WriteNow! Series

Single and Parallel In-System Programmers

Hardware Manual

Rev. 2.00

algocraft

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1. WriteNow! - At a Glance

Overview

Congratulations for purchasing a WriteNow! In-System Programmer. Based on the proprietary WriteNow! Technology, the WriteNow! Series of In-System Programmers are a breakthrough in the Programming industry. The programmers support a large number of devices (microcontrollers, memories and other programmable devices) from various manufacturers and have a compact size for easy ATE/fixture integration. They work in standalone or connected to a host PC (RS-232, USB, LAN connections are built-in), and are provided with easy-to-use software utilities.

The WriteNow! Lineup

Features

- Support of microcontrollers, serial and parallel memories and other programmable devices
- High-speed, parallel programming
- Compact size (fixture friendly)
- Standalone operations or host controlled
- Designed for easy ATE interfacing
- Robust and reliable
- Support of several programming interfaces (JTAG, BDM, SPI/QSPI, I^2C, UART, SWD, C2, ICSP, FINE, SBW, SWIM, DAP, MDI, MUST/MICE, etc.)

- Large built-in internal memory for projects, images, etc.
- Programmable power supply output (1.5-13V)
- Programmable I/O voltage (1.6-5.5V)
- High-speed I/O
- LAN (isolated), RS-232 (isolated), USB 2.0 full-speed, and low-level interface (isolated)
- ISP I/O relay barrier (only available on the single-site model)
- I/O protection
- Wide range power supply (15-25V)

The shortest possible programming times are guaranteed due to a combination of highly optimized programming algorithms, local storage of programming data and high slew rate line driver circuitry.

Model Comparison

The following table summarizes the main features of the various WriteNow! family models.

WriteNow! Model Comparison

Feature	WN-PRG01A	WN-PRG02A	WN-PRG04A	WN-PRG08A
General Features				
Programming Sites	1	2	4	8
Power Supply	15-25V	15-25V	15-25V	15-25V
Device Type Support	Microcontrollers, Serial Memories	Microcontrollers, Serial Memories	Microcontrollers, Serial Memories	Microcontrollers, Serial Memories, Parallel Memories
Programming Protocols	UART, SPI, JTAG, I²C, BDM, SWD, etc.	UART, SPI, JTAG, I²C, BDM, SWD, etc.	UART, SPI, JTAG, I²C, BDM, SWD, etc.	UART, SPI, JTAG, I²C, BDM, SWD, etc.
Relay Barrier	Yes	No	No	No
ISP Lines				
Adj. Voltage Range	1.6-5.5V	1.6-5.5V	1.6-5.5V	1.6-5.5V
Adj. Voltage Resolution	100mV	100mV	100mV	100mV
Bidirectional Lines	6	12	24	48
Prog. Clock Out Lines	1	2	4	8
Programmable Power Supply (PPS)				
Range	1.5-15V	1.5-15V	1.5-15V	1.5-15V
Resolution	100mV	100mV	100mV	100mV
Channels	1	2	4	8
Host Interface				

RS-232 (Isolated)	Yes	Yes	Yes	Yes
LAN (Isolated)	Yes, 100Mbit/s	Yes, 100Mbit/s	Yes, 100Mbit/s	Yes, 100Mbit/s
USB	Yes, full-speed	Yes, full-speed	Yes, full-speed	Yes, full-speed
Low-Level Interface (Isolated)	START, OK/ERR, BUSY, PRJ_SEL[0..5]	START, START_ENA[1..2], OK/ERR[1..2], BUSY, PRJ_SEL[0..5]	START, START_ENA[1..4], OK/ERR[1..4], BUSY, PRJ_SEL[0..5]	START, START_ENA[1..8], OK/ERR[1..8], BUSY, PRJ_SEL[0..5]

Package Checklist

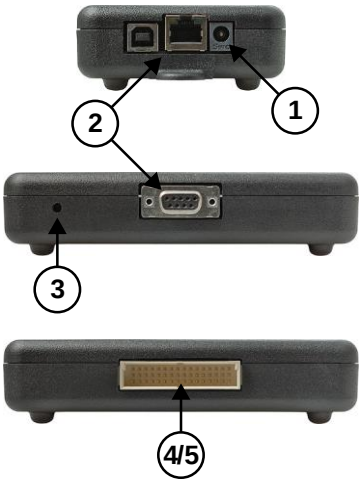
The WriteNow! package includes the following items:

1. WriteNow! unit.
2. 15V power supply.
3. Serial, USB and Ethernet cables.
4. WriteNow! test board.
5. 48-ways, female wire-wrap DIN41612 connector.
6. First user guide

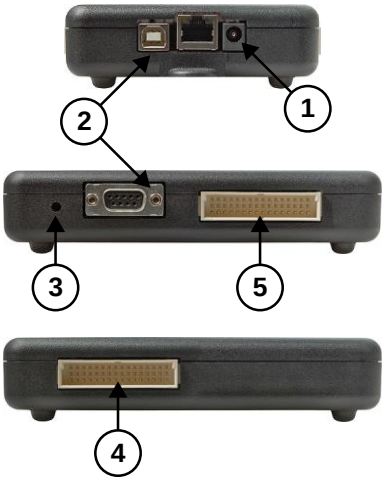
Connectors Overview

WriteNow! has several connectors for interfacing to a host PC, to an Automatic Test Equipment (ATE), and to the target system(s) to be programmed. The following pictures show where, depending on the model, the various connectors are located.

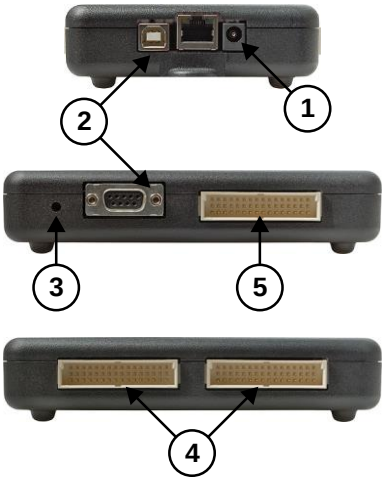
WN-PRG01A



WN-PRG02A/WN-PRG04A



WN-PRG08A



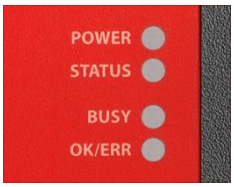
1. The POWER connector accepts a DC voltage between 15V and 25V.
2. The LAN, USB and RS-232 connectors are used to interface the instrument to a PC.
3. The LAN RESET push button is used for factory settings.
4. The ISP connector(s) are used to interface to the target system(s) to be programmed.
5. The LOW-LEVEL INTERFACE connector (which is merged with the ISP connector in the WN-PRG01A model) is used to interface the instrument to an ATE or other systems.

For details and pinout of the various connectors, see the "Connectors" chapter.

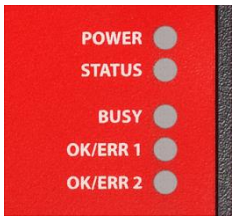
LEDs

The LEDs on the top cover of the instrument, from top to bottom, indicate:

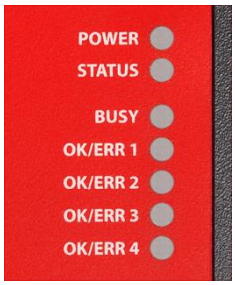
1. POWER: the instrument is turned on.
2. STATUS: indicates system warnings. Normally off, blinks if the system needs user action.
3. BUSY: turns on when programming (when a programming project is being executed).
4. OK/ERR: result of the programming. Each programming site has an OK/ERR LED, which turns green if the programming on that site has been successful, red otherwise.



WN-PRG01A LEDs



WN-PRG02A LEDs



WN-PRG04A LEDs

WN-PRG08A LEDs

Additional Documentation

This hardware manual provides information about how to set up WriteNow! and its hardware characteristics.

For any information about WriteNow! commands and their syntax, please refer to the WriteNow! Programmer's Manual, included (in PDF format) in the WriteNow! setup.

2. System Setup

Software setup

Install the last software version of WriteNow! Setup available on our web site www.algocraft.com under downloads > software menu.

To install the WriteNow! system software you must log in as Administrator.

The WriteNow! system software setup installs all of the required components to your hard drive. These components include:

- The WriteNow! Project Generator utility;
- Command-line utilities and Interface Library;
- Documentation in PDF format

Launch the Project Generator application, that is located under **Programs > Algocraft > WriteNow! Software > Project Generator.**

Configure your WriteNow! Instrument. Choose **Settings > Select Hardware Model**, and specify your WriteNow! model and communication settings with the PC. WriteNow! can be connected through USB, LAN and serial port (RS232).

Hardware setup

To setup WriteNow! you must follow the steps below:

- Connect WriteNow! to your PC through the provided Ethernet, USB or serial cables.
- Power up WriteNow! using the provided power supply.
- Set up LAN, USB or serial settings.
- Check WriteNow! communication sending commands via WriteNow! Project Generator utility.

Power Supply

WriteNow! can be powered in two ways:

- With the provided power supply (which supplies 15V DC);
- By providing a power supply to the PWR pin of the Low-Level Interference connector (see "Low-Level Interface Connector").

WriteNow! accepts a DC power voltage between 15V and 25V. Please note, however, that the SxPPS line on each programming site, if used, can provide a maximum output voltage of the power voltage minus about 2V.

Project setup

Projects are sequences of commands collected in a text file. The project file contains all the target device information and user settings. Use the WriteNow! Project Generator utility to create or edit a project file and then follow the Project Creation Wizard steps.

Connect to Target Device

Connect WriteNow! to your target system through the ISP connector(s). To view the connections for your selected target device, select **Project > Show ISP Connections**.

Interfacing with your Test/Programming Equipment

WriteNow! can be controlled in three other ways:

- By manually sending commands and receiving answers, using the Project Generator Terminal or any other terminal application;
- By configuring the instrument so that it can work in standalone, thus without a connection to a PC;
- By building your own PC software that interfaces to the instrument (for more information, see "WriteNow! API" on Programmer's Manual).

Hardware Test

The diagnostic procedure is a very easy way to verify if any hardware faults occur. Use the provided test-board to check the programmer hardware functionality.

Programming Drivers and Licenses

WriteNow! comes with preinstalled programming drivers (algorithms) that support common microcontrollers and memories. When you purchase a new programming driver, you are supplied with a new driver file (.wnd) and an updated license file (.wnl). The license file enables the use of all of your purchased drivers on your specific WriteNow! unit.

You must copy these files to the unit's internal memory: the driver file must be copied to the unit's **\drivers** folder, and the license file to the unit's **\sys** folder. Please refer to WriteNow! Programmer's Manual for more information.

3. Standalone Mode

Overview

WriteNow! can work with no connection to a PC (standalone mode). In standalone mode, the instrument is controlled through a low-level connection interface.

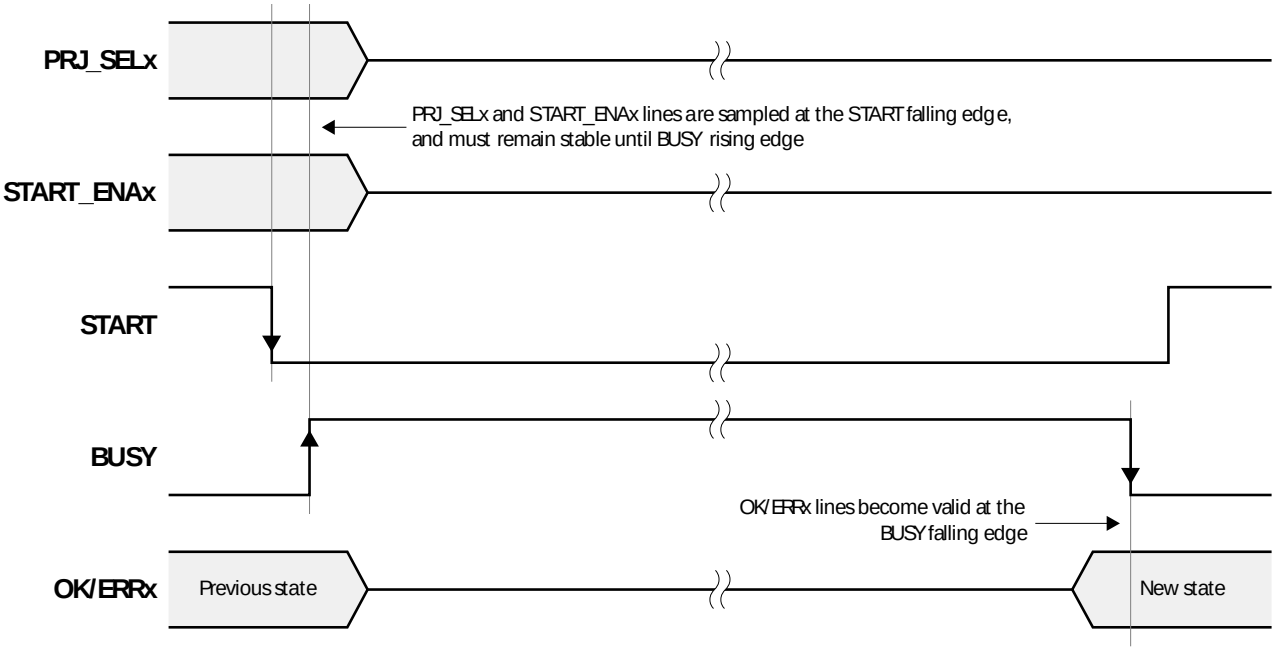
Signals

Signals needed to control the instrument in standalone mode are located in the "Low-Level Interface" connector (see"Connectors" on for the connector pinout on the various WriteNow! models) and are explained below.

Signal level is 0-5V. All lines are isolated (referenced to GNDI).

PRJ_SELx lines (input):	Define which project to execute.
START_ENAx lines (input):	Select which programming site(s) to enable. Active low.
START line (input):	Executes the project specified by PRJ_SELx lines on the programming site(s) enabled by START_ENAx lines. Active low.
BUSY line (output):	Indicates that a project is being executed. Active high.
OK/ERRx lines (output):	Valid at the end of project execution (when BUSY is low). Indicate, for each programming site(s), the success state of the programming project. (OK = high, ERR = low).

The following diagram illustrates the timing for the Low-Level Interface signals.



Low-Level Interface Signals Timing

Project Assignment

Before working in standalone mode, you must associate PRJ_SELx lines to a Project filename to execute.

To do so, in the WriteNow! Project Generator application select **Settings > Hardware Settings**. In the window that will appear, associate PRJ_SEL values to project names by clicking the **"Set Project"** button for each PRJ_SEL configuration you wish to setup.

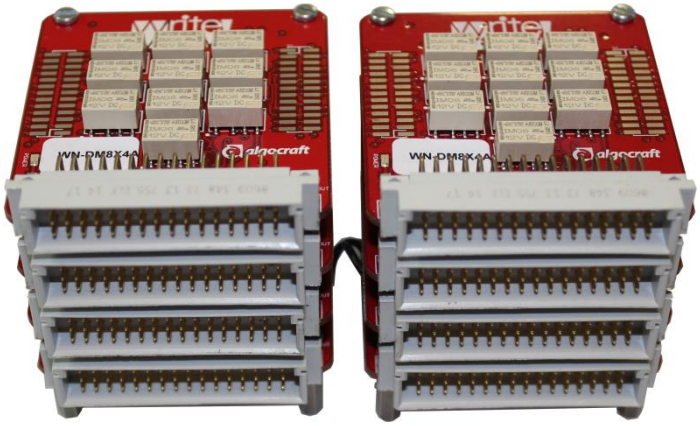
4. Accessories

Algocraft supplies a series of accessories that have been designed to ease the integration to customers as well as saving on engineering time and costs.

Relay Barrier Modules

On the single-site WriteNow! model (WN-PRG01A), a relay barrier is provided on the ISP signals. On the others WriteNow! models (WN-PRG02A, WN-PRG04A and WN-PRG08A) is possible to connect externally a dedicated relay barrier module to ensures true galvanic isolation and reliability.
When you create a programming project using the Project Generator application, relays are by default closed at the beginning of the project (with **`the #relay -o close`** command) and opened at the end (with **`the #relay -o open`** command).
On all WriteNow! models, a special signal (SxRLY) is present (on the "ISP" connector), on every programming site. If the programming site is enabled, this signal is driven to 0V when **`a #relay -o close`** command is executed, and driven to 5.5V when a **`the #relay -o open`** command is executed). This is useful for driving an external relay barrier.
For more information, please see the **AN001_relaybarrier.pdf** in the **\doc** folder.

Demultiplexer Modules



The demultiplexer module is designed to increase the number of ISP lines to be managed. A stack of up to 4 boards could be mounted to each ISP connector. It is built as a tower in order to save space. The Reed relay technology ensures true galvanic isolation and reliability.
For the power supply: a special plug to plug power cable is provided with demultiplexer in order to power both the products through the WriteNow!'s 15V adapter.
No external lines are needed in order to control the multiplexer since the lines are provided by WriteNow! ISP connector A and B (available for external expansion module purpose).

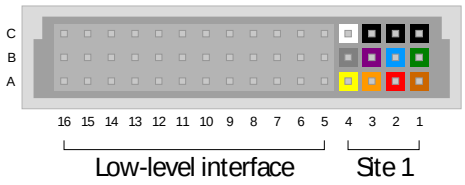
Models	Number of boards in parallel	Demux model Number of board in demultiplexer		
WN-PRG01A	1	-	-	-
WN-PRG02A	2	WN-DM2X2A 4	WN-DM2X3A 6	WN-DM2X4A 8
WN-PRG04A	4	WN-DM4X2A 8	WN-DM4X3A 12	WN-DM4X4A 16
WN-PRG08A	8	WN-DM8X2A 16	WN-DM8X3A 24	WN-DM8X4A 32

5. Connectors

ISP Connectors

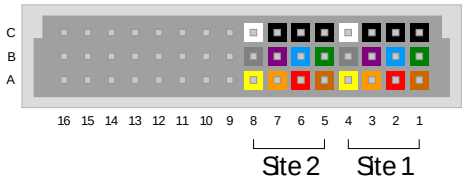
WriteNow! WN-PRG01A, WN-PRG02A and WN-PRG04A models have one ISP connector; the WN-PRG08A model has two ISP connectors. Furthermore, in the WN-PRG01A model, the ISP connector also includes low-level interface signals.

WN-PRG01A ISP Connector



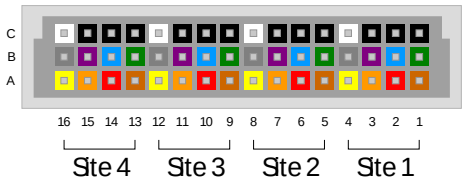
WN-PRG01A ISP Connector

WN-PRG02A ISP Connector



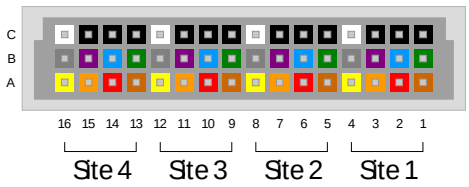
WN-PRG02A ISP Connector

WN-PRG04A ISP Connector

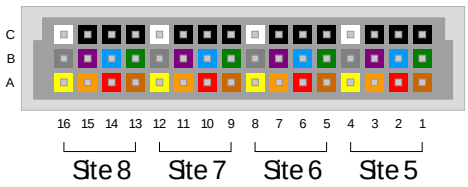


WN-PRG04A ISP Connector

ISP A Connector



ISP B Connector



WN-PRG08A ISP Connectors

ISP Signal Definitions

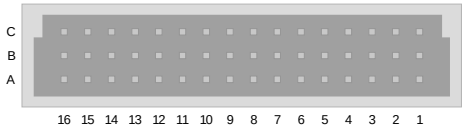
Color	Signal	Description
	SxL01	Site x line 1
	SxL02	Site x line 2
	SxL03	Site x line 3
	SxL04	Site x line 4
	SxL05	Site x line 5
	SxL06	Site x line 6
	SxL07	Site x line 7
	SxPPS	Site x programmable power supply
	SxRLY	Site x relay output
	SxGND	Site x GND

One of the most important parameters to take into account for ISP wiring is the connection length.
For this reason, the programmer should be placed as near as possible to the DUP (Device Under Programming) keeping the ISP wiring length as short as possible.

Low-Level Interface Connector

In the WN-PRG01A model, low-level interface signals are included in the ISP connector, which is called “ISP & LOW-LEVEL INTERFACE” connector.

Low-Level Interface Connector



Low-Level Interface Connector

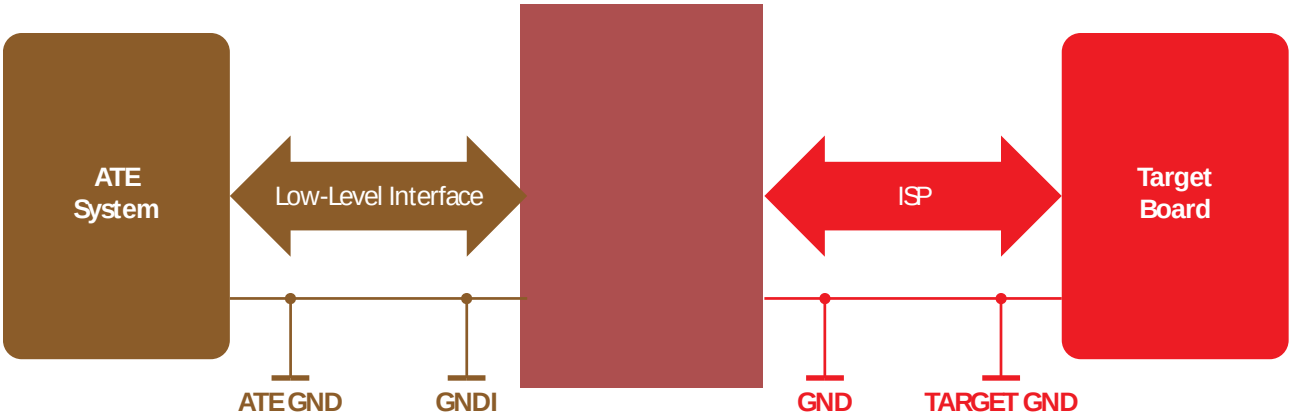
Low-Level Interface Signals

Signal	Description	WN-PRG01A Pin	WN-PRG02A Pin	WN-PRG04A Pin	WN-PRG08A Pin
PWR	Input Power Supply (12-25V)	A5/B5	A5/B5	A5/B5	A5/B5
GND	Power Supply Ground	C5	C5	C5	C5
GNDI	Low-Level Interface Ground	A10/B12/C15/ C16	A10/B12/C15/C16	A10/B12/C15/C16	A10/B12/C15/C16
TX_RS232	RS-232 TX (Output)	A16	A16	A16	A16
RX_RS232	RS-232 RX (Input)	B16	B16	B16	B16
PRJ_SEL0	Project Selector 0 (Input, internal pull-up)	B10	B10	B10	B10
PRJ_SEL1	Project Selector 1 (Input, internal pull-up)	C10	C10	C10	C10
PRJ_SEL2	Project Selector 2 (Input, internal pull-up)	A11	A11	A11	A11
PRJ_SEL3	Project Selector 3 (Input, internal pull-up)	B11	B11	B11	B11
PRJ_SEL4	Project Selector 4 (Input, internal pull-up)	C11	C11	C11	C11
PRJ_SEL5	Project Selector 5 (Input, internal pull-up)	A12	A12	A12	A12
START	Project Start (Input, internal pull-up)	A7	A7	A7	A7
START_ENA1	Site 1 Project Start Enable (Input, internal pull-up)	-	B7	B7	B7
START_ENA2	Site 2 Project Start Enable (Input, internal pull-up)	-	C7	C7	C7
START_ENA3	Site 3 Project Start Enable (Input, internal pull-up)	-	-	A8	A8
START_ENA4	Site 4 Project Start Enable (Input, internal pull-up)	-	-	B8	B8
START_ENA5	Site 5 Project Start Enable (Input, internal pull-up)	-	-	-	C8
START_ENA6	Site 6 Project Start Enable (Input, internal pull-up)	-	-	-	A9
START_ENA7	Site 7 Project Start Enable (Input, internal pull-up)	-	-	-	B9
START_ENA8	Site 8 Project Start Enable (Input, internal pull-up)	-	-	-	C9
BUSY	Busy (Output, push-pull)	C12	C12	C12	C12
OK/ERR1	Site 1 OK/ERR (Output, push-pull)	A13	A13	A13	A13
OK/ERR2	Site 2 OK/ERR (Output, push-pull)	-	B13	B13	B13
OK/ERR3	Site 3 OK/ERR (Output, push-pull)	-	-	C13	C13
OK/ERR4	Site 4 OK/ERR (Output, push-pull)	-	-	A14	A14
OK/ERR5	Site 5 OK/ERR (Output, push-pull)	-	-	-	B14
OK/ERR6	Site 6 OK/ERR (Output, push-pull)	-	-	-	C14
OK/ERR7	Site 7 OK/ERR (Output, push-pull)	-	-	-	A15
OK/ERR8	Site 8 OK/ERR (Output, push-pull)	-	-	-	B15

All low-level interface lines are isolated from system GND (and are referenced to GNDI), except for the PWR line, which is referenced to GND.

Ground Domains

The following diagram illustrates the two ground domains of the programmer.



ATE and Target Ground Domains

In order to avoid undesired current paths between the programmer and the target board, we suggest to use a power supply with a floating output (ground not referenced to the Earth potential).

6. Specifications

Electrical Specifications

Feature	Value
Maximum Ratings	
Power supply voltage	30V
ISP SxL0[1..7] voltage	-0.7-6.5V
ISP SxL0[1..7] current	±60mA
ISP SxPPS voltage	-0.7-18V
ISP SxPPS current(*)	380mA
ISP SxRLY voltage	-1.0-30V
Low level interface PRJ_SELx, START, START_ENAx, BUSY, OK/ERRx voltage	-0.7-6.0V
Operating Ranges	
Power supply voltage	12-25V
ISP SxL0[1..7] voltage	0-5.5V
ISP SxPPS voltage	1.5-15V
ISP SxPPS current	300mA
ISP SxRLY voltage	0-28V
Low level interface PRJ_SELx, START, START_ENAx, BUSY, OK/ERRx voltage	0-5.0V
Physical and Environmental	
Operating conditions	0-40°C, 90% humidity max (without condensation)
Storage conditions	-10-60°C, 90% humidity max (without condensation)
EMC (EMI/EMS)	CE

(*) Current limited, recovers automatically after fault condition is removed.

ISP Connectors and cables

ISP and Low-Level Interface connectors are DIN48 male connectors. We suggest using the following compatible female connectors.

The ribbon cable is available in order to improve the signal integrity through many attributes, like impedance matching, electromagnetic interference (EMI) and crosstalk.

For wire wrapping:

DIN41612 connector, 3 rows, 48 pins, 180° female, C style

Manufacturer: Conec

Manufacturer Part Number: 122A10619X

Catalog Part Number: Mouser 706-122A10619X

For soldering:

DIN41612 connector, 3 rows, 48 pins, female, R/A C style

Manufacturer: FCI

Manufacturer Part Number: 86093488613755E1LF

Catalog Part Number: Mouser 649-8693488637E1L

Cables:

Ribbon cable, 30 cm, DIN41612 connector 48W female/male

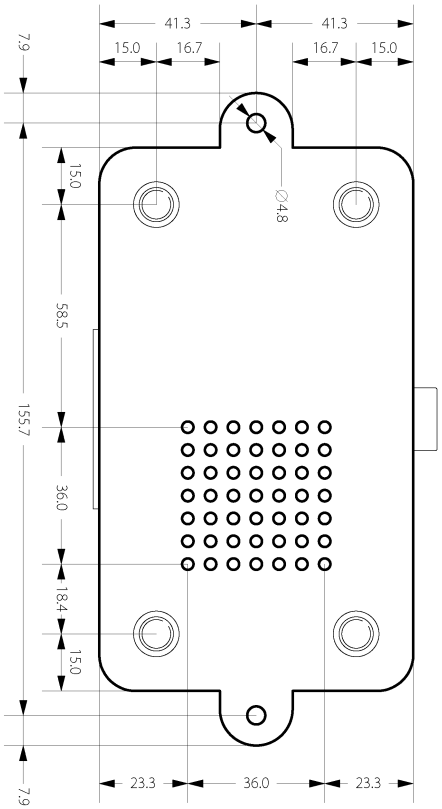
Manufacturer: Algocraft

Manufacturer Part Number: WN-RC30FMA

Catalog Part Number: N/A

Mechanical Specifications

The following drawings detail the mechanical dimensions of the various WriteNow! models.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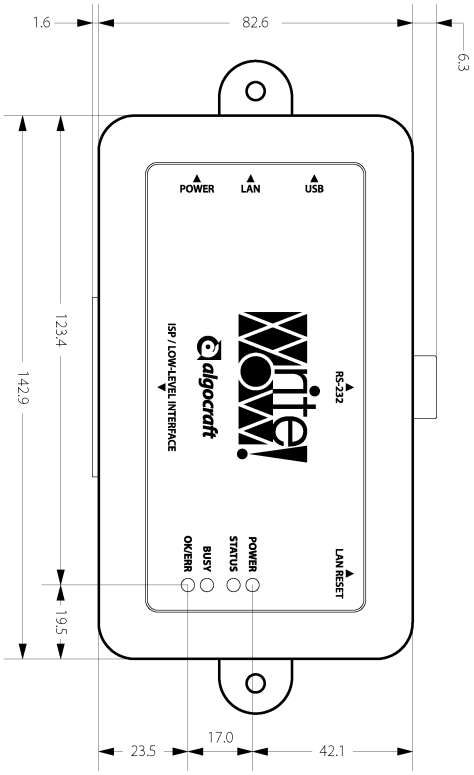
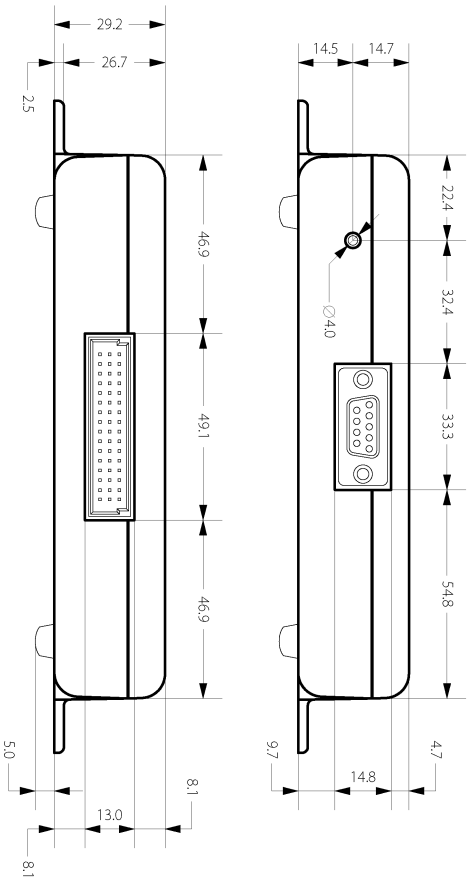
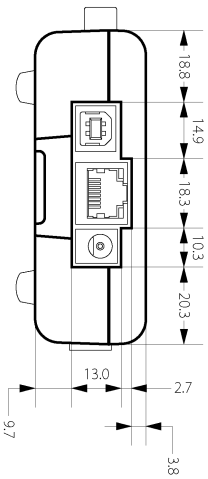
15.0
16.7
16.7
15.0
7.9
15.0
58.5
36.0
18.4
15.0
155.7
7.9
Ø4.8
23.3
36.0
23.3


1.6
82.6
6.3
POWER
LAN
USB
RS-232
ISP / LOW-LEVEL INTERFACE
POWER
STATUS
BUSY
OK/ERR
LAN RESET
123.4
142.9
19.5
23.5
17.0
42.1

WN-PRG01A


29.2
26.7
2.5
46.9
49.1
46.9
5.0
13.0
8.1
8.1
14.5
14.7
22.4
32.4
33.3
54.8
Ø4.0
9.7
14.8
4.7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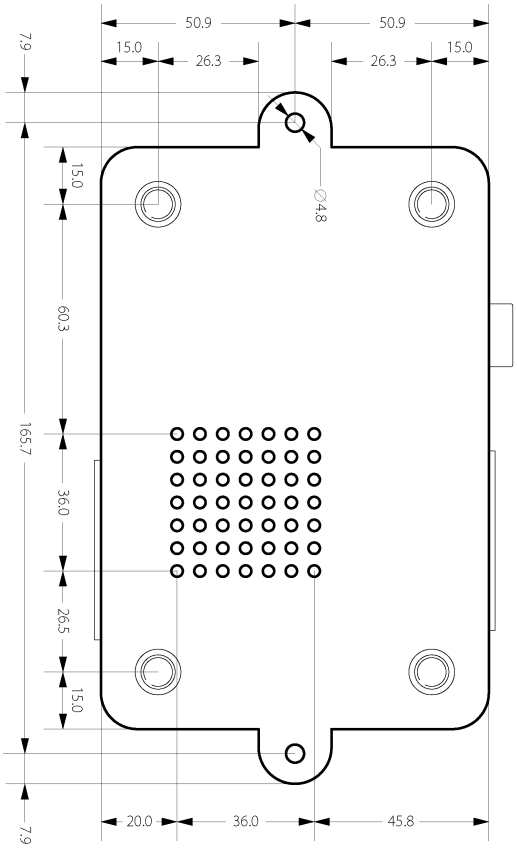
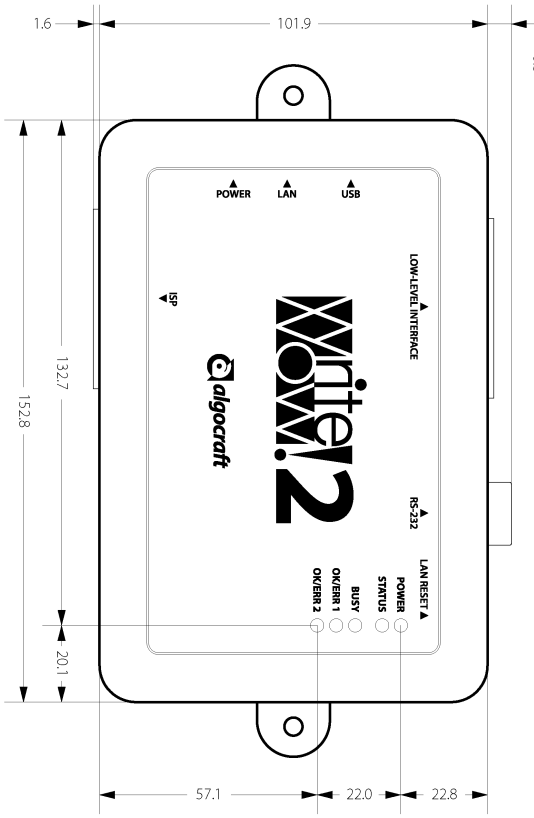
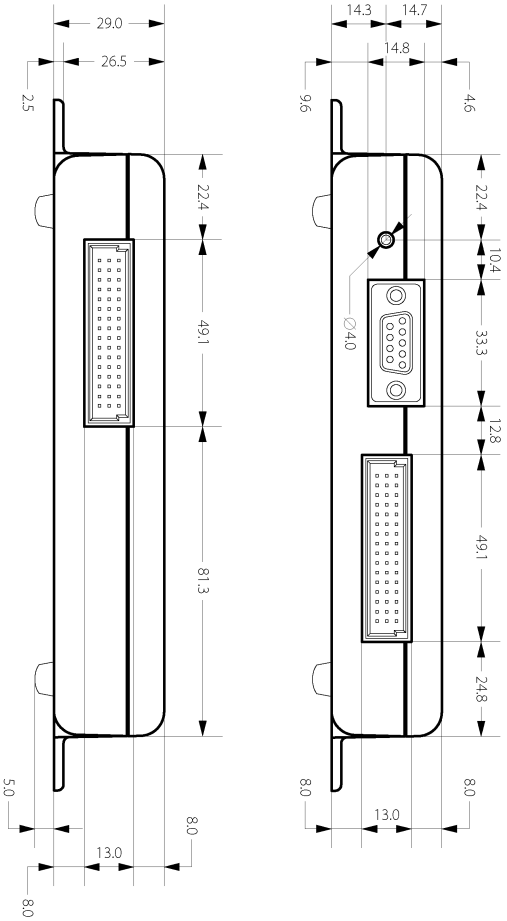
14.9
18.3
10.3
20.3
13.0
2.7
9.7
3.8


50.9
50.9
15.0
26.3
26.3
15.0
7.9
15.0
60.3
36.0
26.5
15.0
165.7
7.9
Ø4.8
20.0
36.0
45.8


1.6
101.9
POWER
LAN
USB
LOW-LEVEL INTERFACE
ISP
algocraft
WriteNow!2
RS-232
LAN RESET
POWER
STATUS
BUSY
OK/ERR 1
OK/ERR 2
132.7
152.8
20.1
57.1
22.0
22.8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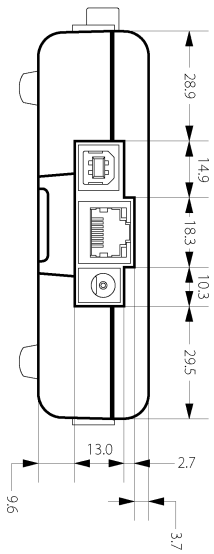
2.5
22.4
49.1
81.3
5.0
13.0
8.0
8.0
14.3
14.7
14.8
9.6
4.6
22.4
10.4
33.3
12.8
49.1
24.8
Ø4.0
8.0
13.0
8.0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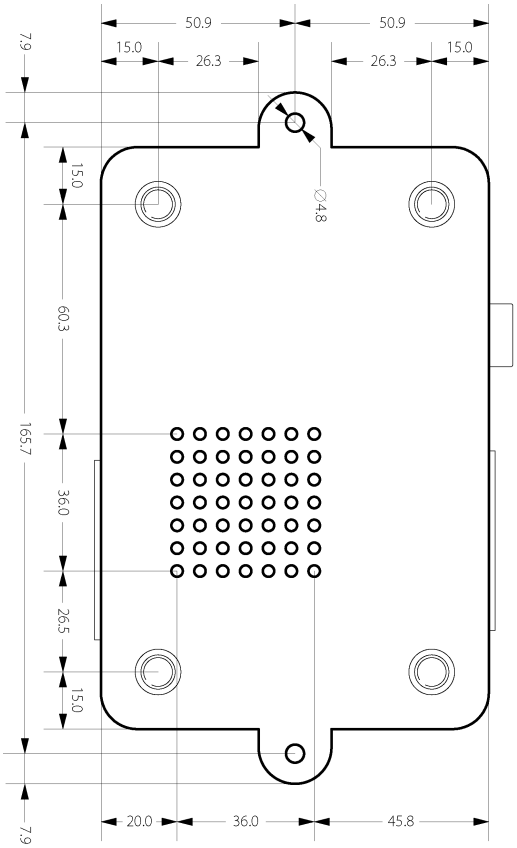
14.9
18.3
10.3
29.5
13.0
2.7
9.6
3.7

WN-PRG02A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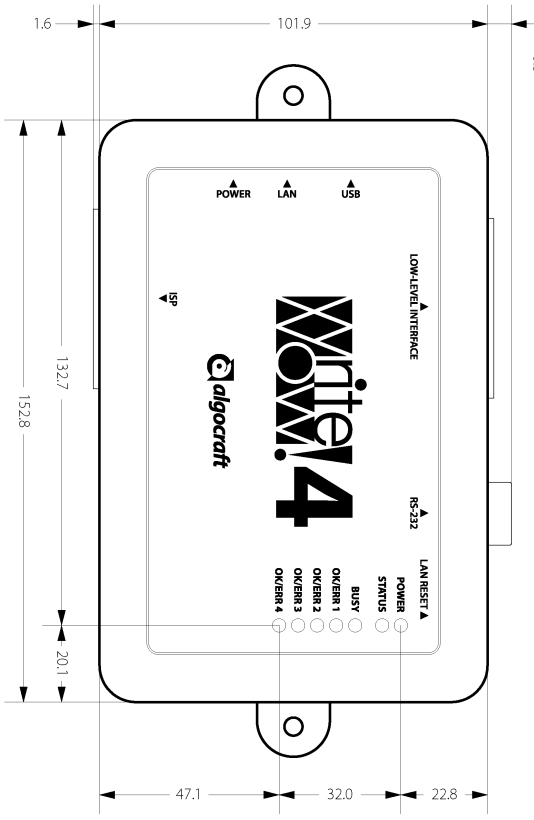
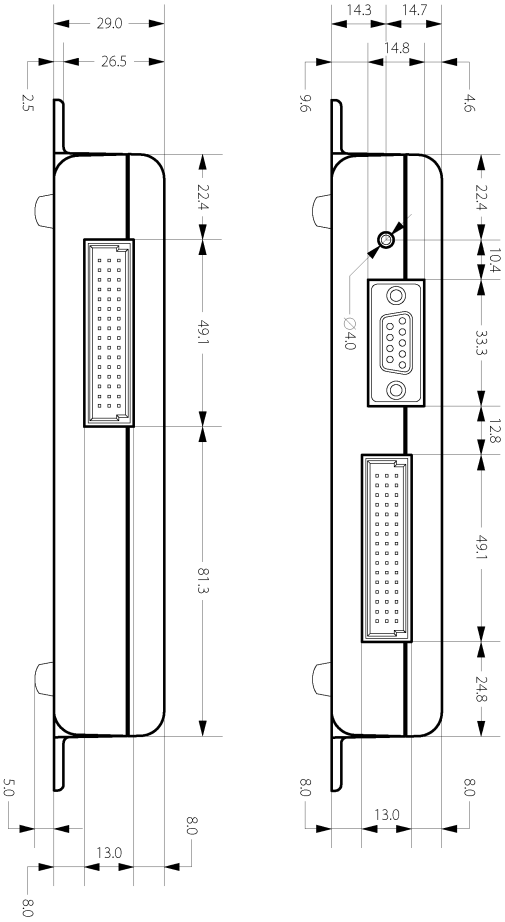
50.9
15.0
26.3
26.3
15.0
7.9
15.0
60.3
36.0
26.5
15.0
165.7
7.9
Ø4.8
20.0
36.0
45.8


1.6
101.9
POWER
LAN
USB
ISP
LOW-LEVEL INTERFACE
RS-232
LAN RESET
POWER
STATUS
BUSY
OK/ERR 1
OK/ERR 2
OK/ERR 3
OK/ERR 4
132.7
152.8
20.1
47.1
32.0
22.8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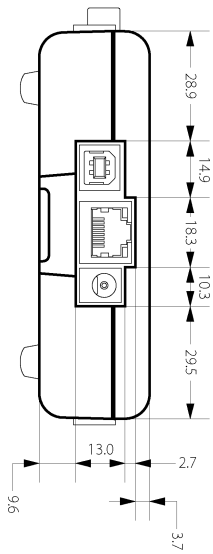
2.5
22.4
49.1
81.3
5.0
13.0
8.0
8.0
14.3
14.7
14.8
9.6
4.6
22.4
10.4
33.3
12.8
49.1
24.8
Ø4.0
8.0
8.0
13.0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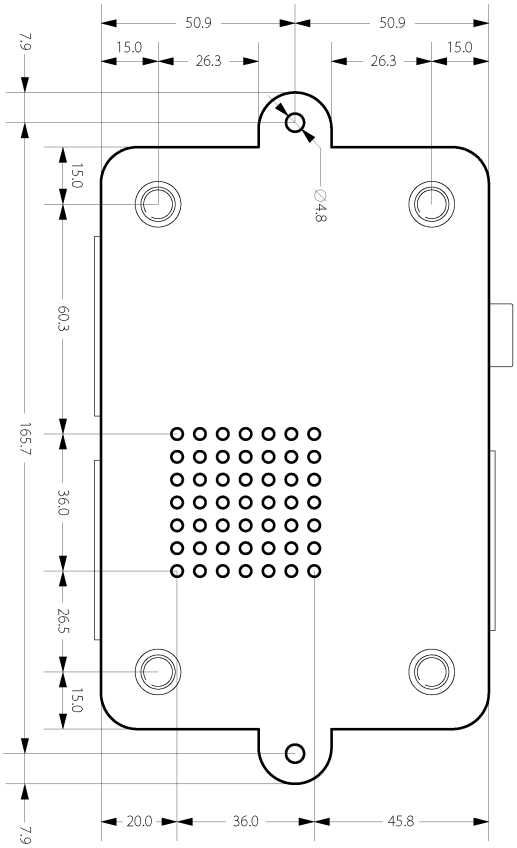
18.3
10.3
29.5
13.0
2.7
9.6
3.7

WN-PRG04A

WN-PRG08A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15.0
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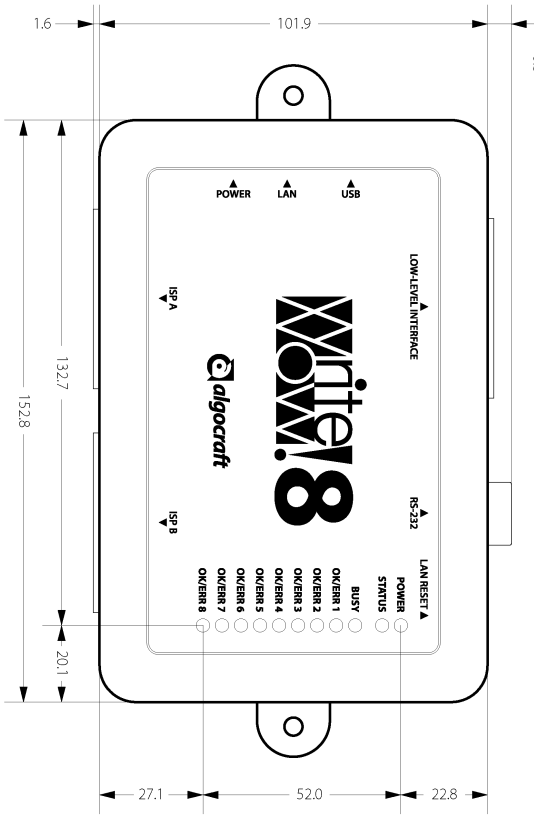
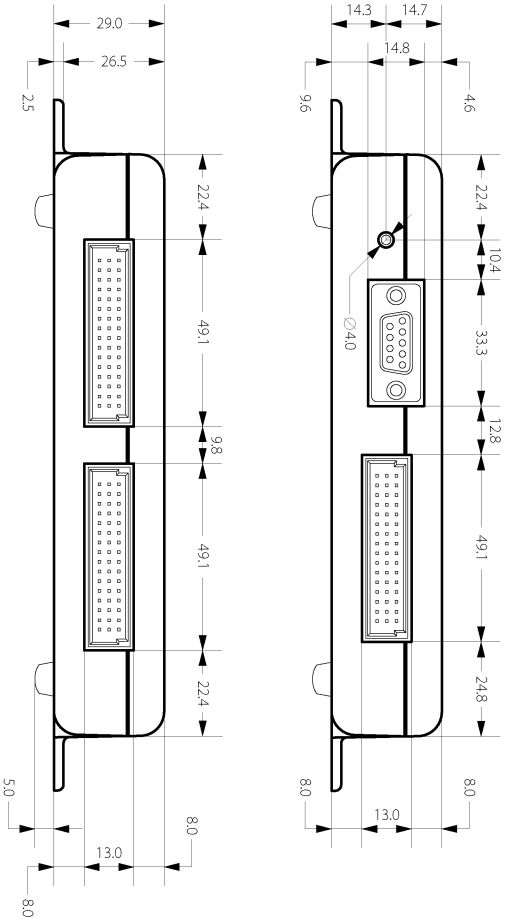
165.7
7.9
Ø4.8
20.0
36.0
45.8


1.6
101.9
152.8
132.7
20.1
POWER
LAN
USB
LOW-LEVEL INTERFACE
ISP A
ISP B
RS-232
LAN RESET
POWER
STATUS
BUSY
OK/ERR 1
OK/ERR 2
OK/ERR 3
OK/ERR 4
OK/ERR 5
OK/ERR 6
OK/ERR 7
OK/ERR 8
27.1
52.0
22.8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8.0
8.0
14.3
14.7
14.8
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4.6
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Ø4.0
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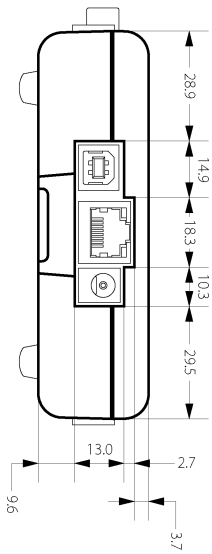
8.0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14.9
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10.3
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2.7
9.6
3.7