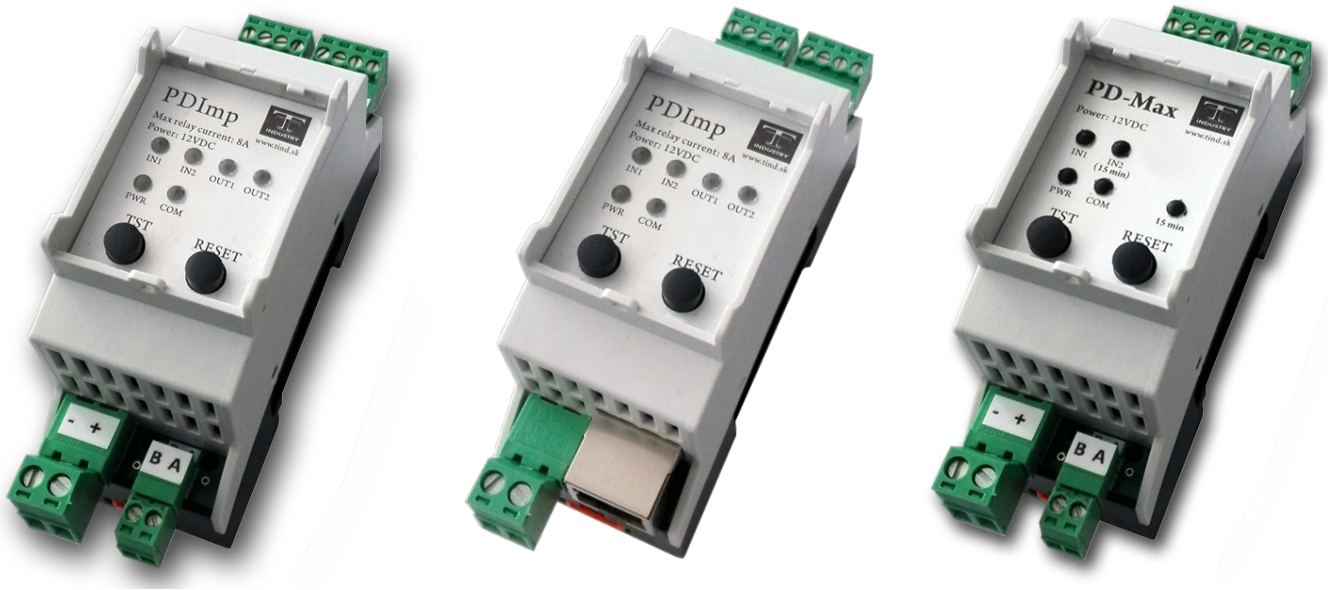
User guide

Advanced IO

PD Imp

Impulse output to ModBUS converter

v.1.1



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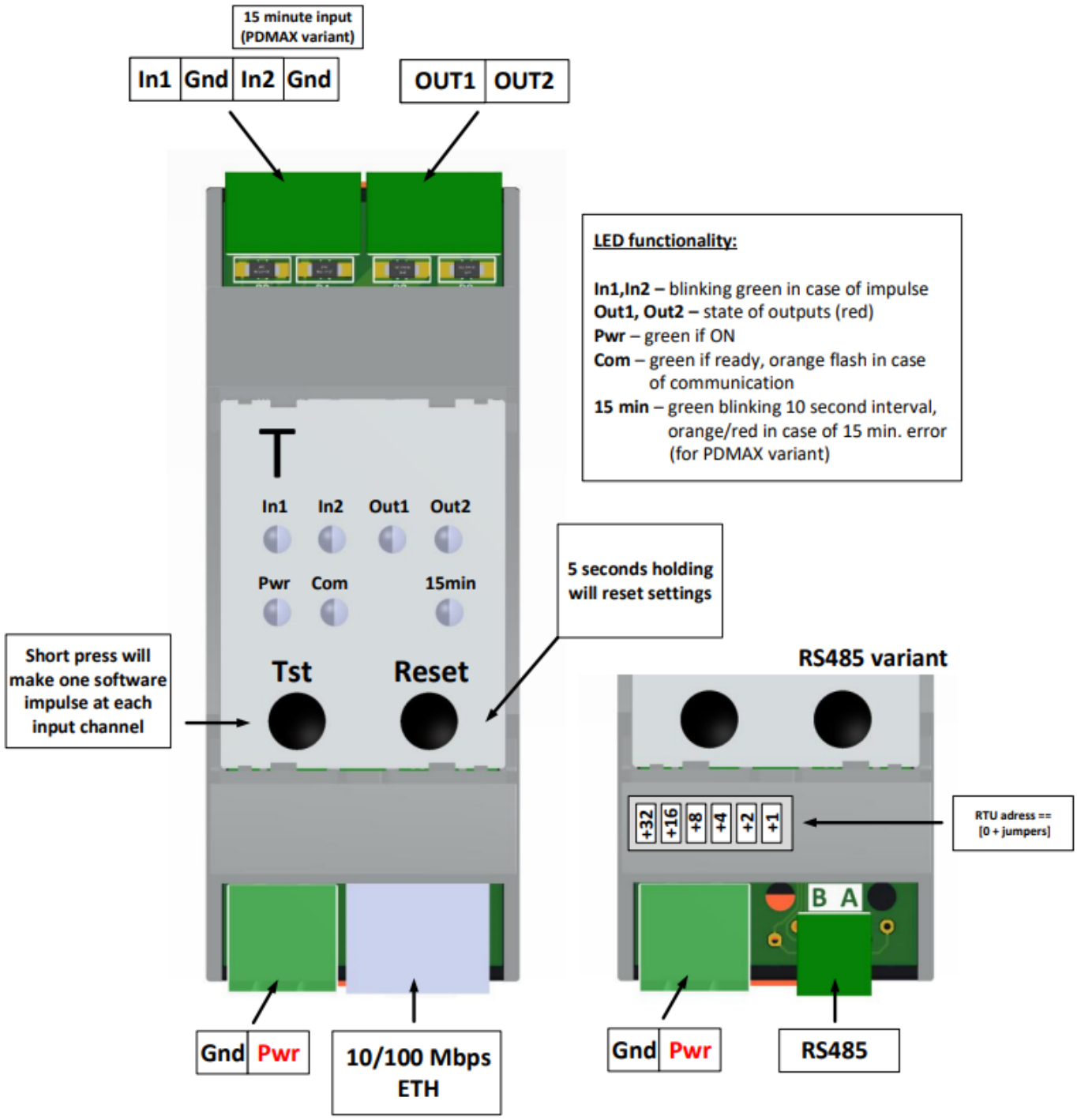
1. System schematic



2. Basic parameters

2.1. System description

This device converts impulse outputs of older meters to data accessible via M-Bus. Each PDImp can be connected to 2 impulse meters; the connected meters are configured separately. The unit has two integrated relay outputs that can automatically control contact switches and control consumption so they do not exceed 15 min maximum. The bus unit acts as a 4-node node. This abstraction allows for complete module setup. The module can be connected to an existing ModBUS network and also use third-party SW tools. It is also possible to supply a PDMAX unit equipped with a single channel to capture a 15-minute pulse from the billing electrometer.

2.2. System parameters

PD Imp RS485 variant	
Communication interface	1x RS485
ModBUS address range	0-63
IO interface	2x digital input 2x digital output 250VAC/8A
Temperature range	-20 to +50°C
Power supply voltage	24 VDC
Power consumption	max. 0,5 W
Dimensions	113 x 35 x 60 mm
Mount	DIN rail

PD Imp Ethernet variant	
Communication interface	1x Ethernet
ModBUS address range	0-63
IO interface	2x digital input 2x digital output 250VAC/8A
Temperature range	-20 to +50°C
Power supply voltage	24 VDC
Power consumption	max. 0,5 W
Dimensions	113 x 35 x 60 mm
Mount	DIN rail

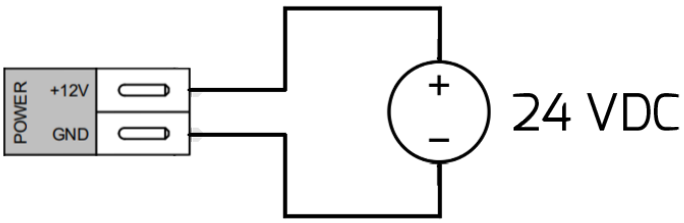
PDMAX variant	
Communication interface	1x RS485
ModBUS address range	0-63
IO interface	2x digital input 1 for consumption 1 for preset 15 min window from billing electric meter 2x digital output 250VAC/8A
Temperature range	-20 to +50°C
Power supply voltage	24 VDC
Power consumption	max. 0,5 W
Dimensions	113 x 35 x 60 mm
Mount	DIN rail

Relay outputs	
Maximum load	8 A / 250 VAC
Digital inputs	
Number of inputs	2 (2x imp + 1x 15min PDMAX variant)
Voltage range	0 - 3,3 VDC
Impulse inputs	Open collector sensing, minimum impulse duration 1ms (500 Hz DC: 50%)

3. Detailed connection schematics

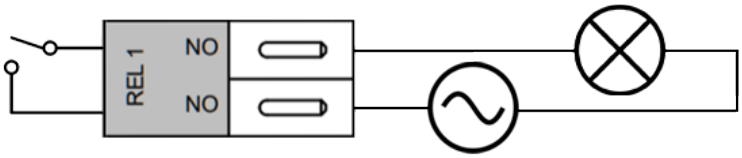
3.1. Power supply

The device requires an external DC power supply, able to provide at least 5 W of power at 24 V.



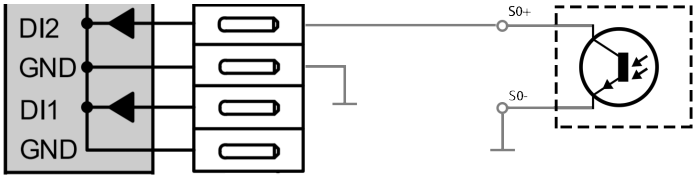
3.2. Relay outputs

Connect the electromagnetic contacts according to the following schematic.
The maximum load for alternating current is 8 A/230 VAC.



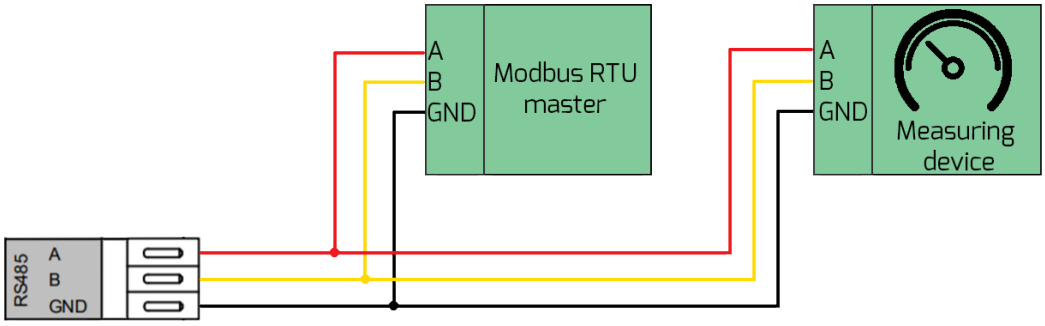
3.3. Digital inputs

Digital inputs have implement an impulse detection feature and can be connected to devices with impulse output (S0 or similar).



3.4. RS485

RS485 serves communication purposes through the Modbus RTU protocol with the master control unit (chapter 4).



4. Modbus communication

4.1. Factory settings

The whole system can be administered using Modbus TCP protocol.
To use Modbus/TCP communication, the device must be connected to the network via ethernet cable.
The device appears as TCP slave in the modbus communication.
To use several devices in one network, they need to be assigned different IP addresses.
Setting a different IP address is possible by rewriting the holding registry 8 to 11. Then you must set the log. 1 coil 4.

Modbus TCP factory settings	
IP address	192.168.0.100
Subnet mask	255.255.255.0
Gateway	192.168.0.1
Modbus port	502

PD Imp RS485 variant can be administered via Modbus RTU which requires the connection of differential pairs of RS485 and GND. To use several devices, they need to be assigned different RTU addresses. This is possible by choosing using combinations of jumpers on the board.

Modbus RTU factory settings	
RTU address	1
Factory communication settings	
Communication speed	19200 Bits/s
Format	8 Bits
Parity	none
Stop bit	1

4.2. Modbus registers

4.2.1. Input registers

		Data type	Order of registers	RAW range from	RAW range to	OpenDAF address	OpenDAF object type	OpenDAF data type
0 - 3	Impulse count on In1 input (impulse count 0)	uint64	little endian	0	4294967295	$a/ul4@3:1	measurement	long
4 -7	Impulse count on In2 input (impulse count 1)	uint64	little endian	0	4294967295	$a/ul4@3:5	measurement	long
12 - 13	Previous 15 min interval total impulse count	uint64	little endian	0	65536	$a/ul2@3:5	measurement	integer
14 - 103	Impulse count of 10 seconds interval t0 up to 15 min registers	uint16		0	256	$a/3:$x	measurement	integer
104	Which 10 second interval of 15 min currently running			0	89			
105	0 - initial value, register, value in registers 12 - 13 not valid 1 - first 15 min impulse arrived, values from 14 - 103 are valid, 12 - 13 not valid 2 - all values are valid, 15 min impulses running OK 3 - all values are valid, 15 min impulse does not come after power-up 4 - 15 min impulse does not come at least twice			0	4	$a/3:106	measurement	integer

($a - unit address)
($x - inpulse count of 10 seconds interval 15, 16, ..., 104)

4.2.2. Holding registers

		Data type	Order of registers	RAW range from	RAW range to	OpenDAF address	OpenDAF object type	OpenDAF data type
0 - 3	Counter 0 preset bits	uint64	little endian	0	4294967295	$a/ul4@4:1	command	long
4 - 7	Counter 0 preset bits	uint64	little endian	0	4294967295	$a/ul4@4:5	command	long

($a - unit address)

		Data type	RAW range from	RAW range to	OpenDAF address	OpenDAF object type	OpenDAF data type
16	IP address of device, first octet (standard: 192) **(ETH)**	uint16	0	255	$a/4:17	measurement / command	integer
17	IP address of device, second octet (standard: 168) **(ETH)**	uint16	0	255	$a/4:18	measurement / command	integer
18	IP address of device, third octet (standard: 0) **(ETH)**	uint16	0	255	$a/4:19	measurement / command	integer
19	IP address of device, fourth octet (standard: 100) **(ETH)**	uint16	0	255	$a/4:20	measurement / command	integer
20	IP subnet mask, first octet (standard: 255) **(ETH)**	uint16	0	255	$a/4:21	measurement / command	integer
21	IP subnet mask, second octet (standard: 255) **(ETH)**	uint16	0	255	$a/4:22	measurement / command	integer
22	IP subnet mask, third octet (standard: 255) **(ETH)**	uint16	0	255	$a/4:23	measurement / command	integer
23	IP subnet mask, fourth octet (standard: 0) **(ETH)**	uint16	0	255	$a/4:24	measurement / command	integer
24	IP gateway, first octet (standard 192) **(ETH)**	uint16	0	255	$a/4:25	measurement / command	integer
25	IP gateway, second octet (standard 168) **(ETH)**	uint16	0	255	$a/4:26	measurement / command	integer
26	IP gateway, third octet (standard 0) **(ETH)**	uint16	0	255	$a/4:27	measurement / command	integer
27	IP gateway, fourth octet (standard 1) **(ETH)**	uint16	0	255	$a/4:28	measurement / command	integer
28	TCP port of modbus communication (standard: 502) **(ETH)**	uint16	1	65535	$a/4:29	measurement / command	integer
29	MAC address, first octet **(ETH)**	uint16	0	255	$a/4:30	measurement / command	integer
30	MAC address, second octet **(ETH)**	uint16	0	255	$a/4:31	measurement / command	integer
31	MAC address, third octet **(ETH)**	uint16	0	255	$a/4:32	measurement / command	integer
32	MAC address, fourth octet **(ETH)**	uint16	0	255	$a/4:33	measurement / command	integer
33	MAC address, fifth octet **(ETH)**	uint16	0	255	$a/4:34	measurement / command	integer
34	MAC address, sixth octet **(ETH)**	uint16	0	255	$a/4:35	measurement / command	integer

($a - unit address)

4.2.3. Coils registers

		Data type	RAW range from	RAW range to	OpenDAF address	OpenDAF object type	OpenDAF data type
0	Save counter 0 preset	bool	1	1	$a/0:1	measurement / command	binary
1	Save counter 1 preset	bool	1	1	$a/0:2	measurement / command	binary
4	Module will load new IP settings and automatically make reset (ETH)	bool	1	1	$a/0:5	measurement / command	binary
5	Relay output 1	bool	0	1	$a/0:6	measurement / command	binary
6	Relay output 2	bool	0	1	$a/0:7	measurement / command	binary

($a - unit address)

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