Instrument Loop Troubleshooting

Quick reference for instrumentation and control engineers

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Loop current symptoms

Reading	Likely cause
0 mA	Open loop, no supply, blown fuse
≤ 3.6 mA	Transmitter fault, downscale burnout
≥ 21 mA	Fault upscale, sensor break (TC)
Fixed value	Loop test or fixed current mode, manual DCS
Noisy	Grounding, shield, VFD noise, low damping
Offset	Zero shift, wrong range, wet leg, mounting

What to measure

- Loop current in series or with a clamp meter.
- Supply voltage at the PSU.
- Voltage at transmitter terminals (≥ minimum on data sheet).
- Loop resistance with the loop open.
- Insulation to earth if earth fault alarms appear.

DP flow faults

Symptom	Check
Reads low	Gas in liquid legs, HP leak, plugged HP tap
Reads high	LP leak, plugged LP tap, liquid in gas legs
Reads at zero flow	Missing low flow cutoff, equaliser open
Double square root	Root in transmitter and DCS

Level faults

Symptom	Check
DP level wrong	Density change, wet leg loss, seal damage
Radar jumps	False echoes, foam, buildup, mapping
Stuck full	Level in blocking distance, coating

Temperature faults

Symptom	Check
Reads ambient	Element not in well, air gap
Moves wrong way	TC polarity reversed
Offset few °C	Copper extension cable, CJC, 2 wire leads
Upscale	Open element or wire

Control valve faults

Symptom	Check
Does not move	Air supply, I/P or positioner, seized stem
Hunting	Stiction, positioner gain, loose feedback
Passing	Seat wear, bench set, thrust
Slow	Blocked vent, small solenoid, booster

Method

- 1. Confirm the complaint with operations.
- 2. Check DCS: mode, alarms, scaling.
- 3. Measure current and voltage.
- 4. Split the loop: field or system side?
- 5. Check the process: taps, legs, valves.
- 6. Fix, test, document, inform.