



Reason S20

**IEC 61850-3 ED.2,  
IEEE 1613 & IEEE 1613.1,  
UL 60950-1 RECOGNITION**

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# IEC 61850-3 ed.2, IEEE 1613 & IEEE 1613.1, UL 60950-1 recognition

The requirements of communication network devices for power utilities has been evolving to include new standards, following this, GE's Reason S20 design has been enhanced with hardware version C, delivering a brand-new High Voltage power supply 125-250 VDC / 110-240 VAC (50/60 Hz). Such model delivers:

- Fully compliance with environment and EMC requirements of IEC 61850-3 edition 2
- Fully compliance with environment and EMC requirements of IEEE 1613:2009 and its extension IEEE 1613.1:2013.
- UL 60950-1 recognition

In addition, the S20 HW C delivers a Real Time Clock (RTC) along with a supercapacitor remaining active for 2 days after S20 is powered-off. The type tests and test levels in which the Reason S20 Hardware C Ethernet Switch was submitted are available in the following sections, categorized by: safety, climatic, mechanical, EMC – Emission and EMC - Immunity, exceeding requirements of IEC 61850-3 and IEEE 1613 standards.

## Safety Tests

UL 60950-1	General Safety Requirements	Recognized	
File number E484801	Impulse voltage	Power supply	5 kV
		Relay contact outputs	5 kV
		Communication ports N/A due to double insulation in PS & Relay contact	
IEC 60255-27	Dielectric voltage	Power supply	3,25 kVac
		Relay contact outputs	3,25 kVac
		Communication ports N/A due to double insulation in PS & Relay contact	
IEC 60255-27	Flammability	Housing	Metal, non-flammable
		Cover	Metal, non-flammable
		Terminals	V-0 (UL94)
		PCB boards	V-0 (UL94)
		(Input) transformers	V-0 (UL94)
		Output relays	V-1
IEC 60255-27	Single fault condition	no fire risk	
IEC 60255-27	Insulation Resistance	> 100MΩ @ 500 VDC	

## Climatic Tests

IEC 60068-2-1	Cold operational and storage test	Operational tTemperature	-40 °C
		Duration of exposure	16 Hours
IEC 60068-2-2	Dry heat operational and storage test	Operational tTemperature	+85 °C
		Duration of exposure	16 Hours
		Test Type	Bd
IEC 60068-2-14	Change of temperature test	Lower temperature	-40 °C
		Upper temperature	+55 °C
		Duration of exposure	5 thermal cycles
		Dwell/recovery period	9 hours
		Steady-State period	3 hours
IEC 60068-2-30	Cyclic temperature with humidity	Test type	Nb
		Lower temperature	+25 °C, ±3 °C
		Upper temperature	+55 °C, ±2 °C
		Relative Humidity at lower temperature	97%, -2%, +3%
		Relative Humidity at upper temperature	93%, ±3%
		Duration of exposure	6 cycles of 24hs (12+12hs)
IEC 60068-2-78	Damp heat steady state	Recovery period	1 to 2 hours
		Temperature	+40 °C
		Relative Humidity	93%
		Duration	10 days
		Test type	Cab

## Mechanic Tests

IEC 60255-21-1	Vibration response	class 2	
		Frequency range	10 to 150 Hz
		Cross over frequency	59 Hz
		Peak displacement before cross over	0,075 mm
		Peak acceleration after cross over	1,0 gn
		Number of sweep cycles per axis	1
IEC 60255-21-1	Vibration endurance	class 2	
		Frequency range	10 to 150 Hz
		Peak acceleration	2,0 gn
		Number of sweep cycles per axis	20
IEC 60255-21-2	Shock response	class 2	
		Peak acceleration	10 gn
		Pulse duration	11ms
		Number of pulses in each direction	3
IEC 60255-21-2	Shock withstand	class 1	
		Peak acceleration	15 gn
		Pulse duration	11 ms
		Number of pulses in each direction	3

IEC 60255-21-3	Seismic	class 2	
		Frequency range	1 to 35 Hz
		Cross over frequency	8 Hz
		Peak displacement before cross over X and Y	7,5 mm
		Peak displacement before cross over Z	3,5 mm
		Peak acceleration after cross over X and Y	2,0 gn
		Peak acceleration after cross over Z	1,0 gn
		Number of sweep cycles per axis	1

## EMC - Emission Tests

CISPR 11 (below 1Gbps)	Radiated emission	class A	
		Frequency	30 to 230 MHz
		Level	50 dB (µV/m) quasi peak at 3 m
		Frequency	230 to 1000 MHz
		Level	57 dB (µV/m) quasi peak at 3 m
CISPR 22 (above 1Gbps)	Radiated emission	class A	
		Frequency	1 to 3 Gbps
		Level	56 dB (µV/m) average; 76 dB (µV/m) peak at 3 m
		Frequency	3 to 6 GHz
		Level	60 dB (µV/m) average; 80 dB (µV/m) peak at 3 m
CISPR 22	Conducted and radiated emission	class A	
		Frequency	0.15 to 0.50 MHz
		Level	79 dB (µV) quasi peak; 66 dB (µV) average
		Frequency	0.5 to 30 MHz
		Level	73 dB (µV) quasi peak; 60 dB (µV) average

## EMC - Immunity Tests

IEC 61000-4-18	Slow damped oscillatory wave	Test level 3	
		Frequency	100kHz and 1MHz
		Power supply (CM)	2,5 kV
		Power supply (DM)	1,0 kV
		Relay contact outputs (CM)	2,5 kV
		Relay contact outputs (DM)	1,0 kV
		Communication ports (CM)	2,5 kV
IEEE C37.90.1	1 MHz Damped oscillatory wave	Test level 3	
		Frequency	100kHz and 1MHz
		Power supply (CM)	2,5 kV
		Power supply (DM)	1,0 kV
		Relay contact outputs (CM)	2,5 kV
		Relay contact outputs (DM)	1,0 kV
		Communication ports (CM)	2,5 kV

IEC 61000-4-2	Electrostatic discharge immunity	Zona A	
		Power supply (CM)	2,5 kV
		Power supply (DM)	2,5 kV
		Relay contact outputs (CM)	2,5 kV
		Relay contact outputs (DM)	2,5 kV
		Communication ports (CM)	2,5 kV
IEC 61000-4-2	Electrostatic discharge immunity	Test level 4	
		Contact discharge on conductive surface	8kV
		Contact discharge on coupling planes	8kV
		Air discharges	15kV
IEEE C37.90.3	Electrostatic discharge immunity	Zona A	
		Contact discharge on conductive surface	8kV
		Contact discharge on coupling planes	8kV
		Air discharges	15kV
IEC 61000-4-3	Radiated radio frequency magnetic field	Test Level 3	
		Electromagnetic field strength	10 V/m
		Frequency range	80 to 1000 MHz
		Modulation AM	1 kHz, 80%
		Electromagnetic field strength	10 V/m
		Frequency range	1400 to 2700 MHz
		Modulation AM	1 kHz, 80%
		Electromagnetic field strength	10 V/m
		Spot frequencies	80, 160, 380, 450, 900, 1850, 2150 MHz
		Modulation AM	1 kHz, 80%
IEEE C37.90.2	RF susceptibility test	Zona A	
		Electromagnetic field strength	20 V/m
		Frequency range	80 to 1000 MHz
		Modulation AM	1 kHz, 80%
		Electromagnetic field strength	10 V/m
		Frequency range	1000 to 3800 MHz
		Modulation AM	1 kHz, 80%
		Electromagnetic field strength	8.5 V/m
		Spot frequencies	1000 to 6000 MHz
		Modulation AM	1 kHz, 80%
IEC 61000-4-4	Fast transient	Test Level 4	
		Power supply (CM)	+/- 4kV @ 5 kHz
		Relay contact outputs (CM)	+/- 4kV @ 5 kHz
		Communication ports (CM)	+/- 4kV @ 5 kHz
		Functional earth port (CM)	+/- 4kV @ 5 kHz
IEEE C37.90.1	Fast transient	Zone A	
		Power supply (CM)	+/- 4kV @ 5 kHz
		Relay contact outputs (CM)	+/- 4kV @ 5 kHz
		Communication ports (CM)	+/- 4kV @ 5 kHz
		Functional earth port (CM)	+/- 4kV @ 5 kHz

IEC 61000-4-5	Surge	Power supply, relay contact, communication ports: Test Level 4 / Zone A			
		Power supply (Line-to-Earth)	4,0 kV		
		Power supply (Line-to-Line)	2,0 kV		
		Relay contact outputs (Line-to-Earth)	4,0 kV		
		Relay contact outputs (Line-to-Line)	2,0 kV		
		Communication ports (Line-to-Earth)	4,0 kV		
IEC 61000-4-6	Conducted disturbance induced by radio	Test Level 3 / Zone A			
		Power supply, relay contact, ground, communication ports			
		Level	10 V		
		Frequency range	150 kHz to 80 MHz		
		Spot frequencies	27 and 68 MHz		
		Modulation AM	1 kHz; 80%		
IEC 61000-4-8	Power frequency magnetic field	Test Level 5 / Zone A			
		Frequency	50 Hz / 60 Hz		
		Continuous field	180 s		
		Level	100 A/m		
		Short time field	3 s		
		Level	1000 A/m		
IEC 61000-4-9	Pulse magnetic field	Test Level 5			
		Number of pulses in each direction	5		
		Level	1000 A/m		
IEC 61000-4-10	Damped oscillatory magnetic field	Test Level 5 / Zone A			
		Frequency	100 kHz		
		Level	100 A/m		
		Frequency	1 MHz		
		Level	100 A/m		
IEC 61000-4-11	AC voltage dips	Residual voltage	0%		
		Duration (50/60 Hz)	1/1 cycles		
		Residual voltage	40%		
		Duration (50/60 Hz)	50/60 cycles		
		Residual voltage	70%		
		Duration (50/60 Hz)	25 / 30 cycles		
	AC voltage interruptions	Residual voltage	0%		
		Duration (50/60 Hz)	250 / 300 cycles		
		IEC 61000-4-29	DC voltage dips	Residual voltage	0%
				Duration	50 ms
Residual voltage	40%				
Duration	100 ms				
Residual voltage	70%				
DC voltage interruptions	Residual voltage	0%			
	Duration	5 s			
	DC voltage variations	Residual voltage	80, 85 and 120%		
		10 s			

IEC 61000-4-17	Ripple on DC input power port immunity test	Test Level 4	
		Level	15%
		Frequency	100/120 Hz
		Waveform	Sinusoidal
IEC 60255-26	Gradual shut-down/start-up (for d.c. power supply)	Shut-down ramp	60 s
		Power off	5 min
		Start-up ramp	60 s
IEC 61000-4-12	Ring Wave (100kHz)	Test Level 3	
		Power supply (CM)	2 kV
		Power supply (DM)	1 kV
		Relay contact outputs (CM)	2 kV
		Relay contact outputs (DM)	1 kV



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