



PROTK

WRM 501TM

Wide Range Monitor (Start-up Channel)

Wide range monitor used with fission chamber for ex-core neutron flux monitoring in the start-up range.



FEATURES

- Qualified to perform safety functions
- Seismic qualification
- Available with fission chambers of various sensitivities (see table)
- High longevity due to the robustness of fission chambers
- LOCA proof fission chambers are available
- Wide measurement range (combined pulse + Campbell (AC) mode) up to 12 decades
- Signal filtering with adaptive time constant
- Calibration to neutron flux signal or reactor power (nv, %FP)
- Calculation of the relative flux change rate (reciprocal of the reactor period) or rate of change of reactor power (in decade/min)
- Linear and/or logarithmic analog outputs
- Generation of analog and binary outputs for the reactor protection system
- Built in test signal generators (remote activation possible)

DESCRIPTION

The wide range monitor WRM 501 forms part of the digital Neutron Flux Monitoring Systems (NFMS) product line proTKTM. It is used, in combination with fission chamber, for ex-core neutron flux monitoring in the start-up range.

The associated processing unit DWK 250 has been designed and is qualified (in hardware and software). It provides functions that can be used at the level of the reactor protection system.

Note: 1 nv = 1 neutron / (cm².s)

EX-CORE WIDE RANGE FISSION CHAMBERS

The ex-core fission chambers of the WRM 501 are designed to provide neutron flux information over a wide range of (thermal) neutron flux levels and can withstand harsh environmental conditions up to LOCA and Post-LOCA conditions. Together with a suitable signal processing unit these detectors can operate in all of the following: the pulse, AC (also known as Campbell or fluctuation) or current mode. In case of the WRM 501 pulse and AC modes are combined to give a smooth, glitch-free wide-range signal from the output of one single fission chamber.

Ref.	Mode	Neutron Sensitivity	Operating Range (nv)	Nominal Diameter (mm)	Detector Length (mm)		Integral Cable
CFUG08 (LOCA proof)	Pulse	4 (cps/nv)	2E-1 to 2E+5	80	Nominal	Sensitive	6 mm coaxial
	Fluctuation	1.6E-25 (A ² .Hz ⁻¹ /nv)	2E+3 to 7E+10		419	220	
	Current	8E-13 (A/nv)	1E+5 to 7E+10				
CFUL08 (LOCA proof)	Pulse	1 (cps/nv)	1E+0 to 1E+6	48	Nominal	Sensitive	6 mm coaxial
	Fluctuation	4E-26 (A ² .Hz ⁻¹ /nv)	8E+4 to 2E+9		384.5	211	
	Current	2E-13 (A/nv)	1E+4 to 1E+10				
CFUM18	Pulse	1E-1 (cps/nv)	1E+1 to 1E+7	25.4	Nominal	Sensitive	6 mm coaxial
	Fluctuation	4E-27 (A ² .Hz ⁻¹ /nv)	1E+5 to 3E+10		263	120	
	Current	1E-14 (A/nv)	1E+7 to 1E+11				

DETECTOR COMMON CHARACTERISTICS

- Maximum operating temperature: 250°C (482°F)
- Nominal operating voltage: 600 VDC
- Connector type: HN (male/female)
- Maximum fluence: 2E+19 nvt (neutrons/cm²)
- Maximum gamma flux: 1E+4 Gy/h
- Maximum gamma exposure: 1E+9 Gy

WIDE RANGE PREAMPLIFIER (TKV 23)

- Input impedance matched to impedance of detector cable (50 or 75 Ω)
- Power supply provided by the DWK 250
- Integrated test signal generator
- Max. distance to detector > 100 m (330 ft)
- Max. distance to processing unit > 100 m (330 ft)
- Dimensions: 268 mm x 155 mm x 53 mm

DIGITAL PROCESSING UNIT (DWK 250)

- Modular, multi-processor system
- Program code & configuration parameters, fixed in EPROM
- Non-volatile parameter memory (CMOS-RAM with integrated Li-battery)
- Data interface: one RS 232 and/or RS 485 (with optional built in firewall)
- Alphanumeric LCD: 2 x 16 characters (measurement values, status, diagnostic, parameters, thresholds...)
- Alarm and status LEDs on the front panel
- HV detector supply 0 ... 800 V
- Dimensions: standard 19" x 3U rack (IEC60297)

ENVIRONMENTAL CHARACTERISTICS (For Electronics)

- Temperature (incl. pre-amplifier): 0°C to +70°C (+32°F to +158°F)
- Relative humidity: max. 75% RH

ELECTRICAL CHARACTERISTICS

- Power supply: 24 VDC or 115/230 VAC (50/60 Hz)
- Isolated analog outputs: 0/4-20 mA, 0/2-10 V
- Binary outputs (isolated relays): 60 V/0.5 A or 125 V/1 A

REFERENCE STANDARDS

- Safety classification: Category A or B acc. KTA3501 (equiv. to IEC61226)
- Software: KTA3503/3505
- Qualification: IEC60780, IIEEE323
- Seismic: IEC60980, IIEEE344
- EMC/RF: IEC61000-6-2, IEC61000-6-4

VERSIONS

- 24 VDC or 115/230 VAC (50/60 Hz)
- Other fission chambers available
- Detector cable lengths as needed
- Number and type of input and output modules adjustable

ACCESSORIES

- Seismic cabinet or wall-mounted cabinet
- Field cables (custom lengths)

Featuring:

