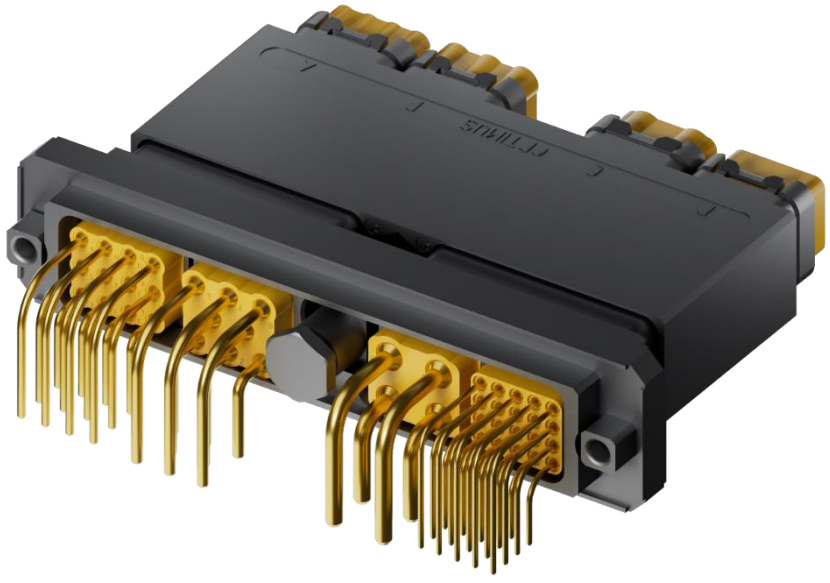
OPTIMUS

Rugged & sealed CONNECTOR

EN4165

BY NICOMATIC

SELF DECLARATION OF CONFORMITY



The **OPTIMUS** connectors tested are measured under EN4165 standard and required test procedures

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We declare the products **OPTIMUS Families** have been tested according to the following items of the EN4165-001 & EN2591 standards and comply with the level of performances required, provided that the product is applied for its intended use and conforms to the specifications of the manufacturer, and that the installation conforms to the relevant standards.

Please refer to the Annex herewith:

- List of QUALIFICATION TESTS "EN4165-001" for Reports numbers, titles and test results (specification data).
- List of OPTIMUS Part qualified in accordance with EN4165-001 specifications;

This document will be replaced by the Product Qualification certificate edited by the ASD-CERT.

Place and date of issue: Bons-en-Chablais March 18th, 2022

Written by Jorris MARTEL (Laboratory manager)

Approved by Christophe GRANDCOING (Technical manager)

Signature and stamp of the Company:

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List of QUALIFICATION TESTS "EN4165-001"
for Reports numbers, titles and test results (specification data).

Group	Test	Requirements	State
0	EN2591-101 Visual examination	**Initial examination** Examination of connectors, housing, module loose parts (contacts, etc.) – identification – appearance – marking – surface finish	PASS
	EN2591-102 Examination of dimensions and mass	According to specification and product standards EN4165	PASS
	EN2591-513 Magnetic permeability	< 2 µ	PASS
	EN2591-408 Mating and unmating forces	**Housing size : 2 modules** Coupling torque : 1.1 ± 0.1 N.m Uncoupling torque : 0.7 N.m minimum Uncoupling torque : 1.7 N.m Maximum Overtightening torque : 3 ± 0.1 N.m **Housing size : 4 modules** Coupling torque : 1.1 ± 0.1 N.m Uncoupling torque : 0.7 N.m minimum Uncoupling torque : 2.2 N.m Maximum Overtightening torque : 3 ± 0.1 N.m	PASS
	EN2591-410 Module retention in housing (axial)	**Force applied** 25.4 daN **Displacement** ≤0.25 mm	PASS
	EN2591-312 Air leakage	**Maximum leakage flow** 4 cm3/h/module@ 100 kPa Differential pressure	PASS
	EN2591-206 Measurement of insulation resistance	**Connectors unmated** @ ambient temperature: 5 000 MΩ	PASS
	EN2591-207 Voltage proof test	**Maximum leakage current** 2 mA **Connectors mated** Size 22 contact : 1300 V r.m.s@sea level Other contact : 1500 V r.m.s@sea level **Connectors unmated** Size 22 contact : 1300 V r.m.s@sea level Other contact : 1500 V r.m.s@sea level	PASS

	EN2591-101 Visual examination	**Final examination** no loosening of parts, crack, excessive wear or detached part shall be observed.	PASS
Group	**Test**	**Requirements**	**State**
1	EN2591-412 Contact insertion and extraction forces	**Maximum force** Contact size 22 @ insertion : 30 N Contact size 22 @ extraction : 30 N Contact size 16 @ insertion : 67 N Contact size 16 @ extraction : 67 N Contact size 08 Power @ insertion : 100 N Contact size 08 Power @ extraction : 100 N	PASS
	EN2591-101 Visual examination	**Final examination** no loosening of parts, crack, excessive wear or detached part shall be observed.	PASS
	EN2591-406 Mechanical endurance - Normal air pressure	**Number of mating and unmating operations** 500 cycles @ maximum five cycles/min	PASS
	EN2591-101 Visual examination	**Final examination** no loosening of parts, crack, excessive wear or detached part shall be observed.	PASS
	EN2591-202 Contact resistance at rated current	**Initial @ ambient temperature** Contact size 22 : 8 mΩ Contact size 16 : 3 mΩ Contact size 08 : 2 mΩ **After test @ ambient temperature** Contact size 11 : 8 mΩ Contact size 5 : 3 mΩ Contact size 3 : 2 mΩ	PASS
	EN2591-205 Housing (shell) electrical continuity	**Maximum resistance between mated connectors** Class F: Initial 1 mΩ After test 2 mΩ Class W: Initial 2.5 mΩ After test 5 mΩ **Maximum resistance between back shell and plug or receptacle** Class F: Initial 1 mΩ After test 2 mΩ Class W: Initial 2.5 mΩ After test 5 mΩ	PASS
	EN2591-206 Measurement of insulation resistance	**Connectors unmated** @ ambient temperature: 5 000 MΩ	PASS
	EN2591-207 Voltage proof test (normal air pressure)	**Maximum leakage current** 2 mA **Connectors mated** Size 22 contact : 1300 V r.m.s@sea level Other contact : 1500 V r.m.s@sea level **Connectors unmated**	PASS

		Size 22 contact : 1300 V r.m.s@sea level Other contact : 1500 V r.m.s@sea level	
	EN2591-408 Mating and unmating forces	**Housing size : 2 modules** Coupling torque : 1.1 ± 0.1 N.m Uncoupling torque : 0.7 N.m minimum Uncoupling torque : 1.7 N.m Maximum Overtightening torque : 3 ± 0.1 N.m **Housing size : 4 modules** Coupling torque : 1.1 ± 0.1 N.m Uncoupling torque : 0.7 N.m minimum Uncoupling torque : 2.2 N.m Maximum Overtightening torque : 3 ± 0.1 N.m	PASS
	EN2591-407 Durability of contact retention system and seals	**Cycle** 10 insertion/extraction of the contacts	PASS
	EN2591-409 Contact retention in module	**Axial load** Contact size 22: 44 N Contact size 16: 110 N Contact size 08: 110 N Displacement < 0,3 mm during and after application of the load.	PASS
	EN2591-412 Contact insertion and extraction forces	**Maximum force** Contact size 22 @ insertion : 30 N Contact size 22 @ extraction : 30 N Contact size 16 @ insertion : 67 N Contact size 16 @ extraction : 67 N Contact size 08 Power @ insertion : 100 N Contact size 08 Power @ extraction : 100 N	PASS
	EN2591-101 Visual examination	**Final examination** no loosening of parts, crack, excessive wear or detached part shall be observed.	PASS
	EN2591-305 Rapid change of temperature	**Connector mated** High temperature = 175°C +5/0 Lower temperature = -55°C 0/-5	PASS
	EN2591-207 Voltage proof test (normal air pressure)	**Maximum leakage current** 2 mA **Connectors mated** Size 22 contact : 1300 V r.m.s@sea level Other contact : 1500 V r.m.s@sea level) **Connectors unmated** Size 22 contact : 1300 V r.m.s@sea level Other contact : 1500 V r.m.s@sea level	PASS
	EN2591-206 Measurement of insulation resistance	**Connectors unmated** @ ambient temperature: 5 000 MΩ	PASS
	EN2591-101 Visual examination	**Final examination** no loosening of parts, crack, excessive wear or detached part shall be observed.	PASS
	EN2591-408 Mating and unmating forces	**Housing size : 2 modules** Coupling torque : 1.1 ± 0.1 N.m Uncoupling torque : 0.7 N.m minimum Uncoupling torque : 1.7 N.m Maximum Overtightening torque : 3 ± 0.1 N.m	PASS

		Housing size : 4 modules Coupling torque : 1.1 ± 0.1 N.m Uncoupling torque : 0.7 N.m minimum Uncoupling torque : 2.2 N.m Maximum Overtightening torque : 3 ± 0.1 N.m	
	EN2591-314 Immersion at low air pressure	**Applicable Pressure** 1,1 kPa (30 000 m)	IN PROGRESS
	EN2591-206 Measurement of insulation resistance	**Connectors mated** @ ambient temperature: 1 000 MΩ	IN PROGRESS
	EN2591-207 Voltage proof test (normal air pressure)	**Maximum leakage current** 2 mA **Connectors mated** Size 22 contact : 1300 V r.m.s@sea level Other contact : 1500 V r.m.s@sea level **Connectors unmated** Size 22 contact : 1300 V r.m.s@sea level Other contact : 1500 V r.m.s@sea level	IN PROGRESS
	EN2591-101 Visual examination	**Final examination** no loosening of parts, crack, excessive wear or detached part shall be observed.	IN PROGRESS
Group	**Test**	**Requirements**	**State**
2	EN2591-205 Housing (shell) electrical continuity - Not applicable for class C	**Maximum resistance between mated connectors** Class F: Initial 1 mΩ After test 2 mΩ Class W: Initial 2.5 mΩ After test 5 mΩ **Maximum resistance between back shell and plug or receptacle** Class F: Initial 1 mΩ After test 2 mΩ Class W: Initial 2.5 mΩ After test 5 mΩ	PASS
	EN2591-412 Contact insertion and extraction forces	**Maximum force** Contact size 22 @ insertion : 30 N Contact size 22 @ extraction : 30 N Contact size 16 @ insertion : 67 N Contact size 16 @ extraction : 67 N Contact size 08 Power @ insertion : 100 N Contact size 08 Power @ extraction : 100 N	PASS
	EN2591-202 - Contact resistance at rated current	**Initial @ ambient temperature** Contact size 22 : 8 mΩ Contact size 16 : 3 mΩ Contact size 08 : 2 mΩ **After test @ ambient temperature** Contact size 11 : 8 mΩ Contact size 5 : 3 mΩ Contact size 3 : 2 mΩ	PASS

EN2591-101 Visual examination	**Final examination** no loosening of parts, crack, excessive wear or detached part shall be observed.	PASS
EN2591-303 Cold low pressure and damp heat	Ionization phenomena tested @-55°C@5.5 KPa	PASS
EN2591-206 Measurement of insulation resistance	**Connectors unmated** @ ambient temperature: 5 000 MΩ	PASS
EN2591-305 Rapid change of temperature	**Connector mated** High temperature = 175°C +5/0 Lower temperature = -55°C 0/-5	PASS
EN2591-207 Voltage proof test (normal air pressure)	**Maximum leakage current** 2 mA **Connectors mated** Size 22 contact : 1300 V r.m.s@sea level Other contact : 1500 V r.m.s@sea level **Connectors unmated** Size 22 contact : 1300 V r.m.s@sea level Other contact : 1500 V r.m.s@sea level	PASS
EN2591-206 Measurement of insulation resistance	**Connectors unmated** @ ambient temperature: 5 000 MΩ	PASS
EN2591-101 Visual examination	**Final examination** no loosening of parts, crack, excessive wear or detached part shall be observed.	PASS
EN2591-408 Mating and unmating forces	**Housing size : 2 modules** Coupling torque : 1.1 ± 0.1 N.m Uncoupling torque : 0.7 N.m minimum Uncoupling torque : 1.7 N.m Maximum Overtightening torque : 3 ± 0.1 N.m **Housing size : 4 modules** Coupling torque : 1.1 ± 0.1 N.m Uncoupling torque : 0.7 N.m minimum Uncoupling torque : 2.2 N.m Maximum Overtightening torque : 3 ± 0.1 N.m	PASS
EN2591-407 Durability of contact retention system and seals	**Cycle** 10 insertion/extraction of the contacts	PASS
EN2591-409 Contact retention in module	**Axial load** Contact size 22: 44 N Contact size 16: 110 N Contact size 08: 110 N Displacement < 0,3 mm during and after application of the load.	PASS
EN2591-412 Contact insertion and extraction forces	**Maximum force** Contact size 22 @ insertion : 30 N Contact size 22 @ extraction : 30 N Contact size 16 @ insertion : 67 N Contact size 16 @ extraction : 67 N Contact size 08 Power @ insertion : 100 N Contact size 08 Power @ extraction : 100 N	PASS
EN2591-101 Visual examination	**Final examination** no loosening of parts, crack, excessive wear or detached part shall be observed.	PASS

	EN2591-406 Mechanical endurance	**Number of mating and unmating operations** 500 cycles @ maximum five cycles/min	PASS
	EN2591-101 Visual examination	**Final examination** no loosening of parts, crack, excessive wear or detached part shall be observed.	PASS
	EN2591-202 Contact resistance at rated current	**Initial @ ambient temperature** Contact size 22 : 8 mΩ Contact size 16 : 3 mΩ Contact size 08 : 2 mΩ **After test @ ambient temperature** Contact size 11 : 8 mΩ Contact size 5 : 3 mΩ Contact size 3 : 2 mΩ	PASS
	EN2591-205 Housing (shell) electrical continuity not applicable for class C	**Maximum resistance between mated connectors** Class F: Initial 1 mΩ After test 2 mΩ Class W: Initial 2.5 mΩ After test 5 mΩ **Maximum resistance between back shell and plug or receptacle** Class F: Initial 1 mΩ After test 2 mΩ Class W: Initial 2.5 mΩ After test 5 mΩ	PASS
	EN2591-206 Measurement of insulation resistance	**Connectors unmated** @ ambient temperature: 5 000 MΩ	PASS
	EN2591-207 Voltage proof test (normal air pressure)	**Maximum leakage current** 2 mA **Connectors mated** Size 22 contact : 1300 V r.m.s@sea level Other contact : 1500 V r.m.s@sea level **Connectors unmated** Size 22 contact : 1300 V r.m.s@sea level Other contact : 1500 V r.m.s@sea level	PASS
	EN2591-408 Mating and unmating forces	**Housing size : 2 modules** Coupling torque : 1.1 ± 0.1 N.m Uncoupling torque : 0.7 N.m minimum Uncoupling torque : 1.7 N.m Maximum Overtightening torque : 3 ± 0.1 N.m **Housing size : 4 modules** Coupling torque : 1.1 ± 0.1 N.m Uncoupling torque : 0.7 N.m minimum Uncoupling torque : 2.2 N.m Maximum Overtightening torque : 3 ± 0.1 N.m	PASS

	EN2591-402 Shock	**Number** 1 shock/direction of each axis **Form** half-sinusoidal form **Amplitude** 100 gn **Duration** 6 ms	PASS
	EN2591-204 Discontinuity of the contact in the microsecond range (during shock)	**Duration of micro-discontinuity** Standard contact: ≤ 1 µs **Test duration** Throughout the duration of the tests EN 2591-402 shock	PASS
	EN2591-101 Visual examination	**Final examination** no loosening of parts, crack, excessive wear or detached part shall be observed.	PASS
	EN2591-403 Sinusoidal and random vibrations - Ambient temperature	**Form** Random **Frequency** from 10 to 2000 Hz, **Spectral density** 0.4 g^2/Hz, 8 h/axis	PASS
	EN2591-204 Discontinuity of the contact in the microsecond range (during shock)	**Duration of micro-discontinuity** Standard contact: ≤ 1 µs **Test duration** throughout the duration of the tests EN 2591-403 vibrations.	PASS
	EN2591-101 Visual examination	**Final examination** no loosening of parts, crack, excessive wear or detached part shall be observed.	PASS
	EN2591-408 Mating and unmating forces	**Housing size : 2 modules** Coupling torque : 1.1 ± 0.1 N.m Uncoupling torque : 0.7 N.m minimum Uncoupling torque : 1.7 N.m Maximum Overtightening torque : 3 ± 0.1 N.m **Housing size : 4 modules** Coupling torque : 1.1 ± 0.1 N.m Uncoupling torque : 0.7 N.m minimum Uncoupling torque : 2.2 N.m Maximum Overtightening torque : 3 ± 0.1 N.m	PASS
	EN2591-202 Contact resistance at rated current	**Initial @ ambient temperature** Contact size 22 : 8 mΩ Contact size 16 : 3 mΩ Contact size 08 : 2 mΩ **After test @ ambient temperature** Contact size 11 : 8 mΩ Contact size 5 : 3 mΩ Contact size 3 : 2 mΩ	PASS
	EN2591-208 Temperature rise due to rated current	Not applicable	/
	EN2591-101 Visual examination	**Final examination** no loosening of parts, crack, excessive wear or detached part shall be observed.	PASS
	EN2591-307 Salt mist	**Class W** Time : 500 Hours **Class F** Time : 96 Hours	PASS

	EN2591-101 Visual examination	**Final examination** no loosening of parts, crack, excessive wear or detached part shall be observed.	PASS
	EN2591-205 Housing (shell) electrical continuity not applicable for class C	**Maximum resistance between mated connectors** Class F: Initial 1 mΩ After test 2 mΩ Class W: Initial 2.5 mΩ After test 5 mΩ **Maximum resistance between back shell and plug or receptacle** Class F: Initial 1 mΩ After test 2 mΩ Class W: Initial 2.5 mΩ After test 5 mΩ	PASS
	EN2591-408 Mating and unmating forces	**Housing size : 2 modules** Coupling torque : 1.1 ± 0.1 N.m Uncoupling torque : 0.7 N.m minimum Uncoupling torque : 1.7 N.m Maximum Overtightening torque : 3 ± 0.1 N.m **Housing size : 4 modules** Coupling torque : 1.1 ± 0.1 N.m Uncoupling torque : 0.7 N.m minimum Uncoupling torque : 2.2 N.m Maximum Overtightening torque : 3 ± 0.1 N.m	PASS
	EN2591-101 Visual examination	**Final examination** no loosening of parts, crack, excessive wear or detached part shall be observed.	PASS
Group	**Test**	**Requirements**	**State**
3	EN2591-315 Fluid resistance	**Test fluid number in accordance with EN 3909** Fuel : 2 Synthetic hydraulic fluid : 3 Mineral hydraulic fluid : 5 Mineral lubricant : 7 Synthetic lubricant : 9 Cleaning products : 11, 12, 13 De-icing fluid :15 Extinguishing fluid : 17 Cooling fluid : 19	PASS
	EN2591-101 Visual examination	**Final examination** no loosening of parts, crack, excessive wear or detached part shall be observed.	PASS
	EN2591-206 Measurement of insulation resistance (except for conductive fluids)	**Connectors mated** @ ambient temperature: 1 000 MΩ	PASS
	EN2591-408 Mating and unmating forces	**Housing size : 2 modules** Coupling torque : 1.1 ± 0.1 N.m Uncoupling torque : 0.7 N.m minimum Uncoupling torque : 1.7 N.m Maximum Overtightening torque : 3 ± 0.1 N.m **Housing size : 4 modules** Coupling torque : 1.1 ± 0.1 N.m Uncoupling torque : 0.7 N.m minimum	PASS

		Uncoupling torque : 2.2 N.m Maximum Overtightening torque : 3 ± 0.1 N.m	
	EN2591-409 Contact retention in module Housing (shell) electrical continuity	**Axial load** Contact size 22: 44 N Contact size 16: 110 N Contact size 08: 110 N Displacement < 0,3 mm during and after application of the load.	PASS
	EN2591-101 Visual examination	**Final examination** no loosening of parts, crack, excessive wear or detached part shall be observed.	PASS
	EN2591-206 Measurement of insulation resistance	**Connectors unmated** @ ambient temperature: 5 000 MΩ	PASS
	EN2591-207 Voltage proof test	**Maximum leakage current** 2 mA **Connectors mated** Size 22 contact : 1300 V r.m.s@sea level Other contact : 1500 V r.m.s@sea level **Connectors unmated** Size 22 contact : 1300 V r.m.s@sea level Other contact : 1500 V r.m.s@sea level	PASS
	EN2591-101 Visual examination	**Final examination** no loosening of parts, crack, excessive wear or detached part shall be observed.	PASS
Group	**Test**	**Requirements**	**State**
4	EN2591-202 Contact resistance at rated current	**Initial @ ambient temperature** Contact size 22 : 8 mΩ Contact size 16 : 3 mΩ Contact size 08 : 2 mΩ **After test @ ambient temperature** Contact size 11 : 8 mΩ Contact size 5 : 3 mΩ Contact size 3 : 2 mΩ	PASS
	EN2591-210 Electrical overload	**Contact size 22** 10 Amps during 40 seconds 50 Amps during 40 seconds **Contact size 16** 26 Amps during 40 seconds 130 Amps during 0.6 seconds **Contact size 08** 92 Amps during 40 seconds 460 Amps during 0.6 seconds	PASS
	EN2591-202 Contact resistance at rated current	**Initial @ ambient temperature** Contact size 22 : 8 mΩ Contact size 16 : 3 mΩ Contact size 08 : 2 mΩ **After test @ ambient temperature** Contact size 11 : 8 mΩ Contact size 5 : 3 mΩ Contact size 3 : 2 mΩ	PASS
	EN2591-206	**Connectors unmated** @ ambient temperature: 5 000 MΩ	PASS

	Measurement of insulation resistance		
	EN2591-207 Voltage proof test (normal air pressure)	**Maximum leakage current** 2 mA **Connectors mated** Size 22 contact : 1300 V r.m.s@sea level Other contact : 1500 V r.m.s@sea level **Connectors unmated** Size 22 contact : 1300 V r.m.s@sea level Other contact : 1500 V r.m.s@sea level	PASS
	EN2591-408 Mating and unmating forces	**Housing size : 2 modules** Coupling torque : 1.1 ± 0.1 N.m Uncoupling torque : 0.7 N.m minimum Uncoupling torque : 1.7 N.m Maximum Overtightening torque : 3 ± 0.1 N.m **Housing size : 4 modules** Coupling torque : 1.1 ± 0.1 N.m Uncoupling torque : 0.7 N.m minimum Uncoupling torque : 2.2 N.m Maximum Overtightening torque : 3 ± 0.1 N.m	PASS
	EN2591-101 Visual examination	**Final examination** no loosening of parts, crack, excessive wear or detached part shall be observed.	PASS
	EN2591-301 Endurance at temperature	1000 Hours @ 175°C High temperature	PASS
	EN2591-201 Contact resistance low level	**Only for contact size 22** Initial : 8 mΩ After test : 12 mΩ	PASS
	EN2591-202 Contact resistance at rated current	**Initial @ ambient temperature** Contact size 22 : 8 mΩ Contact size 16 : 3 mΩ Contact size 08 : 2 mΩ **After test @ ambient temperature** Contact size 11 : 8 mΩ Contact size 5 : 3 mΩ Contact size 3 : 2 mΩ	PASS
	EN2591-205 Housing (shell) electrical continuity not applicable for class C	**Maximum resistance between mated connectors** Class F: Initial 1 mΩ After test 2 mΩ Class W: Initial 2.5 mΩ After test 5 mΩ **Maximum resistance between back shell and plug or receptacle** Class F: Initial 1 mΩ After test 2 mΩ Class W: Initial 2.5 mΩ After test 5 mΩ	PASS
	EN2591-206 Measurement of insulation resistance	**Connectors unmated** @ ambient temperature: 5 000 MΩ	PASS

	EN2591-409 Contact retention in module	**Axial load** Contact size 22: 44 N Contact size 16: 110 N Contact size 08: 110 N Displacement < 0,3 mm during and after application of the load.	PASS
	EN2591-101 Visual examination	**Final examination** no loosening of parts, crack, excessive wear or detached part shall be observed.	PASS
Group	**Test**	**Requirements**	**State**
5	EN2591-412 Contact insertion and extraction forces	**Maximum force** Contact size 22 @ insertion : 30 N Contact size 22 @ extraction : 30 N Contact size 16 @ insertion : 67 N Contact size 16 @ extraction : 67 N Contact size 08 Power @ insertion : 100 N Contact size 08 Power @ extraction : 100 N	PASS
	EN2591-202 Contact resistance at rated current	**Initial @ ambient temperature** Contact size 22 : 8 mΩ Contact size 16 : 3 mΩ Contact size 08 : 2 mΩ **After test @ ambient temperature** Contact size 11 : 8 mΩ Contact size 5 : 3 mΩ Contact size 3 : 2 mΩ	PASS
	EN2591-216 Engagement of contacts	**Depth** ≥ 1.27 mm	PASS
	EN2591-506 Use of tools	Check the ability of modules to withstand the use of the tools for insertion and extraction of contacts **Force to be applied on tool** 13 N	PASS
	EN2591-101 Visual examination	**Final examination** no loosening of parts, crack, excessive wear or detached part shall be observed.	PASS
	EN2591-409 Contact retention in module	**Axial load** Contact size 22: 44 N Contact size 16: 110 N Contact size 08: 110 N Displacement < 0,3 mm during and after application of the load.	PASS
	EN2591-410 Module retention in housing (axial) - Female modules, all variants for 4 and 2 module connectors	**Force applied** 25.4 daN **Displacement** ≤0.25 mm	PASS
	EN2591-312 Air leakage	**Maximum leakage flow** 4 cm3/h/module@ 100 kPa Differential pressure	PASS
	EN2591-302 Climatic sequence	**Connector mated:** Minimum temperature: - 55 2 °C Maximum temperature: 175 2 °C	PASS
	EN2591-206 Measurement of insulation resistance	**Connectors unmated** @ ambient temperature: 5 000 MΩ	PASS

	EN2591-207 Voltage proof test (normal air pressure)	**Maximum leakage current** 2 mA **Connectors mated** Size 22 contact : 1300 V r.m.s@sea level Other contact : 1500 V r.m.s@sea level **Connectors unmated** Size 22 contact : 1300 V r.m.s@sea level Other contact : 1500 V r.m.s@sea level	PASS
	EN2591-202 Contact resistance at rated current	**Initial @ ambient temperature** Contact size 22 : 8 mΩ Contact size 16 : 3 mΩ Contact size 08 : 2 mΩ **After test @ ambient temperature** Contact size 11 : 8 mΩ Contact size 5 : 3 mΩ Contact size 3 : 2 mΩ	PASS
	EN2591-408 Mating and unmating forces	**Housing size : 2 modules** Coupling torque : 1.1 ± 0.1 N.m Uncoupling torque : 0.7 N.m minimum Uncoupling torque : 1.7 N.m Maximum Overtightening torque : 3 ± 0.1 N.m **Housing size : 4 modules** Coupling torque : 1.1 ± 0.1 N.m Uncoupling torque : 0.7 N.m minimum Uncoupling torque : 2.2 N.m Maximum Overtightening torque : 3 ± 0.1 N.m	PASS
	EN2591-101 Visual examination	**Final examination** no loosening of parts, crack, excessive wear or detached part shall be observed.	PASS
	EN2591-324 - Interfacial sealing	**Applicable Pressure** 1,1 kPa (30 000 m)	IN PROGRESS
	EN2591-206 - Measurement of insulation resistance	**Connectors unmated** @ ambient temperature: 5 000 MΩ	IN PROGRESS
	EN2591-207 Voltage proof test (normal air pressure)	**Maximum leakage current** 2 mA **Connectors mated** Size 22 contact : 1300 V r.m.s@sea level Other contact : 1500 V r.m.s@sea level **Connectors unmated** Size 22 contact : 1300 V r.m.s@sea level Other contact : 1500 V r.m.s@sea level	IN PROGRESS
	EN2591-420 Mechanical strength of rear accessories - Phase A + B (only for classes W, J, F, M and A)	Not applicable for this self-declaration	/
	EN2591-101 Visual examination	Not applicable for this self-declaration	/
	EN2591-405 Axial load - Only for class C (as for other classes this test is included in EN EN2591-420)	Not applicable for this self-declaration	/
	EN2591-408 Mating and unmating forces	Not applicable for this self-declaration	/

	EN2591-404 Transverse load - Only for class C (as for other classes this test is included in EN EN2591-420)	Not applicable for this self-declaration	/
	EN2591-408 Mating and unmating forces	Not applicable for this self-declaration	/
	EN2591-101 Visual examination	**Final examination** no loosening of parts, crack, excessive wear or detached part shall be observed.	IN PROGRESS
Group	**Test**	**Requirements**	**State**
6	EN2591-505 Contact protection effectiveness (scoop-proof) - For series 3 only	Not applicable for this self-declaration	/
	EN2591-207 Voltage proof test during contact protection effectiveness	Not applicable for this self-declaration	/
	EN2591-413 Holding force of grounding spring system - For connectors and accessories	**2 Modules** 5 N Min 10 N Max **4 Modules** 10 N Min 20 N Max	PASS
	EN2591-406 Mechanical endurance	**Number of mating and unmating operations** 500 cycles @ maximum five cycles/min	PASS
	EN2591-101 Visual examination	**Final examination** no loosening of parts, crack, excessive wear or detached part shall be observed.	PASS
	EN2591-205 Housing (shell) electrical continuity not applicable for class C	**Maximum resistance between mated connectors** Class F: Initial 1 mΩ After test 2 mΩ Class W: Initial 2.5 mΩ After test 5 mΩ **Maximum resistance between back shell and plug or receptacle** Class F: Initial 1 mΩ After test 2 mΩ Class W: Initial 2.5 mΩ After test 5 mΩ	PASS
	EN2591-206 Insulation resistance	**Connectors unmated** @ ambient temperature: 5 000 MΩ	PASS
	EN2591-207 Voltage proof test (normal air pressure)	**Maximum leakage current** 2 mA **Connectors mated** Size 22 contact : 1300 V r.m.s@sea level Other contact : 1500 V r.m.s@sea level **Connectors unmated** Size 22 contact : 1300 V r.m.s@sea level Other contact : 1500 V r.m.s@sea level	PASS

<table>
<tr><td></td><td>EN2591-408
Mating and unmating forces</td><td>Housing size : 2 modules
Coupling torque : 1.1 ± 0.1 N.m
Uncoupling torque : 0.7 N.m minimum
Uncoupling torque : 1.7 N.m Maximum
Overtightening torque : 3 ± 0.1 N.m

Housing size : 4 modules
Coupling torque : 1.1 ± 0.1 N.m
Uncoupling torque : 0.7 N.m minimum
Uncoupling torque : 2.2 N.m Maximum
Overtightening torque : 3 ± 0.1 N.m</td><td>PASS</td></tr>
<tr><td></td><td>EN2591-213
Shielding effectiveness - From MHz to 1 GHz</td><td><table><tr><th>Frequency
(MHz)</th><th>Minimum attenuation
(dB)</th></tr><tr><td>100</td><td>50</td></tr><tr><td>200</td><td>45</td></tr><tr><td>300</td><td>45</td></tr><tr><td>400</td><td>40</td></tr><tr><td>800</td><td>35</td></tr><tr><td>1000</td><td>30</td></tr></table></td><td>PASS</td></tr>
<tr><td></td><td>EN2591-212
Surface transfer impedance - From 1 KHz to MHz</td><td><table><tr><td>Frequency</td><td>1 Khz</td><td>1 Mhz</td><td>10 Mhz</td><td>100 Mhz</td></tr><tr><td>Impedance</td><td>5 mΩ</td><td>10 mΩ</td><td>20 mΩ</td><td>150 mΩ</td></tr></table></td><td>PASS</td></tr>
<tr><td></td><td>EN2591-214
Lighting strike, current and voltage pulse</td><td>Current Pulse F
15 KA</td><td>PASS</td></tr>
<tr><td></td><td>EN2591-101
Visual examination</td><td>Final examination
no loosening of parts, crack, excessive wear or detached part shall be observed.</td><td>PASS</td></tr>
<tr><td></td><td>EN2591-205
Housing (shell) electrical continuity not applicable for class C</td><td>Maximum resistance between mated connectors
Class F:
Initial 1 mΩ
After test 2 mΩ

Class W:
Initial 2.5 mΩ
After test 5 mΩ

Maximum resistance between back shell and plug or receptacle
Class F:
Initial 1 mΩ
After test 2 mΩ

Class W:
Initial 2.5 mΩ
After test 5 mΩ</td><td>PASS</td></tr>
<tr><td></td><td>EN2591-408
Mating and unmating forces</td><td>Housing size : 2 modules
Coupling torque : 1.1 ± 0.1 N.m
Uncoupling torque : 0.7 N.m minimum
Uncoupling torque : 1.7 N.m Maximum
Overtightening torque : 3 ± 0.1 N.m

Housing size : 4 modules
Coupling torque : 1.1 ± 0.1 N.m
Uncoupling torque : 0.7 N.m minimum
Uncoupling torque : 2.2 N.m Maximum
Overtightening torque : 3 ± 0.1 N.m</td><td>PASS</td></tr>
<tr><th>Group</th><th>Test</th><th>Requirements</th><th>State</th></tr>
<tr><td>7</td><td>EN2591-515
Hydrolytic stability - Classes J, M and C only</td><td>Not applicable for this self-declaration</td><td>/</td></tr>
</table>

	EN2591-101 Visual examination	Not applicable for this self-declaration	/
	EN2591-408 Mating and unmating forces	Not applicable for this self-declaration	/
	EN2591-101 Visual examination	Not applicable for this self-declaration	/
Group	**Test**	**Requirements**	**State**
8	EN2591-308 Sand and dust	**Position** Mated connectors parallel to the wind direction, with the rear of the plug facing into the wind. **Wind velocity in the duct** 3,5 ± 0,5 m/s. **Number of cycles** one	PASS
	EN2591-408 Mating and unmating forces	**Housing size : 2 modules** Coupling torque : 1.1 ± 0.1 N.m Uncoupling torque : 0.7 N.m minimum Uncoupling torque : 1.7 N.m Maximum Overtightening torque : 3 ± 0.1 N.m **Housing size : 4 modules** Coupling torque : 1.1 ± 0.1 N.m Uncoupling torque : 0.7 N.m minimum Uncoupling torque : 2.2 N.m Maximum Overtightening torque : 3 ± 0.1 N.m	PASS
	EN2591-101 Visual examination	**Final examination** no loosening of parts, crack, excessive wear or detached part shall be observed.	PASS
Group	**Test**	**Requirements**	**State**
9	EN2591-317 Flammability	**Connectors mated** Method A	PASS
	EN2591-207 Voltage proof test (normal air pressure)	**Maximum leakage current** 2 mA **Connectors mated** Size 22 contact : 1300 V r.m.s@sea level Other contact : 1500 V r.m.s@sea level **Connectors unmated** Size 22 contact : 1300 V r.m.s@sea level Other contact : 1500 V r.m.s@sea level	PASS
	EN2591-101 Visual examination	**Final examination** no loosening of parts, crack, excessive wear or detached part shall be observed.	PASS
	EN2591-409 Contact retention in module	**Axial load** Contact size 22: 44 N Contact size 16: 110 N Contact size 08: 110 N Displacement < 0,3 mm during and after application of the load.	PASS
Group	**Test**	**Requirements**	**State**
10	EN2591-306 Mould growth	**Method A** Duration: 28 d Growth 0 No prior washing No surface etching	PASS

<table>
<tr><th>Group</th><th>Test</th><th>Requirements</th><th>State</th></tr>
<tr><td>11</td><td>EN2591-419
Stability of male contact in module</td><td>
<table>
<tr><td>Contact Size</td><td>Permitted deflection (mm Max)</td><td>Force (daN)</td></tr>
<tr><td>22</td><td>0.76</td><td>1.2</td></tr>
<tr><td>16</td><td>1.91</td><td>4.9</td></tr>
<tr><td>8</td><td>2.54</td><td>9.7</td></tr>
</table>
</td><td>IN PROGRESS</td></tr>
<tr><th>Group</th><th>Test</th><th>Requirements</th><th>State</th></tr>
<tr><td rowspan="13">12</td><td>EN2591-305
Rapid change of temperature</td><td>Connector mated
High temperature = 175°C +5/0
Lower temperature = -55°C 0/-5</td><td>PASS</td></tr>
<tr><td>EN2591-207
Voltage proof test (normal air pressure) not applicable</td><td>Maximum leakage current
2 mA

Connectors mated
Size 22 contact : 1300 V r.m.s@sea level
Other contact : 1500 V r.m.s@sea level

Connectors unmated
Size 22 contact : 1300 V r.m.s@sea level
Other contact : 1500 V r.m.s@sea level</td><td>PASS</td></tr>
<tr><td>EN2591-206
Measurement of insulation resistance not applicable</td><td>Connectors unmated
@ ambient temperature: 5 000 MΩ</td><td>PASS</td></tr>
<tr><td>EN2591-101
Visual examination</td><td>Final examination
no loosening of parts, crack, excessive wear or detached part shall be observed.</td><td>PASS</td></tr>
<tr><td>EN2591-408
Mating and unmating forces not applicable</td><td>Housing size : 2 modules
Coupling torque : 1.1 ± 0.1 N.m
Uncoupling torque : 0.7 N.m minimum
Uncoupling torque : 1.7 N.m Maximum
Overtightening torque : 3 ± 0.1 N.m

Housing size : 4 modules
Coupling torque : 1.1 ± 0.1 N.m
Uncoupling torque : 0.7 N.m minimum
Uncoupling torque : 2.2 N.m Maximum
Overtightening torque : 3 ± 0.1 N.m</td><td>PASS</td></tr>
<tr><td>EN2591-314
Immersion at low air pressure</td><td>Applicable Pressure:
1.1 kPa</td><td>PASS</td></tr>
<tr><td>EN2591-206
Measurement of insulation resistance</td><td>Connectors mated
@ ambient temperature: 1 000 MΩ</td><td>PASS</td></tr>
<tr><td>EN2591-207
Voltage proof test (normal air pressure)</td><td>Maximum leakage current
2 mA

Connectors mated
Size 22 contact : 1300 V r.m.s@sea level
Other contact : 1500 V r.m.s@sea level

Connectors unmated
Size 22 contact : 1300 V r.m.s@sea level
Other contact : 1500 V r.m.s@sea level</td><td>PASS</td></tr>
<tr><td>EN2591-307
Salt mist</td><td>Class W
Time : 500 Hours

Class F
Time : 96 Hours</td><td>PASS</td></tr>
<tr><td>EN2591-101
Visual examination</td><td>Final examination
no loosening of parts, crack, excessive wear or detached part shall be observed.</td><td>PASS</td></tr>
</table>

<table>
<tr><td></td><td>EN2591-205
Housing (shell) electrical continuity
not applicable for class C</td><td>Maximum resistance between mated connectors
Class F:
Initial 1 mΩ
After test 2 mΩ

Class W:
Initial 2.5 mΩ
After test 5 mΩ

Maximum resistance between back shell and plug (or receptacle)
Class F:
Initial 1 mΩ
After test 2 mΩ

Class W:
Initial 2.5 mΩ
After test 5 mΩ</td><td>PASS</td></tr>
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Mating and unmating forces</td><td>Housing size : 2 modules
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Overtightening torque : 3 ± 0.1 N.m

Housing size : 4 modules
Coupling torque : 1.1 ± 0.1 N.m
Uncoupling torque : 0.7 N.m minimum
Uncoupling torque : 2.2 N.m Maximum
Overtightening torque : 3 ± 0.1 N.m</td><td>PASS</td></tr>
<tr><td></td><td>EN2591-427
Robustness of protective cover attachment</td><td>Not applicable for this self-declaration</td><td>/</td></tr>
<tr><td></td><td>EN2591-213
Shielding effectiveness - From MHz to 1 GHz</td><td><table><tr><th>Frequency (MHz)</th><th>Minimum attenuation (dB)</th></tr><tr><td>100</td><td>50</td></tr><tr><td>200</td><td>45</td></tr><tr><td>300</td><td>45</td></tr><tr><td>400</td><td>40</td></tr><tr><td>800</td><td>35</td></tr><tr><td>1000</td><td>30</td></tr></table></td><td>PASS</td></tr>
<tr><td></td><td>EN2591-101
Visual examination</td><td>Final examination
no loosening of parts, crack, excessive wear or detached part shall be observed.</td><td>PASS</td></tr>
</table>

List of OPTIMUS Part qualified in accordance with EN4165-001 specifications				
Standard		EN4165 Part Number	NICOMATIC Part Number	Commentaries
EN4165-003 July 2016	Male and female modules, rear release contacts series 2	EN4165A20-22#@A	OPTA20-22#@A	@ = All keying codification (N, A, B, C, D, E, F) # = Peripherical sealing & fluids resistance (1 , 2)
		EN4165A20-22#@B	OPTA20-22#@B	@ = All keying codification (N, A, B, C, D, E, F) # = Peripherical sealing & fluids resistance (1 , 2)
		EN4165A20-22#@M	OPTA20-22#@M	@ = All keying codification (N, A, B, C, D, E, F) # = Peripherical sealing & fluids resistance (1 , 2)
		EN4165A20-22#@F	OPTA20-22#@F	@ = All keying codification (N, A, B, C, D, E, F) # = Peripherical sealing & fluids resistance (1 , 2)
		EN4165A01-08#@A	OPTA01-08#@A	@ = All keying codification (N, A, B, C, D, E, F) # = Peripherical sealing & fluids resistance (1 , 2)
		EN4165A01-08#@B	OPTA01-08#@B	@ = All keying codification (N, A, B, C, D, E, F) # = Peripherical sealing & fluids resistance (1 , 2)

		EN4165A01-08#@M	OPTA01-08#@M	@ = All keying codification (N, A, B, C, D, E, F) # = Peripherical sealing & fluids resistance (1 , 2)
		EN4165A01-08#@F	OPTA01-08#@F	@ = All keying codification (N, A, B, C, D, E, F) # = Peripherical sealing & fluids resistance (1 , 2)
		EN4165-#NL	OPT-#NL	# = Peripherical sealing & fluids resistance (1 , 2)
		EN4165A08-16#@A	OPTA08-16#@A	@ = All keying codification (N, A, B, C, D, E, F) # = Peripherical sealing & fluids resistance (1 , 2)
		EN4165A08-16#@B	OPTA08-16#@B	@ = All keying codification (N, A, B, C, D, E, F) # = Peripherical sealing & fluids resistance (1 , 2)
		EN4165A08-16#@M	OPTA08-16#@M	@ = All keying codification (N, A, B, C, D, E, F) # = Peripherical sealing & fluids resistance (1 , 2)
		EN4165A08-16#@F	OPTA08-16#@F	@ = All keying codification (N, A, B, C, D, E, F) # = Peripherical sealing & fluids resistance (1 , 2)
EN4165-004 September 2007	Rectangular stackable mounting receptacle, 2 or 4 modules series 2	EN4165F0A2@@	OPT-F0A2@@	@@ = All keying coupling configuration
		EN4165W0A2@@	OPT-W0A2@@	@@ = All keying coupling configuration
		EN4165F0A4@@	OPT-F0A4@@	@@ = All keying coupling configuration
		EN4165W0A4@@	OPT-W0A4@@	@@ = All keying coupling configuration
-	Short rectangular stackable mounting receptacle, 2 or 4 modules series 2	-	OPT-F0SA2@@	@@ = All keying coupling configuration
		-	OPT-W0SA2@@	@@ = All keying coupling configuration
		-	OPT-F0SA4@@	@@ = All keying coupling configuration
		-	OPT-W0SA4@@	@@ = All keying coupling configuration
EN4165-006 September 2007	Plug 2 or 4 modules series 2	EN4165F6A2@@	OPT-F6A2@@	@@ = All keying coupling configuration
		EN4165W6A2@@	OPT-W6A2@@	@@ = All keying coupling configuration
		EN4165F6A4@@	OPT-F6A4@@	@@ = All keying coupling configuration
		EN4165W6A4@@	OPT-W6A4@@	@@ = All keying coupling configuration
EN4165-008 September 2007	Rectangular rack and panel plug, 2 or 4 modules series 2	EN4165F9A2@@	OPT-F9A2@@	@@ = All keying coupling configuration
		EN4165W9A2@@	OPT-W9A2@@	@@ = All keying coupling configuration
		EN4165F9A4@@	OPT-F9A4@@	@@ = All keying coupling configuration
		EN4165W9A4@@	OPT-W9A4@@	@@ = All keying coupling configuration
EN4165-010 September 2007	Rectangular rack and panel plug rear mounted, 2 or 4 modules series 2	EN4165F9A2R@@	OPT-F9A2R@@	@@ = All keying coupling configuration
		EN4165W9A2R@@	OPT-W9A2R@@	@@ = All keying coupling configuration
		EN4165F9A4R@@	OPT-F9A4R@@	@@ = All keying coupling configuration
		EN4165W9A4R@@	OPT-W9A4R@@	@@ = All keying coupling configuration
EN4165-011 September 2007	Rectangular flange mounting receptacle, 2 or 4 modules series 2	EN4165F7A2@@	OPT-F7A2@@	@@ = All keying coupling configuration
		EN4165W7A2@@	OPT-W7A2@@	@@ = All keying coupling configuration
		EN4165F7A4@@	OPT-F7A4@@	@@ = All keying coupling configuration
		EN4165W7A4@@	OPT-W7A4@@	@@ = All keying coupling configuration
-	Short rectangular flange mounting receptacle, 2 or 4 modules series 2	-	OPT-F7SA2@@	@@ = All keying coupling configuration
		-	OPT-W7SA2@@	@@ = All keying coupling configuration
		-	OPT-F7SA4@@	@@ = All keying coupling configuration
		-	OPT-W7SA4@@	@@ = All keying coupling configuration
EN4165-021 September 2007	Coupling system keyway for plug	EN4165P10	OPT-P10	/