bus-
IF-10	KNX	BUS+	BUS+	NC	BUS-	BUS-
IF-11	Wiegand, 2x INPUTS ⁽¹⁾	Data 0	Data 1	GND	BI 2	BI 1
IF-12	4x INPUTS ⁽¹⁾	BI 4	BI 3	GND	BI 2	BI 1
IF-13	RS232 (CTS, RTS, Rx, Tx)	CTS	RTS	GND	Rx	Tx
IF-13G	RS232 (CTS, RTS, Rx, Tx) ISO	CTS	RTS	GND-ISO	Rx	Tx
IF-14G	4x DIGITAL INPUTS (24V)	ISO DI 4	ISO DI 3	GND-ISO	ISO DI 2	ISO DI 1
IF-15	4x OC (NPN) OUTPUTS	OC 4	OC 3	GND	OC 2	OC 1
IF-15G	4x OC (NPN) OUTPUTS ISO	ISO OC 4	ISO OC 3	GND-ISO	ISO OC 2	ISO OC 1
IF-17G	1x RS485, 1x RS232	A+	B-	GND-ISO	Rx	Tx
IF-18G	1x LORA-EP1, 1x RS485	A+	B-	GND-ISO	Tx/Rx	VCC
IF-21	2x INPUTS ⁽¹⁾ , 1x RELAY	COM	NO	GND	BI 2	BI 1
IF-22G	2x DI. INPUTS 24V, 1x RELAY	COM	NO	GND-ISO	ISO DI 2	ISO DI 1

⁽¹⁾ Alarm / 5V Digital Inputs. It does not apply to combination with the BI8.1 and BI8.4 module, where they only work as digital.

IF-

That way labeled IF modules are suitable for standalone IO modules. They are always connected to a PLC or LAN-RING switch via the RS485 bus.