inView Installation Manual

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Installation OverView

Provide power to the inGate. Connect this gateway to the network via ethernet or third-party wireless adapter. Install electricity meters, flow meters, and sensors. Record information such as sensor IDs, locations, and CT schedules. Wire Modbus devices, such as electricity meters or sensors, to the inGate. Install and power up wireless Zigbee devices. Enter the IP address of the gateway into a web browser. Configure devices on this internal webserver. Inform PowerWise support@powerweisesystems.com of the install and share CT schedules, along with sensor IDs and locations. PowerWise configures your dashboard and provides username and password access to https://app.intellergy.net.

inView

inView is a hardware and web-based application platform for monitoring and controlling buildings and mechanical systems. Visit https://app.intellergy.net to access the application.

inGate -- a Commercial-Grade Ethernet Gateway

The inGate is a gateway that uses the building's network to send and receive data to and from the cloud. Sensors and meters communicate with the gateway through wired and wireless communications. The inGate supports select Modbus and Zigbee devices.
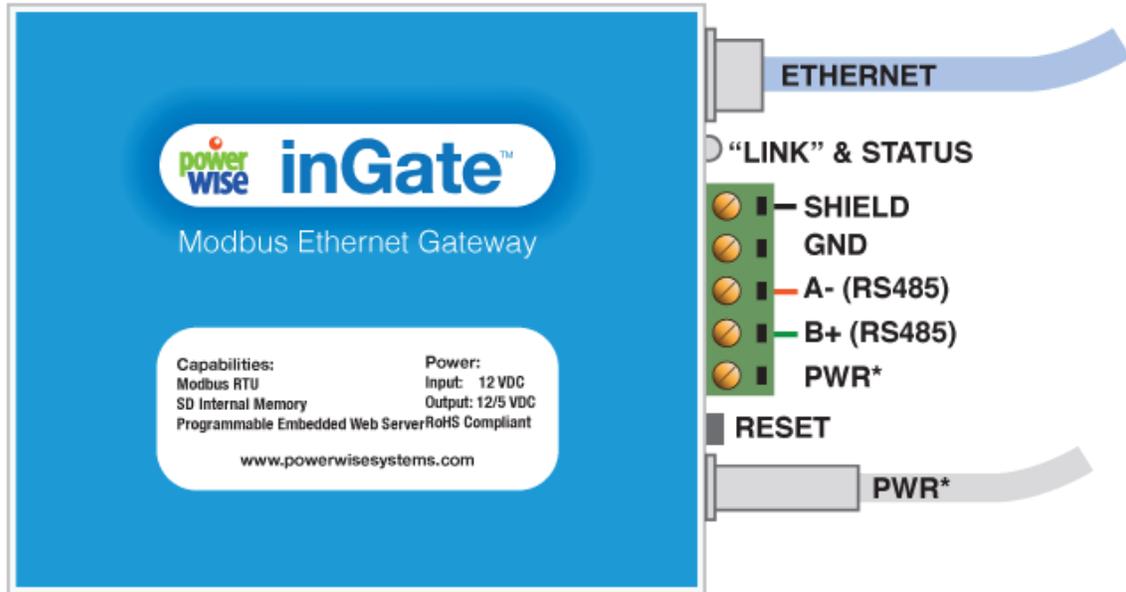
power wise

Figure 1. inGate Terminal Connections and Status Lights
*DC power terminals are interconnected. Do not connect to multiple power sources.

Where to Install the Gateway

The inGate needs to connect to the building's network or a cellular modem network, plus communicate with the sensors and meters. All of these communications may involve wired and wireless options. The gateway's location depends on network access, power availability, and sensor/meter communications. Typically, the device is installed in the mechanical room. The inGate can be mounted on DIN rail.

PowerWise recommends installers have laptops with network access.

Power

The inGate can be powered by 12-30 VDC. A 12 VDC power supply is provided. In some cases, the inGate may be installed inside an enclosure, and an electrician will need to bring power to the enclosure.

The inGate can provide power to other devices via the PWR terminal.

Network

The most reliable network connection is to wire the inGate via ethernet. If the gateway cannot be located where an ethernet connection is available, an ethernet to wireless adaptor can connect the inGate wirelessly to the building's network. Generally speaking, the adapter needs the network password and power with the correct voltage.

Wireless Communications with Sensors and Meters

In some cases, the inGate can communicate with sensors and meters wirelessly. The inGate supports select Zigbee devices such as the Wireless inSense, inBridge, and Zigbee thermostat. The inSense wireless sensor monitors relative humidity and temperature. The inBridge accepts wired inputs from Modbus devices and sends the data wirelessly via Zigbee to the inGate.

Wired Communications with Sensors and Meters

The inGate has A and B inputs for Modbus devices. Examples of Modbus devices include electricity meters, flow meters, and sensors. The inGate is the Modbus master, and the sensors and meters are slave devices.

Use CAT5 or better with twisted pair when wiring Modbus devices to the inGate. If wiring multiple Modbus devices to the inGate, daisy chain the devices together to provide the best conditions for data communications.

All of the A terminals are connected together and all of the B terminals are connected together. Using CAT5 or better, PowerWise recommends using one twisted pair for A and B.

Network and Communication Status

The inGate has a link and status light to the left of the "Normal" LEDs. The two lights identify network and communication status.

Figure 2. inGate Status Lights

Registration

Upon completing the hardware installation, confirm the inGate communication status on the LEDs. If green, enter the gateway's IP address into a web browser.

To find the gateway's IP address, access your router through a browser. Find the MAC address that matches the label on your gateway, and record the IP address. If you cannot access your router, contact support@powerwisesystems.com or call 1-207-370-6517, and choose Tech Support. We can find the IP address for you.

Powerwise

Ethernet – Modbus – Zigbee Gateway

| Overview | Devices | Zigbee | Settings |

Overview

Firmware Version:	30159
TCP/IP Stack:	v5.42
MAC Address:	D880397A0AF1
IP Address:	192.168.0.9
ZigBee Radio:	OK
Memory Usage:	Current:2% Max:3%

System Log

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When you are viewing the gateway's internal server, click on **Devices** to configure Modbus communications. If asked for a username and password, use admin for the username and the last four digits of the mac address as the password. The username and password are case-sensitive.

Select a device to add.

Enter the Modbus address of the equipment next to "add device" and click "add device". Select the Modbus address from the table below.

Device	ID Start
Measurlogic DTS	70
Wattnode/inPower	50
Vaisalas	230-240
inControl	20
inDAC	1-5
Spire BTU Meter	255
Dent	100
Rainwise	60
ICP	35
Onicon	80

You will get some information including "tx" and "Err". The tx should be counting up if the device is connected correctly. Otherwise, the Err will be counting up, indicating an error.

User Access

Notify PowerWise support@powerwisesystems.com about the installation. Email the CT schedules and sensor IDs and location information, as well. PowerWise creates usernames and passwords to allow access to the inView application. Login at https://app.intellergy.net.

inSense Wireless Sensors

There are two versions of the inSense wireless sensors. One is waterproof and suitable for monitoring and alerting on temperatures for refrigeration, freezers, external ambient

temperatures, and solar panels. The second version of the sensor monitors relative humidity and temperature. This sensor surface mounts to a wall. Batteries are included with sensors.

To connect the sensor to the inGate, remove the cover from the case. The sensor ships in hibernate mode. Press the button once to initiate the sensor to join the local inGate network. NOTE: The wireless sensor will connect to the first network it finds. Make sure only one network is enabled.
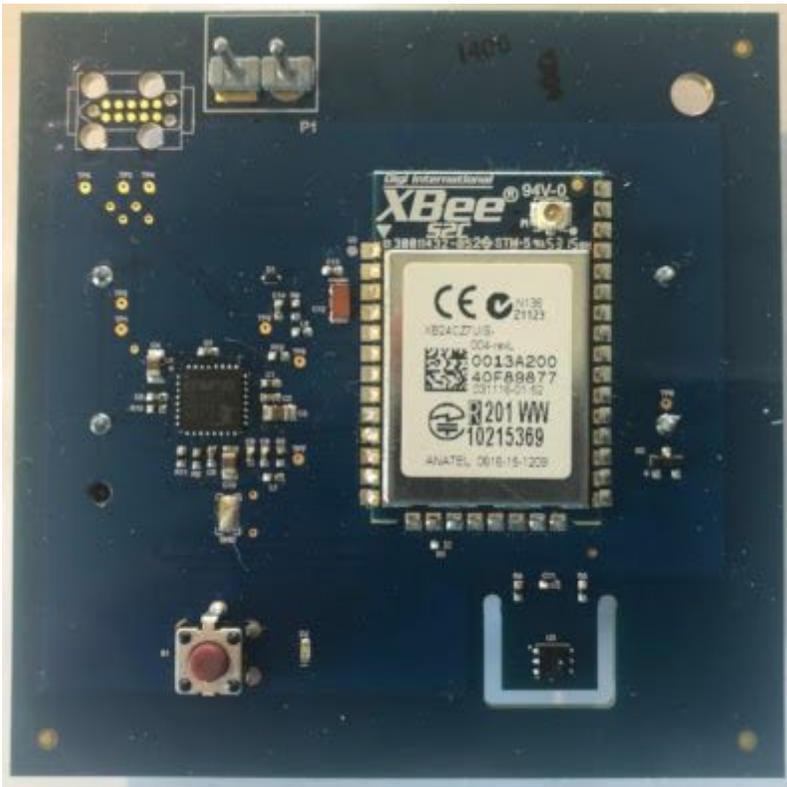
Figure 3. inSense Wireless Circuit Board

LED Indication

Continuous Flashing: Scanning network for matching inGate Zigbee Network.
No Flashing: Connected to inGate.

Button Press

Single Press: Wakes up temperature sensor and sends all sensor values. If in hibernation will wake the sensor to join an open network.

Three Presses: Within 5 second interval will hibernate the device and leave the network. Two long LED flashes will indicate success.

inGate and WattNode Wiring

The WattNode is an electricity meter that measures energy, power, voltage, current, frequency, and power factor.
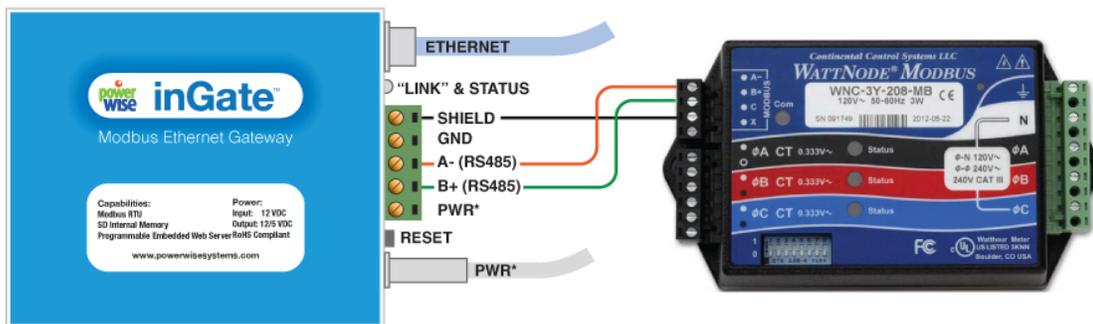
Figure 4. inGate wired to WattNode

Refer to the WattNode installation manual for further instructions. Refer to the PowerWise CT schedule for the project. If one was not created, record the information and email it to support@powerwisesystems.com.

inGate and PowerScout 12HD or 48 HD Wiring

Dent PowerScout electric meters provide high-accuracy electricity monitoring. These meters receive power from the electrical panel.

Figure 5. inGate and Dent PowerScout Wiring Diagram

Refer to the Dent PowerScout Installation Manual for further instructions. Refer to the PowerWise CT schedule for the project. If one was not created, record the information and email it to support@powerwisesystems.com.

inGate and inPower / WattNode Energy Meter Module Wiring

The inPower / WattNode Energy Meter Module is a three-channel electricity meter that supports many phases and voltages. The module is powered by 6-24VDC or isolated 12-24 VAC.
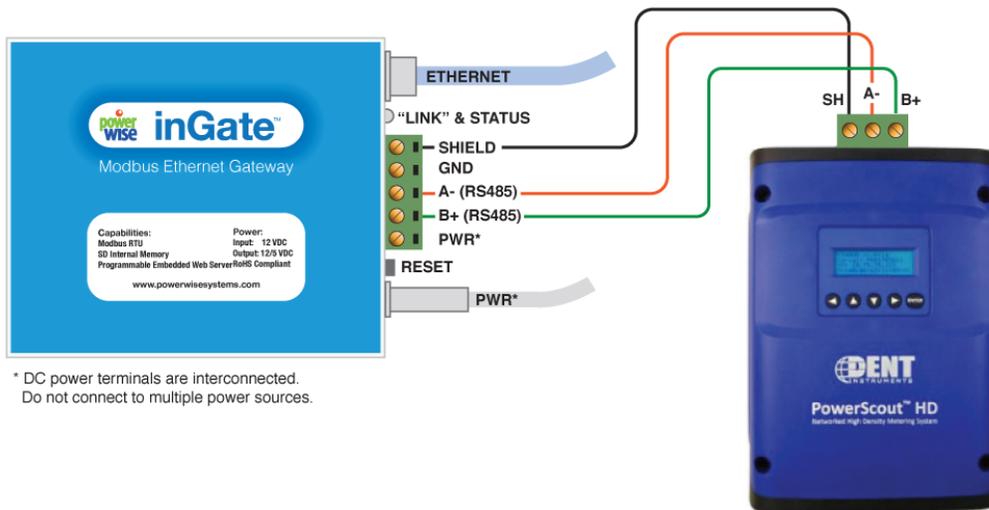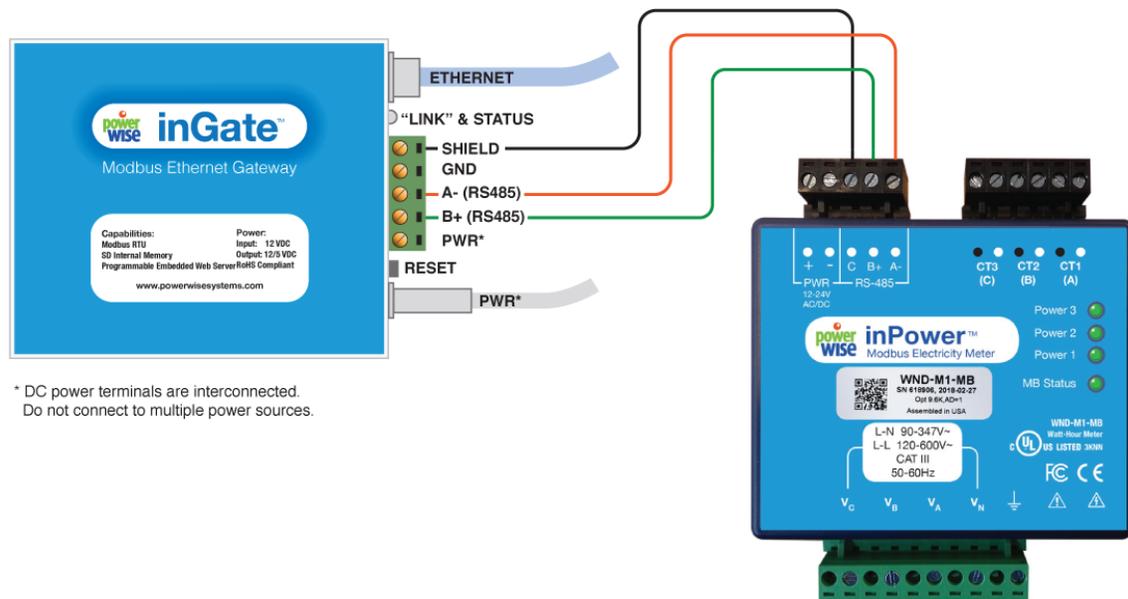
Figure 6. inGate and Dent PowerScout Wiring Diagram

Refer to the inPower Installation Manual for further information. Refer to the PowerWise CT schedule for the project. If one was not created, record the information and email it to support@powerwisesystems.com.

inDAC - Data Acquisition Hardware

Integrate data from popular sensors and meters using the inDAC. Examples include sensors for air quality, CO_2, VOC, relative humidity, temperature, fluid levels, and pressure. As for meters, possibilities include water, gas, and BTU.

The inDAC data acquisition hardware features Modbus RTU communication protocol for connection to Modbus-enabled gateway devices, such as the inGate, allowing for cloud storage. The inDAC's feature two serial connection types: RS-232 and RS-485 enabling expansion of inputs and outputs.

The inDAC has the following inputs and outputs:

Digital Inputs:
(4x) 0-5 V state/contact inputs, sinking
(4x) up to 100 Hz counter inputs, sinking
(1x) 1-Wire master. Up to 20 unique sensor ID's.

Analog Inputs:
(6x) 12 bit, 0-5 VDC

Digital Outputs:
(4x) 0-5 VDC TTL
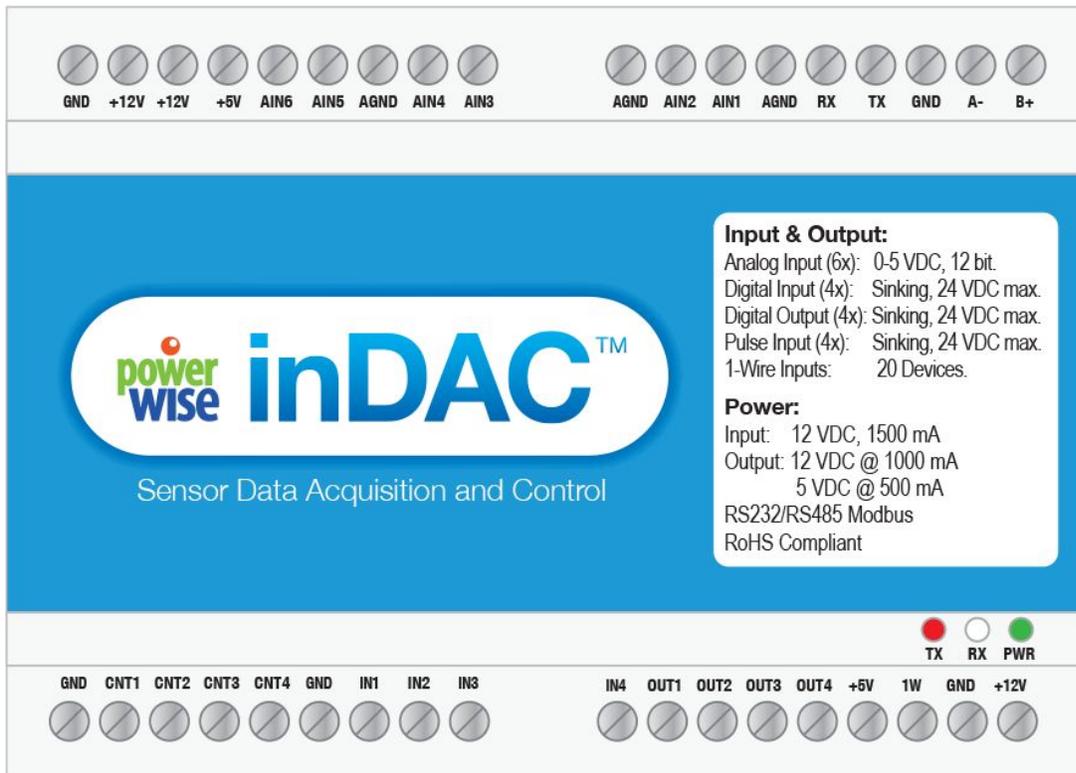
Figure 7. inDAC Terminal Connections

Power

The inDAC is powered by a 9-16 VDC power supply rated to a minimum of 1.5 amp. The system comes standard with a +12 VDC 18-Watt wall transformer with the neutral connected to ground. There is a connector located on the left hand side of the enclosure. A DIN rail mountable industrial power supply can be supplied/used, which allows for multiple inDAC's to be powered by one source.

Communication

The inDAC communicates with the inGate via Modbus. Typically, this is a wired connection, but the inBridge can make the connection wireless.

Figure 8. inGate and inDAC Wiring

Multiple inDACs can connected in parallel via RS-485.

Counter Inputs/Connections

The inDAC has four (4) counter cumulative inputs labeled CT1 –CT4 rated to a maximum switching frequency of 100 samples per second (100 Hz) and protected to 24 VDC input. These inputs need to be setup with sinking logic and will register a pulse/switch when connected to ground. Common sensors include hall-effect flow meters, reed switch flow meters, speed sensors, and contact closures.
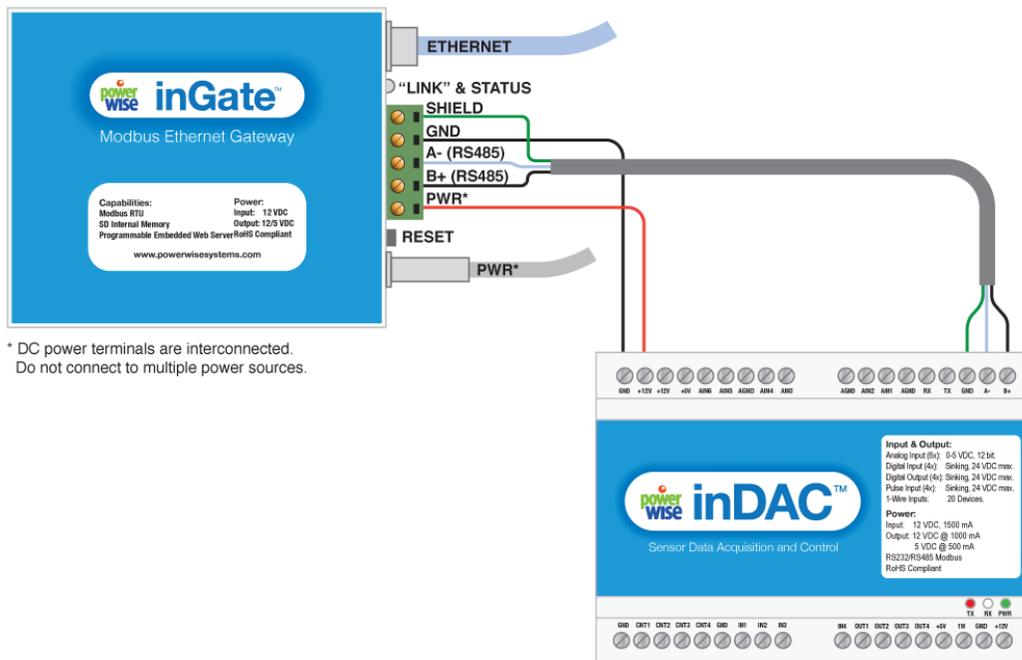
Analog Input Connections

The inDAC has six (6) inputs labeled AIN1 – AIN6 with an input range of 0 – 5 VDC with 12 bit resolution. The ports are optically isolated with overvoltage protection up to 24 VDC. Although the inDAC records only raw data locally scaling factors are applied on the PowerWise website under the settings page.

Analog sensors such as level sensors, HVAC equipment control set points, etc. will integrate into these channels. Integration into 4 – 20 mA output devices can be accomplished by installing a 250 ohm resistor between the signal and ground of the port.

Analog wiring distances should be 20 feet or less.

Digital Input Connections

Four (4) digital input channels are found at connections IN1 – IN4 of the PowerWise inDAC. The digital inputs should be used to tell whether a sensor is "On" or "OFF". These inputs are triggered when connected to ground indicating "ON". The ports are optically isolated with overvoltage protection up to 24 VDC. These inputs will work with a variety of building sensors such as AC switches, DC switches, optical sensors, flame detectors, etc.

Digital Output Connections

Digital outputs are located on channels labeled OUT1 – OUT4 on the sensor controller. Each of the four channels are rated to100 mA maximum and isolated to 24VDC max. These channels are designed to offer basic control of various building systems. The output can also be connected to a 12VDC or 24VDC power source as long as the current is limited to 100mA. This

connection should only be used to power very low consumption devices and is designed primarily to trigger relays, HVAC equipment controls, indicators, etc.

1-Wire Sensors

1-Wire devices are digital sensors that communicate through the 1-Wire communication protocol. Each individual sensor is hard coded with a 64 bit unique ID that should be recorded before installation. Each 1 Wire device can be connected in parallel with a maximum of 20 unique ID's.

1-Wire networks can be wired in several different topologies, with the most common being linear, studded, or star.

Linear

The 1-Wire bus is a single twisted pair, starting from the master and extending to the farthest 1-wire device. Other devices are attached to the 1-Wire bus with insignificant branches (< 3m).
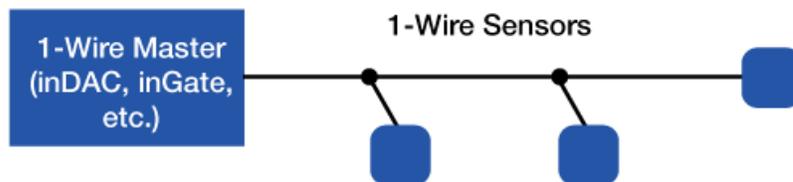

Figure 9. Linear 1-Wire

Stubbed

The 1-Wire bus is a single a single twisted pair, starting at the master and extending to the farthest 1-Wire device. Other devices are attached to the main line through branches 3m or more in length.
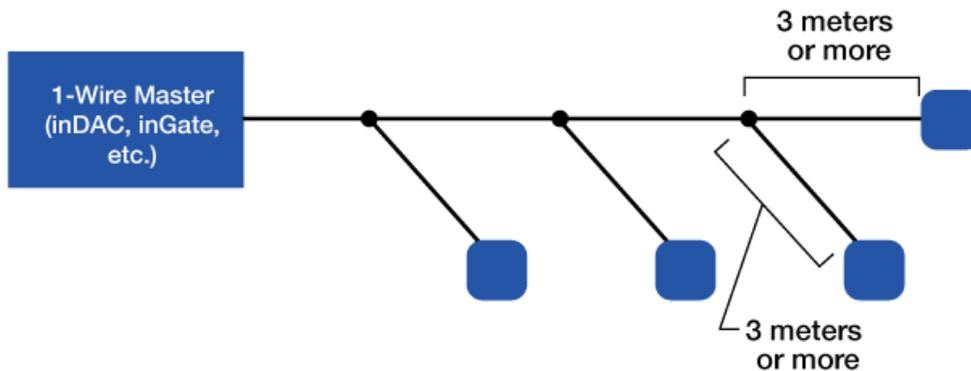

Figure 10. Stubbed 1-Wire

Star (Not Recommended)

The 1-Wire bus is split at or near the master and extends in multiple branches of varying lengths. There are 1-Wire devices along, or at the ends of the branches. (Not recommended for networks with long runs).
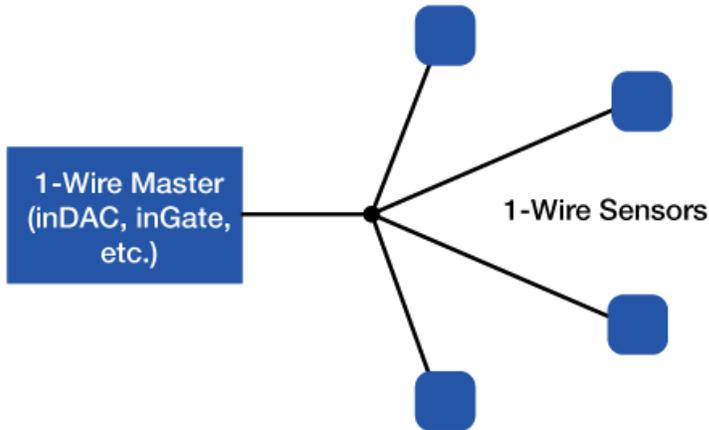
Figure 11. Star 1-Wire

Unswitched star topologies (i.e., those with several branches diverging at the master) are the most difficult to make reliable. The junction of various branches presents highly mismatched impedances that can cause data errors. For this reason, the unswitched star topology is not recommended, and no guarantees can be made about its performance.

inGate and inControl

The inControl offers on/off and variable-speed controls. Common applications involve using contactors to set schedules for lighting. Variable speed controls can be used for controlling valves and fans. The inControl has options to communicate with the inGate via wired or wireless (Zigbee). If making a wired connection, wire A on the inControl to A on the inGate, and wire B on the inControl to B on the inGate.

The inControl control module has the following inputs and outputs for receiving and passing commands from user interaction, automated schedules, or analytics:

Analog input x 2: 0-5V DC
Analog output x 2: 4-20 mA
Digital input x 4: 0-24 VAC & 5-30 DVC
Digital output x 8: 0-60 VDC & 0-42 VAC
2A continuous & 6A < 10Ms

Communication: RS485 and Zigbee

Power:

      10-30 VDC
      24 VDC Minimum for Analog Output

Figure 12. inControl terminal connections.

inView Installation Manual

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