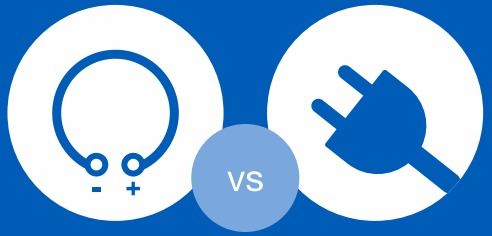

Precision Digital Presents

Loop vs Line Power; Understanding 2, 3, & 4 Wire Signals

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Objectives & Takeaways

Understand the fundamentals and differences between 2, 3, and 4 wire connections

Determine the best choice for your application

Make the best decision for your instruments and meters

Agenda

1

Definitions
- Ohm’s Law V = IR
- 2 wire
- 3 wire
- 4 wire

2

Pros and cons of each type

3

Essentials you need to know

Getting to know you

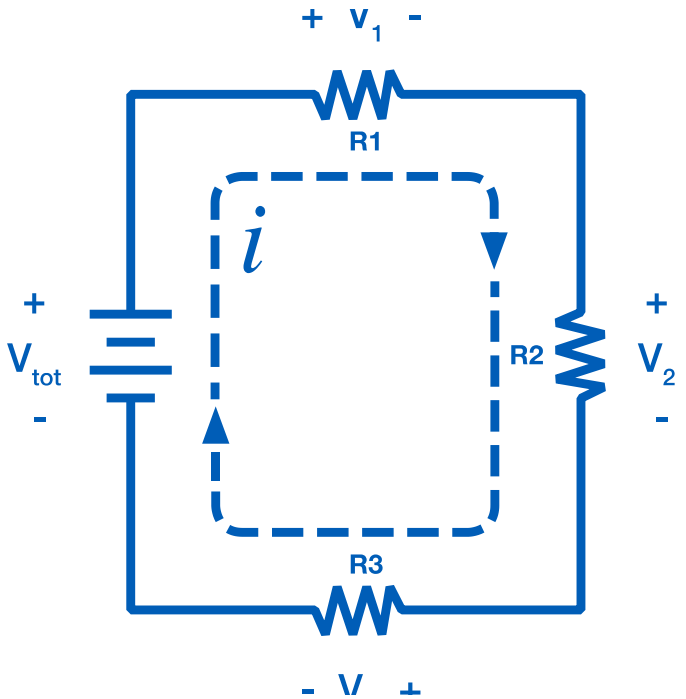
- Where are you located?
- What is your industry?
- What is your level of expertise?

Definitions

Ohm's Law – why it matters

$$V = IR$$

Voltage = Current x Resistance



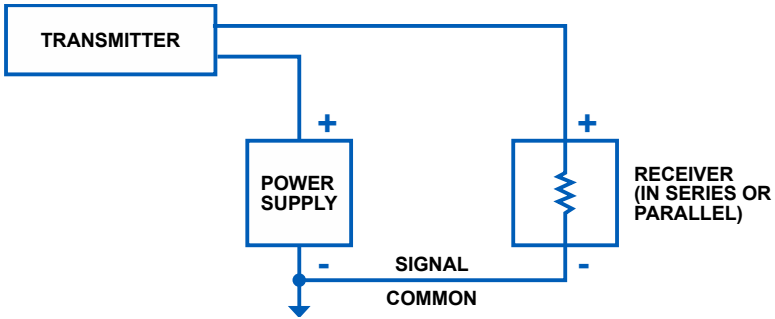
Definitions

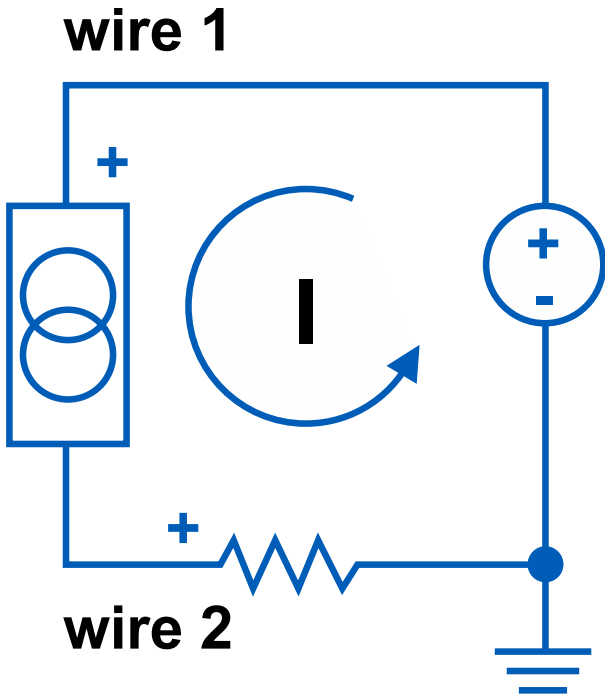
Each of these configurations produces a 4-20 mA current signal

Most installations include a power supply local to the transmitter or receiver

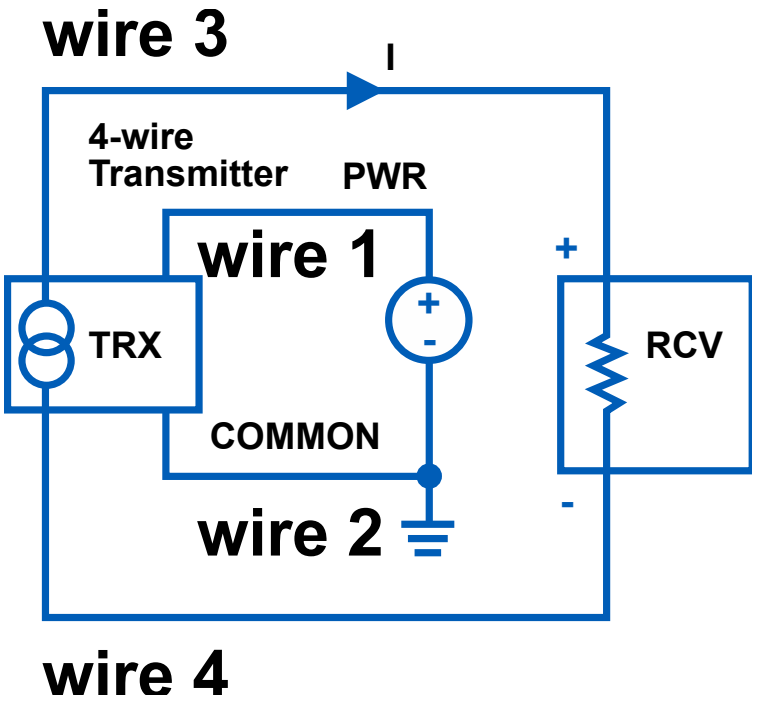
2 wire, current loop and loop power

- 2 wire means there are only 2 wires involved in the connection between the transmitter, power, and output device
- The transmitter or receiver typically provide the power to the loop via a built-in power supply
- Some use a separate power supply as shown here

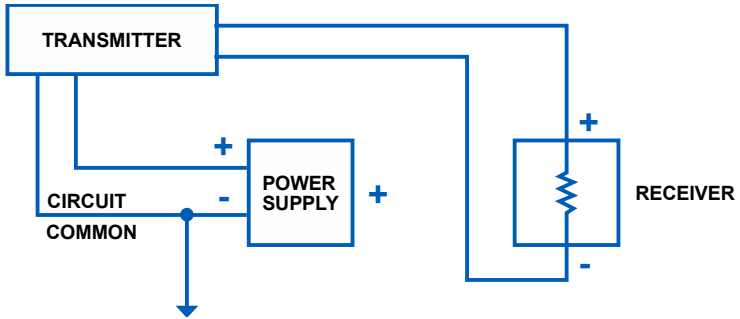




4 wire connections, power and signals

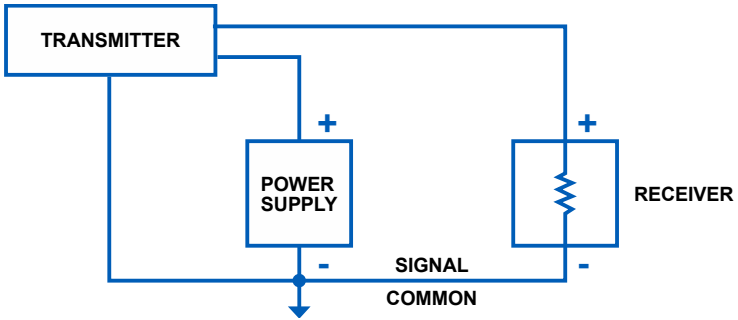


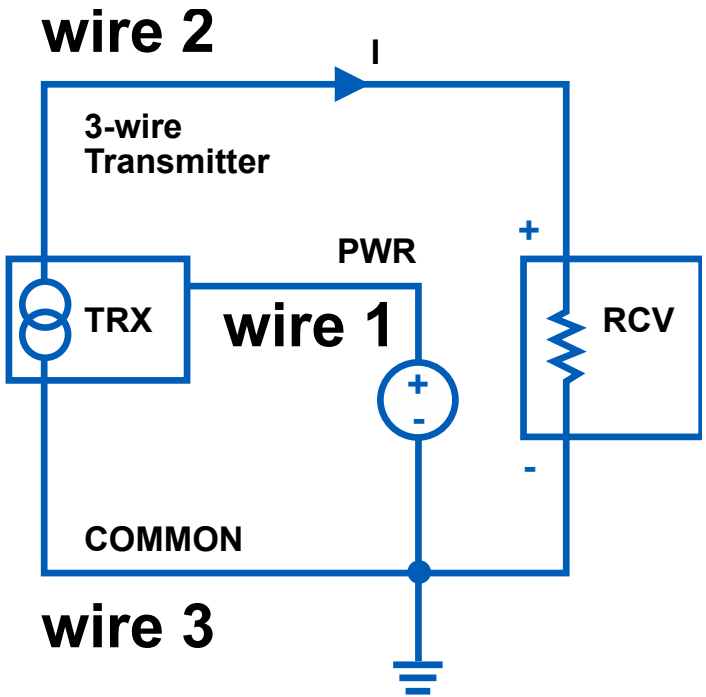
- Transmitter and receiver float
- Separate power leads power the transmitter outside the current loop
- AC or DC power
  - 24 VAC is common



3 wire connections, power and signals

- Transmitter and receiver share a common ground with power
- 3rd wire used to connect transmitter to power outside of the current loop
- Caution: may appear as 4 wire





Getting to know you

- What is your primary application?

Questions

- Please enter your questions in the ‘Questions’ window – on the tab at the bottom of your control panel on the right side of your screen.

Pros & Cons

2 wire pros & cons

Pros

- Simple and easy display for 4-20 mA transmitter
- Low cost solution for display
- Agency approvals
- Local power not required

Cons

- Limited output options
- Very low power
  - Does not support relays
  - Does not support LEDs

4 wire pros & cons

Pros

- More capabilities than 2 wire
  - Relays
  - LEDs
  - Serial communications
- Easier to understand the wiring
  - No need to worry about voltage drop
- Excellent isolation
  - Power from input/outputs

Cons

- Requires a separate local power supply
- Generally more expensive
- More wiring requirements
- Limited hazloc options

3 wire pros & cons

Pros

- Lower cost than 4 wire
- Easier to wire (fewer connections)

Cons

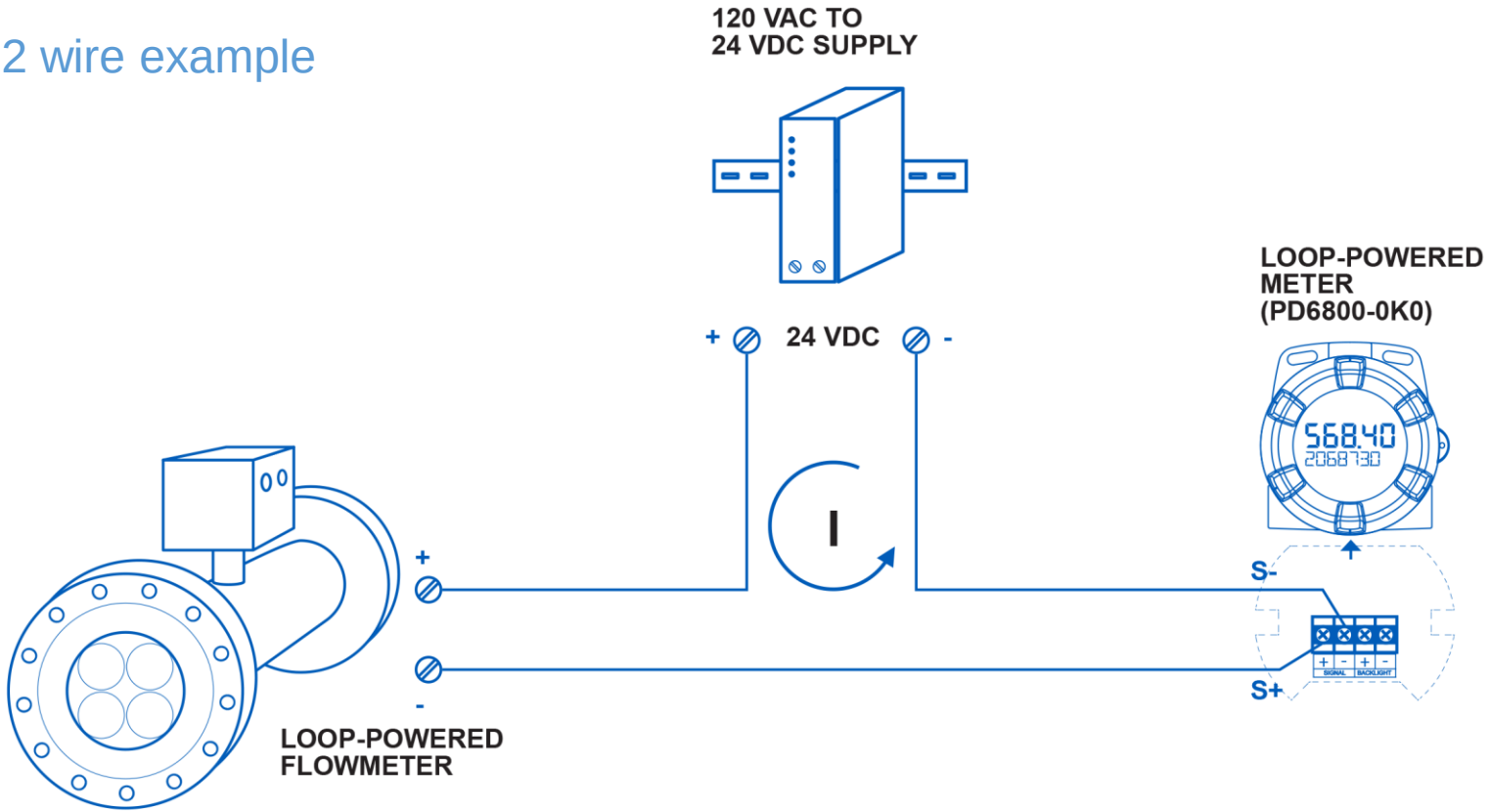
- No isolation
  - Very susceptible to ground loops
- May be confusing to wire

The Essentials

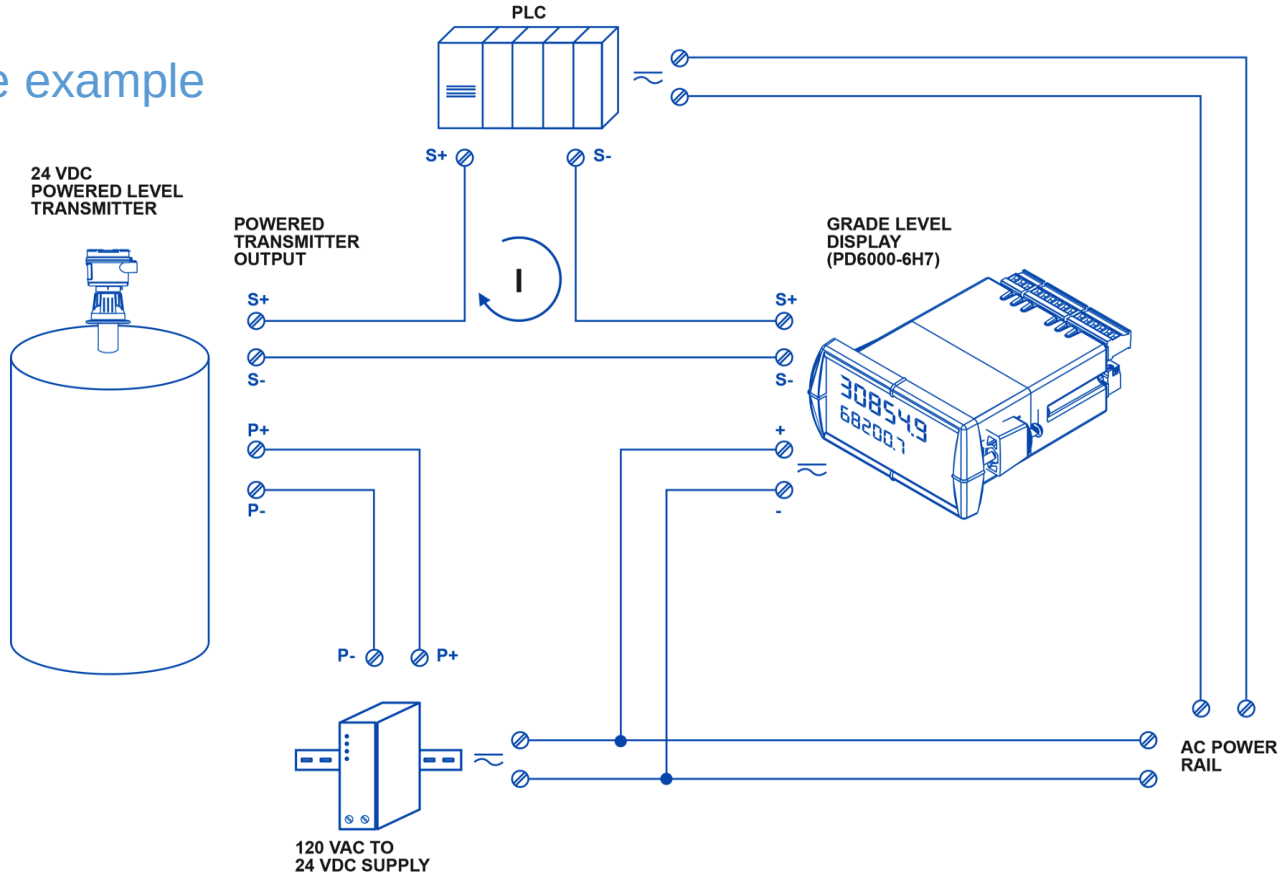
These are the ‘must know’ points

- 4 wire or 3 wire require separate power supply
- 3 wire works – be aware of isolation requirements first
- 2 wire – be aware of voltage drop
- Rule of thumb
  - 2 wire is much less expensive (than 3 or 4 wire)
  - 3 wire is slightly less expensive (than 4 wire)
- Some devices are not available as 2 wire

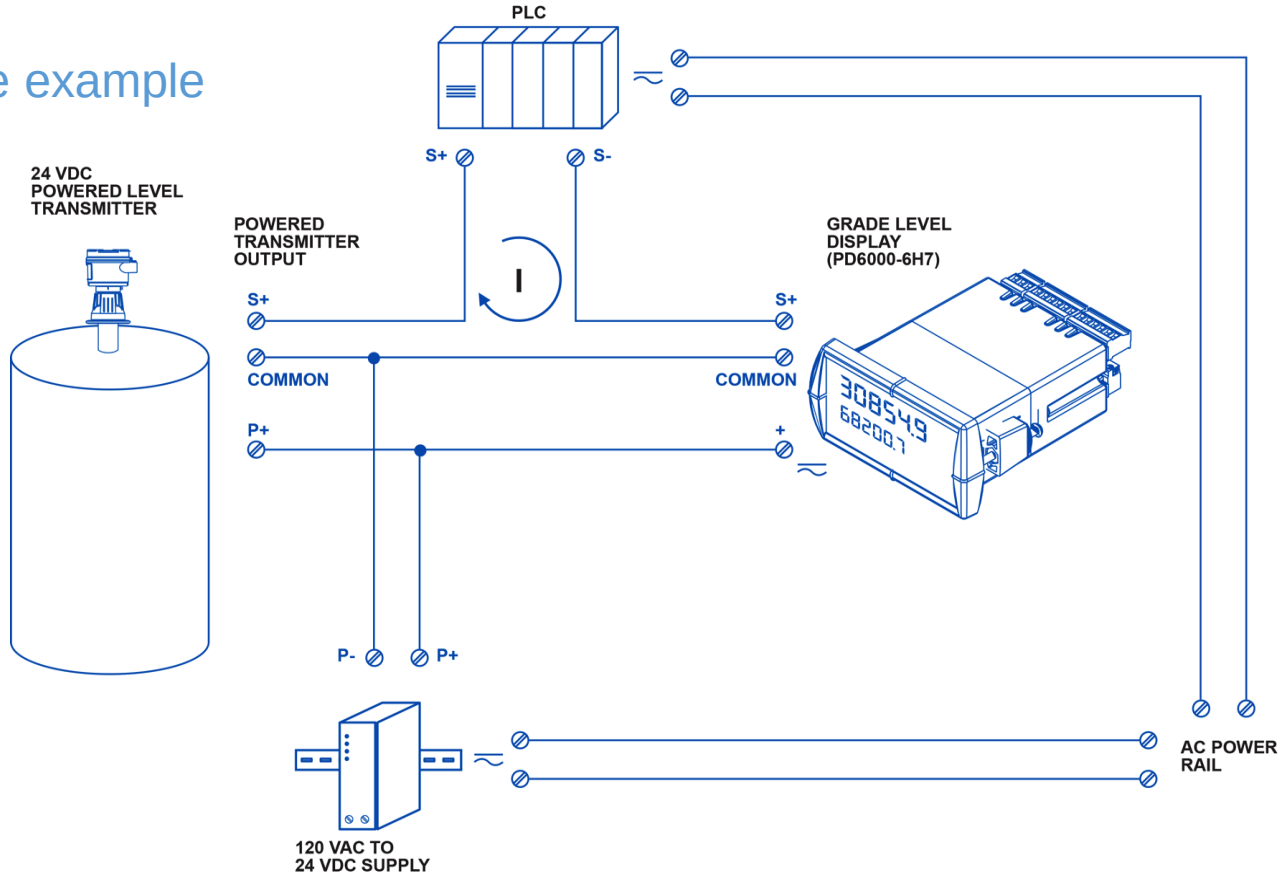
2 wire example



4 wire example



3 wire example



Summary

1. Definitions
   - Ohm’s Law V = IR
   - 2 wire
   - 3 wire
   - 4 wire
2. Pros and cons of each type
3. Essentials you need to know

Getting to know you

- How often do you specify digital displays?

Q & A

- Please enter your questions in the ‘Questions’ window – on the tab at the bottom of your control panel on the right side of your screen.
- Apologies if we do not get to your question today. We’ll contact you offline with a response as soon as possible.

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Let us know what topics we should cover

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