

Power-Limiting vs. Non-Power-Limiting

◆ Power-Limiting Circuits

- **Definition:** Circuits where the energy (voltage and current) is restricted by design so that the wiring cannot overheat or start a fire, even under fault conditions.
- **How it's done:** Limitation is achieved using *listed power-limited power supplies* (e.g., fire alarm control panels, listed control power supplies, or Class 2/3 transformers). These are UL-listed to limit the maximum output to safe levels.
- **Key Code References:**
 - **NFPA 70 (NEC):** Articles 725 (Class 1, 2, 3 circuits) and 760 (Fire Alarm Systems).
 - **Class 2 circuits** are the most common for fire alarm and security.
- **Benefits:**
 - Smaller wire gauge can be used (e.g., 18/2 FPL or FPLP) because the circuit is inherently limited.
 - Conduit often not required in some applications because shock and fire risks are inherently reduced.
 - Safer for installers and equipment.
- **Examples:**
 - Fire alarm NACs and IDC circuits from a listed FACP.
 - Door strikes powered from a listed Class 2 power supply.

◆ Non-Power-Limiting Circuits

- **Definition:** Circuits where the power is not restricted by the supply device; the full fault current of the source is available on the wiring.
- **How it's done:** Typically comes from transformers, power supplies, or building electrical systems that do not have built-in energy limitation.
- **Requirements:**

- Wiring methods must follow higher standards (e.g., same protection as normal 120V branch circuits).
 - Must use heavier gauge wire, often in conduit.
 - Must consider overcurrent protection (breakers or fuses).
 - **Examples:**
 - 120V branch circuit feeding a fire alarm panel.
 - Elevator recall interface powered from a non-power-limited source.
 - HVAC shutdown relays fed from non-power-limited control circuits.
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Key Difference in Practice

- **Power-limited** → The supply itself restricts fault energy → lighter wire, looser routing rules.
 - **Non-power-limited** → No restriction at the supply → must install wiring as if it could carry dangerous current (like standard line voltage).
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✅ Rule of Thumb:

If the output is **UL-listed as Class 2/3** or specifically **marked “Power-Limited”**, treat it as power-limited. If not, it defaults to **non-power-limited** and requires stricter wiring methods.

Do you want me to also draw up a **comparison table (wire type, conduit requirement, code article, etc.)** so you can use it as a quick reference for projects?

	Power-Limited	Non-Power-Limited
Definition	Output is restricted by the supply so that voltage/current are limited under fault conditions.	Output is <i>not</i> restricted; full available fault current can be delivered.
Typical Listing	UL Class 2 or Class 3, or marked “Power-Limited.”	Not marked/limited; treated like standard branch circuits.
NEC Articles	Article 725 (Class 2 & 3), Article 760 (Fire Alarm Power-Limited).	Article 725 (Class 1), Article 760 (Non-Power-Limited).
Wiring Types Allowed	FPL, FPLR, FPLP (fire alarm cables), CAT, twisted pair. Smaller gauges (18 AWG typical).	THHN/THWN in conduit, MC, AC cable. Must meet Chapter 3 wiring requirements.
Conduit Requirement	Often not required , unless for protection (per AHJ/NEC).	Required , must be installed in raceway/cable method acceptable for line voltage.
Overcurrent Protection	Provided by listed power supply (internal fuses/limits).	External OCPD required (breakers/fuses sized for load/wire).
Shock/Fire Hazard	Inherently limited — safer for installers and devices.	Can present full fault hazard; must be treated like line-voltage wiring.
Examples	FACP NACs, IDC loops, card reader power, access control strikes powered from Class 2 supply.	120V branch feed to FACP, HVAC shutdown relays, elevator recall circuits from building power.