

TEST REPORT RAPPORTO DI PROVA

EMC tests on: Robox Sinamics S120 EtherCAT Interface *Test di compatibilità elettromagnetica su: Robox Sinamics S120 EtherCAT Interface*

Customer (Richiedente):

- Dept./Firm (Ente/Società): ROBOX S.p.A.
- Mr./Mrs. (Sig./Sig.ra.): Roberto Montorsi
- Address (Indirizzo): Via Sempione, 82 – 28053 Castelletto Sopra Ticino (NO)

Test Request Form no.:
Modulo Richiesta Prova n.:
EMC1187790A

Test Report sent to:
Rapporto inviato a:
Roberto Montorsi

Name and Signature of the test engineer:
Nome e Firma esecutore prova:
Alessio Giocoli

Name and Signature of the Technical reviewer:
Nome e Firma del Revisore tecnico:
Giuseppe Mecchia

Date of test samples receipt:
Data ricevimento campioni:
19/09/2018

Date of test execution:
Data esecuzione prove:
From 19/09/2018 to 20/09/2018

Site of test execution (if different from the address in the footer):
Località esecuzione prove (se diversa dal piè pagina):

Witness to the test:
Presenti alle prove:
Enea Brunella

The test results contained in this Test report relate to the tested samples only.

I risultati del presente rapporto di prova si riferiscono esclusivamente al campione sottoposto a prova.

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Test report n.: EMC1187790A
Revision: 00
Document name: EMC1187790A_REV00

Project handler:
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Issue date: 03/10/2018

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1 TEST SETUP SETUP DI PROVA

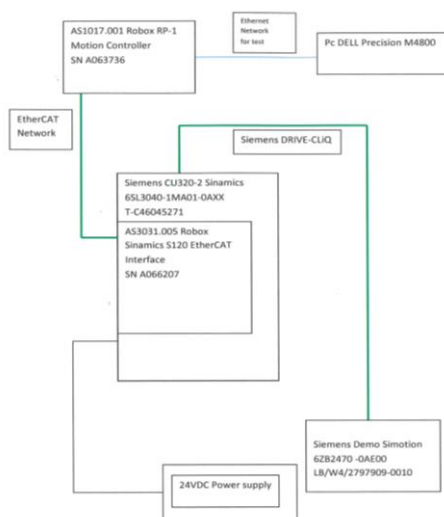
1.1 SAMPLE IDENTIFICATION IDENTIFICAZIONE CAMPIONE

- 1.1.1 Product/material subjected to test:** Robox Sinamics S120 EtherCAT Interface
Prodotto / materiale sottoposto a prova:
- 1.1.2 Description:** EtherCAT interface board for SINAMICS S120
Descrizione
- 1.1.3 Level (Series product, prototype, etc.):** Series product
Livello (Prodotto di serie, prototipo, ecc.)
- 1.1.4 Part number:** None
Codice prodotto
- 1.1.5 Serial number:** A066207
N° Matricola
- 1.1.6 Sample identification code:** 376572
Codice identificativo del campione:

1.2 AUXILIARY DEVICES DISPOSITIVI AUSILIARI

None

1.3 TEST CONFIGURATION CONFIGURAZIONE DI PROVA



1.4 DIAGNOSTIC SYSTEM SISTEMA DIAGNOSTICO

Normal running with monitoring of displayed parameters through software Robox v34.22.3

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2 TEST LIST

ELENCO DELLE PROVE

Test Description	Reference document	Standardized	Differencies
2.1 Measurement of conducted emissions <i>Misura dei disturbi condotti</i>	EN 61800-3:2004/ A1:2012	Yes	None
2.2 Measurement of radiated emissions <i>Misura dei disturbi irradiati</i>	EN 61800-3:2004/ A1:2012	Yes	None
2.3 Electrostatic discharge immunity test <i>Prove di immunità a scariche di elettricità statica</i>	EN 61800-3:2004/ A1:2012 EN 61000-4-2:2009	Yes	None
2.4 Immunity test to radiated radio-frequency electromagnetic fields <i>Prove di immunità ai campi elettromagnetici a radiofrequenza irradiati</i>	EN 61800-3:2004/ A1:2012 EN 61000-4-3:2006/A2:2010	Yes	None
2.5 Electrical fast transient/burst immunity test <i>Prova di immunità a transitori/treni elettrici veloci</i>	EN 61800-3:2004/ A1:2012 EN 61000-4-4:2012	Yes	None
2.6 Surge immunity test <i>Prova di immunità ad impulso</i>	EN 61800-3:2004/ A1:2012 EN 61000-4-5:2014	Yes	None
2.7 Immunity to conducted disturbances, induced by radio-frequency fields <i>Immunità ai disturbi condotti, indotti da campi a radiofrequenza</i>	EN 61800-3:2004/ A1:2012 EN 61000-4-6:2014	Yes	None

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3 TEST EQUIPMENT USED

APPARECCHIATURE UTILIZZATE

Description	Manufacturer	Model	Serial no./ID	Used in test n.:
EMI test receiver	Rohde & Schwarz	ESCI	101279	2.1
LISN	Rohde & Schwarz	ESH2-Z5	100365	2.1
EMI test receiver	Rohde & Schwarz	ESU26	100188	2.2
Biconical antenna	EMCO	3110B	9408-1910	2.2
Log-periodic antenna	Electro-metrics	LPA-25	1117	2.2
Double ridged guide horn antenna	EMCO	3115	9311-4151	2.2
ESD Simulator	SHAFFNER	NSG438	00248	2.3
Signal Generator	Rohde & Schwarz	SMR 20	101684	2.4
Amplifier	Rohde & Schwarz	BBA150 80MHz – 1GHz 1000W	AM6	2.4
Amplifier	Amplifier Research	175S1G4A	340321	2.4
Directional coupler	Amplifier Research	DC6180A	322074	2.4
Directional coupler	Amplifier Research	DC7144	302459	2.4
Power Meter	Rohde & Schwarz	NRVS	841187/022	2.4
Antenna	EMCO	3145	69598	2.4
Antenna	EMCO	3109	69597	2.4
Antenna	Amplifier Research	AT4002A	307308	2.4
Fast transient / Burst simulator	EM TEST	EFT 500-M	V0723102574	2.5
Fast transient / coupling clamp	HFK	Not present	60	2.5
Voltage Current Simulator	EM TEST	VCS 500N10	P1705192243	2.6
Coupling/ Decoupling Network	EM TEST	CNV 503S10	082 316-05	2.6

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Signal generator	HEWLETT-PACKARD	8656B	2703U03718	2.7
Amplifier	AMPLIFIER RESEARCH	75A250	24051	2.7
Directional coupler	AMPLIFIER RESEARCH	DC3510	341909	2.7
Power Meter	Rohde & Schwarz	NRVS	847664/002	2.7
Coupling /Decoupling Network	Fischer Custom Communication	FCC-801-M2-25	9716	2.7
Coupling /Decoupling Network	Fischer Custom Communication	FCC-801-M1-25A	08009	2.7
Injection Clamp	Fischer Custom Communication	F-203I	156	2.7
Coupling / Decoupling Network	Fischer Custom Communication	F-203I-DCN	64	2.7

4 ENVIRONMENTAL CONDITIONS

CONDIZIONI AMBIENTALI

4.1 ROOM TEMPERATURE TEMPERATURA AMBIENTE

24.4 °C ± 2.3 °C

4.2 RELATIVE HUMIDITY UMIDITA' RELATIVA

65 % ± 7 %

4.3 PRESSURE PRESSIONE

986 mbar ± 6 mbar

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5 MEASUREMENT UNCERTAINTY

INCERTEZZA DI MISURA

Measurement uncertainties was estimated as expanded uncertainty obtained multiplying the standard uncertainty by the coverage factor k corresponding to a confidence level of about 95%. Declared uncertainties are obtained with factor k=2 except if otherwise specified.

Measurement	Expanded uncertainty	Found in test n.:
Conducted emissions	Level ± 1.5 dB	2.1
Radiated emissions	Level (30MHz-1GHz) ± 4.7 dB	2.2
Electrostatic discharge immunity test	Output open circuit voltage $\pm 1,48\%$ First peak value $\pm 1,6\%$ Value 30ns $\pm 1,61\%$ Value 60ns $\pm 1,61\%$ Rise time of the first peak value $\pm 0,3\%$	2.3
Immunity test to radiated radio-frequency, electromagnetic field immunity test	Voltage value $\pm 18.8\%$	2.4
Electrical fast transient/burst immunity test	Open circuit impulse duration $\pm 1,65\%$ Rise time loaded at 50 Ω $\pm 3,52\%$ Pulse duration loaded at 50 Ω $\pm 4,46\%$ Output voltage $\pm 1,08\%$ Repetition frequency $\pm 4,56\%$ Duration of burst $\pm 1,66\%$ Repetition time $\pm 1,97\%$	2.5
Surge immunity test	Voltage value $\pm 1,08\%$ Measured value of current $\pm 2,19\%$ Time scale (1,2-50 μ s) $\pm 3,11\%$	2.6
Immunity test to conducted disturbances, induced by radio-frequency fields	Voltage value $\pm 6,2\%$	2.7

6 SAMPLING PLAN

PIANO DI CAMPIONAMENTO

Sample selected by the customer.

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7 TEST AND/OR MEASUREMENT RESULTS

RISULTATI DELLE PROVE E/O MISURE

7.1 Measurement of conducted emissions

Misura dei disturbi condotti

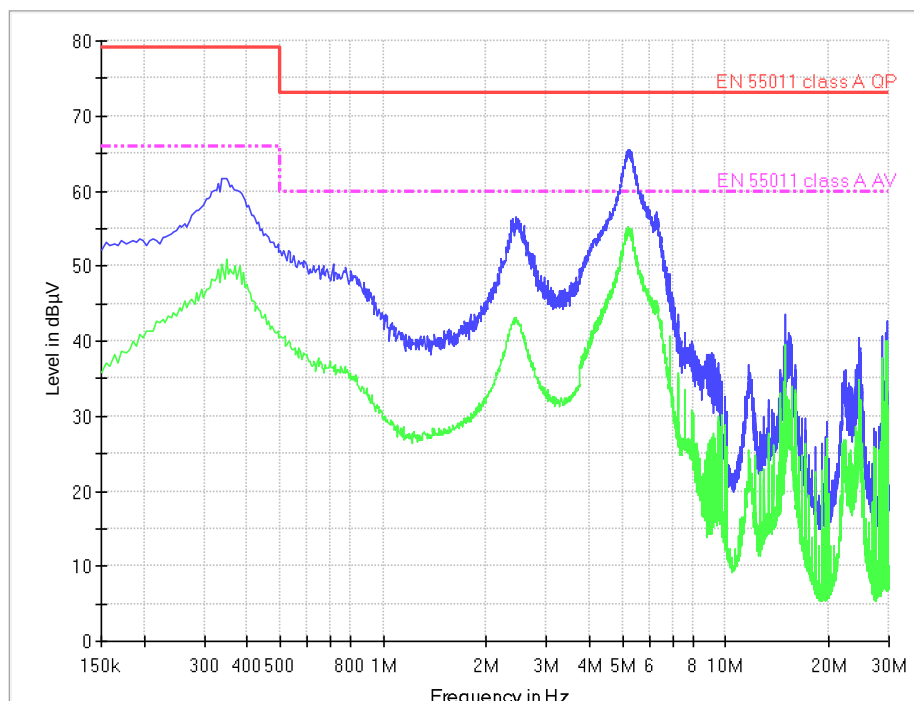
Test	Interface	Specification	Limit	Diagrams (pages)	Test result
Conducted emission 150 kHz-30 MHz	24Vdc SIEMENS	EN 61800-3:2004/ A1:2012	EN 55011 Class A	7	Passed

Scan Setup: Voltage with 4-Line-LISN [EMI conducted]

Hardware Setup: Voltage with 4-Line-LISN
Receiver: [ESCI 3]
Level Unit: dBμV

Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
150 kHz - 30 MHz	4.5 kHz	PK+; AVG	9 kHz	0,1 s	0 dB

Voltage with 4-Line-LISN



PK █ AVG █

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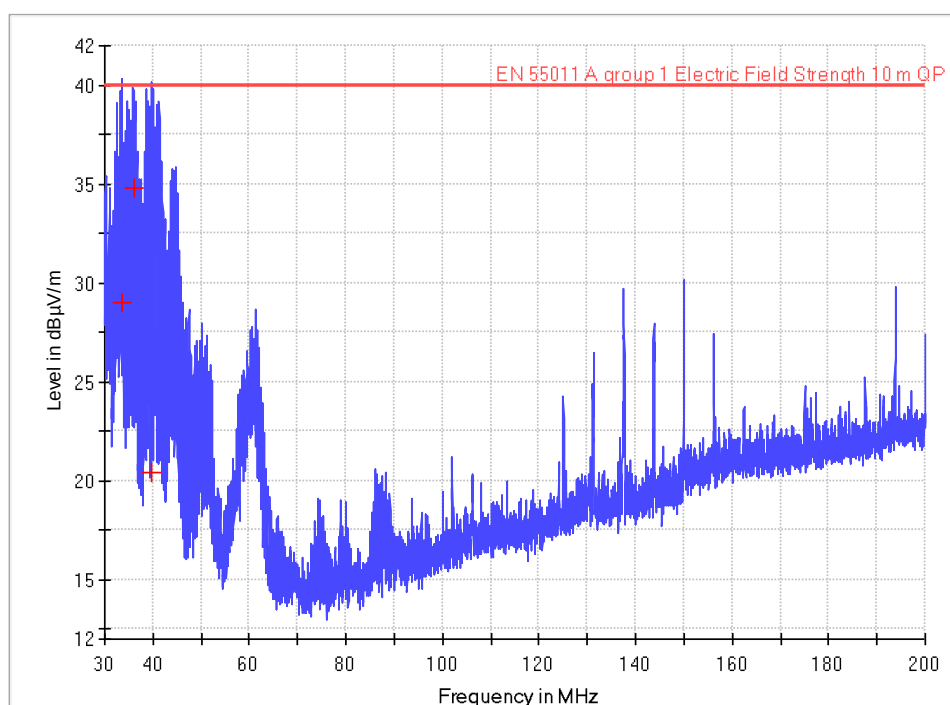
7.2 Measurement of radiated emissions

Misura dei disturbi irradiati

Test	Interface	Specification	Limit	Diagrams (pages)	Test result
Radiated emission 30 MHz – 1GHz	Enclosure	EN 61800-3:2004 + A1:2012	EN 55011 Class A	8 ÷ 11	Passed

Vertical Biconical antenna

Biconica EN 55032



Result Table_Single

Frequency (MHz)	MaxPeak (dBμV/m)	QuasiPeak (dBμV/m)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Corr. (dB/m)
33.660000	---	29.0	---	10.0	120.000	155.0	H	14.0
35.940000	---	34.8	---	10.0	120.000	155.0	H	13.9
39.780000	---	20.4	---	10.0	120.000	155.0	H	13.9

(continuation of the "Result Table_Single" table from column 14 ...)

Frequency (MHz)	Comment
33.660000	
35.940000	
39.780000	

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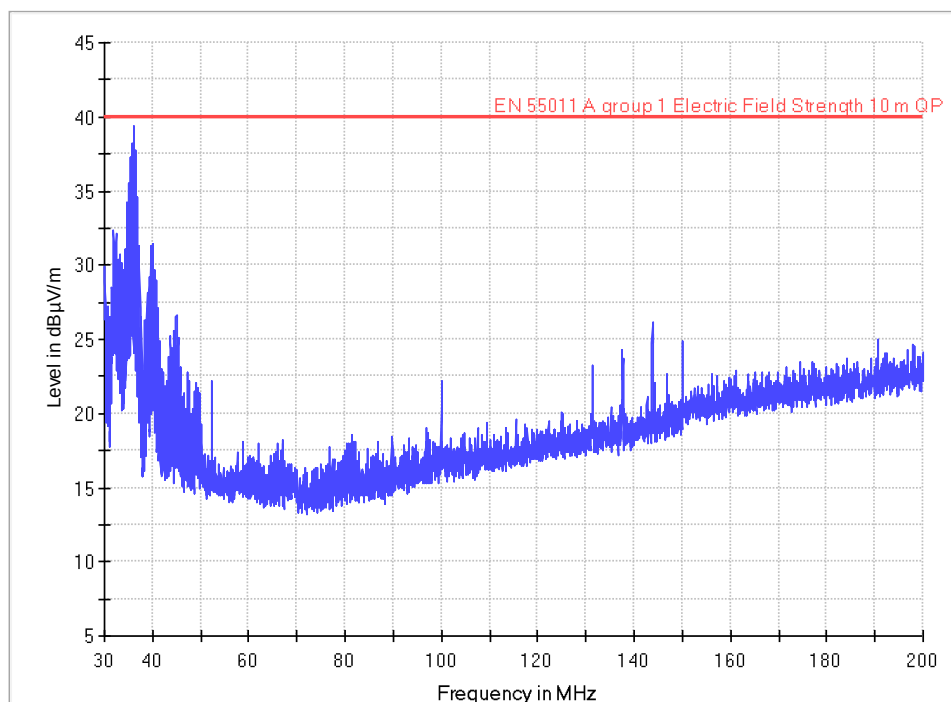
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Horizontal Biconical antenna

Biconica EN 55032



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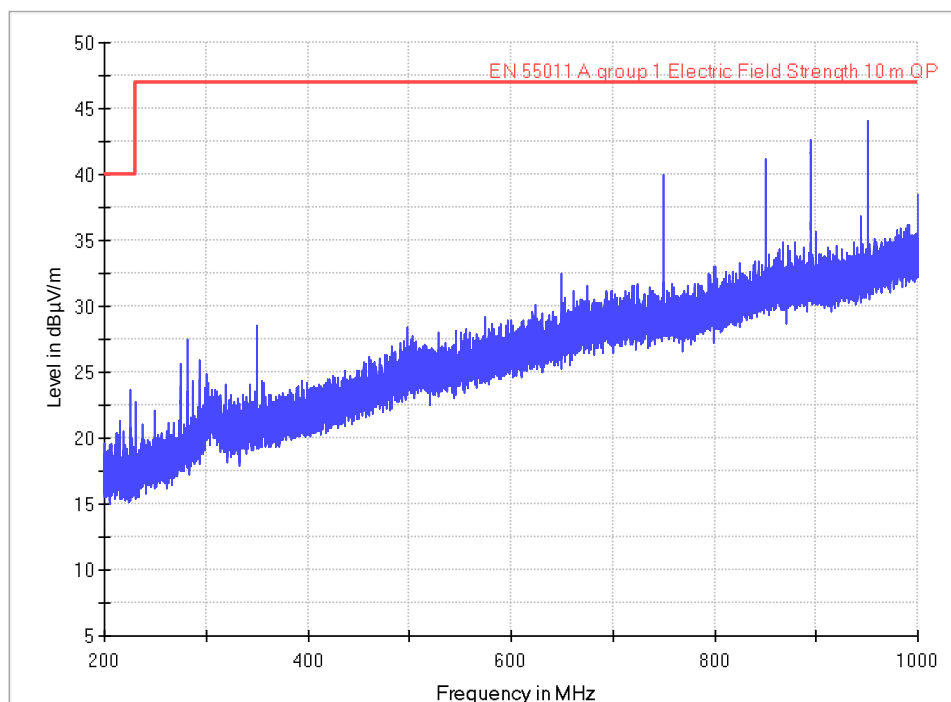
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Horizontal Log-periodic antenna

Loq-periodica EN 55032



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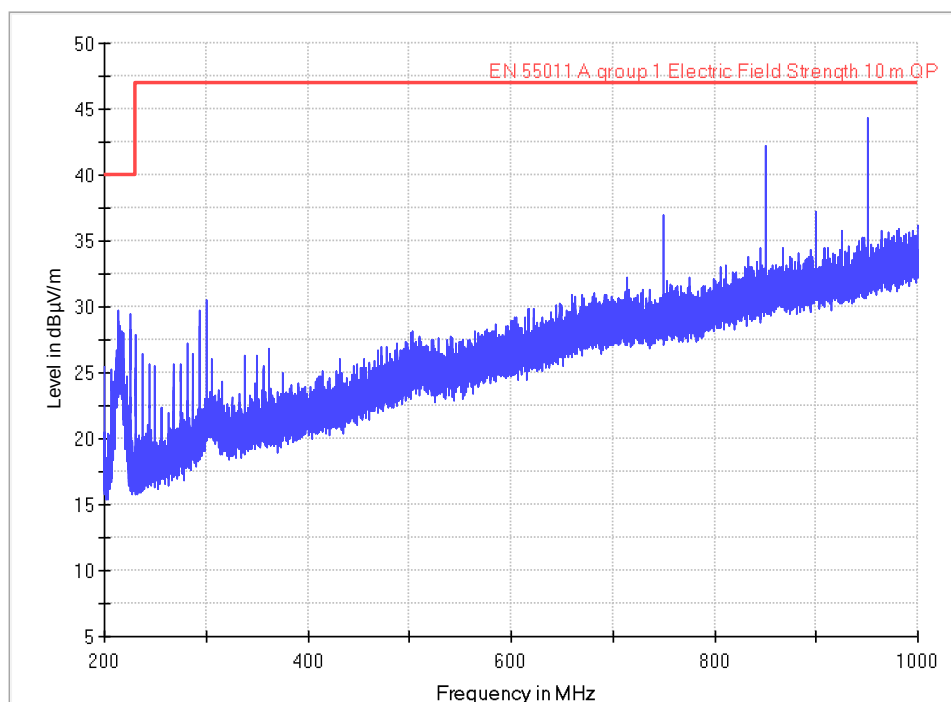
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Vertical Log Periodic antenna

Loq-periodica EN 55032



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7.3 Electrostatic discharge immunity test

Prove di immunità a scariche di elettricità statica

Performance criterion B		
Discharges Procedures	Test level	Test result
Contact discharge Direct+Indirect	± 4 kV	No degradation during and after the test (Test passed)
Air discharge Direct	± 8 kV	No degradation during and after the test (Test passed)

7.4 Immunity test to radiated radio-frequency, electromagnetic field immunity test

Prove di immunità ai campi elettromagnetici a radiofrequenza irradiati

Performance criterion A			
Polarization	Frequency	V/m	Test result
Horizontal / Vertical	80 MHz ÷ 1 GHz	10	No degradation during and after the test (Test passed)
Horizontal / Vertical	1,4 GHz ÷ 2 GHz	3	No degradation during and after the test (Test passed)
Horizontal / Vertical	2 GHz ÷ 2,7 GHz	1	No degradation during and after the test (Test passed)

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7.5 Electrical fast transient/burst immunity test

Prova di immunità a transitori/treni elettrici veloci

Performance criterion B		
Port	Test level	Test result
L – N 24Vdc (Siemens CU320 – 2 Sinamics)	$\pm 2\text{ kV}$	No degradation during and after the test (Test passed)
Signal lines	Test level	Test result
EtherCAT Network	$\pm 2\text{ kV}$	No degradation during and after the test (Test passed)

7.6 Surge immunity test

Prova di immunità ad impulso

Performance criterion B		
Port	Test level	Test result
L – N 24Vdc (Siemens CU320 – 2 Sinamics)	$\pm 1\text{ kV}$	During the positive pulse the motor stops and goes in safety. The intervention of the operator is accepted because the software does not provide for automatic restart. (Test passed)
Signal lines	Test level	Test result
EtherCAT Network	$\pm 1\text{ kV}$	No degradation during and after the test (Test passed)

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7.7 Immunity to conducted disturbances, induced by radio-frequency fields

Immunità ai disturbi condotti, indotti da campi a radiofrequenza

Performance criterion A (Range frequency 150 KHz ÷ 80 MHz)			
Port	Used C.D.N.	Test level	Test result
L – N 24Vdc (Siemens CU320 – 2 Sinamics)	FCC-801-M3-25A	10 V	No degradation during and after the test (Test passed)
PE	FCC-801-M1-25A	10V	No degradation during and after the test (Test passed)
Signal lines	Used Clamp	Test level	Test result
EtherCAT Network	Injection Clamp F-203 Coupling / Decoupling Network F-203-DCN	10 V	No degradation during and after the test (Test passed)

8 REMARKS

NOTE

- The configuration has been supplied by the customer.
- The customer is responsible for this data and for the configuration of tested EUT.(Reference paragraph 1.1 to 1.4)
- Sample under test has been returned to customer.

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9 APPENDIX

APPENDICE

9.1 PHOTO DOCUMENTATION

DOCUMENTAZIONE FOTOGRAFICA

Measurement of conducted emissions



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Measurement of radiated emissions



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Measurement of radiated emissions – From 1 GHz to 6 GHz



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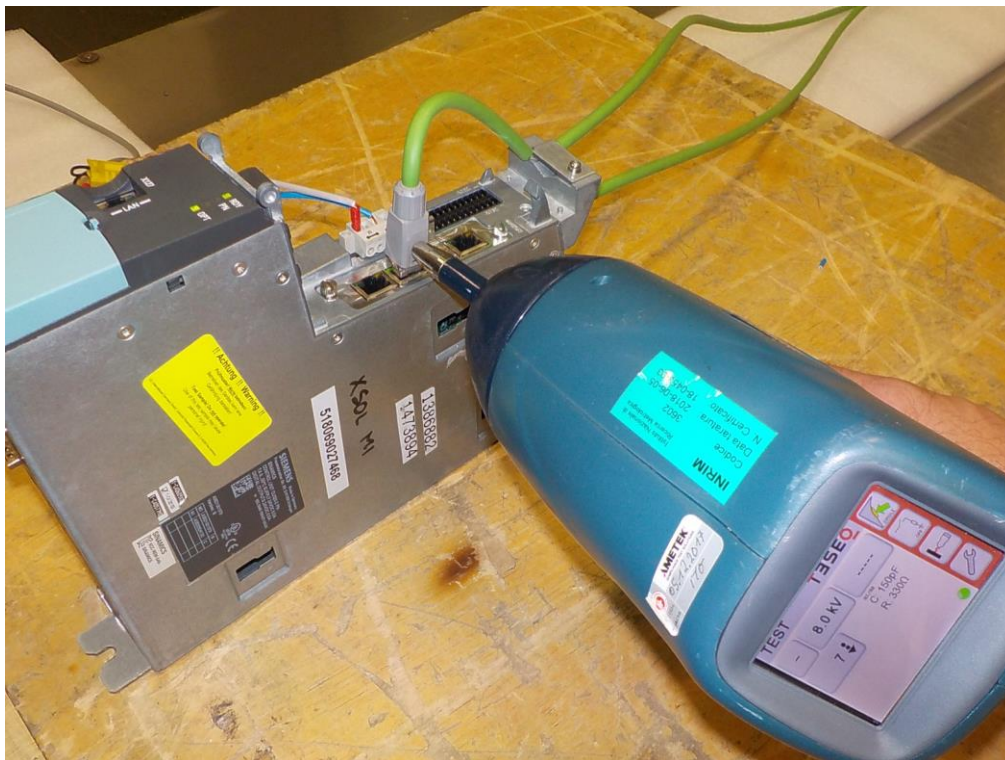
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Electrostatic discharges immunity test - Air discharge



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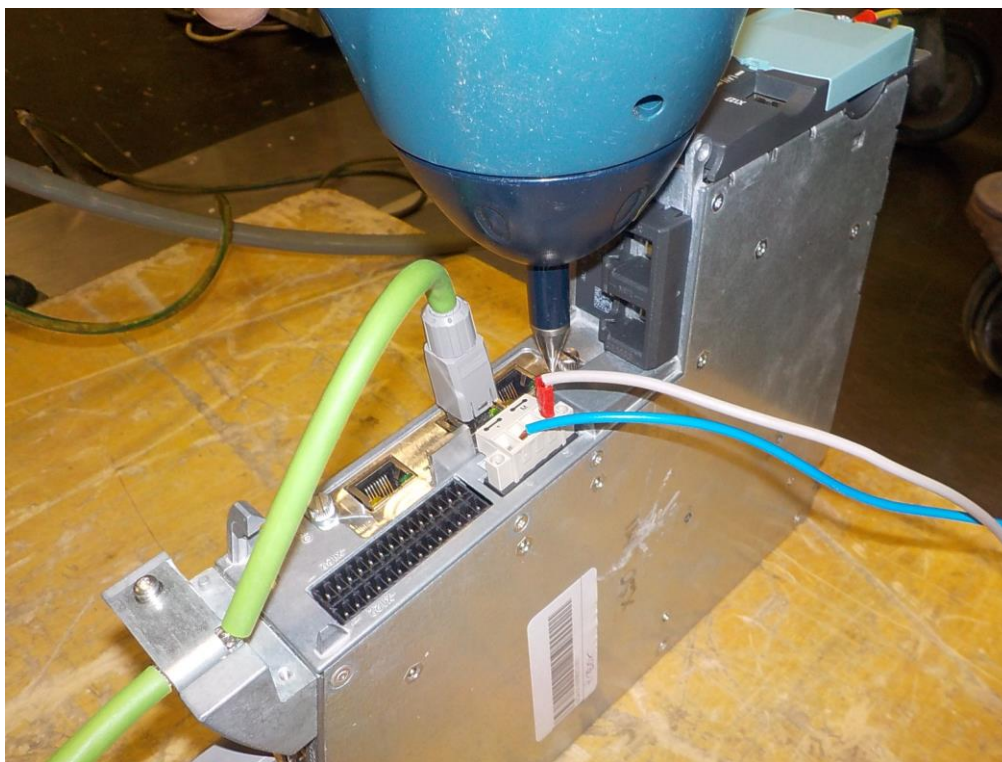
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Electrostatic discharges immunity test - Contact discharge direct



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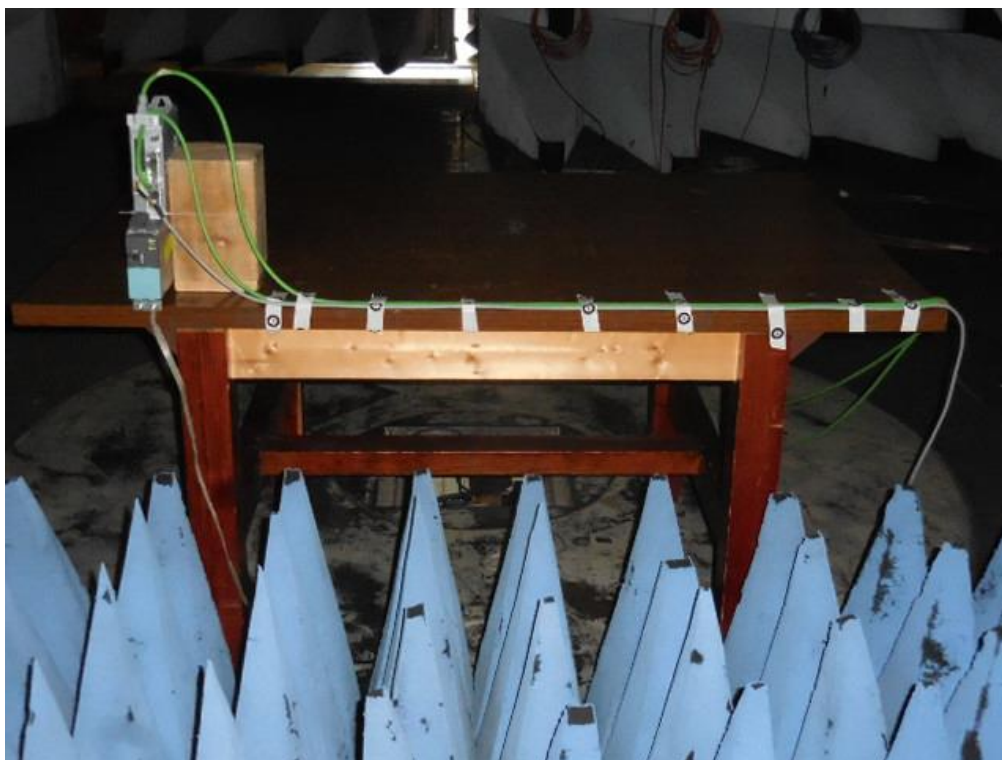
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Immunity to radiated radio frequency electromagnetic fields - Setup



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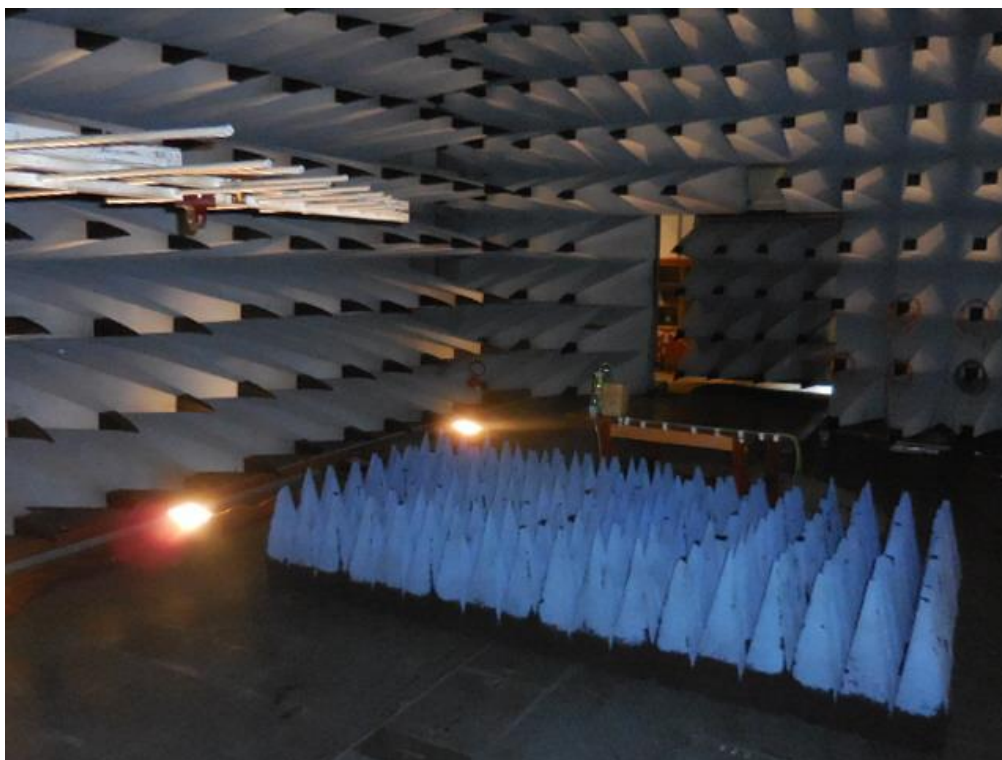
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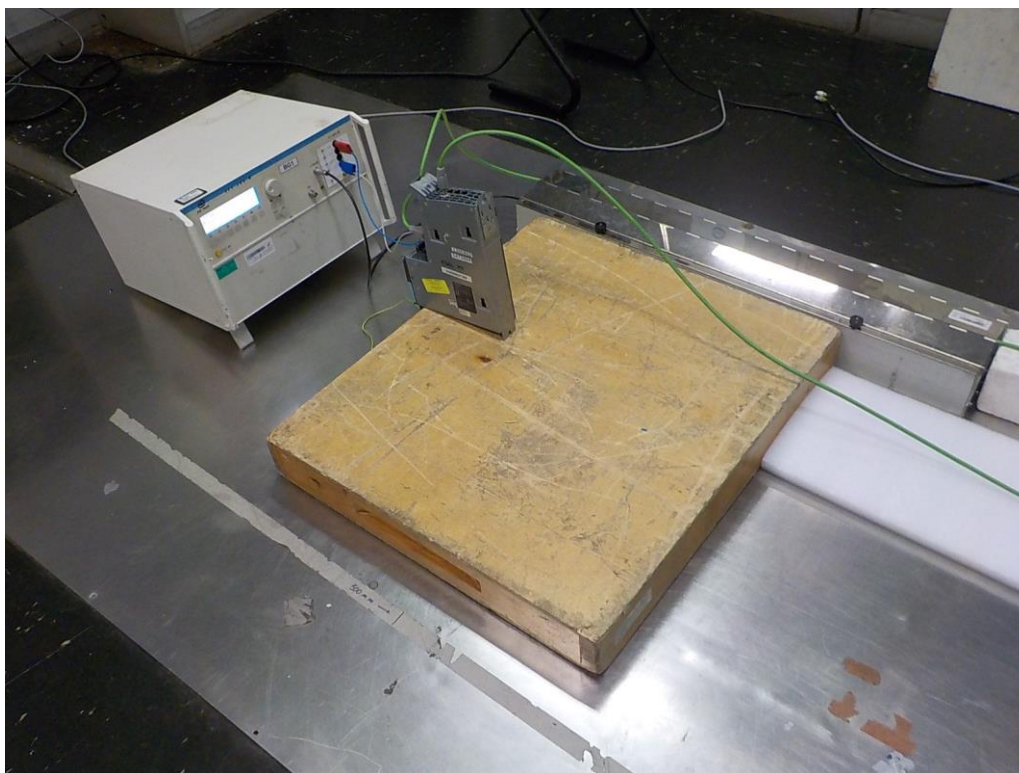
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Electrical fast transient/burst immunity test



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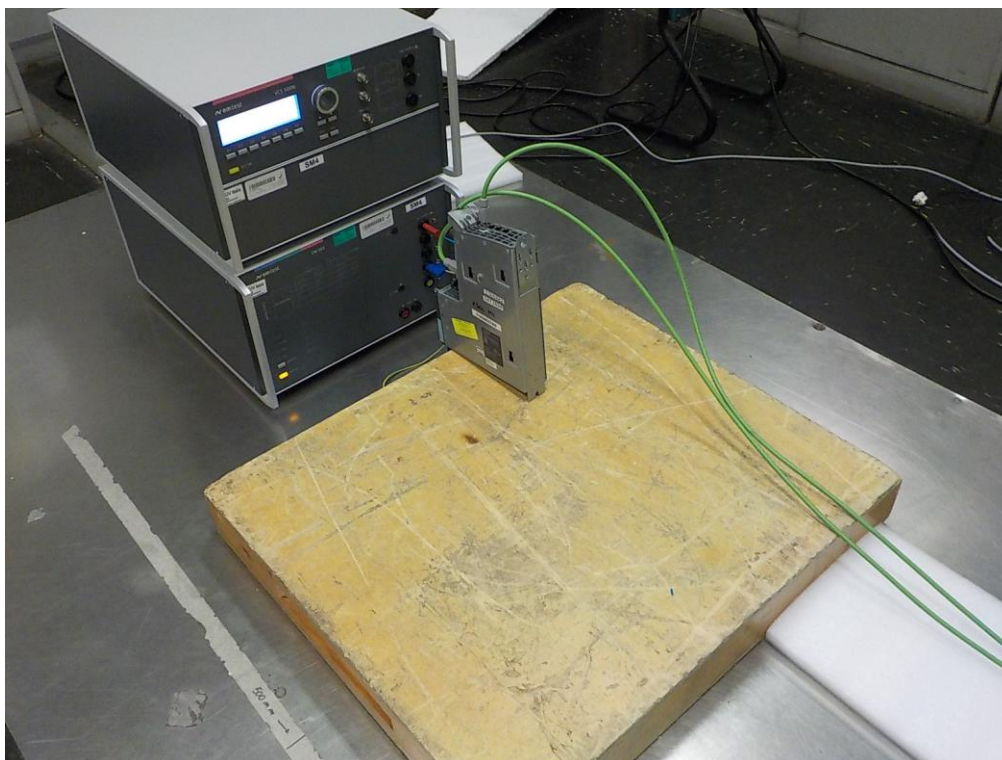
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Surge immunity test



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Immunity to conducted disturbances induced by radiofrequency fields



9.2 ATTACHMENTS ALLEGATI

None

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