SENECA

EN

Z-LINK1
Radio communication device

Installation Manual

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GENERAL FEATURES

The Z-LINK1 modules represent a communication systems for data acquisition and transmission in the process control and industrial / civil automation. Based on an UHF modem radio, Z-LINK1 is able to comunicate with Z-PC line modules through ModBUS protocol. Z-LINK1 represents a new platform communication in radio frequency.

- Power supply and serial connection wiring facilitated by means of a bus that can be used in the DIN guide.
- Functioning modality is configurable by DIP-switch.
- RS485 serial communication with protocol MODBUS-RTU
- High immunity to the RF disturbs
- Transparent to the ModBUS protocol
- Isolation between communication and power supply: 1500 Vac.
- It is possible to implement MESH networks
- BRIDGE or REMOTE I/O functioning

TECHNICAL SPECIFICATIONS

Communication

Interface :	- RS232 - RS485 - Half-duplex functioning module (the communication between devices occurs in alternate way)
ModBUS RTU protocol :	Yes
Delay between polls :	> 200 ms (to set in the master Modbus)
Timeout (master Modbus) :	> maximum between all timeout values configured in the Easy setup software
Frequency band :	g3, attached 1 ERC 70-03 (869.4 MHz - 869.650 MHz)
Modulation :	GFSK
Class of radio module :	2
Performance in free field conditions :	400 m (with PER<10^{-3} @ 57.6 kbaud, with antenna accessory ANT-MAG placed over 2 m from the soil)
Radiated power:	20 mW
Communication :	32 nodes

Electrical features

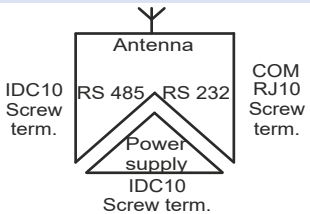
Power supply :	10..40 Vdc or 19..28 Vac (50..60 Hz)
Consumption :	1 W @ 12 Vdc (without radio communication) 1 W @ 24 Vdc (without radio communication) 1 W @ 24 Vdc (with radio communication)
LED status	- Power supply - Data transmission via bus - Data transmission via radio - Test after installation

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Thermo-mechanical features

Functioning :	0..+55 °C
Storage :	-25 °C..+85 °C
Humidity :	20..85 % (without condensing)
Connections :	-Removable screw terminals:conductors up to 2.5 mm^2 -RJ10 connector for RS232 serial port -JACK stereo connector for programming -SMA connector for antenna -IDC10 connector for Seneca bus
Mounting:	For DIN 46277 rail
Case :	PBT, black
Dimensions, weight :	100 x 112 x 17,5 mm, 200 g.
Accessories :	Cable: RJ10/DB9F (PM001420) Directional antenna - 2.5 m - SMA (ANT-MAG) Seneca bus accessories: Z-PC-DIN
Standards: CE	The Z-LINK1 complies with the following standards: ETSI EN 300 220-2 V2.1.2 (2007-06) ETSI EN 301 489-3 V1.4.1 (2002-08) CEI EN 61010 It thus satisfies the basic requirements of directives: Radio and telecommunications terminal equipment 99/5/EC Electromagnetic compatibility 2004/108/EC Low Voltage equipment 2006/95/EC

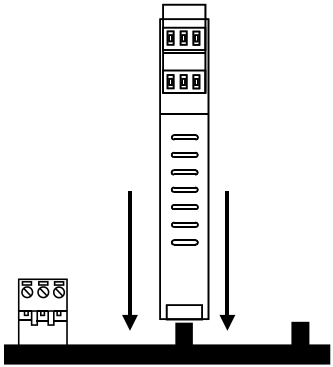
1500Vac isolations



INSTALLATION AND CONNECTIONS

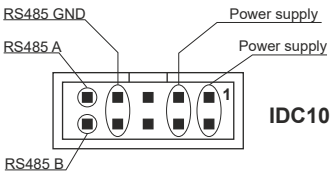
The module is designed to be installed in vertical position on a DIN 46277 rail. In order to ensure optimum performance and the longest working life, the module(s) must be supplied adequate ventilation and no raceways or other objects that obstruct the ventilation slots. Never install modules above sources of heat; we recommend installation in the lower part of the control panel.

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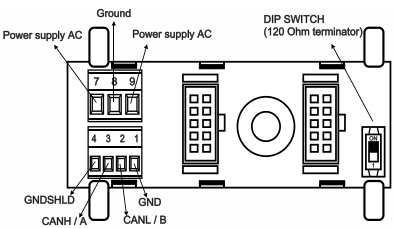
As it is illustrated in the next figure:
1) Insert the rear IDC10 connector on a DIN rail free slot (the inserting is univocal since the connectors are polarized).
2) Tighten the locks placed at the sides of the rear IDC10 connector to fix the module.

Bus connector for DIN rail



In the figure the meaning of the IDC10 connector pins is showed, in the case the user decides to provide the signals directly through it.

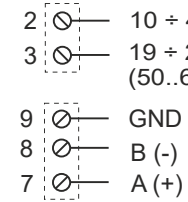
Z-PC-DINAL2-17,5 Accessory Use



In case of Z-PC-DINAL-2-17,5 accessory, the signals may be provided by terminal blocks. The figure shows the meaning of the terminals and the position of the DIP-switch (present on each DIN rail supports listed on Accessories) for network termination (not used in case of Modbus network).
GNDSHLD: Shield to protect the connection cables
(recommended).

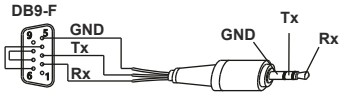
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Power supply and RS485 from screw terminals



There is RS485 communication in the 7, 8, 9 screw terminals as shown in the following figure.
The electric connections for power supply and RS485 can be made by using either the terminals or the bus for the Seneca DIN rail.

RS232 serial port for programming only

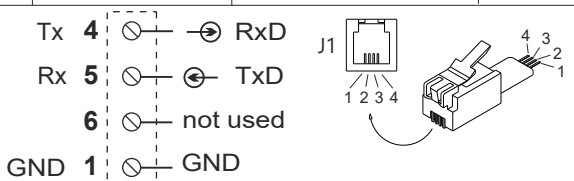


The module has a Jack stereo connector in order to connect its to RS232-bus communication. The frontal COM port is used to program the Z-LINK1 only.

RS232 serial port from RJ10 or terminals

The module Z-LINK1 has the RS232 communication port by RJ10 or screw terminals 4, 5, 6, 1 as shown in the following figure. The RJ10 port is the RS232 physical replica of the RS485 signal via radio.

Z-LINK1			REMOTE DEVICE
SIGNAL	RJ10 connector (J1)	RS-232 from screw term.	
Rx ←	1	5(M2)	⇦ TxD
Tx →	2	4(M2)	⇨ RxD
GND =	3	1(M1)	= GND
not used	4		



Dip-switch settings

Default configuration

The default configuration for Z-LINK1 module: DIP-switches are in position 000000. DIP-switch status defines the functioning modality and module radio communication parameters.
In the following tables: box without circle means Dip-Switch=0 (OFF state); box with circle means Dip-Switch=1 (ON state).

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Z-LINK1 FUNCTIONING MODALITY			
SW1	1		
			Z-LINK1 connected to slave Modbus
		●	Z-LINK1 connected to master Modbus
MODULE RADIO COMMUNICATION PARAMETERS			
SW1	2	3	
			38400 baud - 8N1
		●	19200 baud - 8N1
	●		9600 baud - 8N1
	●	●	(*)Communication parameters from EEPROM (default:38400 baud - 8N1)
FUNCTIONING MODALITY OF RADIO MODULE			
SW1	4	5	
			The module radio is internally connected to IDC10 (bus Seneca RS485) and screw terminals (7-8-9)
	●	●	Follow the procedure described in the software Easy setup (@ 9600-8N1)
Rs485 TERMINATOR			
SW1	6		
			Disabled
	●		Enabled

(*) Each variation has to be performed using the software Easy Setup.

FUNCTIONING

Sharing of the network identifier

All Z-LINK1 devices are provided with the same network identifier (0xD0D0 = 53456), then the operation of binding is already carried out (default: all Z-LINK1 devices are able to communicate with each other).To create independent networks in the same covered area, it is possible to separate networks logically, by modifying the network identifier of the affected devices (using the software Easy Setup).

NOTE: **at first start, radio communication between Z-LINK1 devices may take several minutes to properly establishment because the Z-LINK1 devices must initialize internally.**

Z-LINK1 configuration

To install and configure each Z-LINK1 that belongs to a network, **use the software Easy setup**.

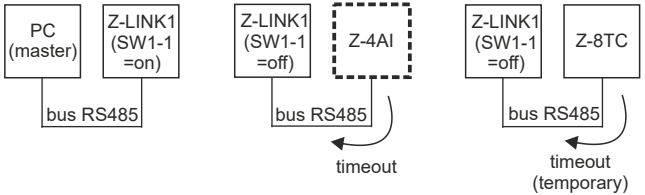
Each Z-LINK1 can be configured as:

- BRIDGE: the Z-LINK1 has not the CPU enabled. To complete the configuration, set if the Z-LINK1 is connected to the Modbus master (PLC, PC, etc...) and Modbus slaves (local bus), or if the Z-LINK1 is only connected to Modbus slaves (local bus).
- REMOTE I/O: the Z-LINK1 has the CPU enabled. **THE CPU COMMUNICATION PARAMETERS (MODBUS MASTER THAT QUERIES MODBUS SLAVES) ARE THE SAME OF INTERNAL RADIO MODULE.** To complete the configuration, set if the Z-LINK1 is the Modbus master. To complete the configuration of Z-LINK1, follow the procedure described by the software Easy setup.

Missing of a slave device in a network of Z-LINK1

Assume a system consisting of: a network of Z-LINK1 devices with some Modbus slave devices connected directly via bus and a PC as Modbus master (with a Z-LINK1 connected via bus). If there is the absence of a Modbus slave device (for example, one Z-4AI connected directly to a Z-LINK1 via local bus) during interrogation by the Modbus master, it is possible to observe a timeout message on all slave devices enquired (Z-8TC).

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After a time interval of about 1 minute, the timeout message on the slave devices actually belonging to the network disappears, returning to the normal functioning.The behavior just described can be observed if there is the absence of the Z-LINK1 device connected to the interested Modbus slave device, too (for example, the previous Z-LINK1 connected to the Z-4AI via local bus).

Infact **the Z-LINK1 devices can detect network paths with timing usually much higher than the timeout of the Modbus Master.** Therefore, the PC (Modbus master) continuing to poll, but the network is still employed to locate the device no longer connected. In particular, the requests that arrive to the network when it is employed by another request will be discarded, causing the subsequent failure on the slaves in the list (timeout temporary).

Important points:

- Only for the Z-LINK1 configured in REMOTE I/O modality as master, the max number of input/output that can be configured in the I/O repetition map:
* is 20, for digital inputs/outputs
* is 50, for analog inputs/outputs
- The Easy setup software allows to negate the status of digital outputs, compared with the corresponding input; allows to scale the analog inputs, repeating the values in the corresponding analog outputs. In both cases, it is possible to set the fail conditions.
- It is advisable to connect the (digital or analog) outputs in the Modbus master local bus
- At the first start, the master module checks which slaves belong to the network effectively. For this reason: first, power on the Z-LINK1 «slave» devices; final, power on the Z-LINK1 «master» module
- In the Easy Setup software (in Test configuration window) there is a incremental counter, to display eventual fails in the modules connected and the radio communication quality. In correspondence of each module of displayed I/O map, there is a flag that signals eventual I/O fails in reading/writing.

Use of the network

To use the devices in the best way, mind the following points:

1. All RS485 buses headed by a Z-LINK1 must be properly polarized and terminated.
2. The packet sending for Modbus broadcast (Modbus address 0x00) is supported by the network; anyway, for multihop MESH topologies, it is strongly discouraged because it involves long communication times and low reliability of achieving all network elements.
3. For networks constituted by a large number of devices, avoid the densification of infrastructural elements within the same covering range.

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PROGRAMMING

To download the free configuration software Easy setup, see the website www.seneca.it

To program the module, use the front connector (COM) and Easy Setup software only: set all communication parameters correctly. In any case, to program the device, refers to Easy Setup software instructions.

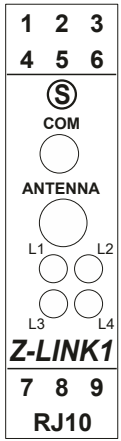
LEDS SIGNALLING

LED L4 (GREEN)	Meaning
Blinking	The module is power on(normal functioning)
LED L1 (YELLOW)	Meaning
Blinking	Data transmission via bus
Constant light	Wrong installation (after test)
LED L2 (GREEN)	Meaning
Blinking	Data transmission via radio
Constant light	Correct installation (after test)

The LED L3 is not used.

When a Z-LINK1 is power on, the following procedure is displayed to identify the module power-on condition:

1. All LEDs (L1-L2-L4) are power on for about 1 second
2. All LEDs (L1-L2-L4) are power off for about 2 seconds
3. All LEDs (L1-L2-L4) are power on for about 50 ms
4. All LEDs (L1-L2-L4) are power off for about 2 seconds
5. Standard visualization (L4 blinks periodically)



Devices directly involved in the transmission of messages may show the flashes on both L1 and L2, or only on L2. In the first case are terminal devices, while in the second case are intermediate devices, which have the only function of forwarding the packet via radio.

NOTE: the Z-LINK1 devices are not suitable for safety applications.

COUNTRIES IN WHICH THE Z-LINK1 CAN BE USED

The countries in which the devices can be used Z-LINK1 are compatible ERC REC 70-03 (Annex 1, G3): Austria, Belgium, Bulgaria, Czech Republic, Cyprus, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, United Kingdom, Switzerland, Sweden, Albania, Bosnia and Herzegovina, Croatia, Moldova, Macedonia, Serbia and Montenegro, Turkey. Excludes: Russia, Ukraine and Georgia.



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