USER MANUAL

Z-10-D-IN

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MI002533-E

Date	Revision	Notes
22/02/2016	1	Rewriting
28/02/2018	2	Changed Upper Title
23/03/2018	3	Added measure unit for Measure 1 and 2 registers

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Seneca **Z-10-D-IN**

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1. Introduction

The Z-10-D-IN module acquires 10 single-ended digital signals, then converts them to a digital format (IN 1-10 state).

The supported communication protocol is Modbus RTU.

The following counters are available:

8 counters at 16 bits

2 counters at 32 bits.

1.1. Features

- Acquisition of digital signals from sensor: Reed, NPN, PNP, Proximity, contact, etc...
- Counters are saved to a non volatile memory (NVM)
- Input signals IN1-IN8 can be filtered
- Pulse counters for digital signals, with max frequency equal to: 100 Hz for 16bit-registers (the signal is acquired from IN1-8); 10kHz, 32bit-registers (the signal is acquired from IN9-IN10)
- Advanced pulse management for digital signals IN9-IN10 (see table 1)
- Up to 10 sensors power by internal supply voltage (Vaux=16V)
- Node address and baud-rate configurable from Dip-Switches
- RS485 serial communication with MODBUS-RTU protocol, maximum 32 nodes.

2. Features

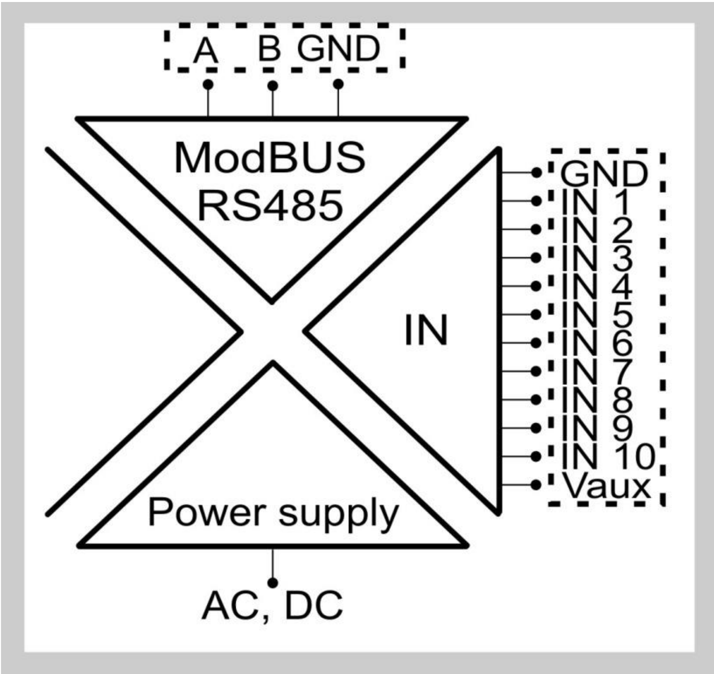
INPUT	
Number	10
Input filter	Cut-off frequency: 100Hz (for IN1-8); 10kHz (for IN9-10)
Filter	Configurable between: 1[ms] and 254[ms]
Protection	This module provides inputs and power supply (Vaux) protection against the overvoltage surge transient by transient suppressor TVS (600W/ms); max current supplied from Vaux is 100mA (limited by internal series PTC)
Pulse min duration (ton)	4ms (for IN1-IN8); 50µs (for IN9-IN10)
Sensor=closed	The sensor is detected «closed» if: acquired signal voltage >12 Vdc and acquired signal current > 3 mA
Sensor=open	The sensor is detected «open» if: acquired signal voltage <10 Vdc and acquired signal current < 2 mA

Internal supply Vaux	The screw terminal 12 (Vaux) supplies 16 V with reference to the screw terminal 1 (GND)

Measure error for frequency: 2% of fmax (for IN1-IN8: ±2Hz; for IN9-IN10: ±200Hz)

Measure error for period, ton, toff: 1ms

CONNECTIONS	
RS485 interface	IDC10 connector for DIN 46277 rail (back-side panel)
1500 Vac ISOLATIONS	
	Between: power supply, ModBUS RS485, digital inputs

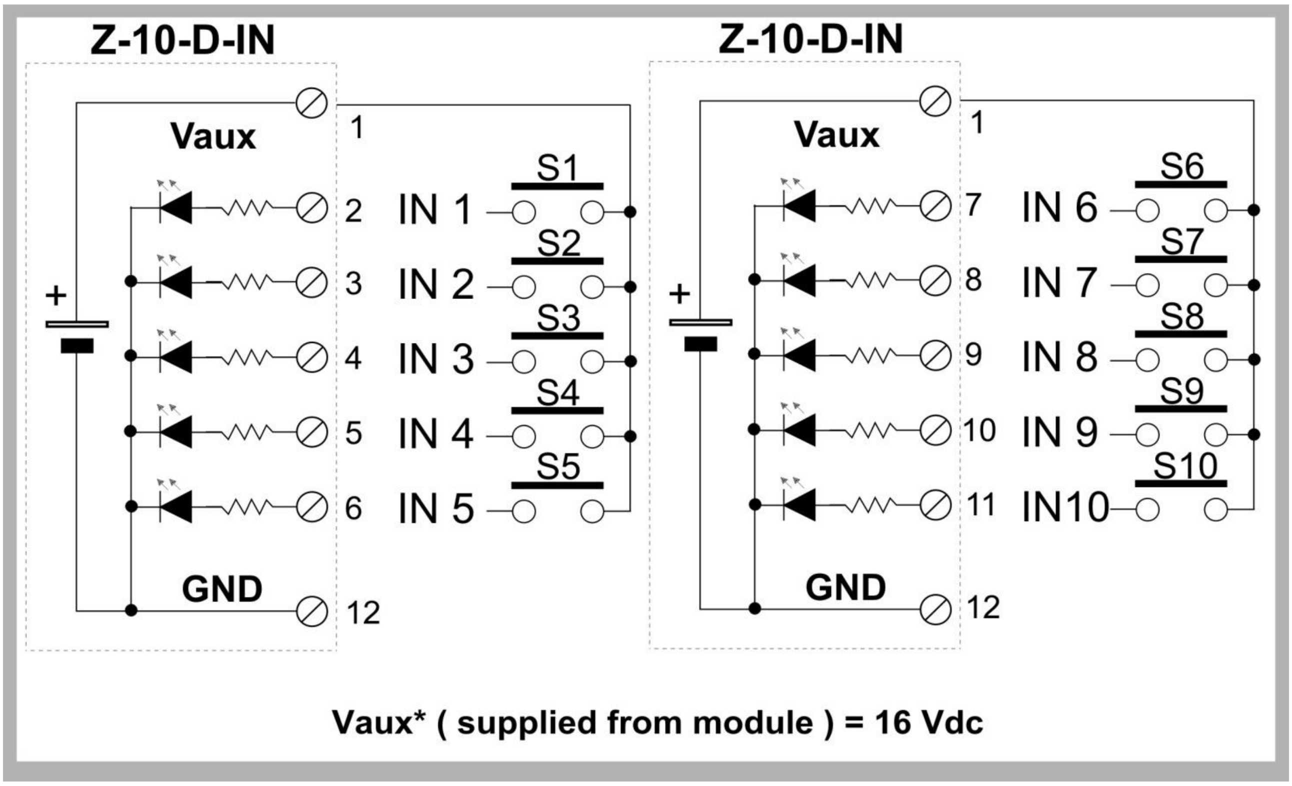


POWER SUPPLY	
Supply voltage	10 – 40 Vdc or 19 – 28 Vac (50Hz - 60Hz)
Power consumption	Min: 0.5W; Max: 2.5W

The power supply transformer necessary to supply the module must comply with EN60742 (Isolated transformers and safety transformers requirements). To protect the power supply, is recommended to install a fuse.

3. Input connections

Power on the module with < 40 Vdc or < 28 Vac voltage supply. These upper limits must not be exceeded to avoid serious damage to the module.



4. *Dip-switches table*

Power off the module before configuring it by Dip-Switches to avoid serious damage due to electrostatic discharges.

In the following tables: box without circle means Dip-Switch=0 (OFF state); box with circle means Dip-Switch=1 (ON state).

<table>
<tr><th colspan="7">BAUD-RATE (Dip-Switches: DIP-SWITCH STATUS)</th></tr>
<tr><td>1</td><td>2</td><td colspan="5">Meaning</td></tr>
<tr><td></td><td></td><td colspan="5">Baud-rate=9600 Baud</td></tr>
<tr><td></td><td>●</td><td colspan="5">Baud-rate=19200 Baud</td></tr>
<tr><td>●</td><td></td><td colspan="5">Baud-rate=38400 Baud</td></tr>
<tr><td>●</td><td>●</td><td colspan="5">Baud-rate=57600 Baud</td></tr>
<tr><th colspan="7">ADDRESS (Dip-Switches: DIP-SWITCH STATUS)</th></tr>
<tr><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>Meaning</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td>Address and Baud-Rate are acquired from memory(EEPROM)</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td>●</td><td>Address=1</td></tr>
<tr><td></td><td></td><td></td><td></td><td>●</td><td></td><td>Address=2</td></tr>
<tr><td></td><td></td><td></td><td></td><td>●</td><td>●</td><td>Address=3</td></tr>
<tr><td></td><td></td><td></td><td>●</td><td></td><td></td><td>Address=4</td></tr>
<tr><td>X</td><td>X</td><td>X</td><td>X</td><td>X</td><td>X</td><td>……………………</td></tr>
<tr><td>●</td><td>●</td><td>●</td><td>●</td><td>●</td><td>●</td><td>Address=63</td></tr>
<tr><th colspan="7">RS485 TERMINATOR (Dip-Switches: DIP-SWITCH STATUS)</th></tr>
<tr><td>9</td><td>10</td><td colspan="5">Meaning</td></tr>
<tr><td></td><td></td><td colspan="5">RS485 terminator disabled</td></tr>
<tr><td></td><td>●</td><td colspan="5">RS485 terminator enabled</td></tr>
</table>

5. Modbus RTU protocol

All registers are “Holding register” (Read Modbus function 3) with the convention that the first register is the 40001 address.

The following Modbus functions are supported:

Read Modbus Register (function 3)

Write Single Modbus Register (function 6)

Write Multiple Modbus Registers (function 16)

All values in 32bits are stored into 2 consecutive registers

For more info refers to:

http://www.modbus.org/specs.php

5.1. Abbreviation used

In the following table this abbreviations are used:

“MS” = Most significant
“LS” = Less significant
“MSB” = Most significant Bit
“LSB” = Less significant Bit
“MSW” = Most significant Word (16 bits)
“LSW” = Less significant Word (16 bits)
“R” = Read only register
“RW” = Read and write register

“Unsigned 16 bits” = Unsigned 16 bits register
“Signed 16 bits” = 16 bits register with sign
“Float 32 bits” = Floating point single precision 32 bits (IEEE 754) register
“0x” = Hexadecimal Value (example 0x1234 = 4660 decimal)
“0b” = Binary Value (example 0b1110 = 14 decimal)

Default communication parameters are 38400 baud, 8bit , parity None, 1 stop bit.

5.2. Modbus Register Addresses

Register Name	Comment	Register Type	R/W	Default value or Start Value	Modbus Address	Modbus Offset Address
MachineID	Module ID code	Unsigned 16 bits	R	0x0A00	40001	0
Inputs	Digital inputs 1..10 status value Bit 0 (LSB) = IN1 status Bit 1 = IN2 status Bit 2 = IN3 status Bit 3 = IN4 status Bit 4 = IN5 status Bit 5 = IN6 status Bit 6 = IN7 status Bit 7 = IN8 status Bit 8 = IN9 status Bit 9 = IN10 status Bit 10..14 = not used Bit 15 (MSB) = not used For example if the register value is: 813 decimal = (MSB)0000 0011 0010 1101(LSB) binary IN1 = 1 IN2 = 0 IN3 = 1 IN4 = 1 IN5 = 0 IN6 = 1 IN7 = 0 IN8 = 0 IN9 = 1 IN10 =1	Unsigned 16 bits	R	0	40002	1
Counter 1	16 bit counter (from 0 to 65535) The value is stored into a non volatile RAM (FeRAM). The Counter 1 value can be written (for example writing 0 for setting the counter)	Unsigned 16 bits	R/W	-	40003	2

Counter 2	16 bit counter (from 0 to 65535) The value is stored into a non volatile RAM (FeRAM). The Counter 2 value can be written (for example writing 0 for setting the counter)	Unsigned 16 bits	R/W	-	40004	3
Counter 3	16 bit counter (from 0 to 65535) The value is stored into a non volatile RAM (FeRAM). The Counter 3 value can be written (for example writing 0 for setting the counter)	Unsigned 16 bits	R/W	-	40005	4
Counter 4	16 bit counter (from 0 to 65535) The value is stored into a non volatile RAM (FeRAM). The Counter 4 value can be written (for example writing 0 for setting the counter)	Unsigned 16 bits	R/W	-	40006	5
Counter 5	16 bit counter (from 0 to 65535) The value is stored into a non volatile RAM (FeRAM). The Counter 5 value can be written (for example writing 0 for setting the counter)	Unsigned 16 bits	R/W	-	40007	6
Counter 6	16 bit counter (from 0 to 65535) The value is stored into a non volatile RAM (FeRAM). The Counter 6 value can be written (for example writing 0 for setting the counter)	Unsigned 16 bits	R/W	-	40008	7
Counter 7	16 bit counter (from 0 to 65535) The value is stored into a non volatile RAM (FeRAM). The Counter 7 value can be written (for example writing 0 for setting the counter)	Unsigned 16 bits	R/W	-	40009	8
Counter 8	16 bit counter (from 0 to 65535) The value is stored into a non volatile RAM (FeRAM). The Counter 8 value can be written (for example writing 0 for setting the counter)	Unsigned 16 bits	R/W	-	40010	9
Counter 9	32 bit counter (from 0 to 4294967295) The value is stored into a non volatile RAM (FeRAM). The Counter 9 value can be written (for example writing 0 for setting the counter)	Unsigned 32 bits	R/W	-	40011 (LSW) 40012 (MSW)	10-11
Counter 10	16 bit counter (from 0 to 4294967295) The value is stored into a non volatile RAM (FeRAM).	Unsigned 32 bits	R/W	-	40013 (LSW) 40014 (MSW)	12-13

	The Counter 10 value can be written (for example writing 0 for setting the counter)					

Counters Overflow Flags	The flag is "1" if the counter has performed an overflow Bit 0 (LSB)= Overflow Counter 1 Bit 1 = Overflow Counter 2 Bit 2 = Overflow Counter 3 Bit 3 = Overflow Counter 4 Bit 4 = Overflow Counter 5 Bit 5 = Overflow Counter 6 Bit 6 = Overflow Counter 7 Bit 7 = Overflow Counter 8 Bit 8 = Overflow Counter 9 Bit 9 = Overflow Counter 10 Bit 10..14 = not used Bit 15 (MSB) = not used	Unsigned 16 bits	R/W	0	40015	14
Measure B	Input B measure value Measure units: Ton/Toff/Period [ms] Frequency [Hz]	Unsigned 16 bits	R	0	40016	15
Measure A	Input A measure value Measure units: Ton/Toff/Period [ms] Frequency [Hz]	Unsigned 16 bits	R	0	40017	16
Measure A/B Type	Bit [15..12] = 0b0000 Measure A frequency Bit[15..12] = 0b0001 Measure A period Bit[15..12] = 0b0010 Measure A Ton Bit[15..12] = 0b0011 Measure A Toff Bit[11..8] = 0b0001 Measure A from input 1 Bit[11..8] = 0b0010 Measure A from input 2 Bit[11..8] = 0b0011 Measure A from input 3 Bit[11..8] = 0b0100 Measure A from input 4 Bit[11..8] = 0b0101 Measure A from input 5	Unsigned 16 bits	R/W*	0	40018	17

	Bit[11..8] = 0b0110 Measure A from input 6 Bit[11..8] = 0b0111 Measure A from input 7 Bit[11..8] = 0b1000 Measure A from input 8 Bit[11..8] = 0b1001 Measure A from input 9 (only frequency) Bit[11..8] = 0b1010 Measure A from input 10 (only frequency) Bit [7..4] = 0b0000 Measure B frequency Bit[7..4] = 0b0001 Measure B period Bit[7..4] = 0b0010 Measure B Ton Bit[7..4] = 0b0011 Measure B Toff Bit[3..0] = 0b0001 Measure B from input 1 Bit[3..0] = 0b0010 Measure B from input 2 Bit[3..0] = 0b0011 Measure B from input 3 Bit[3..0] = 0b0100 Measure B from input 4 Bit[3..0] = 0b0101 Measure B from input 5 Bit[3..0] = 0b0110 Measure B from input 6 Bit[3..0] = 0b0111 Measure B from input 7 Bit[3..0] = 0b1000 Measure B from input 8 Bit[3..0] = 0b1001 Measure B from input 9 (only frequency) Bit[3..0] = 0b1010 Measure B from input 10 (only frequency)					
IN1..IN8 FILTER	Filter value from 1 ms to 255 ms. For example with filter = 1 ms will attenuate pulse with frequency > 1/1ms = 1000 Hz With filter = 10 ms will attenuate pulse with frequency > 1/10ms=100 Hz	Unsigned 16 bits	R/W*	3 ms	40019	18
IN9..IN10 COUNT MODE / RS485 PARITY	Bit [12:8] = 0b00000 IN9 Upcounter IN10 Upcounter Bit [12:8] = 0b00001 IN9 Downcounter IN10 Upcounter	Unsigned 16 bits	R/W*	0	40020	19

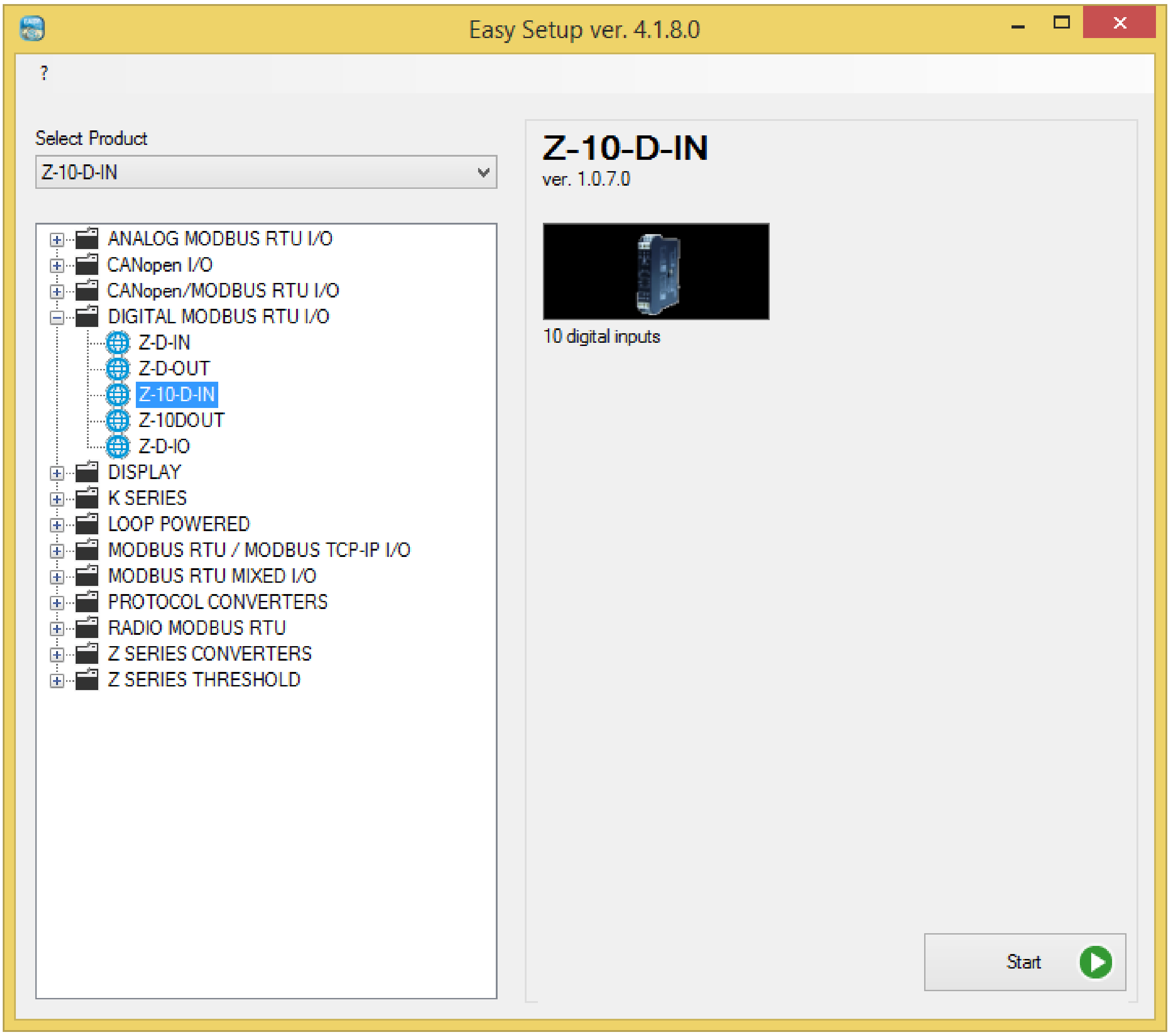
	Bit [12:8] = 0b00010 IN9 Upcounter IN10 Downcounter Bit [12:8] = 0b00100 IN9 Downcounter IN10 Downcounter Bit [12:8] = 0b01000 Count+1 from IN9 and Count-1 from IN10. Only Count 9 Is active Bit [12:8] = 0b10000 if IN10=1 Count9 Upcounter, if IN10=0 Counter9 Downcounter Bit[4] = 0 Port RS485 Parity Even Bit[4] = 1 Port RS485 Parity Odd Bit[3] = 0 Port RS485 Parity Not Active Bit[3] = 1 Port RS485 Parity Active Bit[2] = 0 Delay Between Rs485 Port TX and RX disabled Bit[2] = 1 Delay Between Rs485 Port TX and RX enabled Bit[1] = 0 IN1..IN8 Upcounter Bit[1] = 1 IN1..IN8 Downcounter Bit[0] = 0 IN1..IN10 Normal Logic Bit[0] = 0 IN1..IN10 Reverse Logic					
ADDRESS BAUDRATE	Bit[15..8] = 0b00000000 RS485 use 4800baud Bit[15..8] = 0b00000001 RS485 use 9600baud Bit[15..8] = 0b00000010 RS485 use 19200baud Bit[15..8] = 0b00000011 RS485 use 38400baud Bit[15..8] = 0b00000100 RS485 use 57600baud Bit[15..8] = 0b00000101 RS485 use 115200baud Bit[15..8] = 0b00000110 RS485 use 1200baud Bit[15..8] = 0b00000111 RS485 use 2400baud	Unsigned 16 bits	R/W*	0b0000010000000001 (38400 baud, station address 1)	40021	20

	Bit[7:0] = Station Node Address (if all dip switched are set to OFF)					
COMMAND	If set to 2: Copy the actual contents of registers R/W* into EEPROM. If set to 1: Perform a Reset	Unsigned 16 bits	R/W	0	40022	21
FW REVISION	Fw revision	Unsigned 16 bits	R	-	40024	23

6. EASY SETUP

To configure the Z-10-D-IN download the Easy Setup PC software from the Seneca Website:

http://www.seneca.it/en/linee-di-prodotto/software/easy/easy-setup/


Easy Setup ver. 4.1.8.0
?
Select Product
Z-10-D-IN
ANALOG MODBUS RTU I/O
CANopen I/O
CANopen/MODBUS RTU I/O
DIGITAL MODBUS RTU I/O
Z-D-IN
Z-D-OUT
Z-10-D-IN
Z-10DOUT
Z-D-IO
DISPLAY
K SERIES
LOOP POWERED
MODBUS RTU / MODBUS TCP-IP I/O
MODBUS RTU MIXED I/O
PROTOCOL CONVERTERS
RADIO MODBUS RTU
Z SERIES CONVERTERS
Z SERIES THRESHOLD
Z-10-D-IN
ver. 1.0.7.0
10 digital inputs
Start