

<b>Prüfbericht-Nr.:</b> <i>Test Report No.:</i>	<b>28108161 001</b>	<b>Auftrags-Nr.:</b> <i>Order No.:</i>	8740330	Seite 1 von 11 <i>Page 1 of 11</i>
<b>Kunden-Referenz-Nr.:</b> <i>Client Reference No.:</i>	8704834	<b>Auftragsdatum:</b> <i>Order date:</i>	03/07/2015	
<b>Auftraggeber:</b> <i>Client:</i>	Fronius International GmbH Gunter Fronius Strasse, 1 _ 4600 Wels-Thalheim _ Austria			
<b>Prüfgegenstand:</b> <i>Test item:</i>	Photovoltaic grid tied Inverter			
<b>Bezeichnung / Typ-Nr.:</b> <i>Identification / Type No.:</i>	FRONIUS ECO serie			
<b>Auftrags-Inhalt:</b> <i>Order content:</i>	Type Test			
<b>Prüfgrundlage:</b> <i>Test specification:</i>	DC-Injection NOTA DE INTERPRETACIÓN TECNICA DE LA EQUIVALENCIA DE LA SEPARACIÓN GALVÁNICA DE LA CONEXIÓN DE INSTALACIONES GENERADORAS EN BAJA TENSIÓN			
<b>Wareneingangsdatum:</b> <i>Date of receipt:</i>	07/07/2015			
<b>Prüfmuster-Nr.:</b> <i>Test sample No.:</i>	Sample No.1			
<b>Prüfzeitraum:</b> <i>Testing period:</i>	-			
<b>Ort der Prüfung:</b> <i>Place of testing:</i>	TÜV Rheinland Italia S.r.l.			
<b>Prüflaboratorium:</b> <i>Testing laboratory:</i>	TÜV Rheinland Italia S.r.l.			
<b>Prüfergebnis*:</b> <i>Test result*:</i>	Pass			
<b>geprüft von / tested by:</b>		<b>kontrolliert von / reviewed by:</b>		
31/07/2015	Pierangelo Lobbia/PM	04/08/2015	Marco Piva / BFM	
<b>Datum</b> <i>Date</i>	<b>Name / Stellung</b> <i>Name / Position</i>	<b>Unterschrift</b> <i>Signature</i>	<b>Datum</b> <i>Date</i>	<b>Name / Stellung</b> <i>Name / Position</i>
<b>Sonstiges / Other:</b>				
<b>Zustand des Prüfgegenstandes bei Anlieferung:</b> <i>Condition of the test item at delivery:</i>		Prüfmuster nicht vollständig oder beschädigt <i>Test item complete and undamaged</i>		
<p>* Legende: 1 = sehr gut      2 = gut      3 = befriedigend      4 = ausreichend      5 = mangelhaft  P(ass) = entspricht o.g. Prüfgrundlage(n)      F(ail) = entspricht nicht o.g. Prüfgrundlage(n)      N/A = nicht anwendbar      N/T = nicht getestet</p> <p>Legend: 1 = very good      2 = good      3 = satisfactory      4 = sufficient      5 = poor  P(ass) = passed a.m. test specification(s)      F(ail) = failed a.m. test specification(s)      N/A = not applicable      N/T = not tested</p>				
<p><b>Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens.</b>  <i>This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.</i></p>				

v04

<b>Test item particulars</b> .....	-
Type of item tested.....	Solar PV Grid Tied inverter
Description of equipment function .....	Item converts the DC power coming from a DC source into an AC power to be connected to the grid.
Installation/overvoltage category .....	AC side: OVC III ; PV input: OVC II
Pollution degree .....	PD3 outside, PD2 inside the enclosure.
Environmental rating .....	Outdoor.
Equipment mobility.....	Stationary.
Connection to mains supply.....	Permanent connection.
Operating conditions .....	3~N+PE 230 / 400
Overall size of the equipment (W*H*D) .....	725 x 510 x 225 mm
Mass of the equipment .....	36.69 kg
Marked degree of protection to IEC 60529.....	IP66
Accessories and detachable parts included in the evaluation.....	-
Options.....	N/A
<b>Test case verdicts:</b>	
Test case does not apply to the test object.....	N/A
Test object does meet the requirement.....	P(Pass)
Test object does not meet the requirement.....	F(Fail)
<b>Testing</b> .....	
Date of receipt of test item .....	31/07/2015
Date (s) of performance of tests .....	31/07/2015
<b>General remarks:</b>	
This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.	
The test results presented in this report relate only to the items tested.	
"(see remark #)" refers to a remark appended to the report.	
"(see annex #)" refers to an annex appended to the report.	
"(see enclosure #)" refers to additional information appended to the report.	
"(see appended table)" refers to a table appended to the report.	
Throughout this report a point is used as the decimal separator.	

**Product Description**

The three-phase Fronius Eco in power categories 25.0 and 27.0 kW perfectly meets all the requirements of large-scale installations. Thanks to its light weight and SnapINverter mounting system, this transformerless device can be installed quickly and easily.

Fronius ECO inverter converts the direct current generated by the solar modules into alternating current. This alternating current is fed into the public grid synchronously with the grid voltage.

The inverter monitors the public grid automatically. In the event of abnormal grid conditions, the inverter ceases operating immediately and stops feeding power into the grid (e.g. if the grid is switched off, if there is an interruption, etc.). Grid monitoring involves voltage, frequency and active islanding detection monitoring.

The inverter operates fully automatically. As soon after sunrise as there is sufficient energy available from the solar modules, the inverter starts monitoring the grid. When insolation has reached a sufficient level, the inverter starts feeding energy into the grid.

The inverter operates in such a way that the maximum possible amount of power is obtained from the solar modules.

As soon as the power available has fallen below the level at which energy can be fed into the grid, the inverter disconnects the power electronics completely from the grid and stops running. It retains all its settings and stored data.

**Models of the same family:**

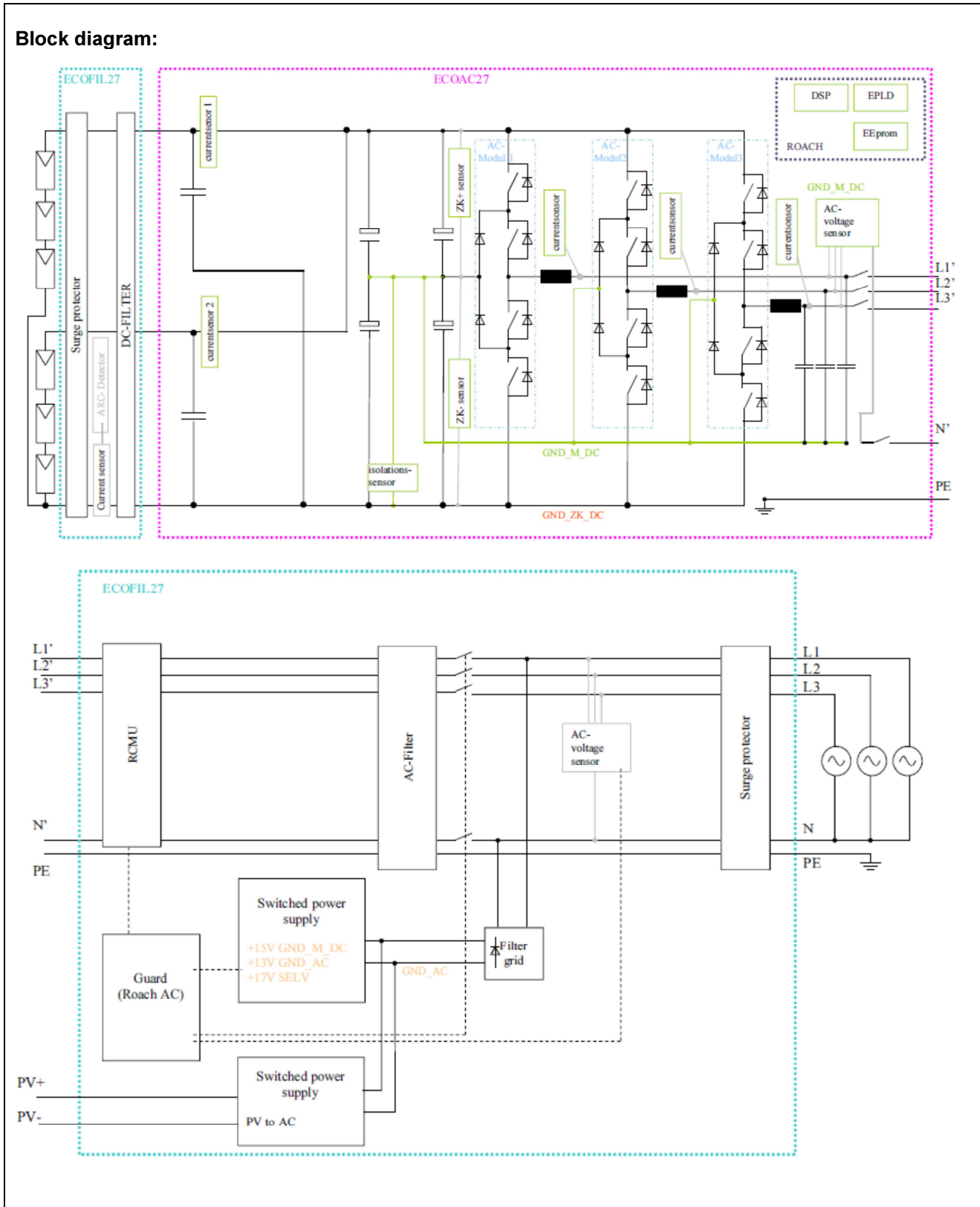
Model	Input Voltage	Rated Output Voltage (V)	Rated Output Current (A)	Maximum apparent power (VA)	Nominal active power (W) @ cosφ 0,9	Maximum cosφ
FRONIUS ECO 25.0-3-S	580-850 Vdc (max.1000Vdc open circuit)	230Vac	36,2A	25000	22500	0-1 ind./cap.
FRONIUS ECO 27.0-3-S	580-850 Vdc (max.1000Vdc open circuit)	230Vac	39,1A	27000	24300	0-1 ind./cap.

All models have the same release firmware version, electronic control boards. The only difference is related to the output power that is limited by a software parameter.







The differences between the models are described below.  
(see next pages)

**THECNICAL INFORMATION (tested model highlighted):**

Model	Fronius ECO	
	25.0-3-S	27.0-3-S
<b>DC input (PV input port)</b>		
MPP voltage range (V)	580-850	580-850
Max input Voltage (V)	1000 V	
Max input current MPPT	44.3 A	47.7 A
Max Short circuit current of the solar modules	66.3 A	71.6 A
<b>AC output</b>		
Nominal active power (W) @cosφ=1	25000	27000
Nominal active power (W) @cosφ=0.9	22500	24300
Maximum apparent power $S_{max}$ (VA)	25000	27000
Nominal grid Voltage (V)	3~NPE 220/230- 380/400	
Max Grid Voltage (V)	275 / 477	
Rated output current (A)	36.2	39.1
Nominal Frequency Hz	50 / 60	
Power factor cos phi	0 – 1 inductive / capacitive	
Class of equipment	Class I	
Degree of protection	IP66	
Dimensions h x w x d	725 x 510 x 225 mm	
Weight	36.69 kg	
Permissible ambient temperature	- 25°C to +60°C	
EMC emission	Class B	
Overvoltage category DC / AC	II / III	
DC disconnecter	integrated	

**Block diagram:**


**Marking Plate for all models of the family**

 www.fronius.com					UAC nom      220 V / 380 V    230 V / 400 V fAC nom        50 / 60 Hz Grid            3~NPE IAC nom        40.9 A            39.1 A IAC max        42 A S <sub>nom</sub> / S <sub>max</sub> 27000 VA	
Model No. Part No. Ser. No.		  OVC 3    OVC 2				
WLAN / LAN / Webserver					cos φ            0 -1 ind./cap. P <sub>max</sub> (cosφ=0.90 / cosφ=1)    24300 W / 27000 W UDC mpp        580 - 850 V UDC min / max    580 - 1000 V IDC max        47.7 A I <sub>sc</sub> pv            71.6 A	
IEC62109-1/-2 / EN61000-3-2/-11/-12 / EN61000-6-2/-3 / EN62233						
CEI 0-16 / CEI 0-21 VDE-AR-N 4105 DIN VDE V 0126-1-1		ÖVE/ONORM E 8001-4-712 Safety Class 1		IP 66		







 www.fronius.com					UAC nom      220 V / 380 V    230 V / 400 V fAC nom        50 / 60 Hz Grid            3~NPE IAC nom        37.9 A            36.2 A IAC max        42 A S <sub>nom</sub> / S <sub>max</sub> 25000 VA	
Model No. Part No. Ser. No.		  OVC 3    OVC 2				
WLAN / LAN / Webserver					cos φ            0 -1 ind./cap. P <sub>max</sub> (cosφ=0.90 / cosφ=1)    22500 W / 25000 W UDC mpp        580 - 850 V UDC min / max    580 - 1000 V IDC max        44.2 A I <sub>sc</sub> pv            66.3 A	
IEC62109-1/-2 / EN61000-3-2/-11/-12 / EN61000-6-2/-3 / EN62233						
CEI 0-16 / CEI 0-21 VDE-AR-N 4105 DIN VDE V 0126-1-1		ÖVE/ONORM E 8001-4-712 Safety Class 1		IP 66		

TABLE: DC-Injection					P
DC current limit (mA):		0.5% I <sub>R</sub> = 195.5 mA			
Output power (Grid Nominal Voltage)			Measured DC Current		
Setting	Measured		Measured Value Phase A	Measured Value Phase B	Measured Value Phase C
	(VA)	(%)			
(30±5)%	9097	34%	21	23	23
(40±5)%	11072	41%	35	29	35
(50±5)%	13744	51%	48	45	48
(60±5)%	16396	61%	52	56	56
(70±5)%	18950	70%	76	63	69
(80±5)%	21818	81%	80	81	90
(90±5)%	24971	92%	93	93	99
(100±5)%	26857	99%	109	99	112
Supplementary information:					
With reference to all other models, the max. DC current limit ( <b>Idcmax</b> ) is shown on below table:					
	<b>Power [W]</b>	<b>Voltage [V]</b>	<b>In [A]</b>	<b>Idcmax [mA]</b>	
	25000	230 / 400	36.2	181	

**TESTING INSTRUMENT LIST**

		<b>MANUFACTURER</b>	<b>MODEL</b>	<b>TÜV RHEINLAND ITALIA Ref.</b>
<b>X</b>	Power Analyzer	YOKOGAWA	WT500	87020193
	Power Analyzer	YOKOGAWA	WT230	87010027
	Power Quality Analyzer (with 6 probes)	Chauvin Arnoux	C.A 87334B	87010232
	Current Shunt DC	RS	100A dc	98020198
<b>X</b>	Oscilloscope	YOKOGAWA	DLM2054	87020194
<b>X</b>	Current probe	YOKOGAWA	7011930	87020195
<b>X</b>	Differential voltage probe	YOKOGAWA	7011926	87020196
	Scope corder	YOKOGAWA	SL 1400	87020239
	Current probe	YOKOGAWA	96033	87020240 87020241 87020242
<b>X</b>	RLC Load	N.B.N AUTOMATION RLC	Load	87020226
<b>X</b>	Grid Simulator	AMETEK	MX30	87010273
<b>X</b>	Dc Power Supply	REGATRON	Top Con Quadro	87010278
	Harmonics and Flicker analyzer	EM Test	DPA503	87010274
	Artificial lumped impedance for flicker	EM Test	AIF503N32	87010275
	Digital Multimeter	AGILENT TECHNOLOGIES	U1242A	87010022
	Current Clamp For Digital Multimeter	ALCRON	DT-98	87010033
	Digital Multimeter	ISO-TECH	IDM 305	87020142
	Test Fingernail	ATS GALBUSERA	01.10	87010127
	Safety Tester	FLUKE	601PRO XL	87010179
	Data Acquisition Unit	AGILENT TECHNOLOGIES	34970A	87010205
	Probe For Oscilloscope	GMW	GE 3121	87010220
	Earth Continuity Tester	KIKUSUI	TOS6210	87010238
	HV Tester	SCHLEICH	GLP1-e HV-AC	87010239
	Dummy Load For HV Tester	SCHLEICH	4000987	87010240



		<b>MANUFACTURER</b>	<b>MODEL</b>	<b>TÜV RHEINLAND ITALIA Ref.</b>
	Surge Generator	EMTEST	VSS 500 N6	87010269
	Load Cell	LAUMAS ELETTRONICA	CTL 200	87010245
	Phono-meter	BRÜEL & KJÆR	2236	87020108
	Thermal chamber	VÖTSCH	VT4004	87020091
	Thermal chamber	Angelantoni Industrie	Higros 50	87020030
	Thermal chamber	Weiss Technik	SB22/300/40	87020044
	Thermal chamber	Vötsch	VT7012S2	87020094
	Thermal chamber	Vötsch	VCV4057-5	87020093
	Thermal chamber	Angelantoni Industrie	CH600CVT	87020105
	Caliper	MITUTOYO	CD-6"C	87020051

<b>Metodi di Prova /Testing Methods.</b>	<b>Incertezza /Uncertainty</b>	<b>Fattore di copertura k /coverage factor K</b>
Misura di Tensione in Continua <i>/direct voltage measurement</i>	0,50% lett	2,00
Misura di Corrente in Continua <i>/direct current measurement</i>	0,35% lett	2,00
Misura di Tensione Alternata in regime Dinamico <i>/Alternate Voltage measurement (Dynamic regime)</i>	0,75% lett	2,10
Misura di Tensione Alternata in regime Statico <i>/Alternate Voltage measurement (Static regime)</i>	0,40% lett	2,00
Misura di Corrente Alternata in regime Dinamico <i>/Alternate current measurement (Dynamic regime)</i>	0,75% lett	2,10
Misura di Corrente Alternata in regime Statico <i>/Alternate Current measurement (Static regime)</i>	0,35% lett	2,00
Misura di Potenza Attiva/Reattiva/Apparente in regime dinamico <i>/Active/Reactive/Apparend power measure ment (Dynamic regime)</i>	1,4% lett	2,20
Misura di Potenza Attiva/Reattiva/Apparente in regime statico <i>/Active/Reactive/Apparend power measurement (Static regime)</i>	0,40% lett	2,00
Misura del fattore di potenza <i>/Power factor measurement</i>	0,014	2,20
Prova di Riscaldamento - Misura mediante Termocoppie <i>/Heating test – Thermocouples method</i>	4,1 °C	2,20
Prova di Riscaldamento – Misura della Variazione di Resistenza <i>/Heating test – change of resistance method</i>	4,5 °C	2,00
Prova di Riscaldamento nel triedro di prova <i>/Heating on test corner</i>	3,3 °C	2,16
Prova di Rigidità Dielettrica <i>/Dielectric strength test</i>	2,4% lett	2,00
Misura della Resistenza di Isolamento <i>/insulation resistance test</i>	2,5% lett	2,00
Misura della Continuità di Terra <i>/Earth continuity test</i>	2,3% lett	2,05
Misura della Corrente di Dispersione <i>/Leakage current test</i>	3,0% lett	2,00
Misura della Tensione Residua ai Capi della Spina <i>/Residual voltage test</i>	5,2%	2,06
Prova di Freddo IEC/EN 60068-2-1 /Cold test	1,9 °C	2,05
Prova di Caldo Secco IEC/EN 60068-2-2 <i>/Dry heat test</i>	2,3 °C	2,11
Prova di Caldo Umido IEC/EN 60068-2-78 <i>/Humidity test</i>	5,7%RH	2,00
Prova del Filo Incandescente (Glow Wire test)	11,2 °C	2,11
Prova di Resistenza alla Fiamma ad Ago <i>/Niddle flame resistance</i>	0,63 sec	2,23
Prova di Vibrazioni Sinusoidali IEC/EN 60068-2-6	3,5% acc.gen.	2,00

<b>Metodi di Prova /Testing Methods.</b>	<b>Incertezza /Uncertainty</b>	<b>Fattore di copertura k /coverage factor K</b>
<i>/Sinusoidal vibration test</i>		
Prova di Nebbia Salina IEC/EN 60068-2-11 <i>/Salt mist test</i>	2,3 °C	2,11
Prova del cambio di temperatura IEC/EN 60068-2-14 <i>/Change of temperature test</i>	2,3 °C	2,11
Misura della Correnti Armoniche IEC/EN 61000-3-2 e IEC/EN 61000-3-12 <i>/Harmonics current test IEC/EN 61000-3-2 and IEC/EN 61000-3-12</i>	4,1% lett	2,00
Misura delle Fluttuazioni di Tensione e dei Flicker IEC/EN 61000-3-3 e IEC/EN 61000-3-11 <i>/Flicker test IEC/EN 61000-3-3 and IEC/EN 61000-3-11</i>	5,0%	2,00
Misura dei Tempi / Frequenza <i>/Time measurement - frequency</i>	0,025%	2,13
Prova dell'Impulso di tensione (Surge test)	4,2% Vset	2,00
	90 ns salita	2,23
	1,9 us emival	2,23
Grado di Protezione IPX3 <i>/ Degrees of protection IPX3</i>	4,0 % lett.	2,00
Grado di Protezione IPX4 <i>/ Degrees of protection IPX4</i>	1,7 % lett.	2,00
Grado di Protezione IPX5 <i>/ Degrees of protection IPX5</i>	3,5 % lett.	2,00
Grado di Protezione IPX6 <i>/ Degrees of protection IPX6</i>	2,9 % lett.	2,00
Tutte le incertezze sopra riportate sono espresse normalmente con livello di fiducia 95%. All the above mentioned uncertainties are expressed with a coverage probability of 95%.		

END TEST REPORT