



REPORT OF PERFORMANCE

TIC 1329-12

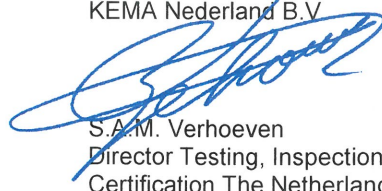
OBJECT	Industrial Ethernet Switch
TYPE	712FX4-HV series Uaux: 43 - 300 VDC
MANUFACTURER	N_TRON Corporation, Mobile, Alabama, USA
CLIENT	N_TRON Corporation, Mobile, Alabama, USA
INSPECTED BY	KEMA HIGH-VOLTAGE LABORATORY Arnhem, the Netherlands
TEST LOCATION	KEMA HIGH-VOLTAGE LABORATORY Arnhem, the Netherlands
DATE OF TESTS	19 August 2010 to 26 February 2012
INSPECTION PROGRAM	Selected tests in accordance with IEC 61850-3 (2002-01) and IEEE 1613 (2009) (see page 4 to 8).
SUMMARY AND CONCLUSION	The object passed the tests.

This Report of Performance applies only to the object tested. The responsibility for conformity of any object having the same designations with that tested rests with the Manufacturer.

This report consists of 72 pages in total.

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KEMA Nederland B.V



S.A.M. Verhoeven
Director Testing, Inspections &
Certification The Netherlands

Arnhem, 5 April 2012

SUMMARY

By the order of N-TRON Corporation, located in Mobile, Alabama USA, EMC tests were performed on an Industrial Ethernet Switch 712FX4-HV series for use in substation and industrial environments.

Manufacturer	N-TRON Corporation
Type	712FX4-HV series
Firmware version	3.4.1
Boot version	2.0.5.1

The Industrial Ethernet Switch, 712FX4-HV series is tested for use in HV substations and connections to HV equipment according IEC 61850 and IEEE 1613. The 712FX4-HV series overall complies with the following classes:

IEC 61850-3	EMC immunity EMC emission	performance class 2 class A
IEEE 1613	EMC	class 1

The Conducted Emission is measured for class A and Class B according to CISPR22.

Test program according to IEC 61850-3

Communication networks and systems in substations – Part 3: General requirements (2002-01)

Climatic environmental conditions					
test description	IEC 61850-3 reference	test reference	requirement	test standard	ports
low air temperature for use	5.2	IEC 60870-2-2 table 1	class C3 (3K7), -40°C	IEC 60068-2-1 IEC 60721-3-3	F
high air temperature for use	5.2	IEC 60870-2-2 table 1	class C3 (3K7), +70°C	IEC 60068-2-2 IEC 60721-3-3	F
low air temperature for storage and transportation	5.2	IEC 60870-2-2 table 2	class Ct2 (2K4), -40°C	IEC 60068-2-1 IEC 60721-3-3	F
high air temperature for storage and transportation	5.2	IEC 60870-2-2 table 2	class Dt1 (2K5), +85°C	IEC 60068-2-2 IEC 60721-3-3	F
damp heat separate communication equipment	5.3	IEC 60870-2-2 table 1	class C1 (3K5), 95%	IEC 60870-2-2 IEC 60068-2-30 IEC 60721-3-3	F

Mechanical environmental conditions					
test description	IEC 61850-3 reference	test reference	requirement	test standard	ports
stationary vibration	5.5	IEC 60870-2-2 table 3	class C _m (3M6, 4M6)	IEC 60068-2-6 IEC 60721-3-3	F
shock	5.5	IEC 60870-2-2 table 3	class C _m (3M6, 4M6)	IEC 60068-2-27 IEC 60721-3-3	F
free fall	5.5	IEC 60870-2-2 table 3	class C _m (3M6, 4M6)	IEC 60721-3-3	F
static load	5.5	IEC 60870-2-2 table 3	class A _m (no test required)	IEC 60721-3-3	F

Electromagnetic compatibility (EMC)					
test description	IEC 61850-3 reference	test reference	requirement	test standard	ports
induced disturbances by RF-fields	5.7.1.1	-	0,15 – 80 MHz AM 80% 1 kHz 10 V (un-modulated)	IEC 61000-4-6	A, B, C, E
surges	5.7.1.2	-	4 kV CM 2 kV DM	IEC/TS 61000-6-5 IEC 61000-4-5	A, B, C, E
100 kHz oscillatory waves	5.7.1.3	-	2,5 kV CM 1 kV DM	IEC 61000-4-18	A, B, C, E
1 MHz oscillatory waves	5.7.1.3	-	2,5 kV CM 1 kV DM	IEC 61000-4-18	A, B, C, E
fast transient	5.7.1.4	-	4 kV CM / 2 kV CM	IEC 61000-4-4 IEC/TS 61000-6-5	A, B, C, E
EM-fields immunity	5.7.2	-	0,08 – 3 GHz AM 80% 1 kHz 10 V/m (un-modulated)	IEC 61000-4-3	F
induced CM voltages	5.7.3	-	level 4 30 V cont., 300 V 1 s	IEC 61000-4-16	A, B, C, E
1 MHz damped oscillatory magnetic field	5.7.3	-	30 A/m	IEC 61000-4-10	F
100 kHz damped oscillatory magnetic field	5.7.3	-	30 A/m	IEC 61000-4-10	F

test description	IEC 61850-3 reference	test reference	requirement	test standard	ports
PF magnetic field	5.7.3	-	100 A/m continuous 1000 A/m 1 s to 3 s	IEC 61000-4-8	F
conducted emission	5.8	-	class B	CISPR22 FCC part 15	A
radiated emission	5.8	-	class B	CISPR22 FCC part 15	F
power supply variations, dips and interruptions	6	IEC 60870-2-1	class DC1 +/- 10% 1)	IEC 61000-4-11 IEC 61000-4-29	A
1) interruptions 10 ms for DC supply DC supply earthing condion class E- ripple class VR3 (<= 5%)					

Ports

- A Main power supply input
- B 10/100BaseTx electrical Ethernet port
- C Digital input & output ports
- D RS232 console port
- E Functional earth port
- F Housing

Test program according to IEEE 1613

IEEE Standard Environmental and Testing Requirements for Communications Networking Devices in Electric Power Substations (2003)

Climatic environmental conditions					
test description	IEEE 1613 reference	test reference	requirement	test standard	ports
low air temperature for use	4.1.1	IEEE 1613 clause 4.1.1	-40°C	IEEE 1613 clause 4.1.1	F
high air temperature for use	4.1.1	IEEE 1613 clause 4.1.1	+70°C	IEEE 1613 clause 4.1.1	F
low air temperature for storage and transportation	4.1.2	IEEE 1613 clause 4.1.2	-40°C	IEEE 1613 clause 4.1.2	F
high air temperature for storage and transportation	4.1.2	IEEE 1613 clause 4.1.2	+85°C	IEEE 1613 clause 4.1.2	F
damp heat separate communication equipment	4.1.3	IEEE 1613 clause 4.1.3	95% during 96 hours	IEEE 1613 clause 4.1.3	F

Power inputs					
test description	IEEE 1613 reference	test reference	requirement	test standard	ports
power supply variations	5	IEEE 1613 clause 5.1	¹⁾	IEEE 1613 clause 5.1	A
<p>1) tolerances DC supply ripple on DC supply 48 V; 0,8 Ur Umin = 38,4V 5% in range 0,8 Un – Udesign max design voltage 280 V</p>					

Insulation					
test description	IEEE 1613 reference	test reference	requirement	test standard	ports
dielectric power frequency test	6.2	IEEE 1613 clause 6.2	2,0 kVrms if Ur > 50 V to 250 V 0,5 kVrms if Ur < 50 V	IEEE 1613 clause 6.2 IEEE C 37.90	A, B, C
impulse voltage test	6.3	IEEE 1613 clause 6.3	5,0 kV	IEEE 1613 clause 6.3 IEEE C 37.90	A, B, C

Electromagnetic compatibility (EMC)					
test description	IEEE 1613 reference	test reference	requirement	test standard	ports
1 MHz oscillatory waves	7	IEEE 1613 clause 7	2,5 kV CM 2,5 kV TM	IEEE C37.90.1	A, B, C

fast transient	7	IEEE 1613 clause 7	4 kV CM 4 kV TM	IEEE C37.90.1	A, B, C
RF susceptibility	8	IEEE 1613 clause 8	0,08 – 1 GHz, AM 80% 1 kHz AM 100% 1 Hz 20 V / m (un- modulated) 35 Vp / m (modulated)	IEEE C37.90.2	F
electrostatic dis- charges	9	IEEE 1613 clause 9	8 kV contact, 15 kV air	IEEE C37.90.3	F

Mechanical environmental conditions					
test description	IEEE 1613 reference	test reference	requirement	test standard	ports
stationary vibration	10	IEEE 1613 10, table 14	V.S.3, < 30 mm/s	IEEE C37.1 / IEEE 1613 10, table 14	F
free fall	10	IEEE 1613 10, table 15	height of fall 250 mm	IEEE 1613 10, table 15	F

Ports

- A Main power supply input
- B 10/100Base TX/PoE electrical Ethernet port
- C 10/100/1000Base TX electrical Ethernet port
- D Alarm port
- E Functional earth port
- F Housing