SCADACORE

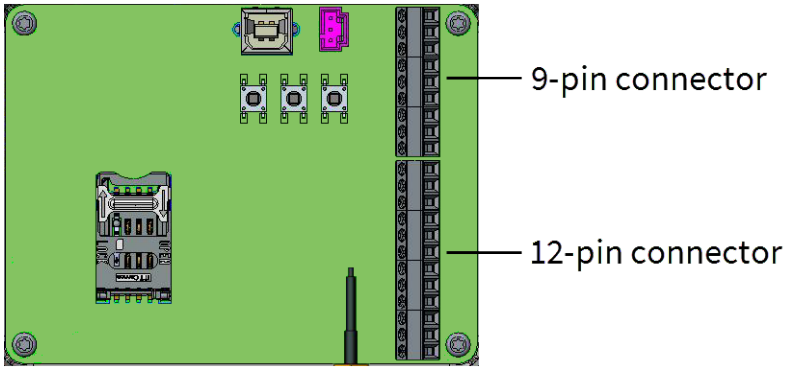
SCADACore ViaCell-100

I/O Wiring Guide

Contents

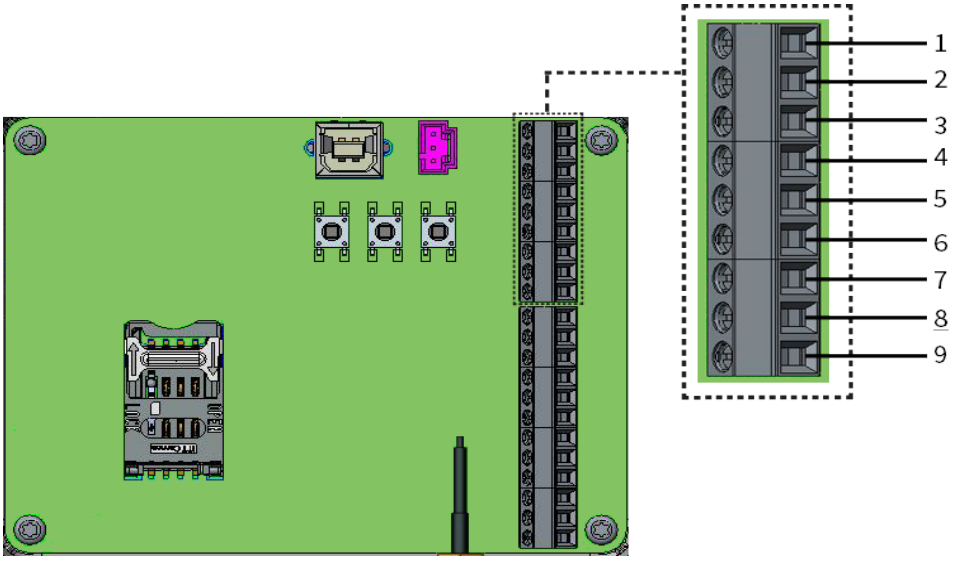
I/O interface pin assignments

ViaCell-100 has two I/O connectors—a 9-pin connector and a 12-pin connector.



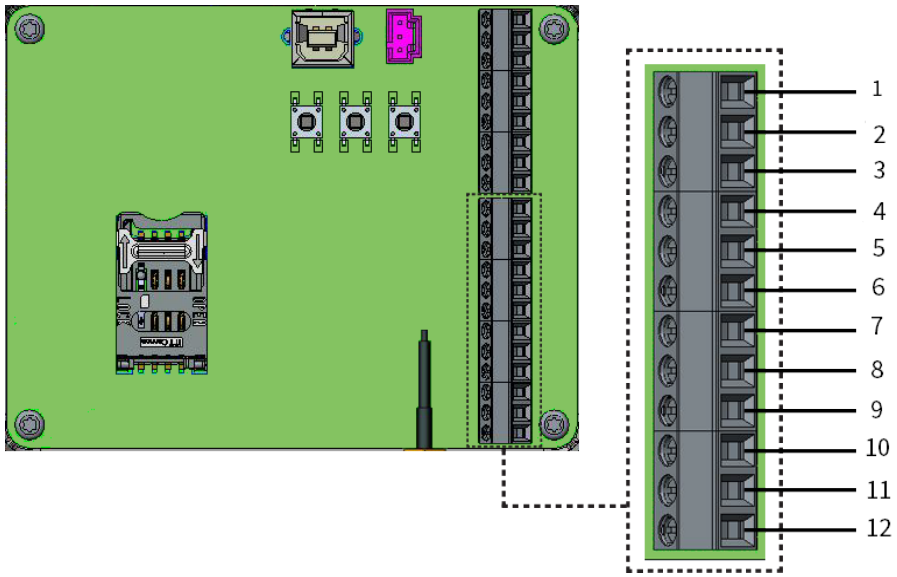
The pin assignments and signals are shown in the following images and tables.

9-pin connector details



Pin number	Assignment	Signal
1	SGnd	Serial interface ground
2	SRX/-	Serial interface Modbus -
3	STX/+	Serial interface Modbus +
4	SPwr	Serial interface power output
5	EXT GND IN	External power supply, ground
6	EXT PWR IN	External power supply, positive input
7	DGnd	Digital interface, ground
8	DIO	Digital interface I/O
9	DPwr	Digital interface power output

12-pin connector details



Pin number	Assignment	Signal
1	A4 GND	Analog interface 4, ground
2	A4 IN	Analog interface 4, analog input
3	A4 Pwr	Analog interface 4, power output
4	A3 GND	Analog interface 3, ground
5	A3 IN	Analog interface 3, analog input
6	A3 Pwr	Analog interface 3, power output

Pin number	Assignment	Signal
7	A2 GND	Analog interface 2, ground
8	A2 IN	Analog interface 2, analog input
9	A2 Pwr	Analog interface 2, power output
10	A1 GND	Analog interface 1, ground
11	A1 IN	Analog interface 1, analog input
12	A1 Pwr	Analog interface 1, power output

Wire sensors to the I/O interface

To wire third-party sensors to the ViaCell-100 I/O interface, you need the following equipment:

- A slot-headed 0.4 x 2.5 x 80 mm screwdriver
- Wire size 1.29-0.25 mm (16-30 AWG) for each pin connector

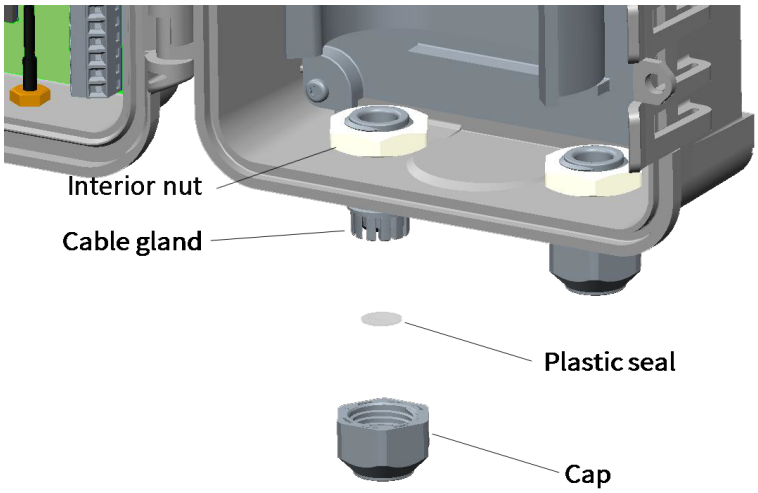
Note All external or field wiring must be in accordance with NFPA 70 Article 501.10(B).

To wire sensors to the I/O interface:

1. Open the ViaCell-100 enclosure and disconnect all power sources.

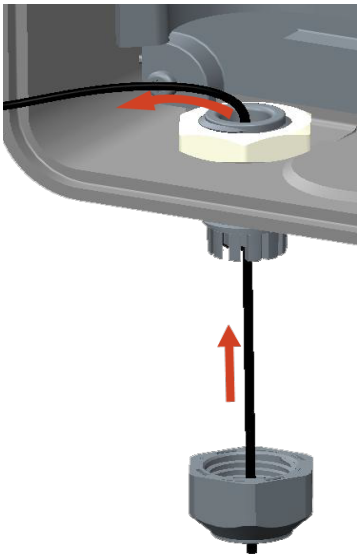
CAUTION! You must disconnect power from ViaCell-100 before wiring sensors to the I/O interface.

2. Unscrew the gland cap and remove the plastic seal.

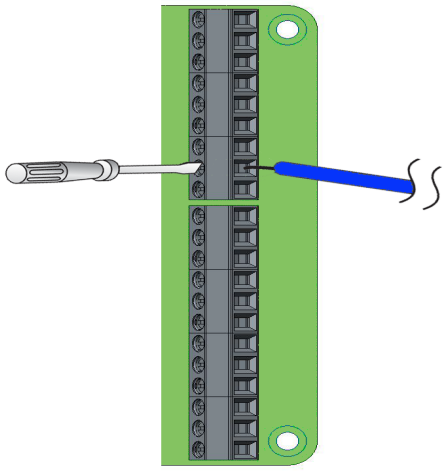


Note For an unused cable gland, make sure the plastic hole cover stays in place to keep it sealed. Over tightening an unused cable gland cap can force out the plastic hole cover, unsealing the cable gland.

3. Run the sensor cable through the cap and thread it through the cable gland.



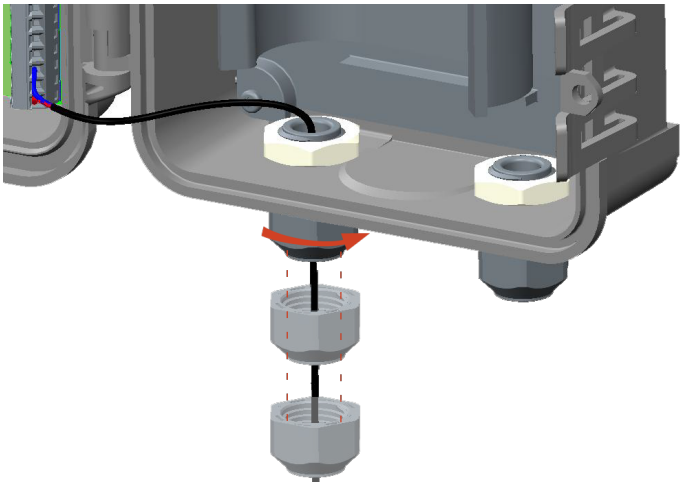
4. Use the screwdriver to loosen the I/O interface connector screw.
5. Slide the wire into the terminal side of the connector.
6. Tighten the screw to 0.2 N-m to secure the wire to the connector.



7. Seal and secure the wire.
    a. Hold the cable gland and tighten the interior nut to secure the rubber seal between the device and the cable gland. This ensures that the rubber seal does not buckle.

    Note If the rubber seal is buckled, water intrusion may occur.

    b. Tighten the cap to the cable gland to seal and secure the wire.



8. Apply the gasket lubricant on the gasket to properly seal the device.
    a. Retrieve the gasket lubricant kit that was provided with the product components.
    b. Open the lubricant pouch and use the swab to apply a thin coating of the lubricant onto the gasket. Make sure to completely cover the black surface of the gasket. There is no harm in applying a thicker coating, as the lubricant cannot harm the device.
9. Close the cover on the device. The cover snaps into place.

Power options

The following sections provide details about powering ViaCell-100 and its sensors.

Power ViaCell-100

While ViaCell-100 has an internal battery for power, you can use an external power source, such as solar panels or other DC sources. For an external power source, use the **external power input** to power the ViaCell-100 device.

Note the following:

- When ViaCell-100 is connected to an external power source, the external power source becomes the primary power source and the internal battery becomes a backup power source. If the external power source is unable to power ViaCell-100 (such as when it has an unacceptable voltage range), it automatically switches to the internal battery as the power source.
- The external power inputs accept a DC range of 8-30 VDC.

Power the sensors

ViaCell-100 can power sensors using the analog, digital, or serial power outputs. The power outputs can supply one of four output voltages to a sensor.

Note If you have a Modbus-enabled device that must get power from ViaCell-100, the Modbus device must be wired to the serial power output.

Note the following:

- The sensor power output voltage options are:
  - 3.3 VDC
  - 5 VDC
  - 15 VDC
  - 24 VDC
- The maximum output current for each sensor power output connector is 200 mA.

Note When using continuous monitoring, the combined maximum output current for ALL sensors is 200 mA.

Analog input

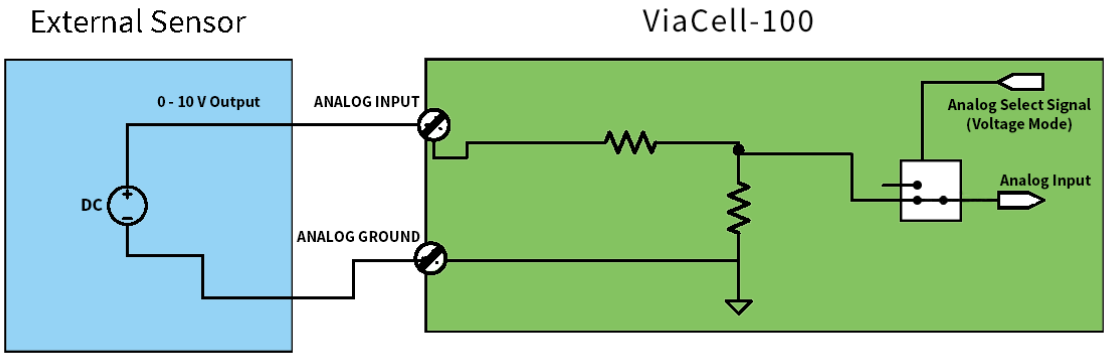
The analog inputs have the following modes of operation, which are disabled by default.

Voltage input

ViaCell-100 can monitor a voltage input from 0 V to 10 V. The following schematics show wiring options for 0-10 V input.

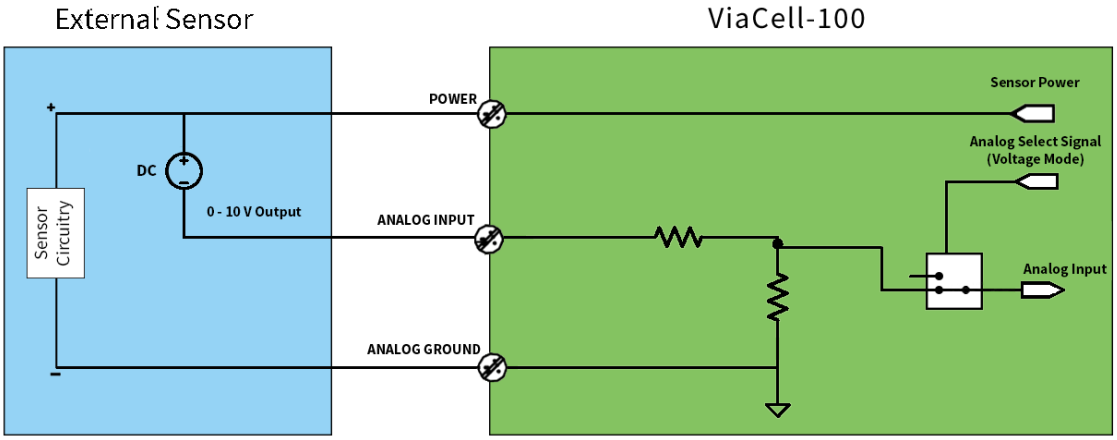
Self-powered

This figure shows the schematic when the external sensor is self-powered or powered from a source other than ViaCell- 00.



3-wire sensors

This figure shows the schematic when using power from ViaCell-100 to power the sensor.



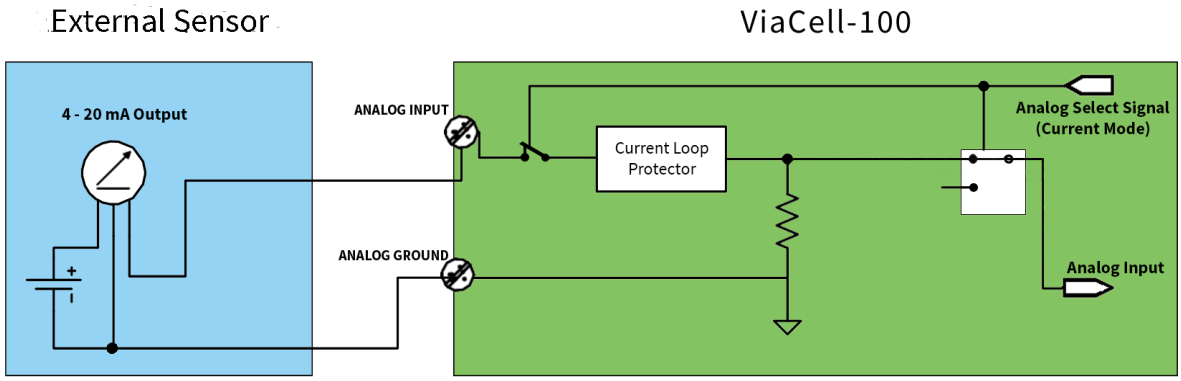
Current loop

ViaCell-100 can monitor a current input from 4 mA to 20 mA. The following schematics show wiring options for 4-20 mA inputs.

Note ViaCell-100 supports wired HART protocol only on analog current loop 1. When a sensor device that supports HART protocol is enabled on analog current loop 1, ViaCell-100 reports on the HART protocol and the current loop. If a HART sensor is connected to analog current loop 2, 3, or 4, ViaCell-100 reports on the current loop only.

Self-powered

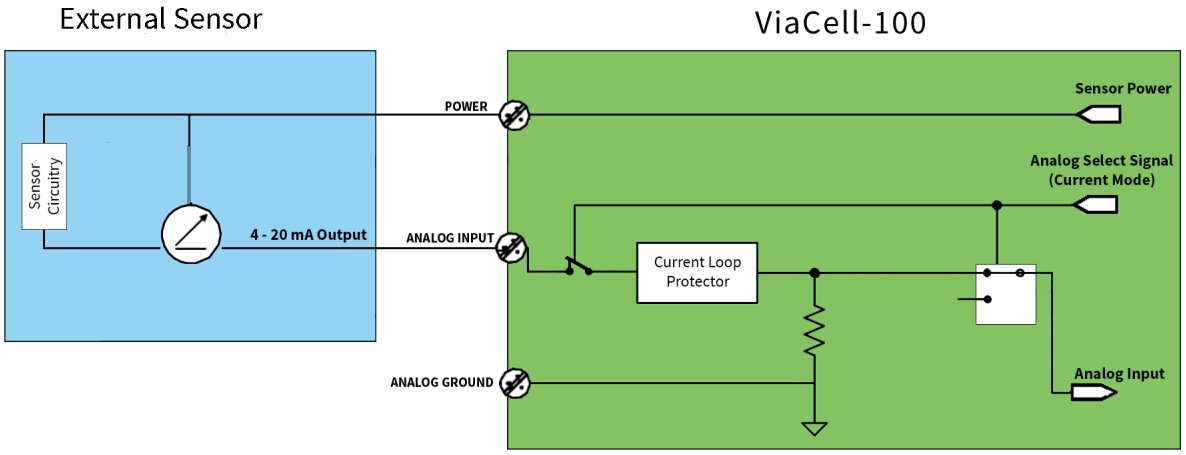
This figure shows the schematic when the external sensor is self-powered or powered from a source other than ViaCell-100.



2-wire (loop-powered) sensors

You can connect ViaCell-100 to a 4/20 mA 2-wire sensor, which is also known as a loop-powered sensor.

This figure shows the schematic when using power from the ViaCell-100 current loop to power a sensor.



Calculating supply voltage for a 2-wire (loop-powered) sensor

The power output from ViaCell-100 is configurable. The configured voltage value for ViaCell-100 is between the **Power** and **Analog Ground** terminals, as shown in the schematic above. The voltage across the terminals of the external sensor device (between **Power** and **Analog Input**) fluctuates, depending on the loop current. The fluctuation occurs because the variable loop current through the resistance inside ViaCell-100 changes the voltage between the **Analog Input** and **Ground** terminals. This is expected behavior for a 4/20 mA 2-wire interface.

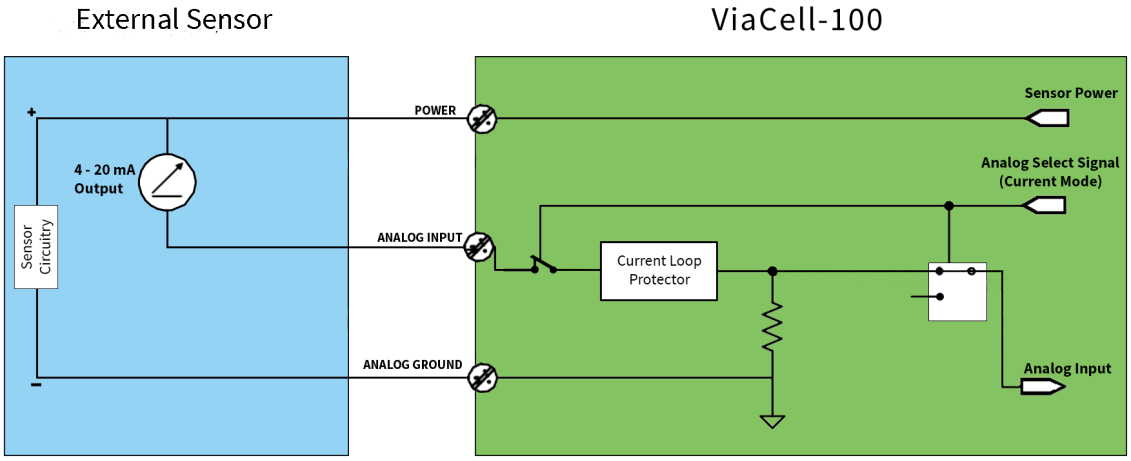
When determining the value for the output power, you must calculate the range of voltages to determine whether the voltage setting is sufficient. The voltage across the external sensor device terminals (**Power** and **Analog Input**) is always less than the configured voltage.

For example, calculate an estimate of the range of voltage across the external sensor device terminals (**Power** to **Analog Input**) when the Analog Output voltage is set to 24 V. The nominal internal resistance of ViaCell-100 is 375 ohms, but may vary across current flow and temperature.

- Max: 24 V – (4 mA *375 ohms) ≈ 22.5 V
- Min: 24 V - (20 mA *375 ohms) ≈ 16.5 V

3-wire sensors

This figure shows the schematic when the analog power output from ViaCell-100 is powering the sensor.



Digital I/O

ViaCell-100 has one digital I/O pin. You can configure the pin as a digital input, pulse counter, or digital output, but not more than one I/O function simultaneously.

Digital input and pulse counter

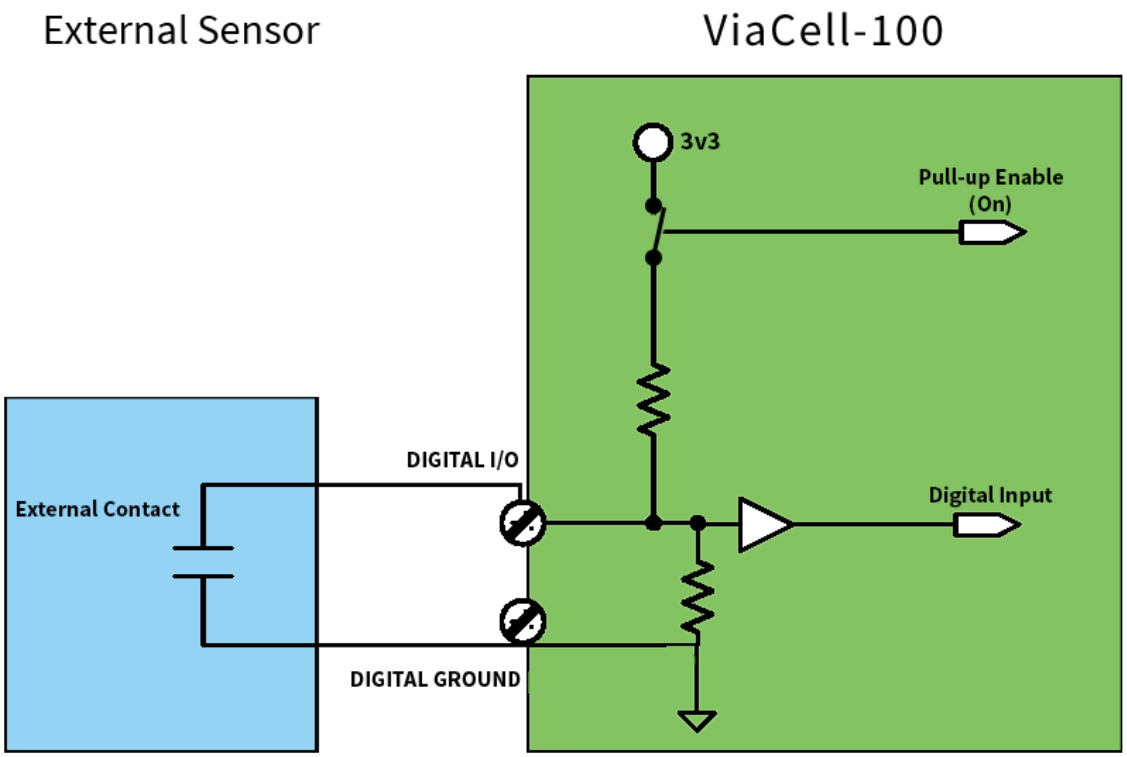
When configuring the digital I/O pin as a digital input, it allows the following modes of operation:

- **Input mode:** ViaCell-100 gets the digital input value at scheduled sensor readings. You can configure it to send an alarm report for specific input values or when an input value changes. You can also configure ViaCell-100 to wake from sleep mode when an input value changes (rising edge or falling edge wake).
- **Pulse counter:** When connected to a mechanical meter, ViaCell-100 counts pulses during ViaCell-100 sleep cycles and reports them to Remote Manager during normal reporting intervals.

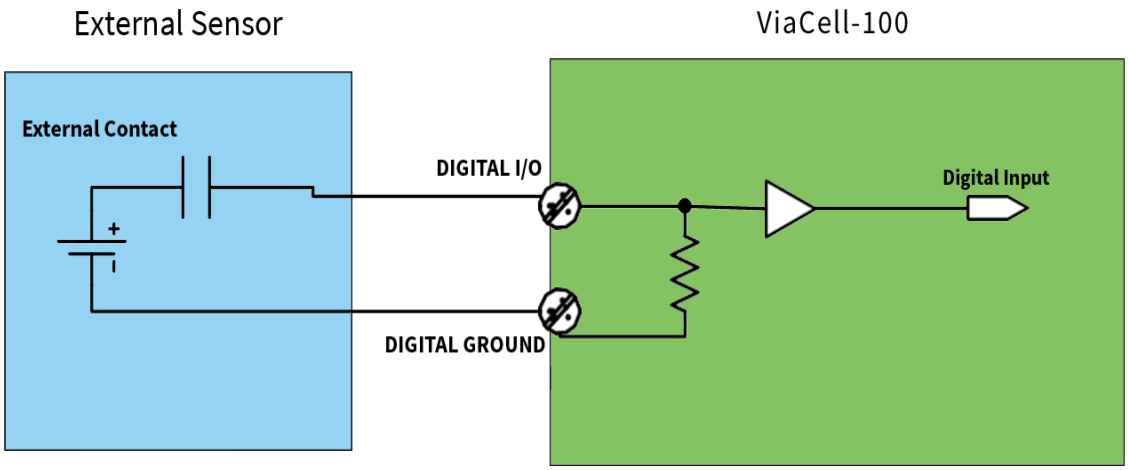
Each mode has a pull-up resistor that you can enable or disable. The pull-up indicates the digital input's state when there is no external voltage.

Note If you enable the pull-up resistor, it will constantly draw power. Depending on the current flow to the sensor, you may need to externally power ViaCell-100.

The following figure shows a digital input with the pull-up resistor enabled where it is driving an external relay.



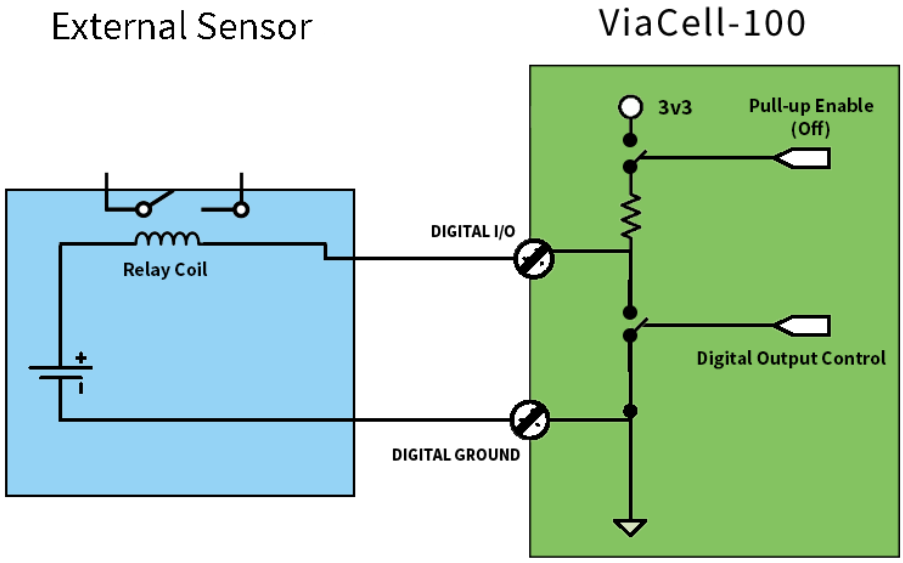
The following figure shows a digital input with the pull-up resistor disabled.



Digital output

When configuring the digital I/O pin as a digital output, it is an open collector output with an optional pull-up resistor. A self-resetting fuse limits the maximum collector current to 750 mA.

The following image shows a schematic of the typical digital-out application.



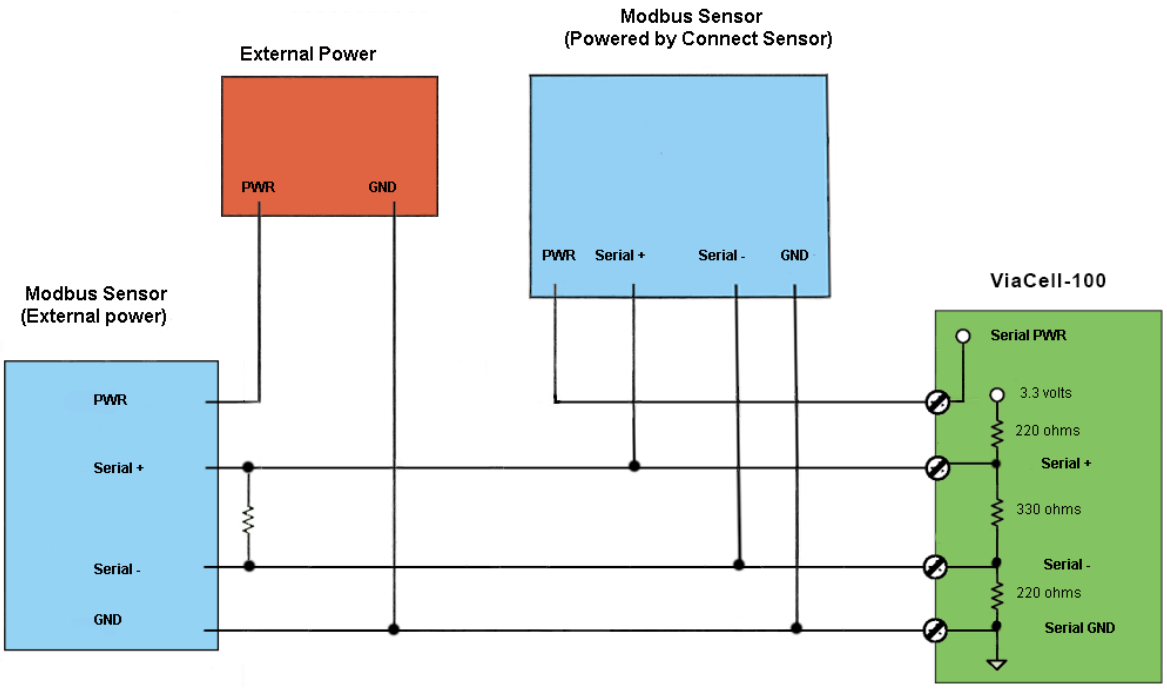
Modbus serial power output

ViaCell-100 can monitor a Modbus-enabled external sensor device.

Biasing and termination are needed when a Modbus sensor is connected on a long wiring harness and the sensor does not provide its own termination and biasing. Termination is only applied at the two ends of the 485 bus (not in the middle, and bias typically is applied only once on the whole bus.

For detailed information about implementing Modbus over a serial line, refer to the Modbus documentation at www.modbus.org.

The schematic below shows how to wire the device, depending on the power source for the Modbus device: ViaCell-100 or powered from a source other than ViaCell-100.

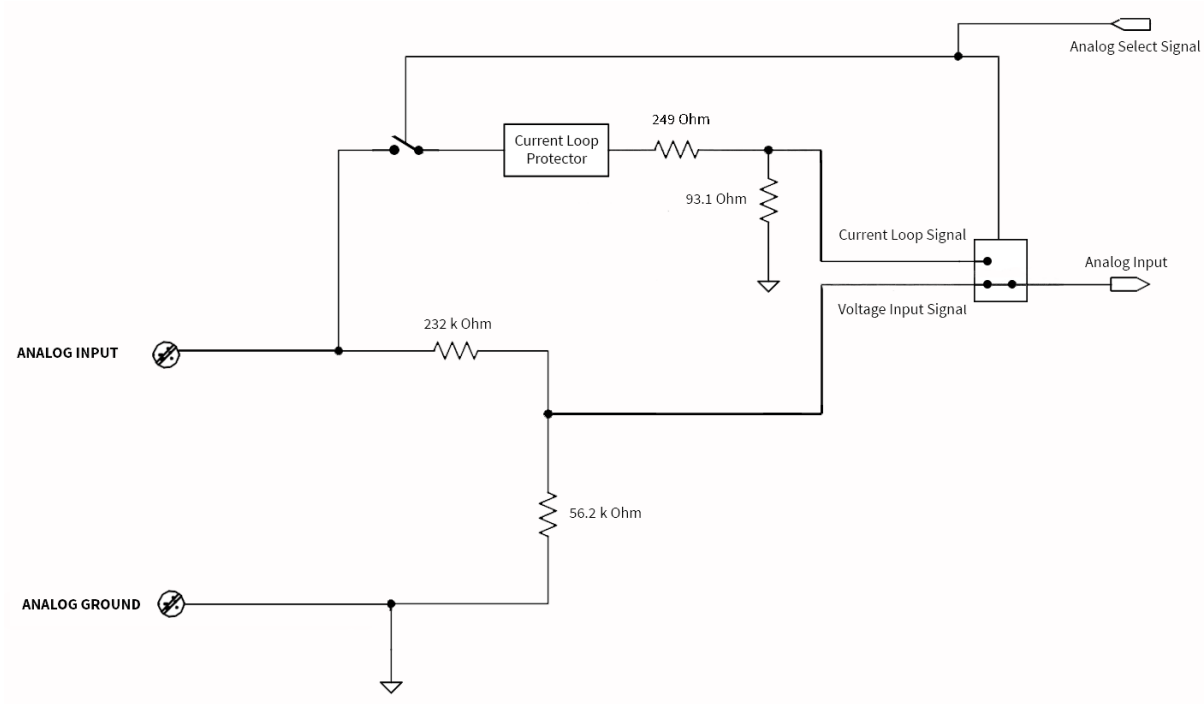


I/O schematics

The following sections show electrical wiring schematics for the ViaCell-100 I/O connectors.

Analog input schematic

The following image is an overview of the analog input wiring diagrams.



Digital I/O schematic

The following image is an overview of the digital I/O wiring diagrams.