

SVT Leak Sensor Debugging

Detector Support Group

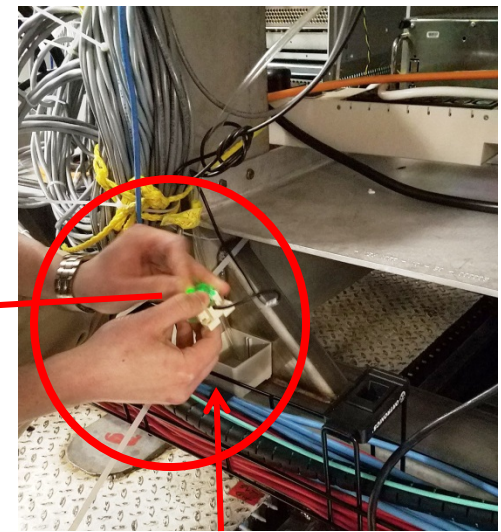
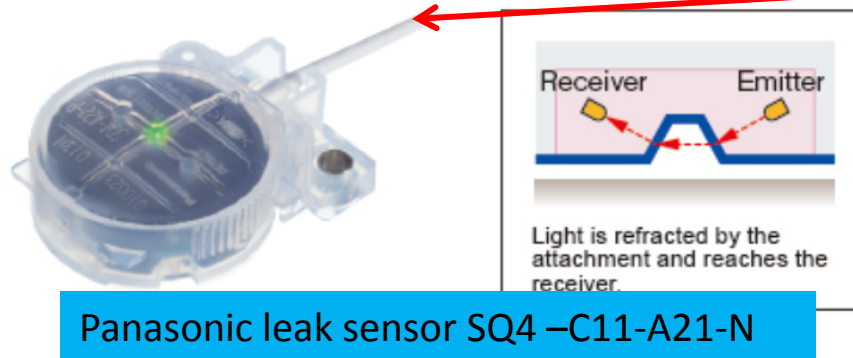
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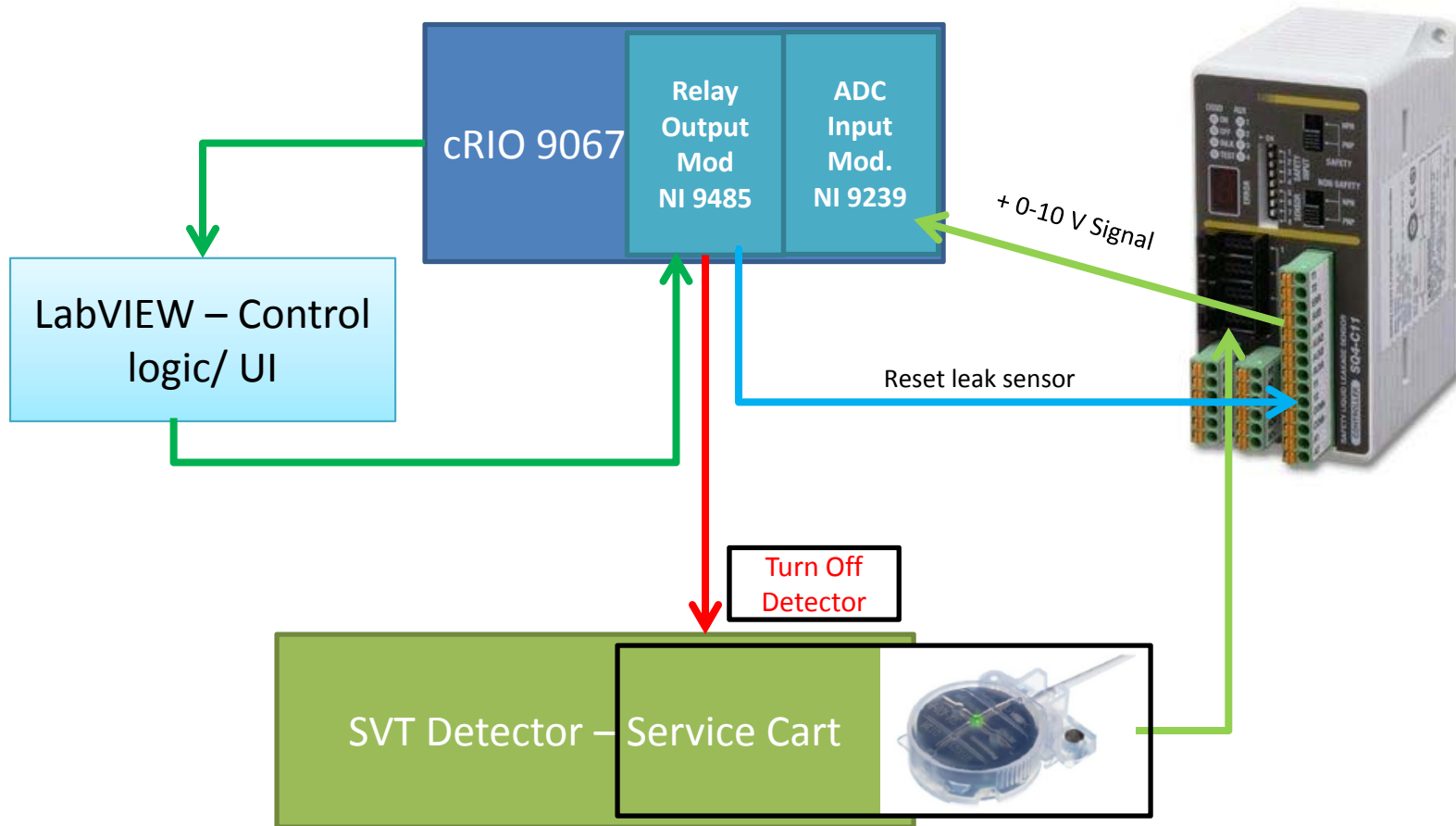
Description

- SVT had installed a leak sensor to detect coolant liquid leaks, which never was used before, since its implementation as part of Interlock hardware system.
- Recently (02/18) sensor was located at SVT service cart



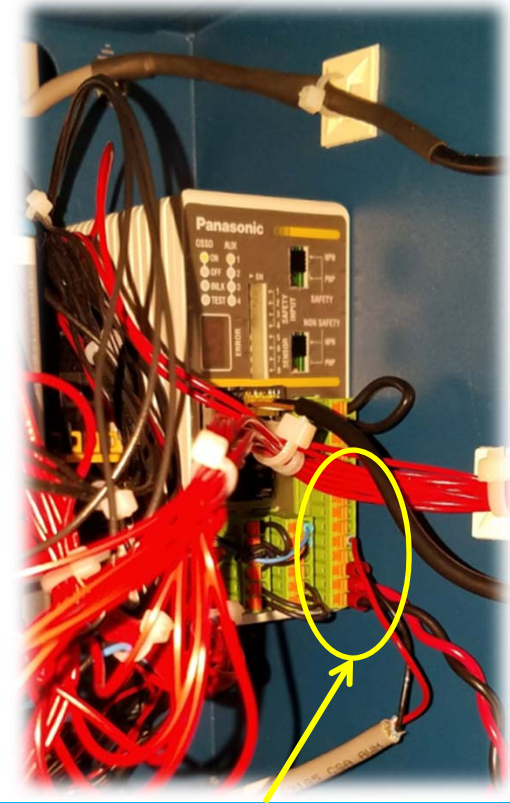
Leak sensor location –
Drain pan at SVT service
cart

Leak Sensor Connection



Debugging task

- Moved the output on the leak sensor controller (Panasonic SQ4-C11) from AUX1 to Y1
 - Spikes (> 9.5 V) at cRIO ADC input tripped SVT.
- Found Y1 output is a pulsed +24 VDC output.
- Noticed controller's manual indicates that for an NPN (type sensor) output the COM+ terminal should be used.
 - After change wire connection the circuit breaker in the interlock control box tripped and turn off the SVT detector.
- Measured voltage on the ERR, SUB, and AUX1 outputs and did not find changes in voltage for liquid detection.
 - AUX1 LED on the controller matched the leak sensor status. (orange light for liquid detection)



Leak sensor controller – Output connections

Measured outputs



Output voltage pulse signal measured between output controller terminals Y1 and (-) COM.

Liquid leak Sensor Specs

4 safety liquid leak sensors can be connected to leak SQ4 controller

Leak sensor SQ4 –C11-A21-N		
Sensor type	Leakage sensor - NPN	
Safety category	Category 1, PLc, SIL1 (with SQ4C11 controller: category 4, Ple, SIL3)	
Tolerable liquids	Water	Sulfuric acid, ammonia, Galden, Fluorinert, fluorine, etc.
Supply voltage	12 to 24V DC ±10%	
Output	PNP / NPN transistor, max. 50mA	
Response time	10ms	
Emitting element	Infrared LED	
Degree of protection	IP65/IP67 (IEC)	
Rated current consumption	Max. 30mA	
Ambient temperature	-10 to +55°C	
Material	Polypropylene	PFA
Dimensions (ØxH)	35.8 x 18.7mm	
Connection method	Cable: 2m	
Weight	45g	

Leak Sensor SQ4 Controller	
Response time	Max. 20ms (limited by the sensor)
Supply voltage	24V DC +10/-15%
Control outputs	OSSD1 and OSSD2 (2x PNP or 2x NPN transistor, switchable), max. 200mA
Functions	Interlock, lockout, cancel test / external monitoring, safety input
Rated current consumption	Max. 200mA
Degree of protection	IP20 (IEC)
Ambient temperature	-10 to +55°C
Material	PC / ABS
Connection method	Connector (sensors), terminal block
Dimensions (HxWxD)	100 x 48 x 66mm
Weight	170g

Conclusions

- Possible output connection (AUX1) damaged.
 - Plan to test outputs (AUX2 to AUX4) in the next SVT shutdown period.
- Leak detection interlock disabled in Hardware Interlock control program to avoid any unexpected trip.
- Controller and leak sensor ordered .