Connect your standalone hardware to the Cloud with this IoT gateway

The Zen IoT is a bridging device for connecting legacy standalone infrastructure (PLCs or other discrete control systems) to the Cloud. Use it also for Edge Processing: to collate data, perform calculations and send the results to the Cloud.

Convert process signals direct to wireless

While most gateway devices only convert Modbus to wireless, the Zen IoT converts process signals straight to wireless! No additional devices needed. It features industrial grade analog and digital I/O, with 4–20mA, RTD, TC and many more available options.

Integrates with all your existing equipment

The Zen IoT supports a wide range of communication protocols, including Modbus, and new IoT comms like MQTT. Physical connections include Ethernet, WiFi, 3G/4G modems, RS485 and Bluetooth*. Potential applications include AMR (Automatic Meter Reading), remote monitoring of assets, and data collection and transmission. Additionally, the Zen IoT offers a flexible logic engine which can be programmed with a powerful scripting language for custom applications.

Uses extra layer of IoT security

Privacy and security are big concerns, but the Zen IoT gives you peace of mind. It has its own WiFi port, and connects with an extra layer of security: Transport Layer Security (TLS). Additionally, it has an Ethernet port which uses only Modbus TCP, so the port cannot be hijacked for other communication uses.

Unique low power design for space and cost savings

The Zen IoT features a unique low power design which can be programmed to start at power levels of less than 1/20W, making battery packs and solar panel systems smaller and more cost effective.

Key features:

› **Up to 16 Universal isolated inputs**
  TC, RTD, mA, mV, V, Potentiometer, Frequency, Counter and more
› **Variety of physical connection options**
  Including WiFi, 3G/4G modems, Ethernet, RS485 and Bluetooth Low Energy (BLE)*
› **Wide connection to leading Cloud service providers**
› **Includes real-time clock and data logging**
› **Scripting logic engine** For custom applications
› **Low power design with sleep options**
› **4 Digital inputs**
› **1 Relay output & 3 Solid state relays**
› **Easy USB programming and data log retrieval** defineinstruments.com/workbench

* Bluetooth option available to OEM's on request. Please inquire.
Cloud connection options

**Wired Ethernet Port**
An Ethernet port (use order code 'EIOT') is available for wired internet connection. (Ethernet Modbus TCP is also supported by this instrument and is available to OEM’s on request.)

**WiFi**
WiFi connection (use order code 'WIFI') enables LOS transmission of up to 1476ft (450m) using the supplied 3dBi wireless antenna.

**External 3G or 4G modem**
An external 3G or 4G modem may be used for remote devices, and is especially useful when other connections are not an option. The Zen IoT supports 3G/4G modems by default via the included RS485 serial port. (You can also order an additional RS485 comm if required for connection to your PLC.) The external modem supported at this time is the GateTel GT-HE910-NAD with type approval for AT&T and T-Mobile.

Simple setup with Define WorkBench

Once you have decided on a Cloud connection option, Define WorkBench can then be used to configure your Cloud/server connection settings.

Currently supported Cloud platforms are Xively and deviceWISE (please contact us if your preferred Cloud provider is not listed).

A Custom connection can also be used to connect to your own server or that of a third party. The Custom connection is secured using TLS and uses MQTT as the protocol transfer mechanism. It sends JSON packets containing the industry standard SenML (Sensor markup language) data.

WorkBench also enables easy setup of your inputs, set-points and totalizers, with presets for hassle-free scaling (no calibration required). A Data Viewer module is included for convenient data log extraction, export and visualization.

Download WorkBench for free at defineinstruments.com/workbench

Ordering Options

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZEN-IOT-4</td>
<td>4 x Universal Isolated Inputs, 4 digital inputs, 1 relay, 3 solid state relays, Up to 2 comm ports. Battery low power. Real-time clock and data logging (32MB). Case width 1.38” (35mm)</td>
</tr>
<tr>
<td>ZEN-IOT-12</td>
<td>12 x Universal Isolated Inputs, 4 digital inputs, 1 relay, 3 solid state relays, Up to 2 comm ports. Battery low power. Real-time clock and data logging (32MB). Case width 2.36” (60mm)</td>
</tr>
<tr>
<td>ZEN-IOT-16</td>
<td>16 x Universal Isolated Inputs, 4 digital inputs, 1 relay, 3 solid state relays, Up to 2 comm ports. Battery low power. Real-time clock and data logging (32MB). Case width 3.35” (85mm)</td>
</tr>
</tbody>
</table>

**Comms Configuration (Select One)**

- RS 2 x RS485 / RS232
- EIOT 1 x RS485 / RS232, 1 x Ethernet IoT
- WIFI 1 x RS485 / RS232, Wifi (3dBi antenna included)

NOTE: Bluetooth and Modbus TCP comms are also supported by this instrument and are offered to OEM’s, subject to minimum order requirements. Please inquire.
General specifications

Power

**Power supply** Battery Low Voltage, 10–30V DC

Analog input

**Universal isolated analog inputs**
Zen IoT 4: 4 Input channels
Zen IoT 12: 12 Input channels
Zen IoT 16: 16 Input channels

**PTO for input specifications**

**Input isolation** 2,500V AC 1 minute between all input channels

**Isolation test voltage** 1000V DC for 1min (Analog input to digital output, Analog input to analog input)

**Input resolution** 16 bits

**Accurate to** <±0.1% FSO (unless otherwise stated in input specifications)

General specifications

**Linearity & repeatability** <±0.1% FSO

**Channel separation** 125db minimum

**RF immunity** <±1% effect FSO typical

**Noise immunity (CMRR)** 160dB tested at 300V RMS 50Hz

**Permanent memory (E2ROM)** 100,000 writes per input parameter

Relay output

1 x latching relay output
1A, 30V DC (Form C)

3 x solid state relays
0.4A, 30V DC (Form A)

Digital input

4 x Digital inputs

**Functions** Status, up counter, up/down counter with direction, debounced counter, frequency, gated frequency

Counter register output 32 bit

**Frequency range** 0–10,000Hz (Reduced to 0–1,000Hz in Sleep Mode)

**Input types** NPN, Clean Contact, Voltage 2–30V DC

**Threshold** 1.2V typical

**Debounce counter range** 0–100Hz

**Isolation** Not isolated to power supply

Comms

**Protocols** Modbus RTU, RS485, RS232 or Define ASCII

**Default comm port** RS485 / RS232 auto-select. Selectable baud rate 2400–230000 baud

**Format** 8 bit, no parity, 1 stop

**Isolation test voltage** 1000V DC for 1min (Comm to analog input, Comm to digital input/output)

**Optional additional comm (front panel)** Select WiFi, Ethernet IoT or RS485/232 (auto-detecting)

Programming

**USB programmable** Via 'PC Setup' port using Bridge Key USB programmer (sold separately)

Define WorkBench Simple configuration using Define WorkBench:
[defineinstruments.com/workbench](http://defineinstruments.com/workbench)

Datalogging

**Real-time clock**

**Data logging** 32MB (31,774 samples for all channels)

**Simple data log retrieval and visualization, using Define WorkBench**

Construction

**Casing** DIN 35 rail mounting; Material: ABS inflammability V0 (UL94)

**Dimensions (H x W x D)**
Zen IoT 4 = 3.98 x 1.38 x 4.72" (101 x 35 x 120mm)
Zen IoT 12 = 3.98 x 2.36 x 4.72" (101 x 60 x 120mm)
Zen IoT 16 = 3.98 x 3.35 x 4.72" (101 x 85 x 120mm)

**Height with antenna** 4.65" (118mm), WiFi model only

Environmental conditions

**Operating temperature** –40 to 176°F (–40 to 80°C)

**Storage temperature** –40 to 176°F (–40 to 80°C)

**Operating humidity** 5–85% RH max, non-condensing

Compliances

EN-61326-1:2006

EMC Emissions EN 558022-A; Immunity EN 50082-1; Safety EN 60950

Accessories (Sold Separately)

| BRIDGE-KEY | BRIDGE-KEY | USB Bridge Key, required for PC programming using our free WorkBench software. |
| GT-HE910-NAD | GT-HE910-NAD | GateTel cellular modem for 3G/4G connections |
### Input types

#### Thermocouple Input

**Thermocouple types**
- B: 32 to 3272°F (0 to 1800°C)
- E: -328 to 1292°F (-200 to 1000°C)
- J: -328 to 1832°F (-200 to 1000°C)
- K: -328 to 2300°F (-200 to 1260°C)
- N: -328 to 2372°F (-200 to 1300°C)
- R: 32 to 3092°F (0 to 1700°C)
- S: 32 to 3092°F (0 to 1700°C)
- T: -328 to 752°F (-200 to 400°C)

**Input impedance**: >500KΩ

**T/C lead resistance**: 100Ω max

**Cold junction compensation**: 14 to 140°F (–10 to 60°C)

**CJC drift**: <0.02°C/°C typical for all inputs

**Accuracy**: 0.1% of FSO ±1°C typical

**Sensor open**: Upscale

#### RTD Input

**RTD input type**
- Pt100 3 wire RTD DIN 43760: 1980
- Pt1000 3 wire RTD standard

**Range**
- -328–572°F (-200–300°C), 0.02°F (0.01°C) resolution
- -328–1472°F (-200–800°C), 0.1°F (0.1°C) resolution

**Lead wire resistance**: 10Ω/lead max recommended

**Sensor current**: 0.6mA continuous

**Sensor fail**: Upscale

**Accuracy**: -328–572°F (-200–300°C) = ±0.1; -328–1472°F (-200–800°C) = ±0.3°C

**Ambient drift**: 0.003°C/°C typical

#### Voltage Input

**Ranges** ±200mV, –200mV to 1V, 0–10V, 0–18V

**Input impedance**: >500KΩ on all ranges

**Maximum over voltage**: 24V DC

**Linearity & repeatability**: 0.1% FSO max

#### AC Current Sensor Input

**Sensor type** Current transformer
- ACCS-420, ACCS-420-L and ACCS-010

**Amperage range** Header selectable
- ACCS-420/010= 100/150/200A
- ACCS-420-L = 10/20/50A

**Overload**: (continuous)
- ACCS-420/010= 175/300/400A
- ACCS-420-L = 80/120/200A

**Output** (Representing 0–100% of full scale input range)
- ACCS-420(-L)= 4–20mA DC loop powered
- ACCS-010= 0–10V DC

**Power supply**
- ACCS-420(-L)= Loop powered, 15–36V DC
- ACCS-010= Self powered

**Accuracy**: 1% of full scale

**Response time**: 250ms (10–90%)

**Isolation voltage**: 2,000V

**Frequency**: 50–60Hz

#### Attenuator Input

**Attenuator type** Define Instruments HVA-1000, differential resistive attenuator

**Max input voltage**: 1000V DC

**Attenuation factor**: 1000 ±0.1%

**Input impedance**: 3.8MΩ

**Output impedance**: 3.8kΩ

**Ambient drift**: 50ppm/°C max