Technical Paper | opticalCON® DRAGONFLY

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Content

Technical Paper – opticalCON **DRAGONFLY**
Title: NTP11

Subject:

Mechanical and optical tests applied to the opticalCON® transmission system for Pro Audio / Video industry purposes with main focus on changes in attenuation.

Optical performance is being examined with regard to attenuation and its variation vs. environmental and mechanical conditions.

This documentation describes the results of the test series conducted at Neutrik AG and University of Applied Sciences of Technology Buchs NTB.

The tests were carried out in accordance with the IEC-Standard main groups IEC 61753-1 and IEC 61300 as well as to Neutrik internal specifications.

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1 Vibration

Object:

Examination of following components, receptacles NO2MW-XP, NO2FW-XP and NKO2S-XP-0-1 cable. The intention of the test was to determine the attenuation in a fiber optic system and the performance during the vibration test.

The test was carried out by an independent laboratory: NTB, "Interstaatliche Hochschule für Technik Buchs" division "Labor Mess- und Simulationstechnik" located in Buchs / Switzerland.

Test Set-Up:

For the vibration test 3 NO2MW-XP and 3 NO2FW-XP receptacles were mounted. The front side was mated with a NKO2S-XP-0-1 cable. The rear end was connected with the test instrument via precision measuring cables (fig. 1.a).

The applied test set-up complies with IEC 61300-2-1.

Shaker:	Tira Power Amp. 5020	
Floor cloth:	Dytran 3055B2T (Serial Nr. 11974)	
Software:	SignalStar Vector (Version 2.3.989)	
Interface:	ABACUS System 71504	
Power Meter:	Kingfisher KI2824	
Light source (850nm):	Kingfisher KL2600GE	
Wavelength	1310 nm	singlemode
Frequency range:	10 – 55 Hz sinusoidal	
Amplitude displacement:	0.75 mm (1.5 mm p-p)	
Sweep rate:	1 oct/min	
Number of sweeps:	15	
Axis:	X, Y, Z	

After 15 cycles the receptacles were changed to the next axis without disconnecting the plugs to avoid any mismatching.

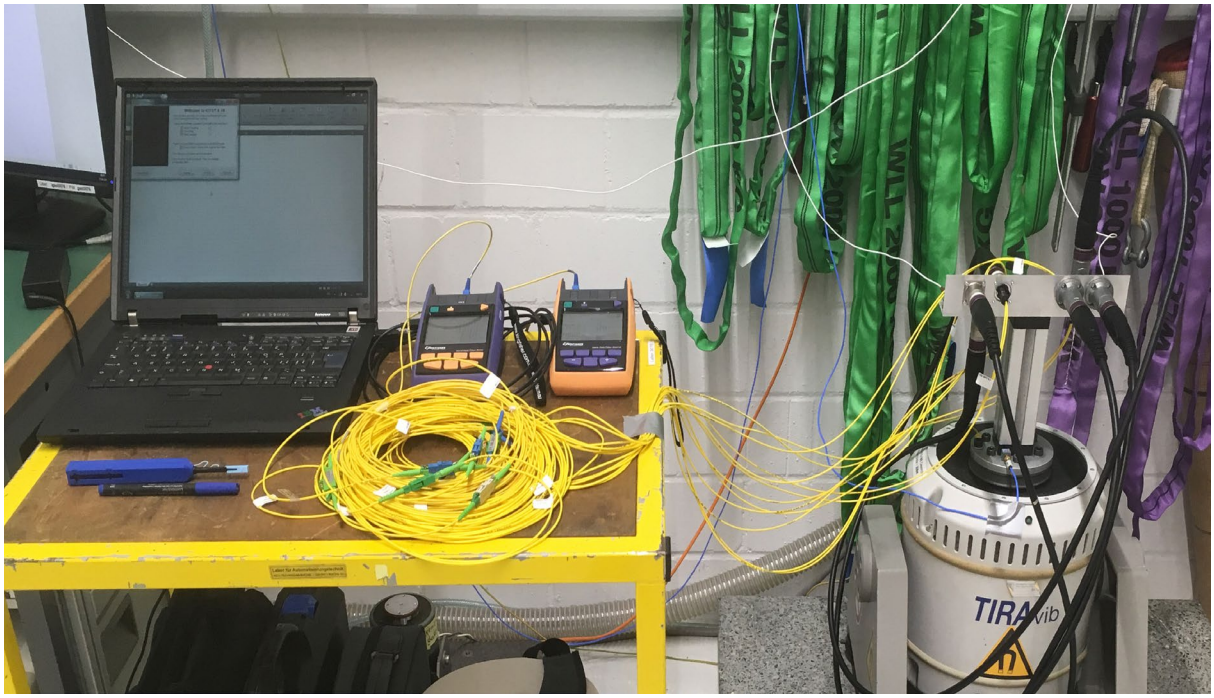

figure 1.a: Test set-up

Test Results:

Measurement during vibrations showed no variation in attenuation. The locking mechanism withstands this extreme vibration without any problems, i. e. no separation or functional deteriorization occurred.

2 Change of Temperature

Object:

Variations in attenuation due to temperature changes.
The test was arranged with one NKO2S-XP-0-1 cable connected to a NO2MW-XP and a NO2FW-XP receptacle.

Test Set-Up:

Test procedure according to IEC 61300-2-22.
The test was realized in a temperature testing chamber type WEISS WK11-180/40.

Test cycles:	96 h	
Profile of temperature:	-40 °C to +85 °C	
Light source:	Kingfisher KI2824	
Power meter	Kingfisher KI2600GE	
Measuring wave lengths:	1310 nm	singlemode
Cable length:	1 m	

figure 2.a: Test set-up

Temperature Profile and Results:

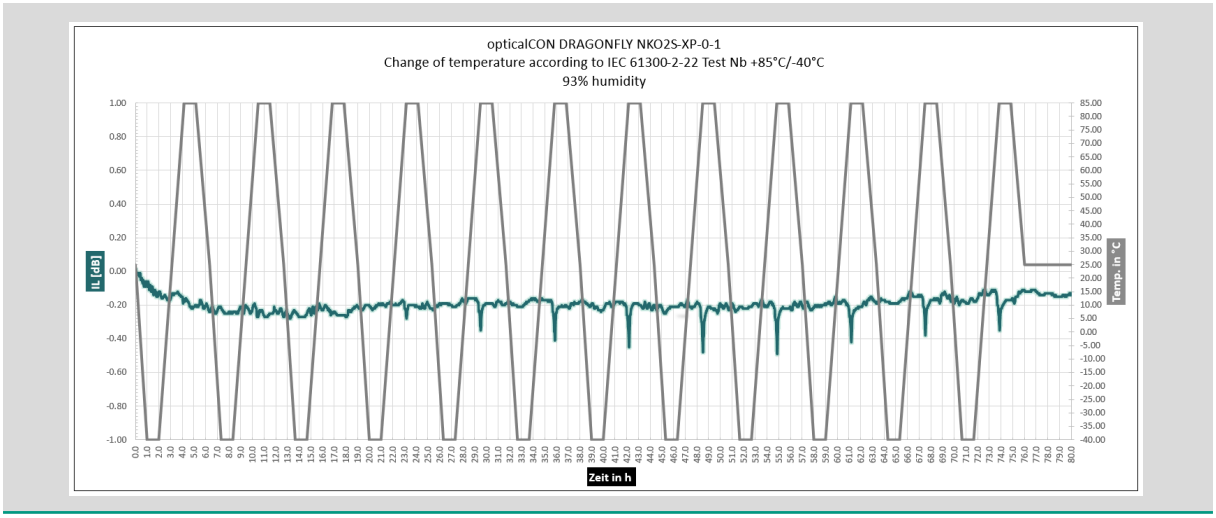

figure 2.b: Temperature profile and measurement results

The change of the attenuation varied from 0.1 dB to maximum 0.5 dB within 96 hours. The values are in the Neutrik's attenuation and return loss limits and for field application with temperature variations suitable and approved.

3 Cable Retention

Object:

Test of the cable retention efficiency. The opticalCON DRAGONFLY cable NKO2S-XP-0-1 was exposed to tractive forces until the cable started to move.

Test Set-Up:

The applied test procedure is referred to IEC 61300-2-4.

Tension test device:	Mecmesin MultiTest 2.5i (0 - 1'000 N)
Light Source:	Kingfisher KI2824
Power Meter:	Kingfisher KI2600-GE
Cable type:	NKO2S-XP-0-1

Test Results:

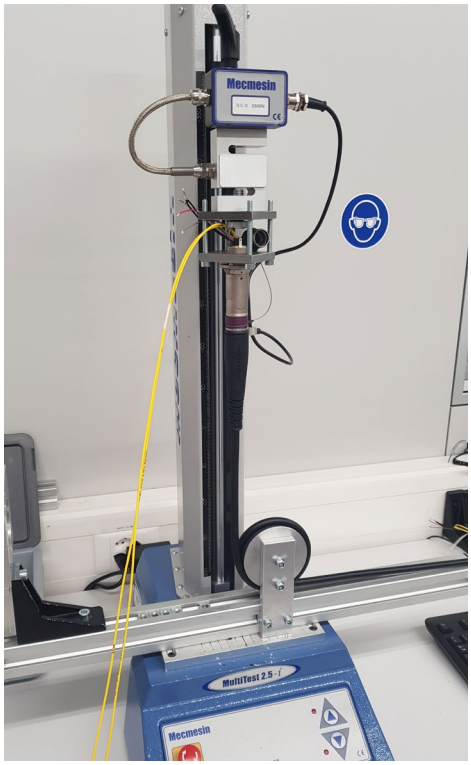

figure 3.a: Test set-up

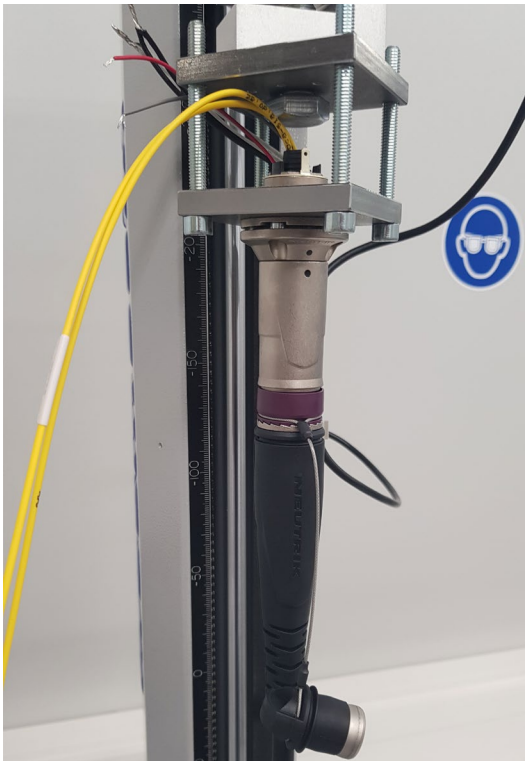

figure 3.b: Detailed measuring set-up

The opticalCON DRAGONFLY cable is tested and approved for min. 600 N and 60 sec. readjustment without any quality and function adverse effects.

4 Impact

Object:

The impact test is performed to show possible deformations or plug malfunction of the internal mechanism due to heavy mechanical exposure.

Test Set-Up:

The applied test procedure is referred to the IEC 61300-2-12 Method A pendulum drop.

Test cable:	NKO2S-XP-0-10
1st part of test:	NKO2S-XP-0-10 with mated protection caps
2nd part of test :	NKO2S-XP-0-10 with unmated protection caps

Parameters of Test:

Distance from centre of rotation:	2.25 m
Number of drops:	5
Height of falling:	1.0 – 1.9 m
Ground:	steel plate, thickness 25 mm

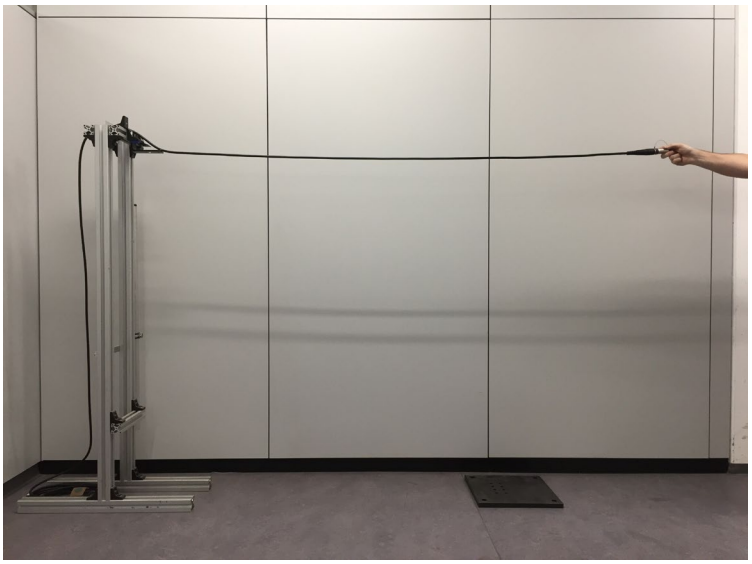

figure 4.a: Test set-up

Impact test with different heights (1.0 - 1.9 m) and steel plate.

Test Results:

TEST #	with cap	drop heigh [m]	drops	result
1	yes	1.0	5	no visible abrasion, full function
2	yes	1.9	5	no visible abrasion, full function
3	no	1.0	5	minimal visible abrasion, full function
4	no	1.9	5	minimal visible abrasion, full function

After several impact tests on different heights (1.0 - 1.9 m) the opticalCON DRAGONFLY connector doesn't indicate critical mechanical damages and is working properly.

5 Flexing

Object:

Variations of attenuation and mechanical damage of fiber optic cable due to a defined flexing procedure.

Test Set-Up:

Measurement of attenuation before, during and after flexing cycles.
Test procedure according to IEC 61300-2-44 in combination with IEC 61300-3-4.

Test cycles:	10’000
Mass of weight:	10 N
Flexing angle:	± 90 °C
Flexing speed:	ca. 37 cycles/min
Light source:	Kingfisher KI2824
Power meter:	Kingfisher KI2600-GE
Launching cables:	NKOBM2S-XP-0-1
Wavelength:	1310 nm
Test cable:	NKO2S-XP-0-10

Results:

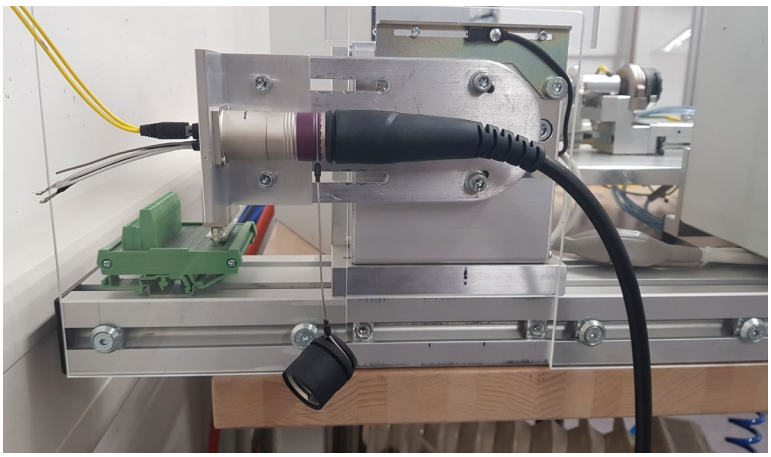

figure 5.a: Test set-up

Change in attenuation over all < 0.30 dB. No mechanical cable damage at 10.000 cycles visible.

6 Mating Durability

Object:

The mating durability test was carried out to show variations in attenuation after lifetime.

Test parameter:

NKO2S-XP-0-10

Test Set-Up:

Test procedure according to IEC 61300-2-2 in combination with IEC 61300-3-4 figure 4 with mode filter as defined in table 3 for multimode.
Contact resistance measurement according to IEC 60512-2.

Mating cycles:	10.000	
Launching:	Kingfisher KI2824	light source
	Kingfisher KI2600-GE	power meter
Measuring cables:	NKOBM2S-XP-0-1	
Measuring wave lengths:	1310 nm	singlemode
DUT cable length:	10 m	singlemode

Durability Results:

10.000 cycles (lifetime test):

The functionality from the lenses as well as the locking mechanism is warranted.
During measuring procedure there were no significant variations.

MEASURING	BEFORE LIFETIME TEST [dB]	AFTER LIFETIME TEST [dB]
Return Loss	> 40	> 40
Insertion Loss	< 0.6	< 0.6

10.000 cycles - Lifetime test

figure 6.a: measuring setup for lifetime test

figure 6.b: fixture for 10.000 mating cycles

Lens Condition:

Condition after 3.800 cylces.

Female Side **Male Side**

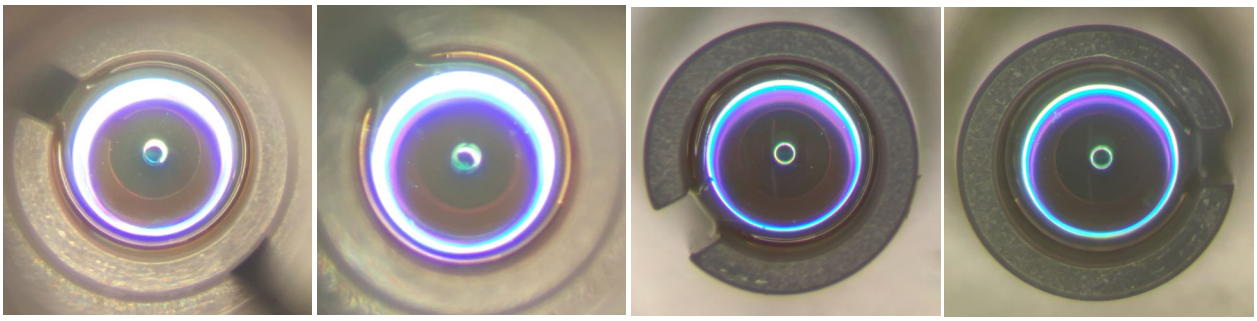

figure 6.c: Lens condition after 3.800 cycles

Condition after 10.000 cylces.

Female Side **Male Side**

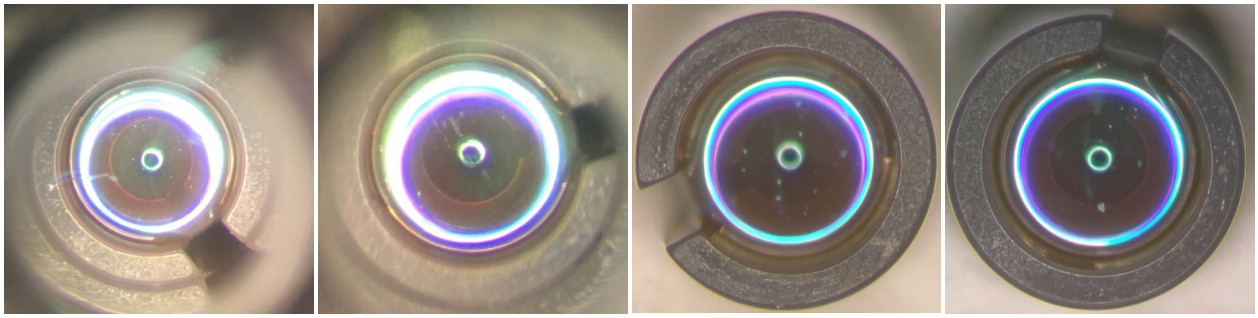

figure 6.d: Lens condition after 10.000 cycles

7 Contact Resistance

Object:

Initial value and variation of contact resistance.

Test parameter:

NKO2S-XP-0-10

Test Set-Up:

Test procedure according to IEC60512-2 test 2a.

Measuring Instrument: Sourcetronic ST2521

Test Results:

CONTACT RESISTANCE		
	measured average value	conditional value
initial		**< 7 mΩ**
power	1.8 mΩ	
sense	6.1 mΩ	
after 10.000 cycles		**< 10 mΩ**
power	4.7 mΩ	
sense	7.1 mΩ	

Table 7.a: contact resistance values

8 Dielectric Strength

Object:

The dielectric strength was checked in unmated condition.
The combination of contact to contact and contact to shell was judged.

Test Set-Up:

Test procedure according to IEC 60512-2 test 4a

Measuring Instrument:	Sefelec DMG 50

Test Results:

DIELECTRIC STRENGTH		
	measured average value	conditional value
Power contact - Housing	2.3 kVAC	> 2.3 kVAC
Sense contact - Housing	0.5 kVAC	> 0.46 kVAC
Power contact - Sense contact	2.9 kVAC	> 2.8 kVAC

Table 8.a: dielectric strength values

9 Insulation Resistance

Object:

The insulation restistance of the DRAGONFLY connector was checked.

Test Set-Up:

Test procedure according to IEC 60512-2 Test 3a

Measuring Instrument:	Sefelec DMG 50
Maximum measurable isolation resistance:	100 GΩ
Test Parameter:	test voltage 500 V DC

Test Results:

The measuring results were all in the defined range.

10 Current Capacity

Object:

Temperature rise of the power and sense contacts as a result of electrical current.

Test Set-Up:

Test procedure according to IEC 60512-5-1.

Measuring Instrument:	VAREG, 3 V 0-50 A rms
Temperature measuring Instrument:	Picolog Tc-08

The maximum temperature rise was defined generally with < 40 K.

Test Results:

The measurements were realized with following combinations:

NO2SMX-XP (male connector) connected with **NO2FW-XP** (female chassis connector)

NO2SFX-XP (female connector) connected with **NO2MW-XP** (male chassis connector)

NO2SFX-XP (female connector) connected with **NO2SMX-XP** (male connector)

NO2SMX-XP (male connector) connected with **NO2FW-XP** (female chassis connector)

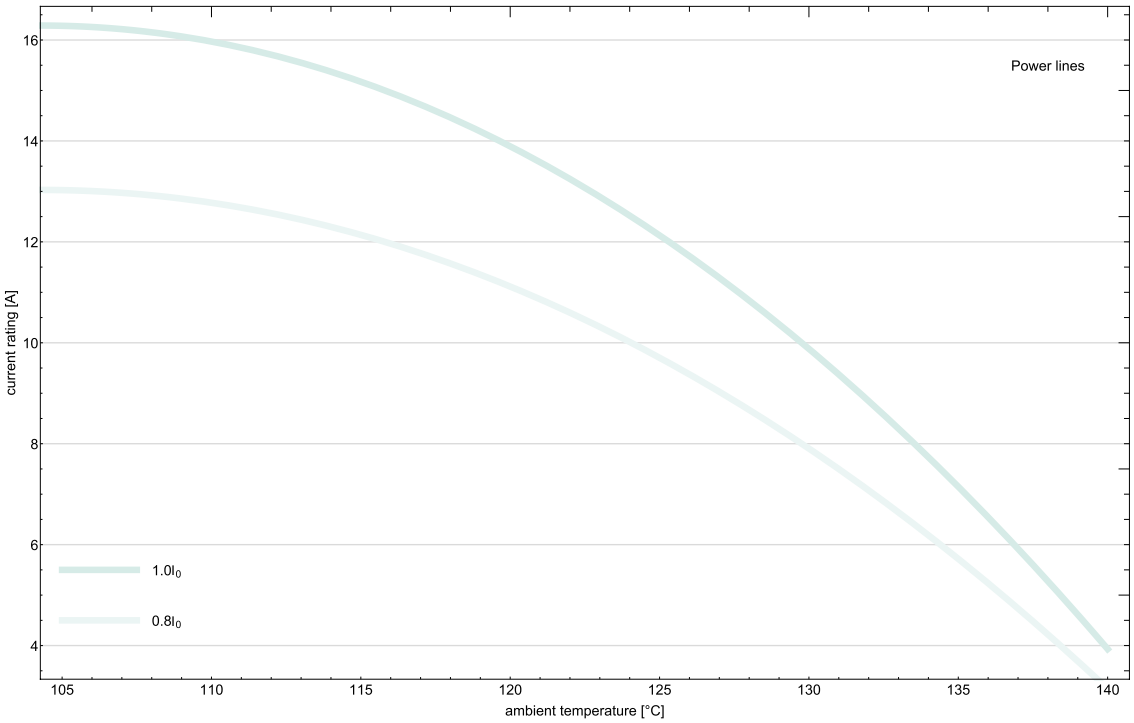

Table 10.a: NO2SMX-XP with NO2FW-XP - Power lines

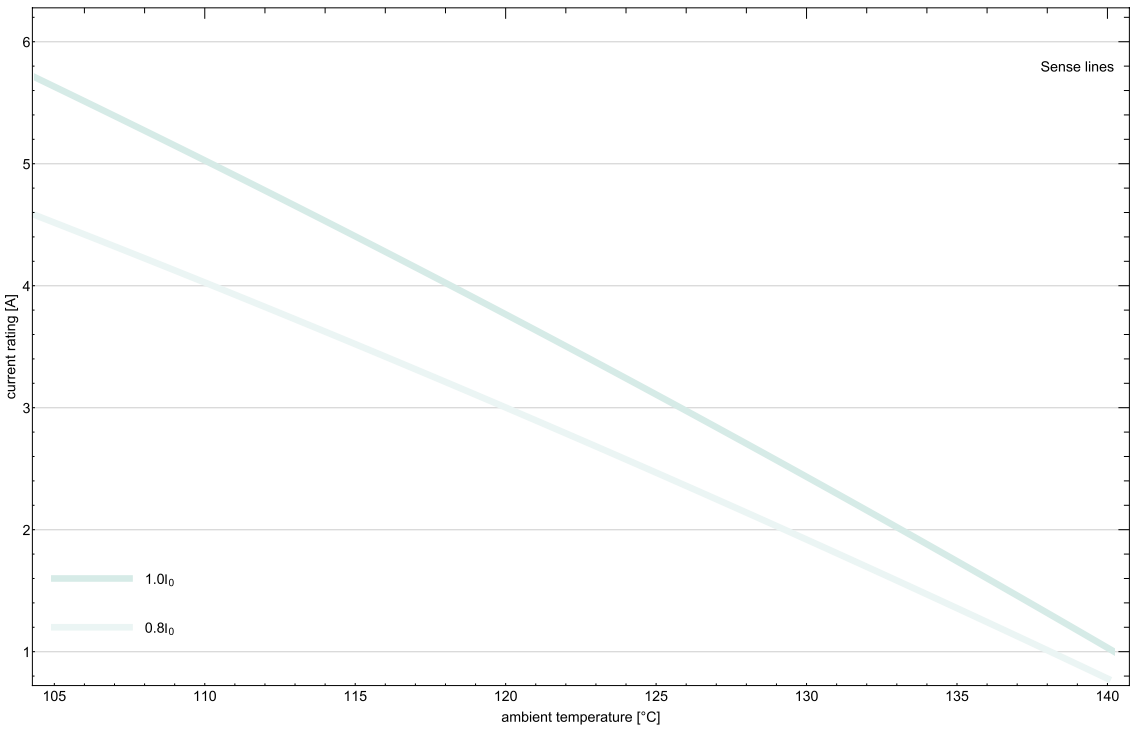

Table 10.b: NO2SMX-XP with NO2FW-XP - Sense lines

NO2SFX-XP (female connector) connected with **NO2MW-XP** (male chassis connector)

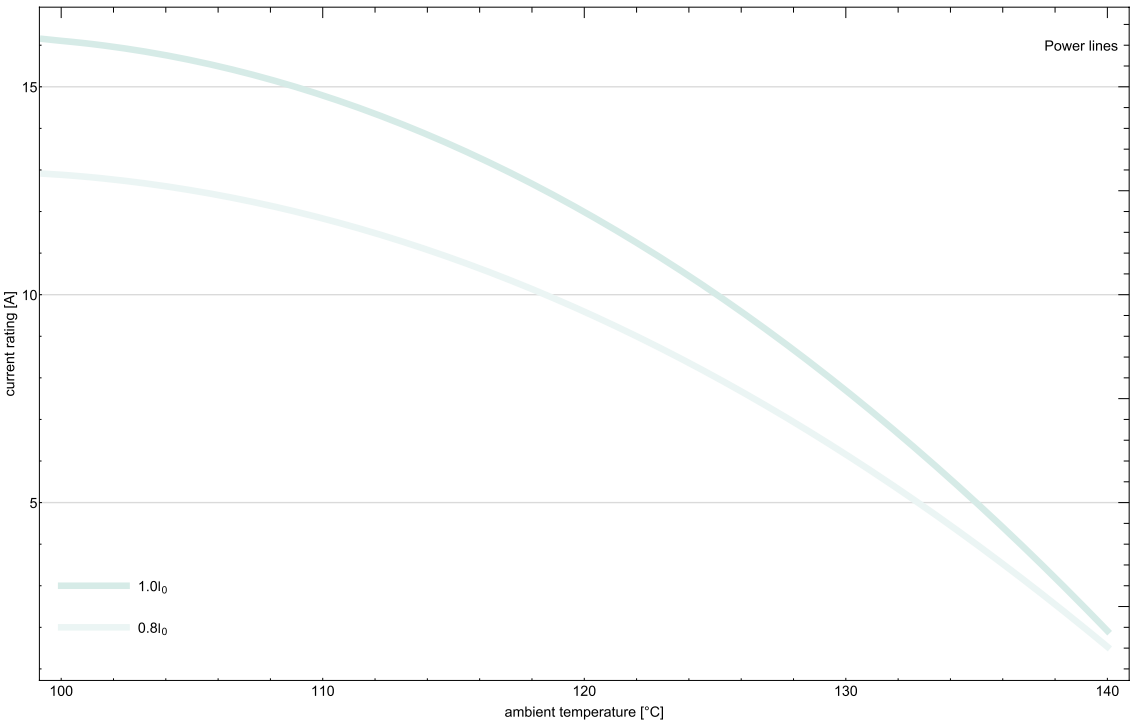

Table 10.c: NO2SFX-XP with NO2MW-XP - Power lines

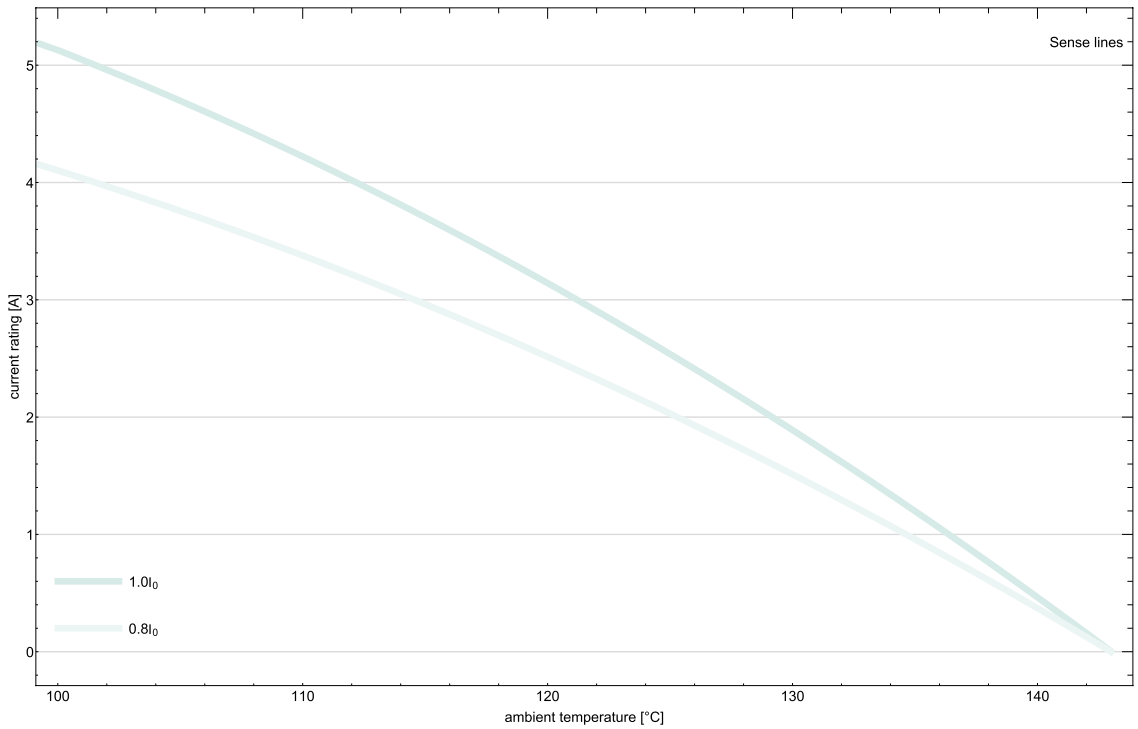

Table 10.d: NO2SFX-XP with NO2MW-XP - Sense lines

NO2SFX-XP (female connector) connected with **NO2SMX-XP** (male connector)

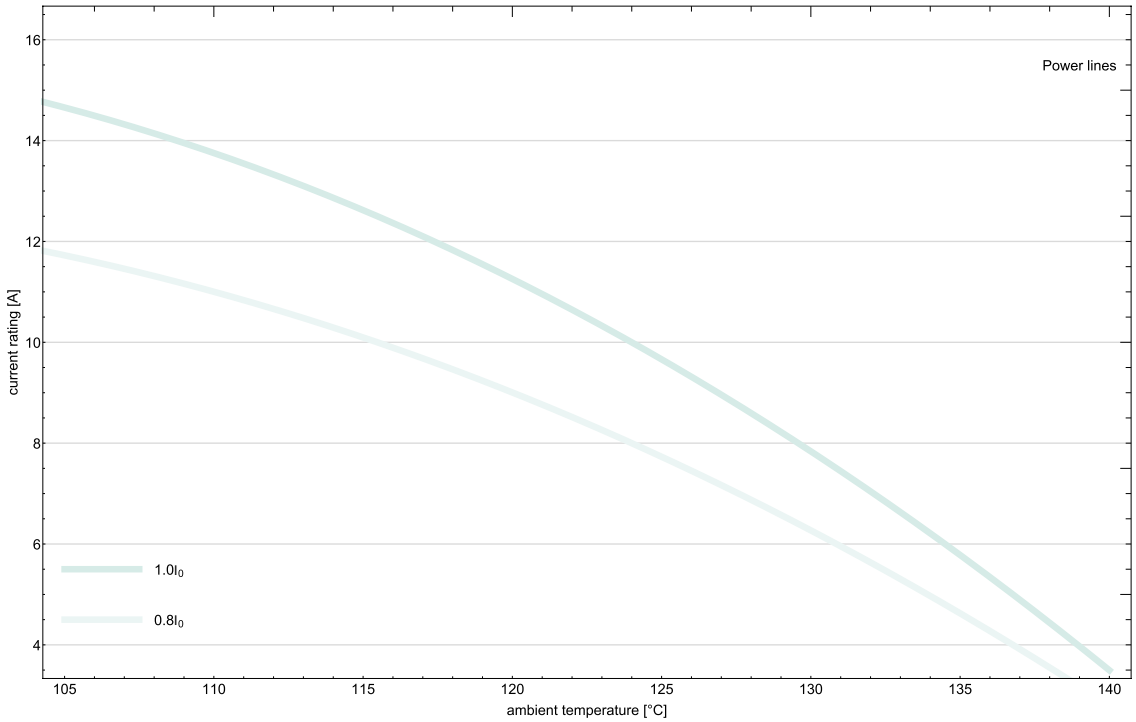

Table 10.e: NO2SFX-XP with NO2SMX-XP - Power lines

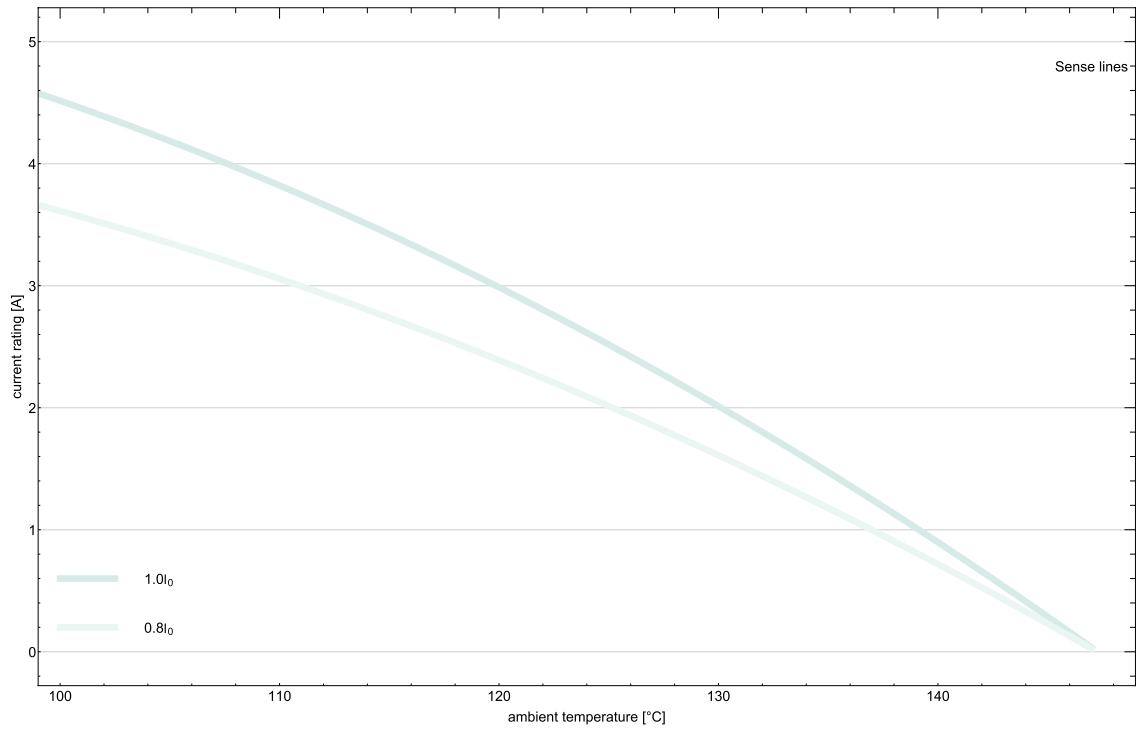

Table 10.f: NO2SFX-XP with NO2SMX-XP - Sense lines

11 Ingress Protection IP 6x Solids Protection

Object:

Dust Tight according to IP 6x Solid Protection. No ingress of dust, complete protection against contact.

The test was carried out by an independent laboratory: Electrosuisse, test laboratory PQ/PIK in 8320 Fehraltorf, Switzerland.

Test Set-Up:

Test procedure according to IEC 60529.

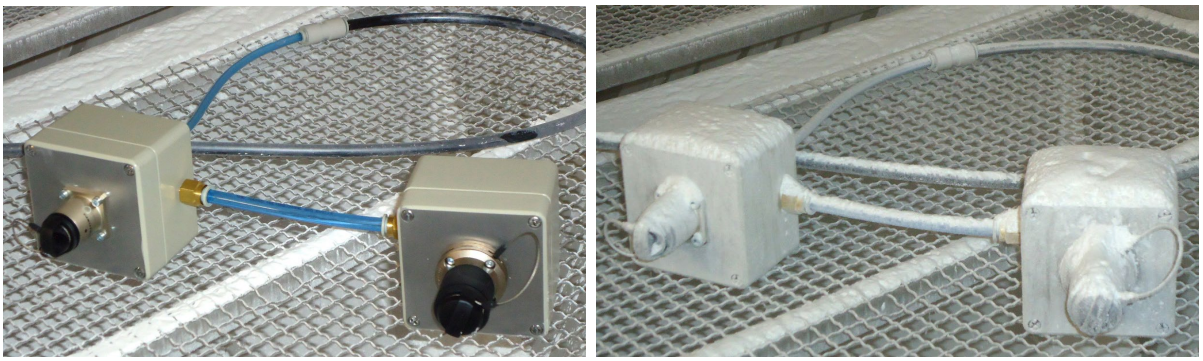

Table 11.a: NO2MW-XP and NO2FW-XP before and after the dust chamber.

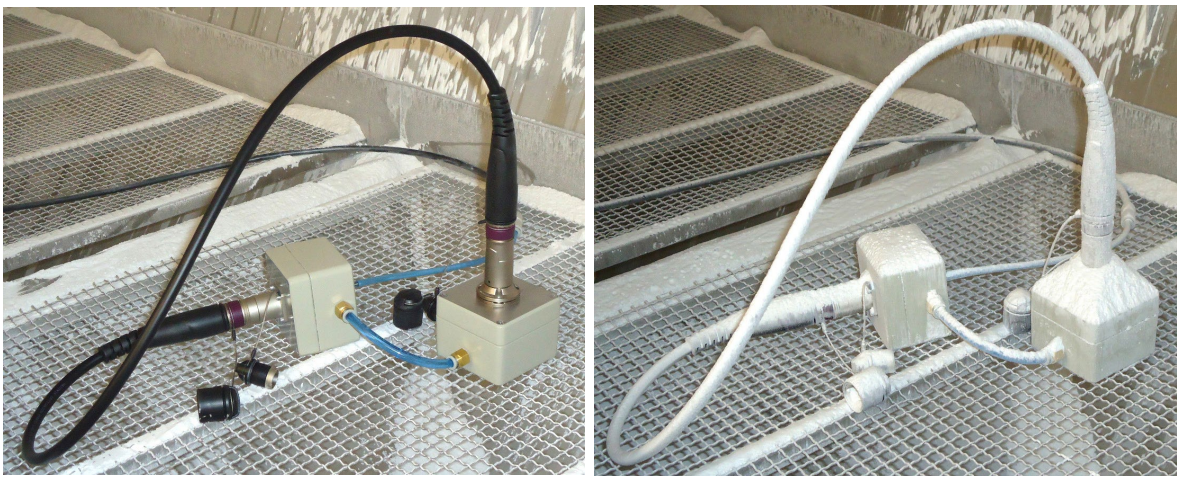

Table 11.b: Connected DRAGONFLY System before and after the dust chamber.

Test Results:

The opticalCON DRAGONFLY succesfully passed the IP 6x test.

12 Ingress Protection IP x8 Liquids Protection

Object:

Protection against harmful ingress of water according to IP x8 Liquids Protection. Immersion beyond 1m.

The test was carried out by an independent laboratory: Electrosuisse, test laboratory PQ/PIK in 8320 Fehraltorf, Switzerland.

Test Set-Up:

Test procedure according to IEC 60529.

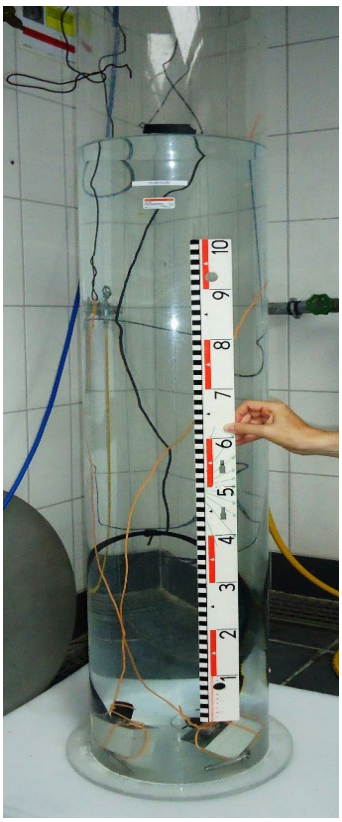

Table 12.a: NO2MW-XP and NO2FW-XP immersion by 1.2 m for 30 min.

Table 12.b: Connected DRAGONFLY System immersion by 1.2 m for 30 min.

Test Results:

The opticalCON DRAGONFLY succesfully passed the IP x8 test.

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