



Troubleshooting Dredge Sensors (instrumentation) and Electronic Equipment

Presentation by : Jay Wise
Kruse Integration

Downtime on a dredge varies based on

- Level of Automation
- Age of equipment
- Hardware brand name
- Spare parts
- Usage and environment of the dredge
- Proper documentation
- Level of competence
- Availability for response

Know your dredge and documentation

Keep these documents up to date:

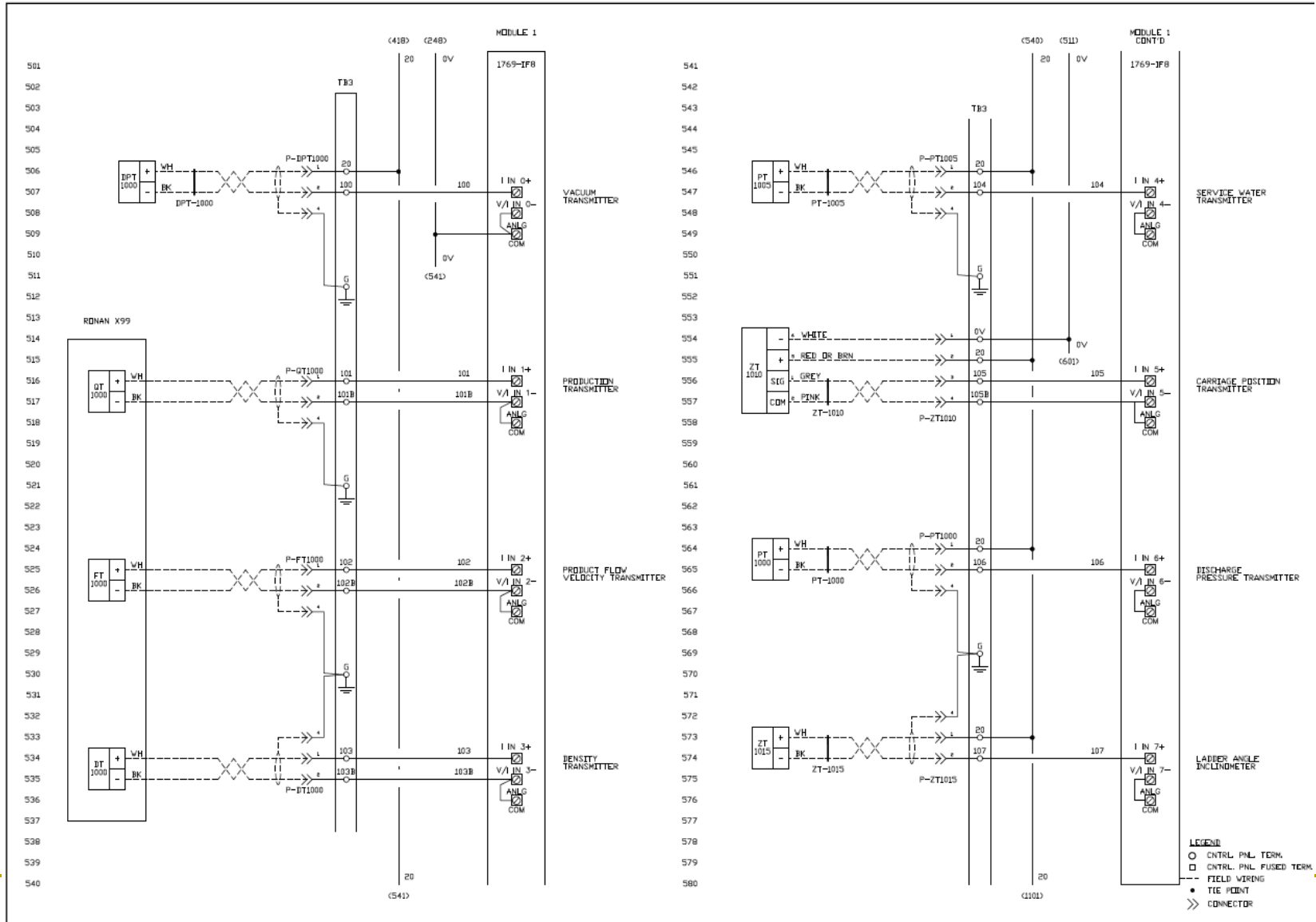
- Wiring diagrams (schematics)
- P&IDs
- Equipment data sheets
- Manuals
- Maintenance records
- PLC logic printouts

Use the Web to find equipment manuals if missing.

Learn these typical electrical diagram symbols...

SWITCHES																																									
DISCONNECT	CIRCUIT INTERRUPTER	CIRCUIT BREAKER OVERLOAD TYPES			LIMIT SWITCHES		FOOT SWITCHES																																		
		THERMAL	MAGNETIC	THERMAL & MAGNETIC	NORMALLY OPEN	NORMALLY CLOSED	N.O.	N.C.																																	
PRESSURE & VACUUM SWITCHES		LIQUID LEVEL SWITCH		TEMPERATURE ACTUATED SWITCH		FLOW SWITCH																																			
N.O.		N.C.		N.O.		N.C.		N.O.		N.C.																															
FUSE	STANDARD DUTY SELECTOR																																								
POWER OR CONTROL	2 POSITION		2 POSITION		3 POSITION																																				
	3 POSITION		1=CONTACT CLOSED		1=CONTACT OPEN			<table border="1"> <thead> <tr> <th rowspan="2">CONTACTS</th> <th colspan="4">SELECTOR POSITION</th> </tr> <tr> <th colspan="2">A</th> <th colspan="2">B</th> </tr> <tr> <th></th> <th>BUTTON</th> <th>BUTTON</th> <th>BUTTON</th> <th>BUTTON</th> </tr> <tr> <th></th> <th>FREE</th> <th>DEPRESSED</th> <th>FREE</th> <th>DEPRESSED</th> </tr> </thead> <tbody> <tr> <td>1-2</td> <td>1</td> <td></td> <td></td> <td></td> </tr> <tr> <td>3-4</td> <td></td> <td>1</td> <td>1</td> <td>1</td> </tr> </tbody> </table>					CONTACTS	SELECTOR POSITION				A		B			BUTTON	BUTTON	BUTTON	BUTTON		FREE	DEPRESSED	FREE	DEPRESSED	1-2	1				3-4		1	1	1
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MOMENTARY CONTACT							PILOT LIGHTS																																		
SINGLE CIRCUIT		DOUBLE CIRCUIT		MUSHROOM HEAD	WOBBLE STICK	ILLUMINATED	MAINTAINED CONTACT		INDICATE COLOR BY LETTER																																
N.O.	N.C.	N.O.	N.C.				TWO SINGLE CKT.	ONE SINGLE CKT.	NON PUSH-TO-TEST		PUSH-TO-TEST																														
CONTACTS							COILS		OVERLOAD RELAYS		INDUCTORS																														
INSTANT OPERATING				TIMED CONTACTS - CONTACT ACTION RETARDED WHEN COIL IS...				SHUNT	SERIES	THERMAL	MAGNETIC	IRON CORE																													
WITH BLOWOUT		WITHOUT BLOWOUT		ENERGIZED		DE-ENERGIZED																																			
N.O.	N.C.	N.O.	N.C.	N.O.	N.C.	N.O.	N.C.																																		
												AIR CORE																													

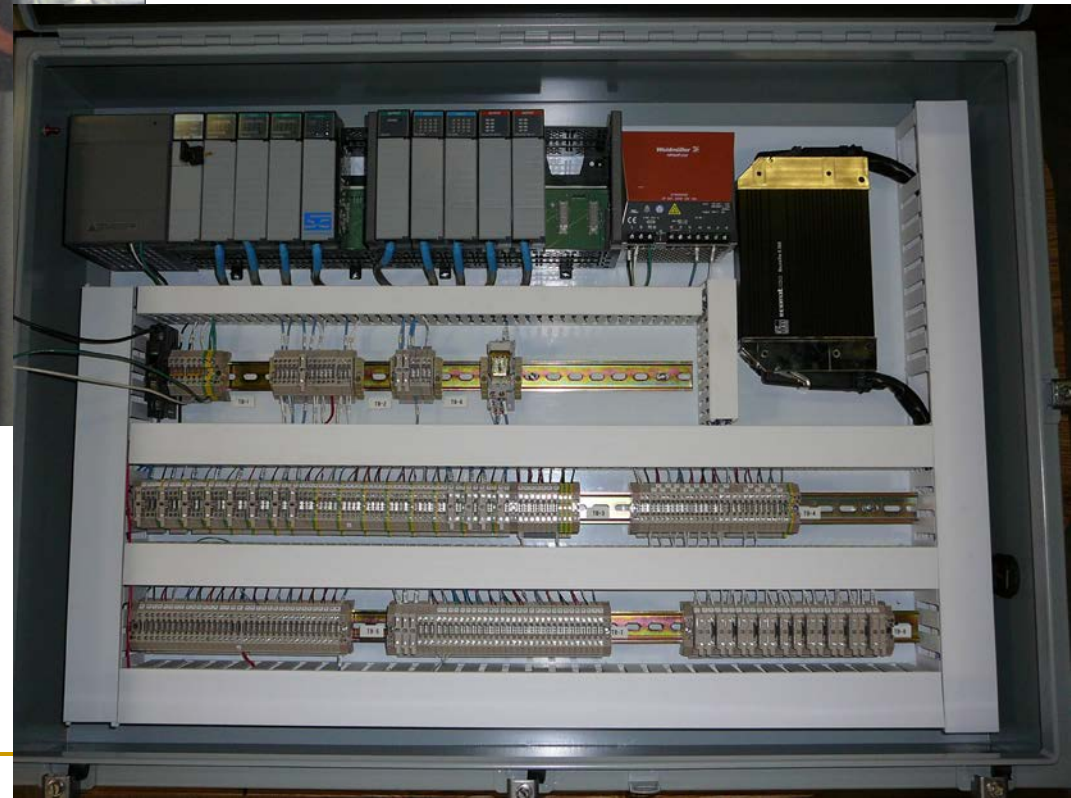
Have your wiring diagrams on hand



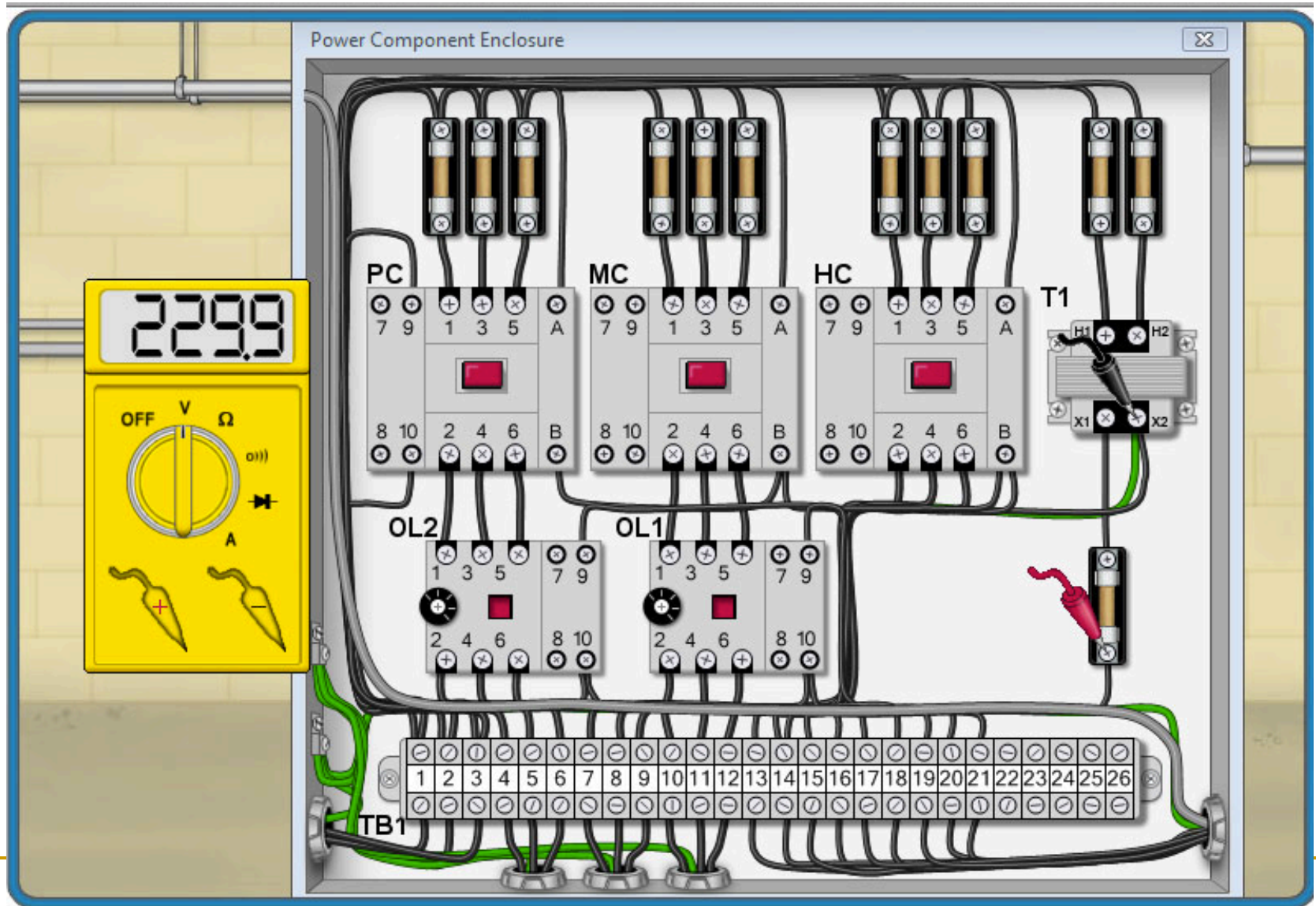
Meters...



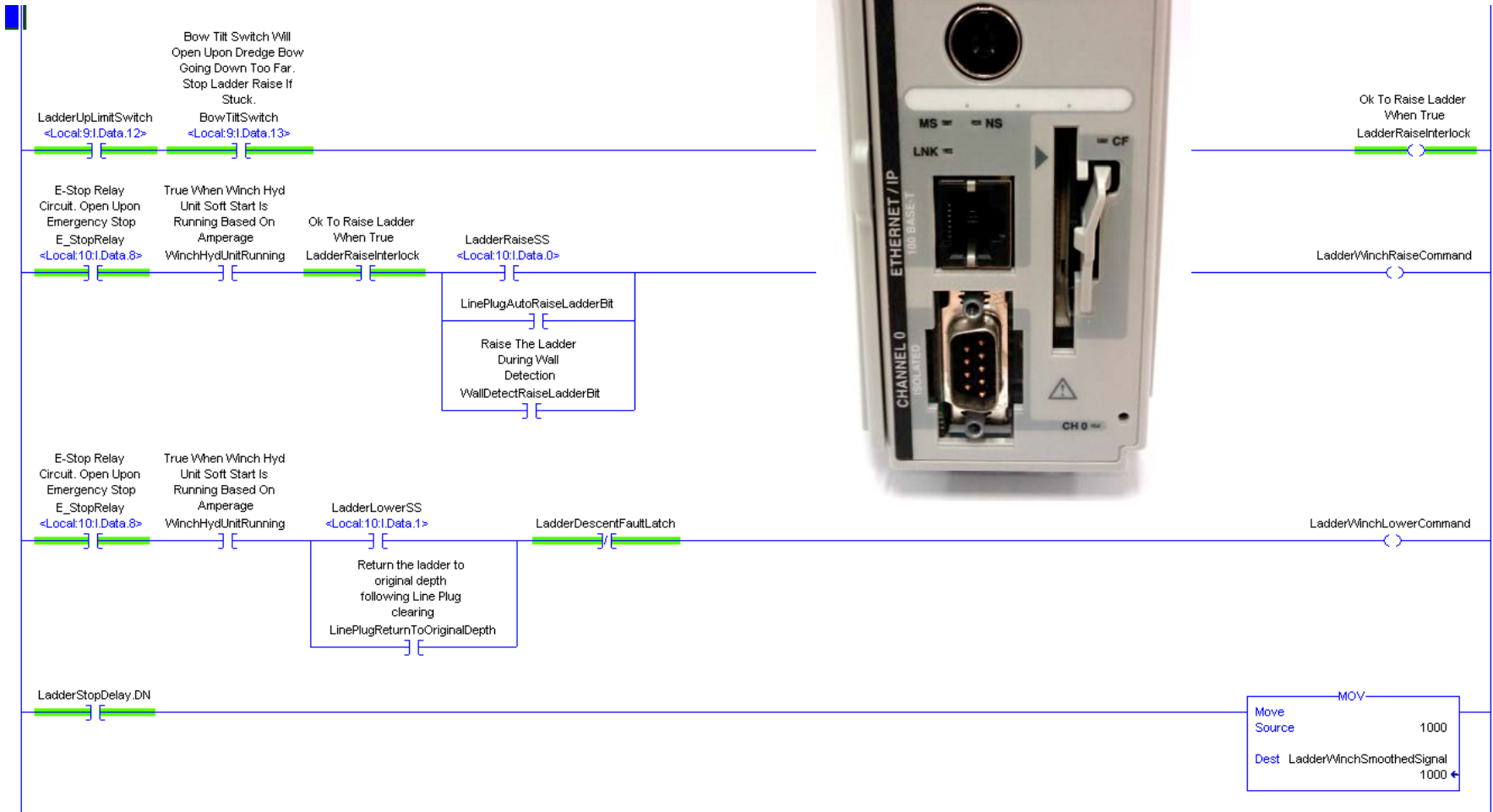
Keep wiring and cabinets neat



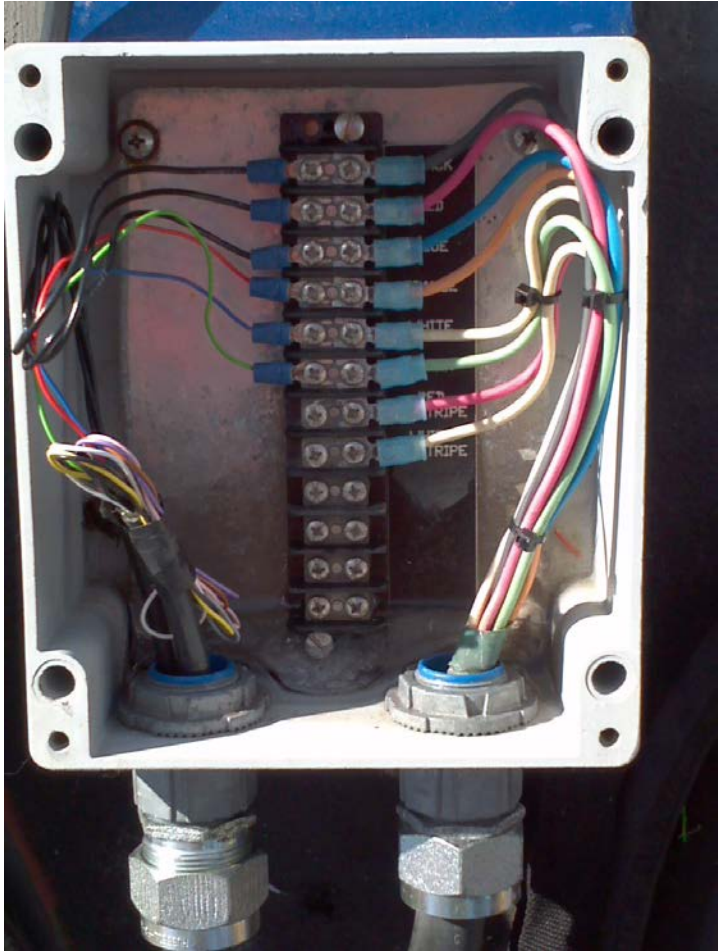
Motor control troubleshooting



PLC troubleshooting



Common field issues

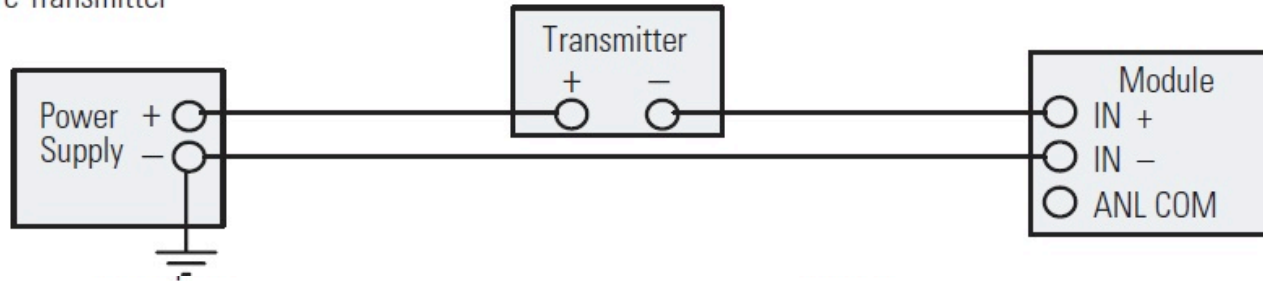


Transmitters (sensors aka instruments)



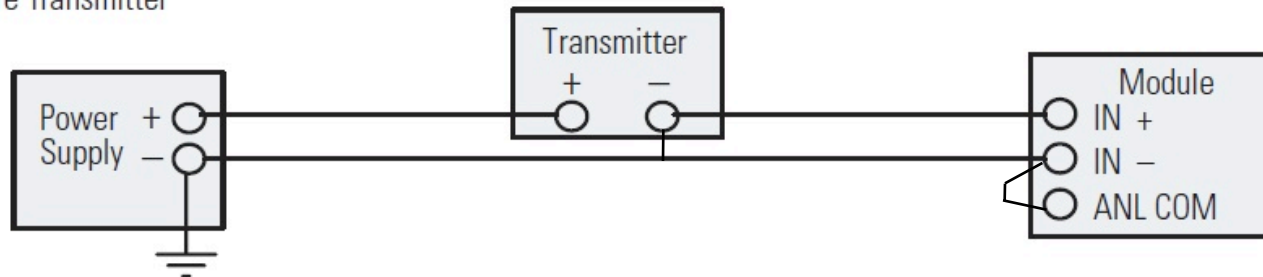
Transmitter troubleshooting

2-Wire Transmitter



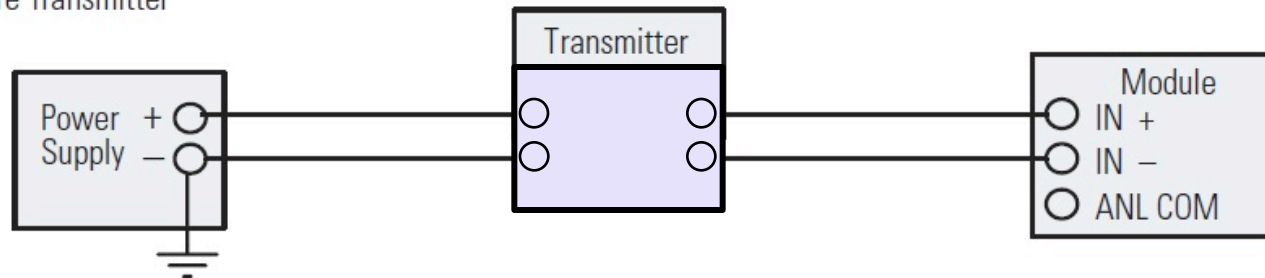
3-Wire Transmitter

□



4 Wire Transmitter

□



Transmitter troubleshooting



Clamp on milli-amp probe



Transmitter mounting location



5 times the pipe diameter upstream and down stream

Density meter issues

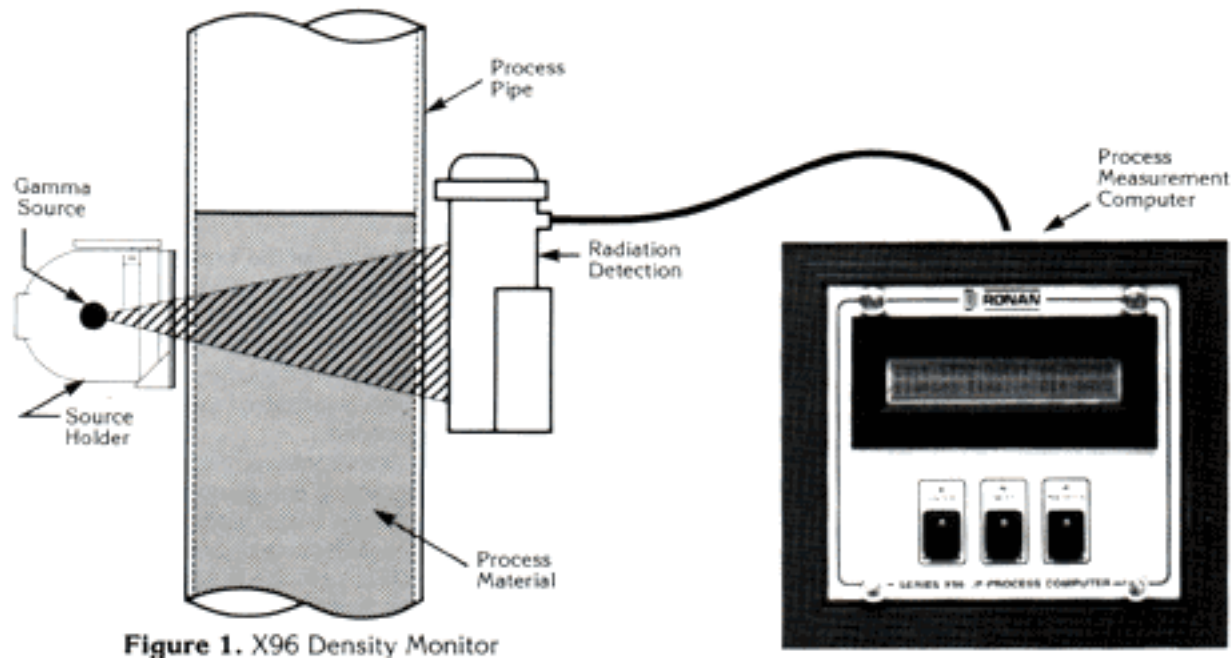


Figure 1. X96 Density Monitor

- Needs proper dry specific gravity value.
- Requires media calibration.
- Makes use of proper flow value input.

Questions ???

