TEST REPORT / *PRØVERAPPORT*

IEC 60598 and/or/*og* EN 60598

Part 2: Particular requirements

Report Reference No.....:	Mikado Glow Downlight.
Rapport reference nr.	Mikado Glød downlight.
Tested by / *Prøvet af* .....:	Bill Poder Consult Ribe-Vejle Landevej 29 6622 Bække
Date / *dato*:	15-12-2014. updated 20-02-2016, Updated.16-03-2016.
Test specification: Standard	IEC/EN 60598-1 / IEC/EN 60598-2-3
Test procedure .....:	CE
Test item description .....:	Luminaires, road and street lighting.
Prøveemne beskrivelse	Belysnings armaturer for vej og park belysning.
Trade Mark / *Varemærke* .....:	EXVENTAR
Manufacturer / *Fabrikant* .....:	EXVENTAR
Address / *adresse* .....:	Stampemøllevej 42. DK-8300 Odder, Danmark
Model/Type reference .....:	Mikado Glow Downlight
Ratings / *Arbejdsværdier*.....:	230V, 50-60 Hz, IP44, Max 16W LED, Class I, Risk group 1

Possible test case verdicts / *Mulige prøveresultater:*

- test case does not apply to the test object / *Prøve kan ikke anvendes*	:	N (not app. / *ikke anvendelig*)
- test object does meet the requirement / *Prøven blev bestået*	:	P (Pass / *Bestået*)
- test object does not meet the requirement / *Prøven blev ikke bestået*	:	F (Fail / *fejl ikke bestået*)

Copy of markings and photo / *Kopi af mærkning og foto*

EXVENTAR

Mikado Glow Downlight.

230V

Max 16 W LED.

CE

IP44

IEC 60598 and/or EN 60598			
Clause	Requirement + Test	Result – Remark	

2	**CLASSIFICATION / *KLASSE***		**P**
2.2	Type of protection/ *Beskyttelsesklasse* .....:	Class I	P
2.3	Degree of protectio/ *Tæthedsgrad*.....:	IP 44	P

3	**MARKING / *MÆRKNING***			**P**
	Manufacture / *Fabrikant*		EXVENTAR	P
	Type / *Type*		Mikado Glow Downlight	P
	IP No. > IP20	IP	IP44	P
	Insulation class II / *Isolationsklasse II*		Part of the luminaire is solved as insulation class III. Dele af armaturets opbygning er løst som isolationsklasse III.	N
	Insulation class II / *Isolationsklasse III*			N
	Rating volt / *Mærkespænding*		230V 50/60Hz.	P
	Max Watt		Max 16 W	P
	Distance to lighted object *Afstands til belyst genstand*			N
	Power Factor		 0,98	P
	LED Risk Group / LED Risikogruppe		Moderate Risk. Risk group 1	P
	Caution Risk of electrical shock. Advarsel risiko for elektrisk stød.			N
	Warning mounting on flammable surfaces / advarsel mod montering på brændbart underlag.			N
	Warning mounting in flammable surfaces/ advarsel mod montering i brændbart underlag.			N
	Warning covering with insulation / advarsel mod tildækning med isolering.			N
	Symbol of vaste / *Affaldssymbol*			P
	CE mark / *CE mærke*			P

4	**CONSTRUCTION / *KONSTRUKTION***		**P**
4.3	Wire ways smooth and free from sharp edges *Ledningspassager glatte og fri for skarpe kanter*		P
4.7.2	Test 8 mm live conductor / *Prøve 8 mm spf. leder*	Measured Inside mounting box. Målt indvendigt I samledåsen.	P
	Test 8mm earth conductor / *Prøve 8 mm jordleder*		P

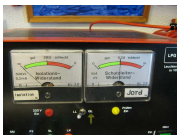
IEC 60598 and/or EN 60598			
Clause	Requirement + Test	Result – Remark	
4.10	Insulation of Class II luminaries / *Isolation af Klasse II armatur*		N
4.10.1	No contact, mounting surface - accessible metal parts - wiring of basic insulation *Ingen kontakt, monteringsoverflade –berørbare metaldele – ledere med grundisolation*	Part of the luminaire is solved as insulation class III. Dele af armaturets opbygning er løst som isolationsklasse III.	N
4.10.3	- lining in lampholder / *isolerbøsning I fatning*		N
4.11.3	Screw locking: *Låsning af skruer*		P
	- spring washer / *Tandskiver*		N
	Torque test: torque (Nm); part .....: *Momentprøve: moment (Nm); del*	3mm 0,5Nm 4mm 1,2Nm 5mm 2,0Nm	P
4.12.4	Locked connections: *Låste sam*linger:		N
	- fixed arms; torque (Nm).....: - *faste arme; moment (Nm)*		N
	- lampholder; torque (Nm).....: - *Lampeholder moment (Nm)*:	LED chip.	N
4.13	Mechanical strength / *Mekanisk styrke*		P
4.13.1	Impact tests: *Slagprøver:*		P
	- fragile parts; energy (Nm).....: - *skøre dele; slagstyrke (Nm)*	0,5Nm	P
	- other parts; energy (Nm) .....: - *andre dele; slagstyrke (Nm)*	0,7Nm	P
4.14	Suspensions and adjusting devices / *Ophængnings og justerbare dele*		N
4.14.1	Mechanical load: *Mekanisk belastning:*		N
	A: four times the weight – B: torque 2,5 Nm *A: fire gange vægten – B: moment 2,5 Nm*		N

4.14.2	Load to flexible cables / *Belastning på bøjelige ledninger*		N
	Mass (kg) / *Vægt (Kg)*.....:	 	N
	Stress in conductors (N/mm²).....: *Belastning på leder (Nmm²)*		N
4.14.3	Adjusting devices: *Justerbare dele:*		N
4.15	Flammable materials: *Brændbart materiale:*		P
	- glow-wire test 650 °C / *glødetrådsprøve 650 °C*	LED Electronic circuit. ‘ Driver auto cut off at 110°C.	N
	- spacing ≥ 30 mm / *afstand ≥ 30mm*		N

IEC 60598 and/or EN 60598			
Clause	Requirement + Test	Result – Remark	
	No lamp control gear / *Ingen forkobling*	(compliance with Section 12)	N
4.16.1	Lamp control gear spacing: *Forkobling afstand til underlag*		N
	- spacing 35 mm / *afstand 35 mm*		N
	- spacing 10 mm / *afstand 10mm*		N
4.24	Photo biological hazards. Risk group 0-1-2 Fotobiologisk risiko. Risiko gruppe 0-1-2	Estimated to risk group 0	P
4.31	Insulation between circuits. SELV / FELV / PELV / Others circuits Isolation I mellem kredsløb. SELV / FELV / PELV / Andre kredsløb.	SELV Circuit.	P

11	**CREEPAGE DISTANCES AND CLEARANCES / *KRYBE- LUFTAFSTANDE***				**P**
	Working voltage (V) / *Arbejdsspænding (V)*	230		12	P
		Class I	Class II	Class III	
	1)Current-carrying parts of different polarity: - *Strømførende dele af forskellig polaritet* cr (mm); cl (mm).....:	≥ 2,5 / 1,5		≥ 1,2 / 0,2	P
	2) Current-carrying parts and accessible parts: - *Mellem spændingsførende dele og tilg. metal* cr (mm); cl (mm).....:	≥ 2,5 / 1,5		≥ 1,2 / 0,2	P
	3) Parts become live due to breakdown of insulation: - *Spænding på berørbare dele pga brud på isolation* cr (mm); cl (mm).....:	-		-	N
	4) Outer surface of cable where it is clamped and metal parts: - *Ledningskappe mod metal fæsted med isolerholder* cr (mm); cl (mm)..... :	≥ 2,5 / 1,5		-	P
	5) Not used – *ikke anvendt*	-		-	-
	6) Current-carrying parts and supporting surface: - *Mellem el-førende dele og monteringsunderlag* cr (mm); cl (mm).....:	≥ 2,5 / 1,5		≥ 1,2 / 0,2	P

IEC 60598 and/or EN 60598			
Clause	Requirement + Test	Result – Remark	

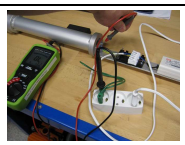
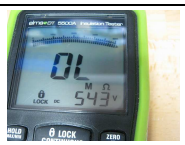
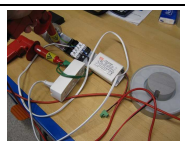
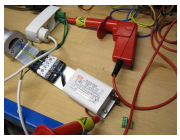
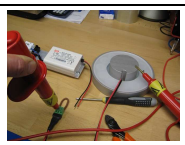
7	**PROVISION FOR EARTHING / *JORDFORBINDELSE***			**P**
1.8	Accessible metal parts - (7.2.1 + 7.2.3) *Berørbare metal dele -*			P
	Resistance < 0,5 Ω / *Modstand < 0,5 Ω*		< 0,2 Ω	P

14	**SCREW TERMINALS / *SKRUEKLEMMER***	**N**
15	**SCREWLESS TERMINALS / *SKRUELØSEKLEMMER***	**P**

5	**EXTERNAL AND INTERNAL WIRING / *YDRE OG INDRE LEDNINGER***		**P**
5.2.1	Means of connection / *Tilslutningsmåde* .....:	Terminals in mounting box. Klemrække I samledåse.	P
5.2.2	Type of cable .....: *Ledningstype*	Suitable for 2 pieces of 5x1,5 mm² Indgangs mulighed for 2 stk. 5x1,5 mm²	P
	Nominal cross-sectional area (mm²).....: *Tværsnitsareal af leder*	1,5 mm²	P
5.2.7	Cable entries in rigid material - rounded edges *Kabelindføringer I hårde materialer – runde kanter*		P
5.2.10	Cord anchorage / *Ledningsaflastninger* *(only Cord anchorage for indoor use.* 1 pieces of 0,75 mm² *)*		P
1.10	Tests / *Prøver*:: (5.2.10.3)		N
	- pull test: 25 times; pull (N) / *trækprøve 25 gange* .:	60N (no pull in wirer)	N
	- torque test: torque (Nm) / *Drejningsmomentprøve*:		N
	- displacement ≤ 2 mm / *Forskubbelse ≤ 2 mm*		N
	no damage of cable or cord *ledning ikke beskadiget*		N
5.3	Internal wiring / *Indre ledninger*		P
	Cross-sectional area (mm²) / tværsnitsareal (mm²).:	0,5 / 0,75 / 1,5 mm²	P
	Insulation thickness / *Isolationstykkelse*	>0,6mm	P
5.3.1.3	Double or reinforced insulation for class II *Dobbelt eller forstærket isolation*		N
5.3.2	Sharp edges etc. / *Skarpe kanter mm*		P
	No twisting over 360°/ *Ingen vridning over 360°*		P

IEC 60598 and/or EN 60598			
Clause	Requirement + Test	Result – Remark	

9	**RESISTANCE TO DUST, SOLID OBJECTS AND MOISTURE / *TÆTHED***		**P**
	- classification according to IP .....: - *IP klasse*	IP 44. See picture down below. Test according to EN 60529.	P

10	**INSULATION RESISTANCE AND ELECTRIC STRENGTH** ***ISOLATION- OG SPÆNDINGSPRØVE***			**P**
	Insulation resistance / *Isolationsmodstand* (MΩ) >4 GΩ			P
10.2.2	Electric strength test / *Spændingsprøve* (V).....: Testing 1460V			P
10.2.2	Electric strength test / *Spændingsprøve* (V).....: Driver primary/secondary short circuited. Testing "SELV" Circuit whit 2920V for double insulation			P
10.2.2	Electric strength test / *Spændingsprøve* (V).....: Testing 500V SELV circuit.			
10.3.1	Leakage current (mA).....:	< 0,7mA Peak < 3,5 mA Protective conductor current.		P

1.11 8	**PROTECTION AGAINST ELECTRIC SHOCK / *BESKYTTELSE MOD STØD***		**P**
8.2.1	Live parts not accessible *Strømførende dele ikke tilgængelige*		P
8.2.3	Class II luminaire / *Klasse II armaturer*		N
8.2.4	Portable luminaire / *Transportable armaturer*		N

IEC 60598 and/or EN 60598			
Clause	Requirement + Test	Result – Remark	

	ANNEX 1: components ***BILAG 1: komponenter***				
object/part No.	manufacturer/ trademark	type/model	technical data	standard	mark(s) of conformity
LED strip	Osram	Golden Dargon. LCW W5Am	2700-5000K Riskgroup 1 CRI 80 76 lm/W LM 80 350mA. Temp 40-125°C	IEC/EN 62031 IEC/EN 62471	CE
New Driver	Mean Well	PLD-16-350B	200-240V AC 50 Hz. Cc 350mA Tc 70°C Ta 50°C SELV Double insulated.	IEC/EN 61347 IEC/EN 61347-2-13	CE ENEC 17
Terminals	BJB or other manufactures.	46.415.1114 5 pol	450V /16A T85	IEC/EN 60998	CE
Internal Cable PVC	All manufactures.	H03VV-F	300V 2x0,75 mm² T=70°C	IEC/EN 50525	CE >HAR<
Internal Cable PVC	All manufactures.	PVL	300V 1x0,5/0,75/1,5 mm² T=70°C	IEC/EN 50525	CE

No	Marked	No	Marked	No	Marked	No	Marked
Nr	*Mærket*	*Nr*	*Mærket*	*Nr*	*Mærket*	*Nr*	*Mærket*
1	ENEC	2	VDE	3	SEV	4	ÖVE
5	DEMKO	6	SEMKO	7	NEMKO	8	FIMKO
9	BSI	10	UL	11	CSA	12	LCIE
13	IMQ	14	BNL	15	CEBEC	16	KEMA

IEC 60598 and/or EN 60598			
Clause	Requirement + Test	Result – Remark	

	ANNEX 2: temperature measurements, thermal tests of Section 12 ***BILAG 2; temperaturmålinger***		**P**
	Type reference .....:	**Heat test prototype 7W LED** Mikado Glow Downlight.	—
	Lamp used / *anvendt lampe* .....:	LED Strip Side view VN 24128	—
	Lamp control gear used / *Anvendt forkobling* .....:	Snappy SNP15-12VF	—
	Mounting position of luminaire .....: *Monteringmåde .....:*	Normal position, standing vertical.	—
	- test 1: rated voltage / *mærkespænding* .....:	230V	—
	- test 2: 1,06 times rated voltage or 1,05 times rated wattage ....: *- prøve 2: 1,06 x mærkespænding / 1,05 x mærkewatt*	244V	—
	- test 4: 1,1 times rated voltage or 1,05 times rated wattage .....: *- prove 4 : 1,1 x mærkespænding 7 1,05 x mærkewatt*		—
	Through wiring or lopping-in wiring loaded by a current of (A) during the tests .....:		—

temperature (°C) of part *temperatur (°C) af del*	§ 12.4 - normal				§ 12.5 – abnormal *unormal*	
	test / *prøve* 1	test / *prove* 2	test / *prøve* 3	limits *grænse*	test / *prøve* 4	limit *grænse*
Driver Tc.	32	33		75		
Internal wire.	32	33		90		
Terminals	31	32		85		
Strain relief.	31	32		75		
Ambient temp pipe	31	31		45		
Mounting surface.	30	30		90		
LED Silicone	42	43		70		
Tophat/Heatsink.	42	43		70		

IEC 60598 and/or EN 60598			
Clause	Requirement + Test	Result – Remark	

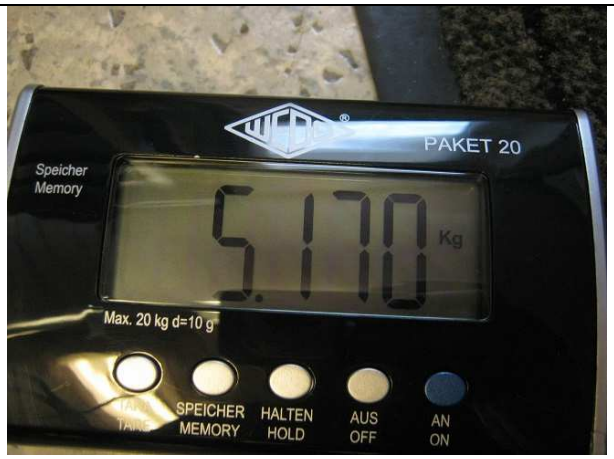
	ANNEX 2: temperature measurements, thermal tests of Section 12 ***BILAG 2; temperaturmålinger***		**P**
	Type reference .....:	**Heat test final type 16W LED** Mikado Glow Downlight.	—
	Lamp used / *anvendt lampe* .....:	LED Chip Osram Golden dragon LCW W5AM	—
	Lamp control gear used / *Anvendt forkobling* .....:	MW PLD-16-350B	—
	Mounting position of luminaire .....: *Monteringmåde .....:*	Normal position, standing vertical.	—
	- test 1: rated voltage / *mærkespænding* .....:	230V	—
	- test 2: 1,06 times rated voltage or 1,05 times rated wattage ....: *- prøve 2: 1,06 x mærkespænding / 1,05 x mærkewatt*	244V	—
	- test 4: 1,1 times rated voltage or 1,05 times rated wattage .....: *- prove 4 : 1,1 x mærkespænding 7 1,05 x mærkewatt*		—
	Through wiring or lopping-in wiring loaded by a current of (A) during the tests .....:		—

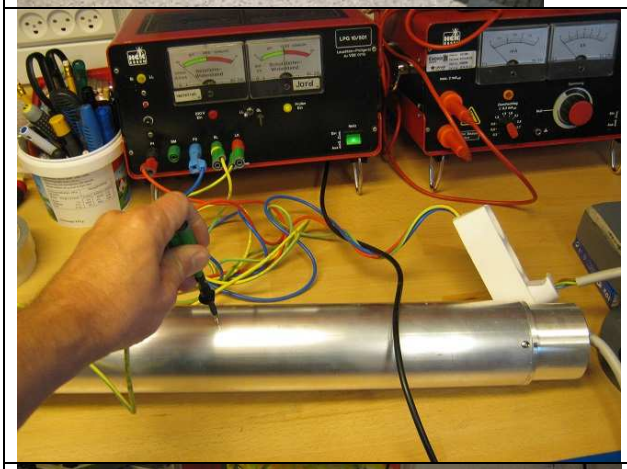
temperature (°C) of part *temperatur (°C) af del*	§ 12.4 - normal				§ 12.5 – abnormal *unormal*	
	test / *prøve* 1	test / *prove* 2	test / *prøve* 3	limits *grænse*	test / *prøve* 4	limit *grænse*
Driver Tc.	37	37		70		
Terminals	28	28		110		
Strain relief.	28	28		55		
LED Silicone top.	34	35		70		
Tophat/Heatsink.	36	37		60		

Photo / remarks – *Foto bemærkninger*

Testning prototype / Test på prototype.

Photo / remarks – *Foto bemærkninger*





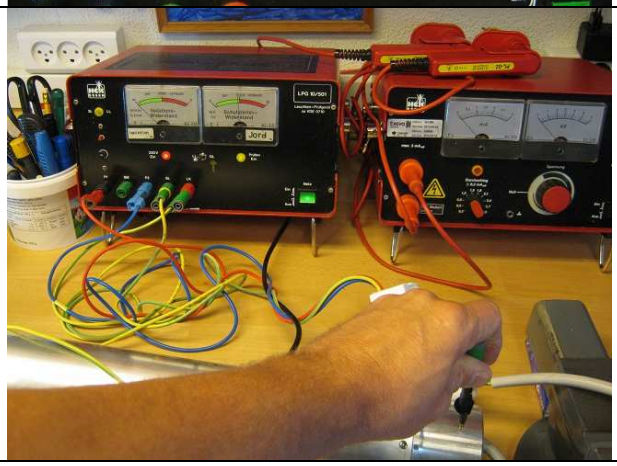
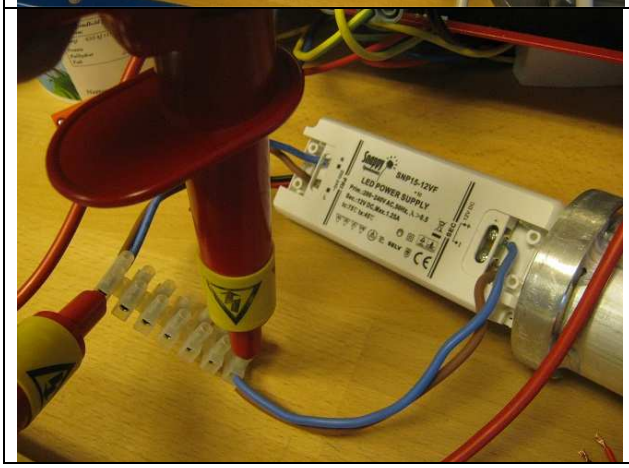


Photo / remarks – *Foto bemærkninger*



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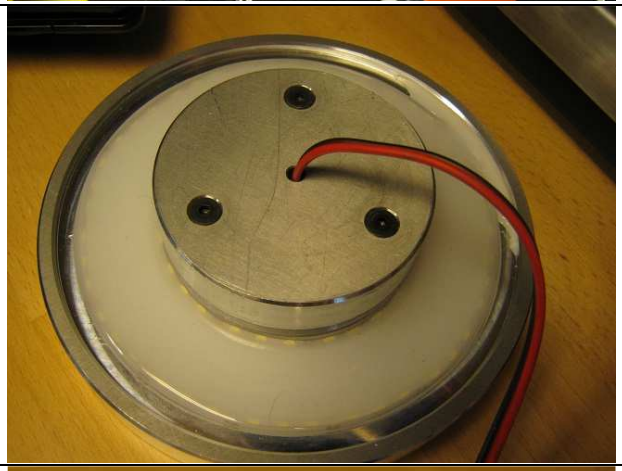

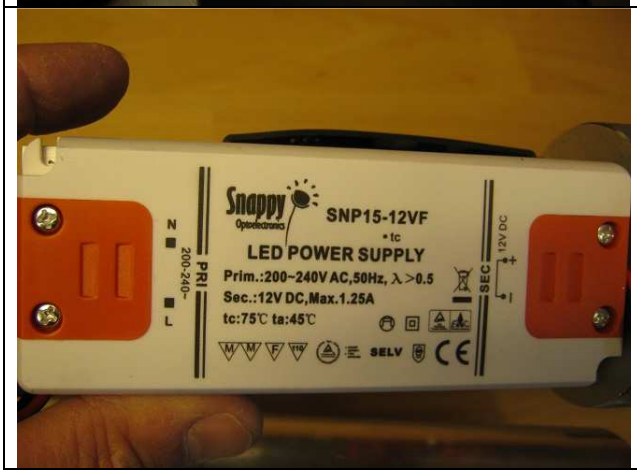

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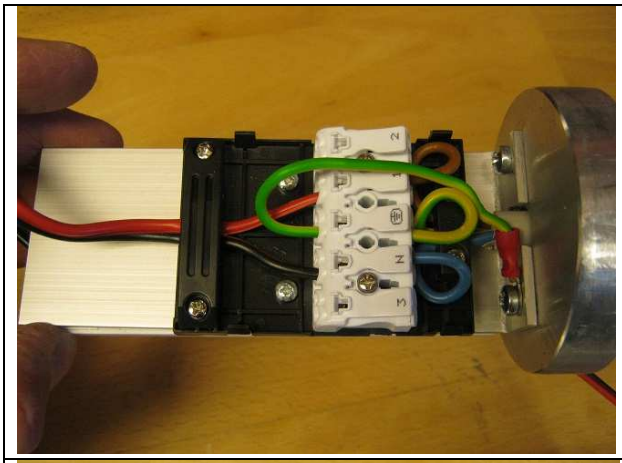

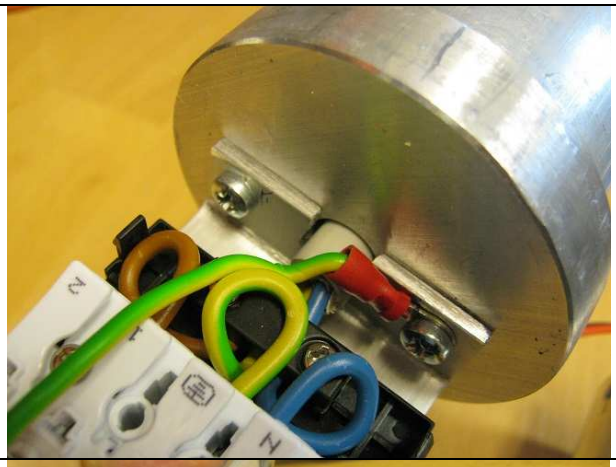

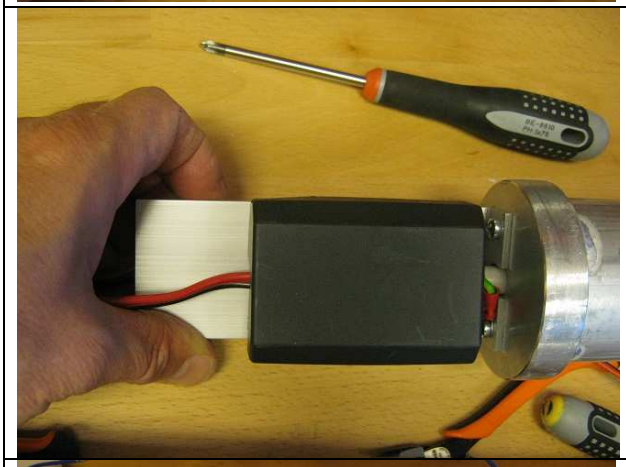

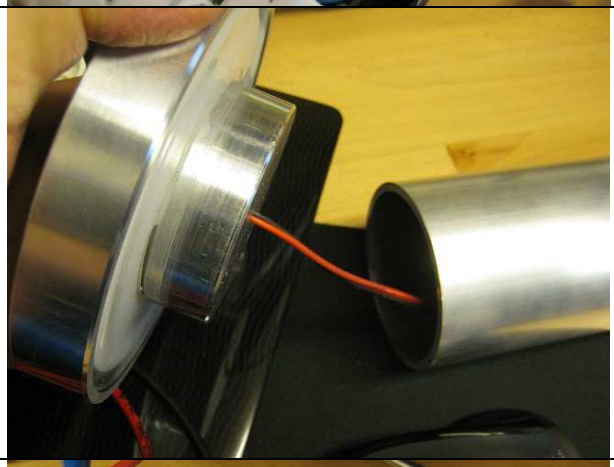

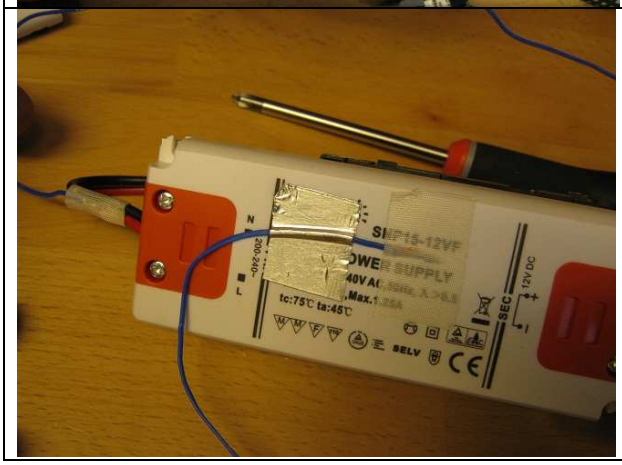

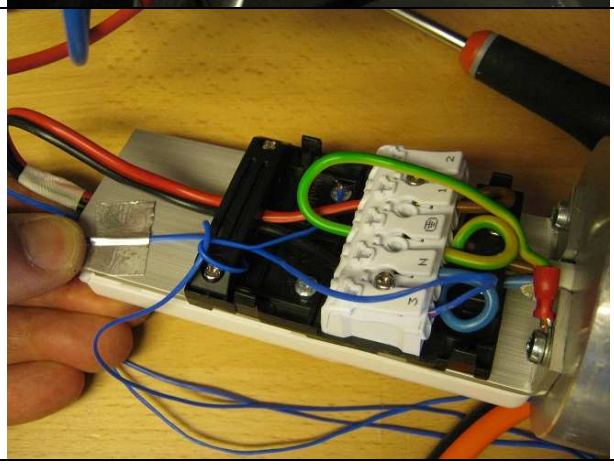

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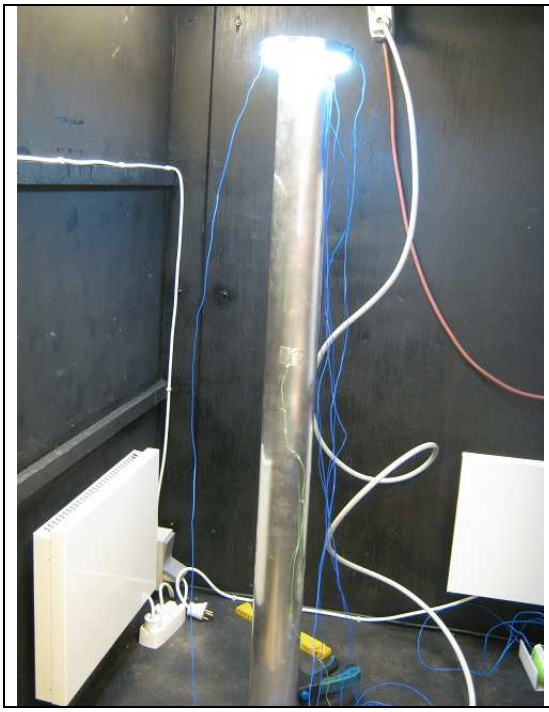
		

Photo / remarks – *Foto bemærkninger*

IP X4 Testing / IP44 Test.

Photo / remarks – *Foto bemærkninger*

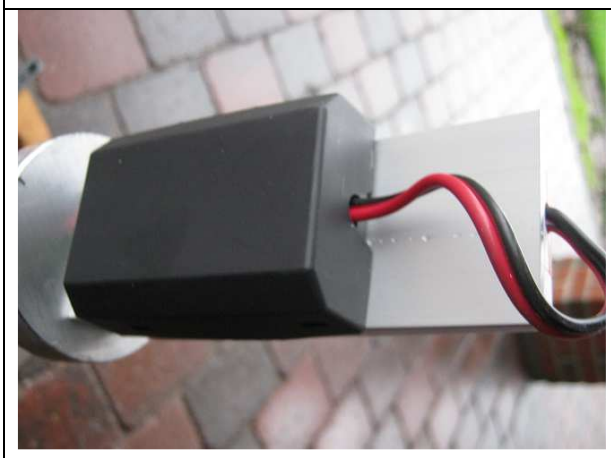
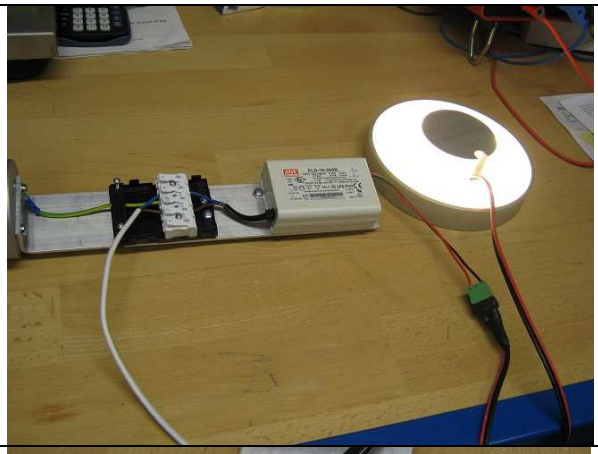
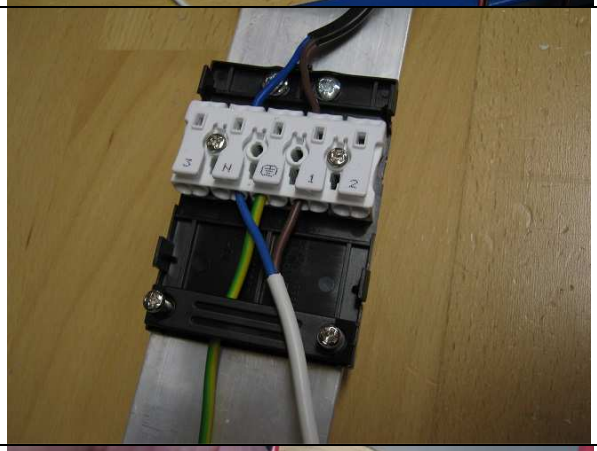
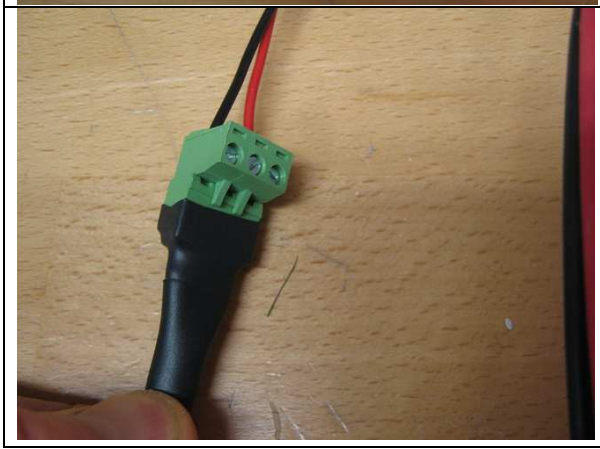


Photo / remarks – *Foto bemærkninger*

Control of 0-serie







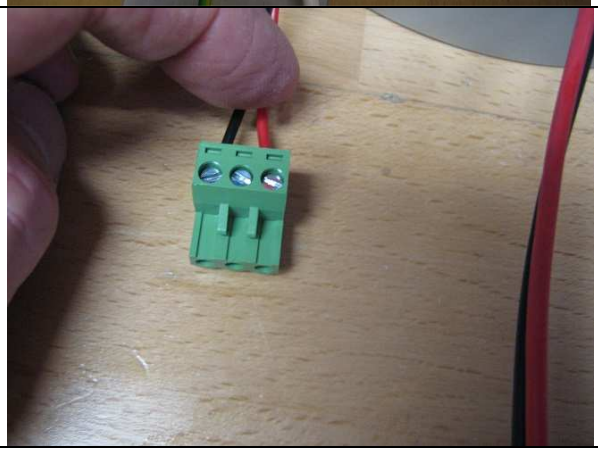
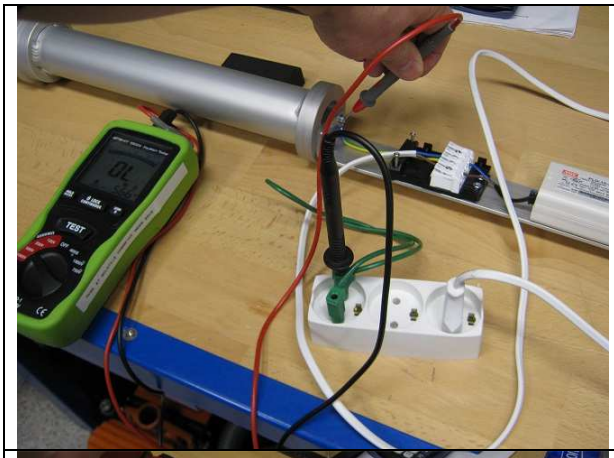
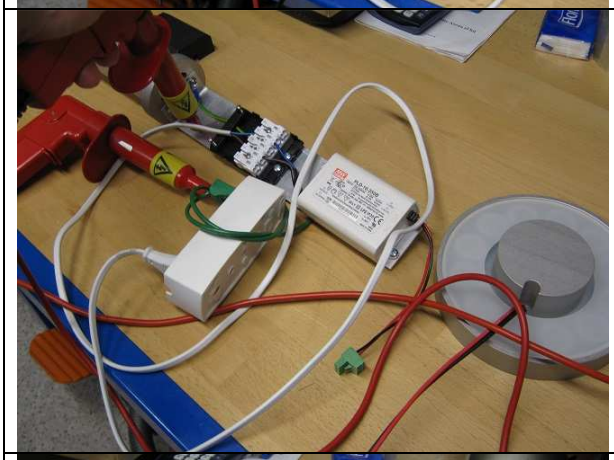
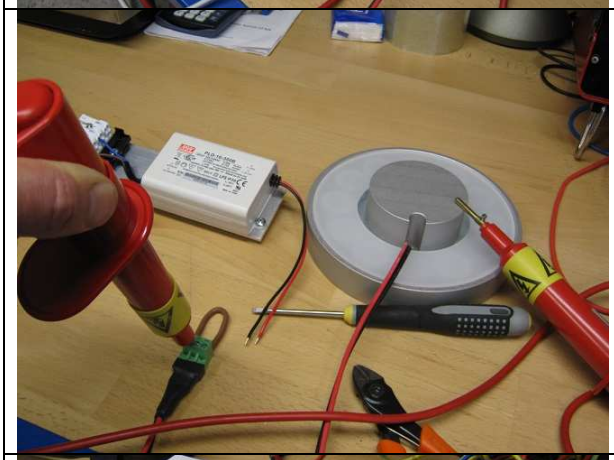
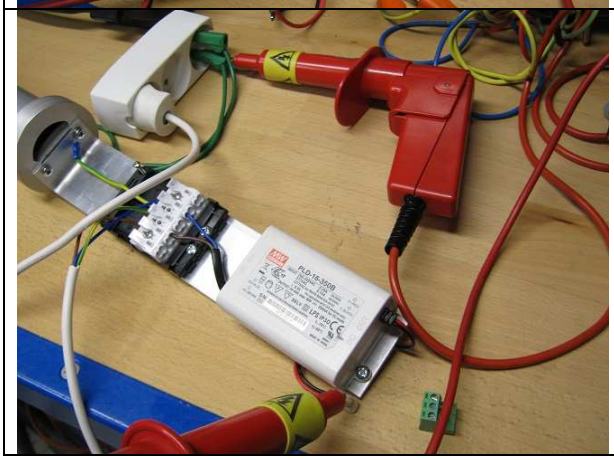


Photo / remarks – *Foto bemærkninger*









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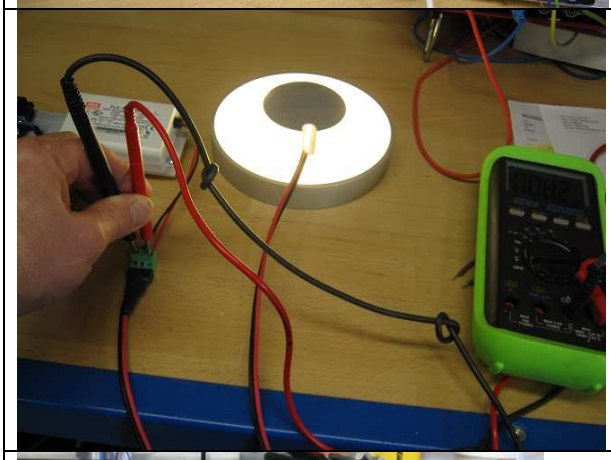

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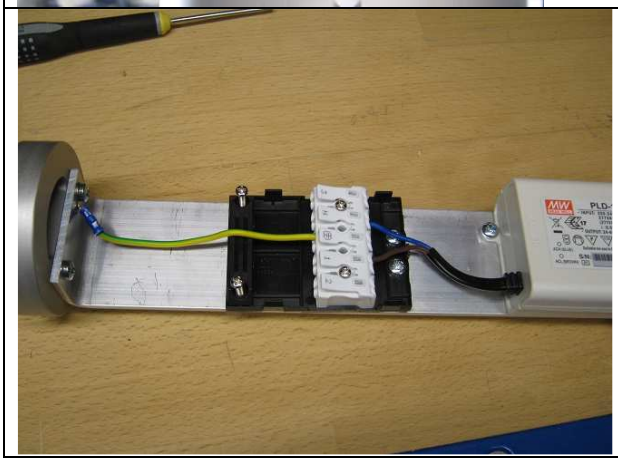


Photo / remarks – *Foto bemærkninger*

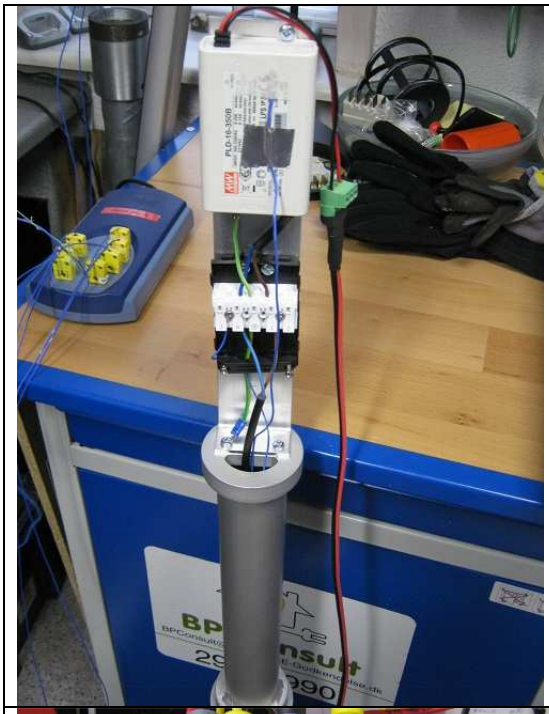
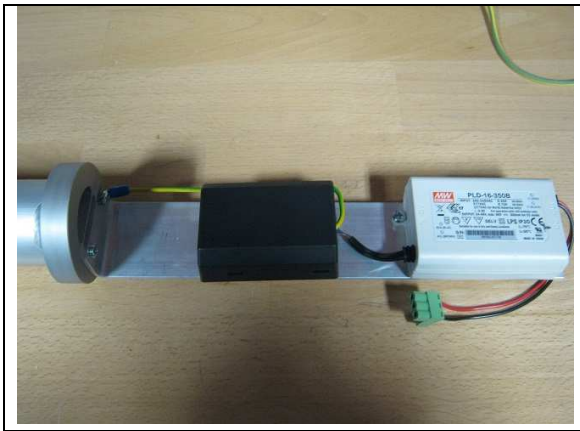
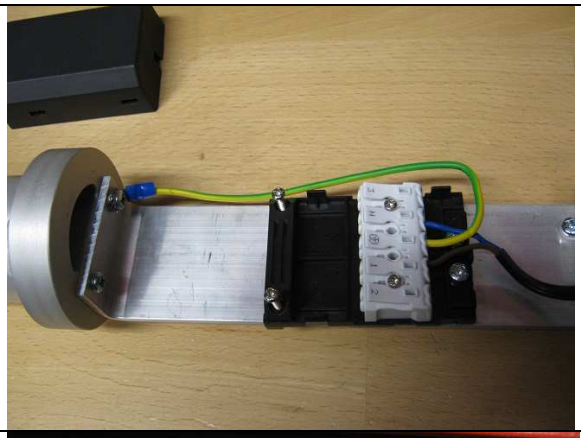


Photo / remarks – *Foto bemærkninger*

Updated 0-serie.





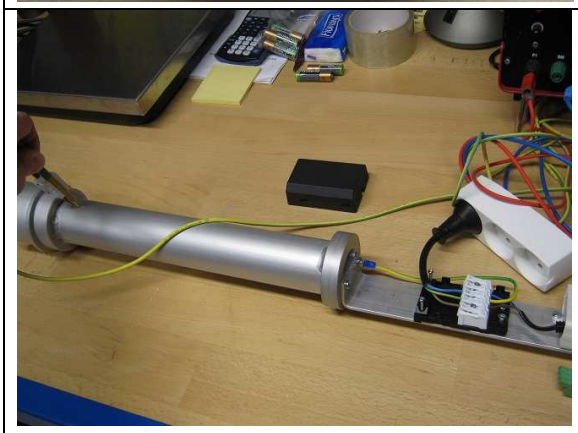


Photo / remarks – *Foto bemærkninger*

MAX OVERALL UNCERTAINTY

Electrical quantities			
			Max overall uncertainty
Voltage			
	1 - 1000 V RMS	45 Hz – 2 kHz	+/- 1,5%
	1000 V – 6000V RMS	45 Hz - 2 kHz	+/- 5%
Current			
	< 2 A	45 Hz – 2 kHz	+/- 1,5%
	2 - 10 A	45 Hz – 2 kHz	+/- 2,5%
	> 10 A	45 Hz – 2 kHz	+/- 5%
Resistance	< 100 mΩ		+/- 5%
	100 mΩ - 2 MΩ		+/- 1%
	> 2 MΩ		+/- 5%
Electric power	1 W – 2 kW	15 Hz - 65 Hz	+/- 1,5%
Earth continuity meters			+/- 10%
Leakage current	< 30 mA	50 – 60 Hz	+/- 3,5%

Non-electrical quantities		
		Max overall uncertainty
Temperature	20°C – 300° C	+/- 3° C
Linear dimensions	< 2mm	+/- 0,05 mm
	2 - 150 mm	+/- 0,1 mm
	> 150 mm	+/- 0,25%
Mass	< 10 g	+/- 0,5%
	10 g - 100 g	+/- 1%
	> 100 g	+/- 2%
Relative humidity		+/- 5%
Force		+/- 10%
Torque		+/- 10%
Time		
	1 s - 1 min	+/- 1 s
	> 1 min	+/- 10 s