FLUID COMPONENTS INTERNATIONAL LLC

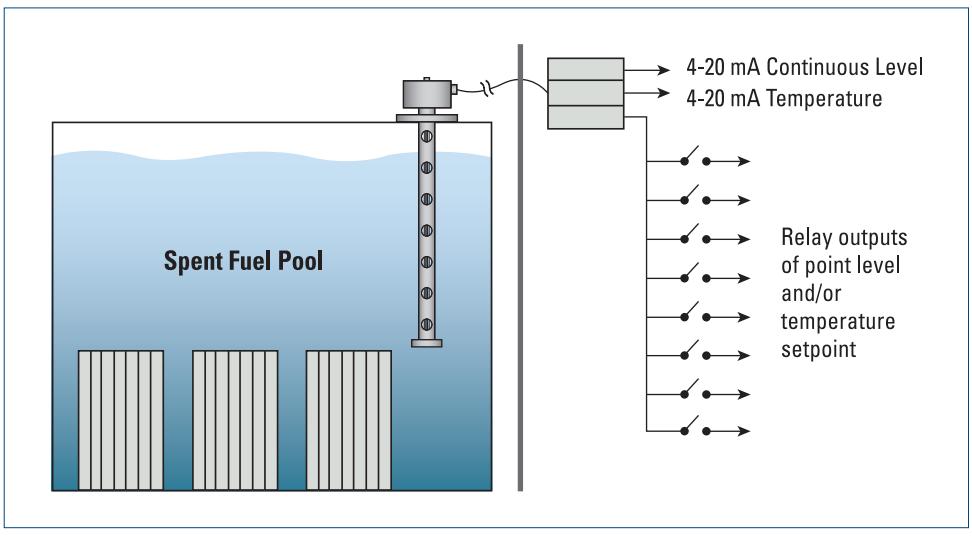
Spent Fuel Pool Multi-Monitor System

CL86 Plus: Continuous Level, Point Level and Temperature

Recent events at Japan's Fukushima Daiichi nuclear power plant revealed the critical need to monitor water level and conditions within the spent fuel pool. As a long-term, leading supplier of level, temperature and flow instrumentation to the nuclear power industry, FCI has responded to this pressing situation with a specially modified version of our proven and 1E approved CL86. The CL86 Plus solution will meet or exceed all parameters currently being proposed by plant operators and regulatory agencies for SFP monitoring.

The CL86 Plus is an extension of FCI's nuclear industry proven thermal dispersion technology, 1E qualified CL86. CL86 Plus combines the three critical measurements of continuous level, point level and temperature into an integrated multi-variable solution designed specifically for spent fuel pool (SFP) monitoring. Although integrated, the sensors and their associated electronics are completely independent from each other to provide the robustness, diversity and reliability required in nuclear power plant installations. The CL86 Plus provides discrete and independent outputs of each measurement for interface with the plant control room and alarm systems.

- **Continuous Water Level**
- **Multiple Point Level Wet/Dry Indication and Alarms**
- **Water Temperature**
- **1E Qualified**
- **Exceeds Design-Basis Event**
- **New and Retrofit SFP Applications**
- **Exclusive In-Situ Verification Option**



Installation

The CL86 Plus consists of a unified probe assembly immersed in the SFP and manufactured to the exact length specified for the application. The sensor wires and electronics interface junction box has a rugged metal enclosure that is water-tight and immune to falling debris. For installations challenged by overhead constraints the probe assembly can be manufactured with strategically placed flex-joints.

The electronics are remote mounted, up to 1000 feet [300 meters] in a stainless steel NEMA rated enclosure for installation in a mild environment, and for wire-up to power and the outputs to the control room.

Station Blackout Operation (SBO) Optimization

Depending on site specific needs, FCI can advise client of product selection and operation strategies for the CL86 Plus to optimize for SBO.

Exclusive In-Situ Verification

Optionally available is FCI's proprietary in-situ verification of level operation. With this option operators can simulate SFP water level and verify proper operation and outputs from the CL86 Plus without having to alter or drain water from the pool or remove the CL86 Plus from its installation. For more details on this option and its operation contact FCI.

Individual, Discrete Instrument Solutions

For operator's who prefer individual instruments for each parameter or where installation constraints do not allow use of the CL86 Plus, FCI can supply specific, dedicated instruments.

- CL86 Continuous Level
- FLT93 M Multi-Point Level
- FLT93 Temperature Transmitter

FLT93M

FLT93

FCI Advantage

FCI is the world's leading manufacturer of thermal dispersion technology-based level and flow instrumentation. FCI has been a continuous, nuclear industry 1E qualified supplier since 1978. We have provided measurement solutions to numerous applications to more than a hundred nuclear power plants throughout the world. The CL86 Plus is an extension to these products, experiences and qualifications specifically to address the emerged needs for better measurement and monitoring of the spent fuel pool.

CL86 Plus Specifications

General

Technology

Level	Thermal dispersion
Temperature	Platinum RTD

Media: Water / air interface

Measurement Range

Level (Continuous)	up to 30' [9m] specific to installation requirements
Level (Point)	up to 4 points as specified by installation requirements
Temperature	32 °F to 212 °F [0 °C to 100 °C]

Accuracy

Level (Continuous)	± 2% of full scale
Level (Point)	± 0.25" [6.4 mm]
Temperature	± 2 °F [± 1 °C]

Sensor Element

Material of Construction: 316L stainless steel

Junction Box: 316L stainless steel; water tight, sealed and protected from falling debris

Qualifications

Radiation	1x 10^8 rads TID
Seismic Test	1.8 g horizontal SSE Test Response Spectrum (TRS); 1.2 g vertical SSE TRS
Design Basis Event	Peak test to 360 °F [182 °C], 10 minutes Short test 275 °F [135 °C], 9 hours

Electronics

Discrete and independent sets of electronics for each measurement variable of continuous level, point level and temperature mounted within an integrated stainless steel enclosure. Electronics remote mounted from sensor element up to 1000' [300 m].

Outputs

Level (Continuous)	4-20mA
Level (Point)	Two (2) 6A relays per point; gold-plated relays assignable to level and / or temperature
Temperature	4-20mA

Power: 120 Vac or 230 Vac, 150 watt maximum

Ambient Temperature: 40 °F to 120 °F [4 °C to 49 °C]

Qualifications

Seismic Test	5 g SSE TRS (horizontal and vertical)

FCI Qualifications

Quality assurance program in accordance with 10CFR50 App.B, ANSI N45.2, ASME NQA-1

NUPIC approved, ISO 9001 certified

Qualified to IEEE 323, 344

Continuous Class 1E Supplier since 1978

FLUID COMPONENTS INTERNATIONAL LLC

Locally Represented By:

Visit FCI online at www.FluidComponents.com | FCI is ISO 9001:2000 and AS9100 Certified

FCI World Headquarters
1755 La Costa Meadows Drive | San Marcos, California 92078 USA | **Phone:** 760-744-6950 **Toll Free (US):** 800-854-1993 **Fax:** 760-736-6250

FCI Europe
Persephonestraat 3-01 | 5047 TT Tilburg, The Netherlands | **Phone:** 31-13-5159989 **Fax:** 31-13-5799036

FCI Measurement and Control Technology (Beijing) Co., LTD | www.fluidcomponents.cn
Room 107, Xianfeng Building II, No.7 Kaituo Road, Shangdi IT Industry Base, Haidian District | Beijing 100085, P. R. China
Phone: 86-10-82782381 **Fax:** 86-10-58851152

0412 0 K

Doc. No. 02MK011537 –