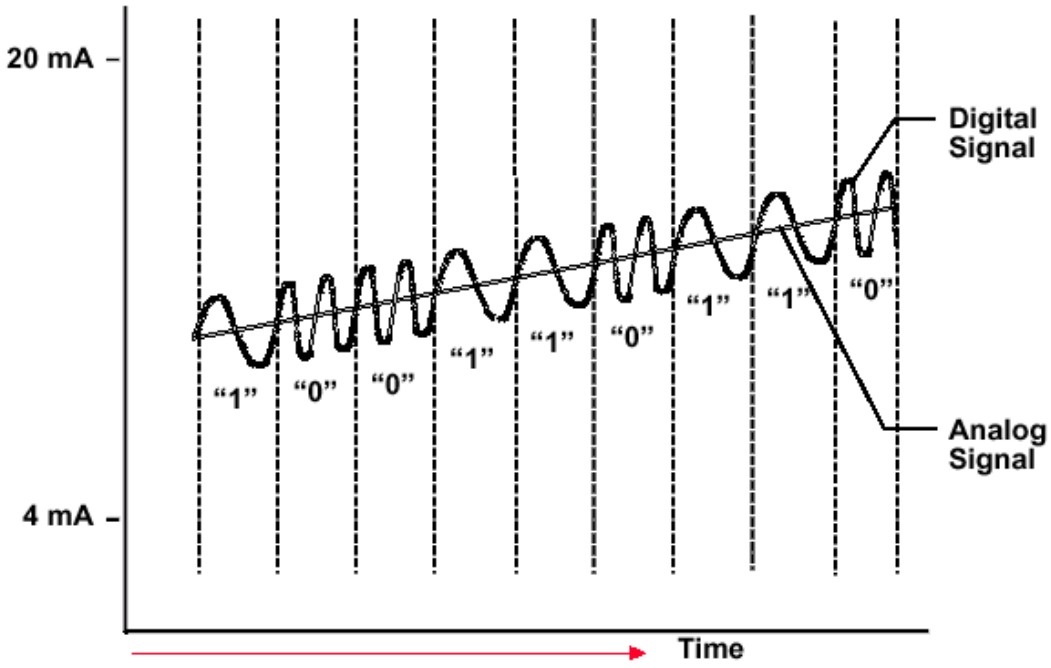
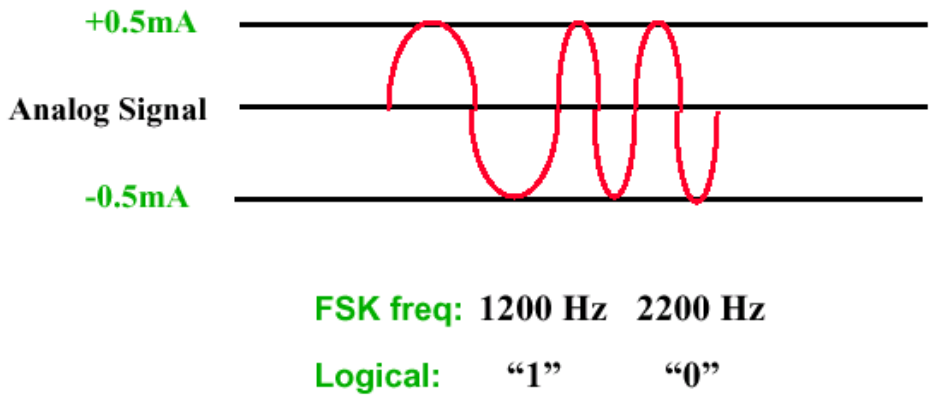
PROTOCOLO HART

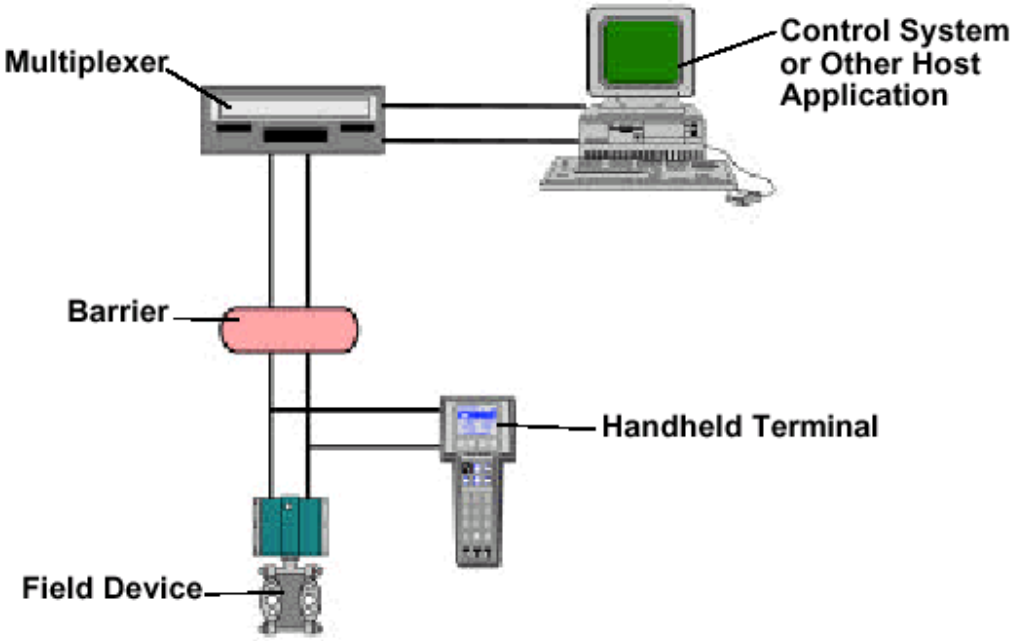


Comunicación HART sobre la señal 4-20 ma

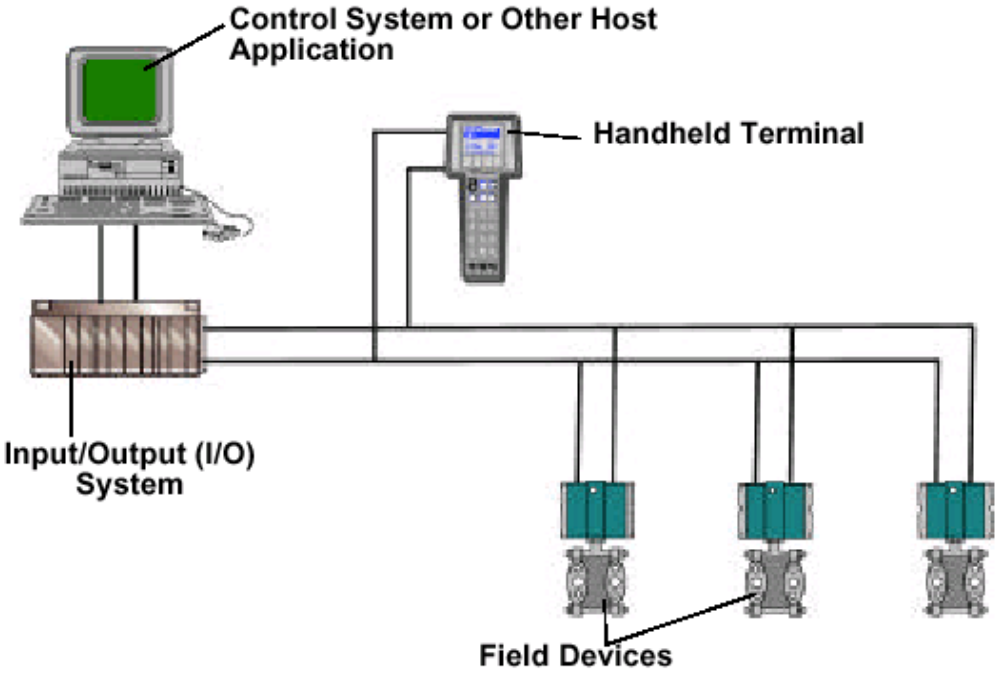


Modulación FSK (Codificación por corrimiento de frecuencia)

PROTOCOLO HART



Comunicación Punto a Punto



Comunicación Multi-Punto

PROTOCOLO HART

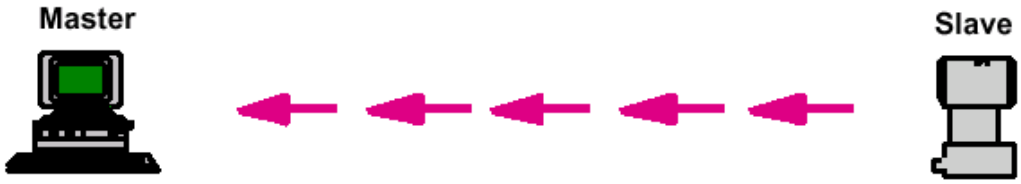
Analog + Digital or Digital Only Communication

Analog signal is not interrupted

"Slave" responds to Commands/Requests from "Master"

Typical 500 ms response (2 values per second)

MODO Maestro – Esclavo



All Digital Communication Mode.

Continuous transmission of a Selected Standard Reply Message such as PV.

Gaps between Messages allow "Master" to change Command or Mode

3 to 4 updates per second typical

MODO por Ráfagas (BURST)

PROTOCOLO HART

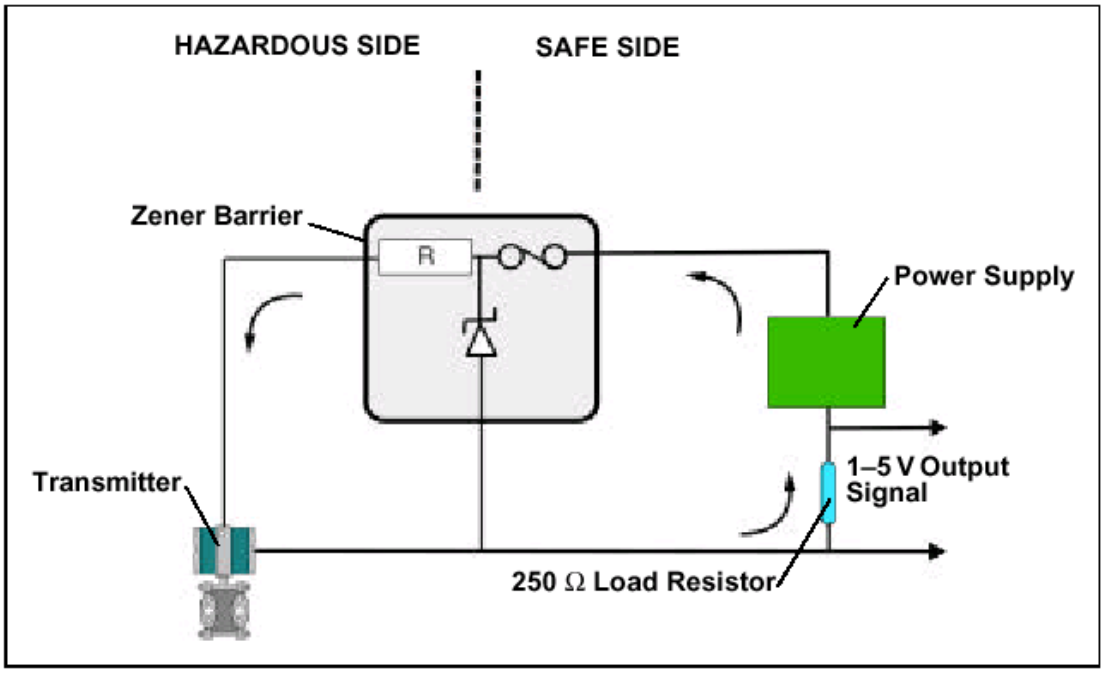
Universal Commands	Common Practice Commands	Device-Specific Commands
• Read manufacturer and device type • Read primary variable (PV) and units • Read current output and percent of range • Read up to four predefined dynamic variables • Read or write eight-character tag, 16-character descriptor, date • Read or write 32-character message • Read device range values, units, and damping time constant • Read or write final assembly number • Write polling address	• Read selection of up to four dynamic variables • Write damping time constant • Write device range values • Calibrate (set zero, set span) • Set fixed output current • Perform self-test • Perform master reset • Trim PV zero • Write PV unit • Trim DAC zero and gain • Write transfer function (square root/linear) • Write sensor serial number • Read or write dynamic variable assignments	• Read or write low-flow cut-off • Start, stop, or clear totalizer • Read or write density calibration factor • Choose PV (mass, flow, or density) • Read or write materials or construction information • Trim sensor calibration • PID enable • Write PID setpoint • Valve characterization • Valve setpoint • Travel limits • User units • Local display information

Comandos HART

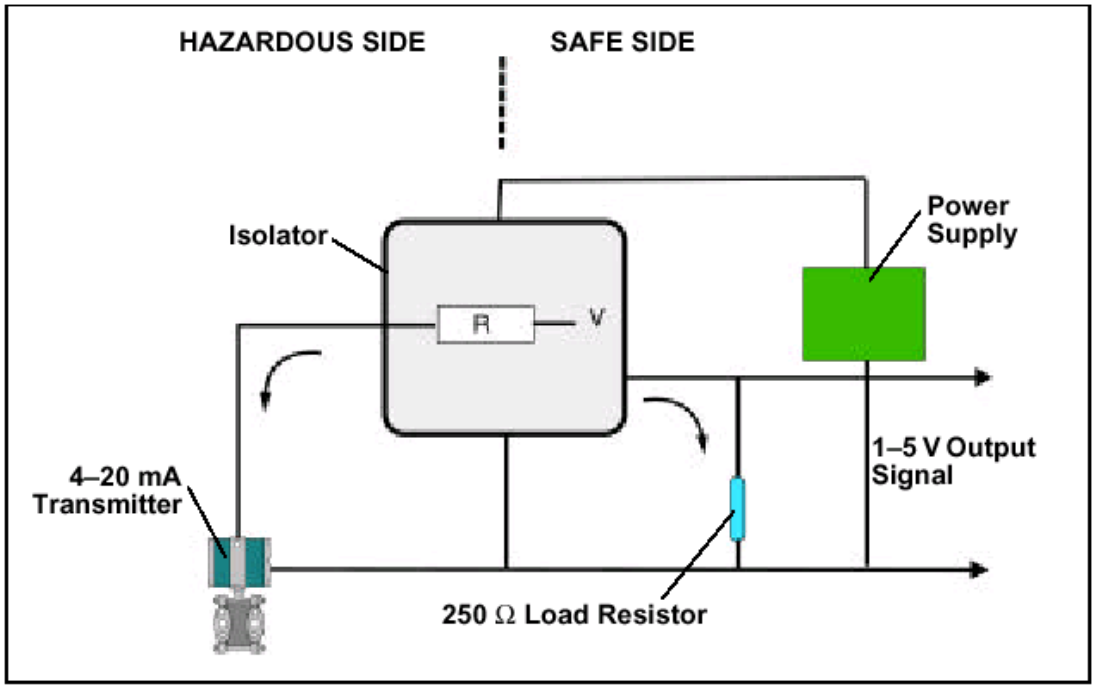
	Cable Capacitance – pf/ft (pf/m) Cable Length – feet (meters)			
No. Network Devices	20 pf/ft (65 pf/m)	30 pf/ft (95 pf/m)	50 pf/ft (160 pf/m)	70 pf/ft (225 pf/m)
1	9,000 ft (2,769 m)	6,500 ft (2,000 m)	4,200 ft (1,292 m)	3,200 ft (985 m)
5	8,000 ft (2,462 m)	5,900 ft (1,815 m)	3,700 ft (1,138 m)	2,900 ft (892 m)
10	7,000 ft (2,154 m)	5,200 ft (1,600 m)	3,300 ft (1,015 m)	2,500 ft (769 m)
15	6,000 ft (1,846 m)	4,600 ft (1,415 m)	2,900 ft (892 m)	2,300 ft (708 m)

Largo de cables según cantidad de dispositivos y capacidad del cable

PROTOCOLO HART

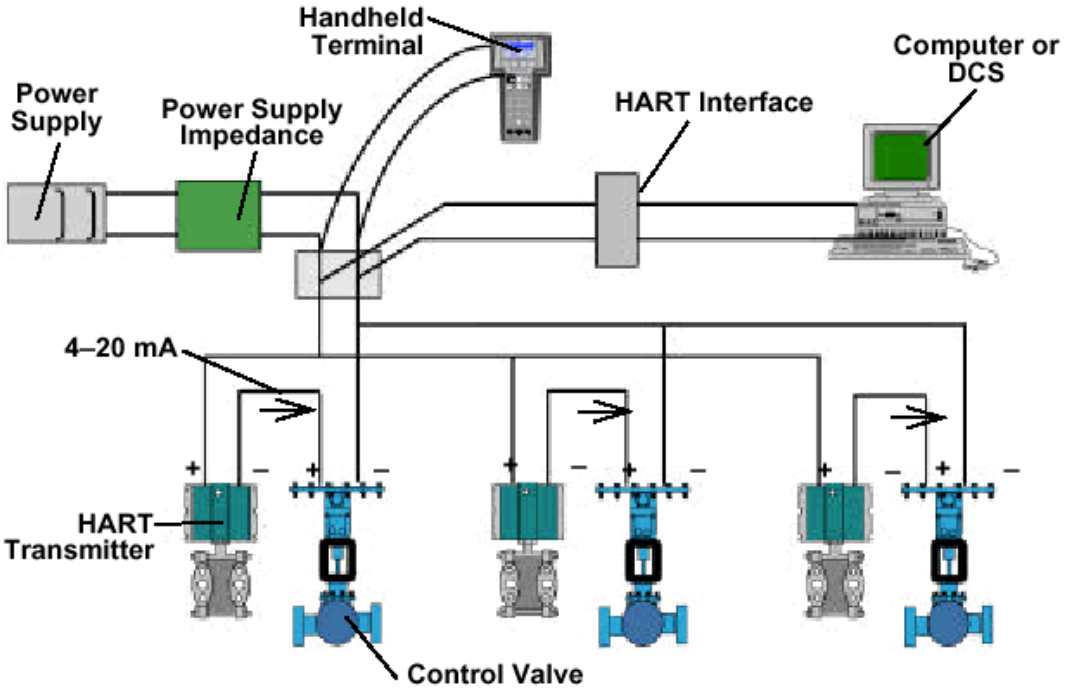


Barrera 4-20 ma Intrínsicamente Segura

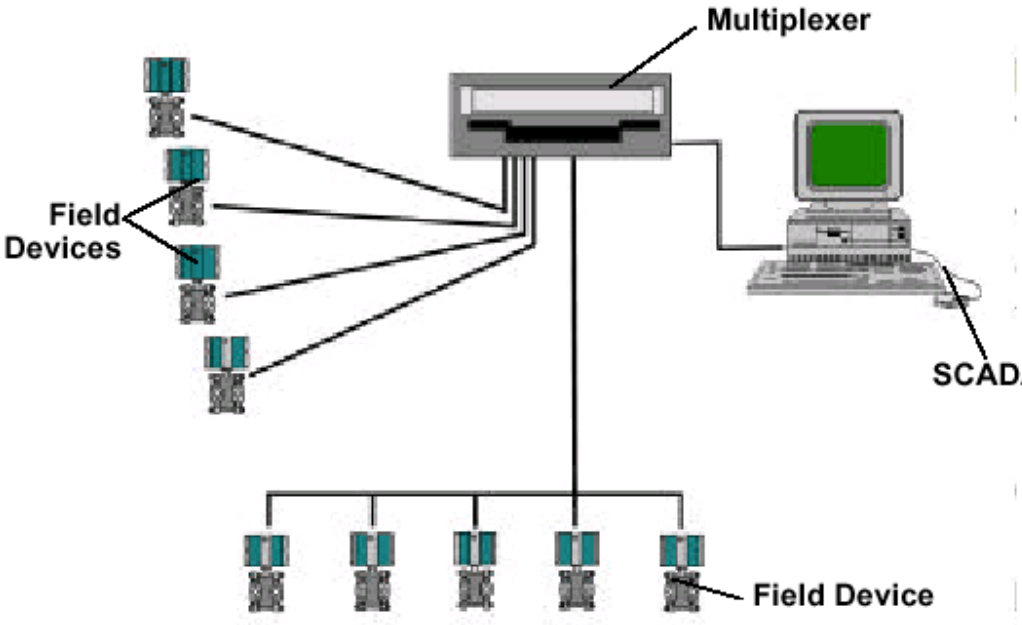


Aislamiento 4-20 intrínsicamente Seguro

PROTOCOLO HART



Dispositivos HART y NO-HART juntos



Multiplexores