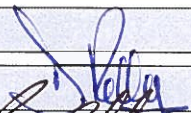
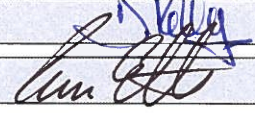


LABORATORY GENERAL TEST REPORT.

TEST REFERENCE No:	G2077
PRODUCT TESTED:	UK JN2 Panelboard Range {JN2**B(G)} c/w Surge Protection Device
ADDITIONAL INFORMATION:	Recommendation from the 18 th wiring regulations
CLIENT:	Hager Engineering
CLIENT CONTACT:	C.Howells
NUMBER OF SAMPLES:	1
DATE SAMPLES RECEIVED:	14/03/2019
DATE TEST STARTED:	14/03/2019
LABORATORY TEMPERATURE AND HUMIDITY:	20°C ± 5°C Ambient 50% ± 20% Relative humidity
REASON FOR TESTING:	New Product Introduction: JN201SPD Type 1 Surge Protection Kit (Phoenix) JN202SPD Type 2 Surge Protection Kit (Phoenix)
TEST SPECIFICATION OUTLINE:	BS EN 61439-2:2011 Clause 10 Design Verification
RESULT:	6.1 Assembly designation marking: Complies by inspection 10.2 Strength of materials & parts: No change: Complies 10.3 Degree of protection: No change: Complies 10.4 Clearances & creepage distances: Complies by inspection 10.5 Protection against electric shock: No change: Complies 10.6 Incorporation of switching devices & components: Complies 10.7 Internal electric circuits & connections: Complies by inspection 10.8 Terminals for external conductors: No change: Complies 10.9 Dielectric properties: No change: Complies by test 10.10 Verification of temperature rise: No change: Complies. 10.11 Short-circuit withstand strength: No change: Complies 10.12 EMC: No change: Complies 10.13 Mechanical Operations: No change: Complies
OBSERVATION/COMMENTS:	Modification changes issued under TMN851T
TEST ENGINEER:	 D.Kelly
APPROVED BY:	 I. Ellis
DATE REPORT PREPARED:	10 th October 2019

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"Opinions and interpretations expressed herein are outside the scope of accreditation."

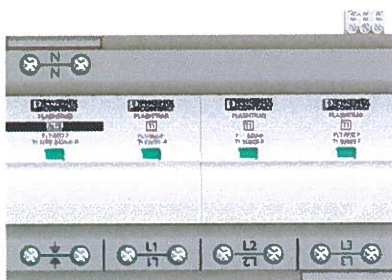
REPORT No:	G2077	DATE OF TEST	Mar - Oct 2019
PRODUCT TESTED:	JN204BG fitted with JN201/2SPD SPD and JN201PM Meterpack		
APPLICABLE STANDARD:	BS EN 61439-2:2011 Clause 10 Design Verification		
REASON FOR TESTS:	Integrate new Type 1&2 SPD's inside JN2**B(G) MCCB Distribution Board for 18 th edition Wiring Regulation Main Panel		

Note 1:
ASSEMBLY tested (**highlighted in yellow**) is the smallest Distribution Board in the range and is the most onerous for design verification.

JN2 Panelboards:-

JN204B	JN2 MCCB Panelboard 4 Ways 125A Plain Door (Modified TMN851T)
JN204BG	JN2 MCCB Panelboard 4 Ways 125A Glazed Door (Modified TMN851T)
JN208B	JN2 MCCB Panelboard 6 Ways 125A Plain Door (Modified TMN851T)
JN208BG	JN2 MCCB Panelboard 6 Ways 125A Glazed Door (Modified TMN851T)
JN208B	JN2 MCCB Panelboard 8 Ways 125A Plain Door (Modified TMN851T)
JN208BG	JN2 MCCB Panelboard 8 Ways 125A Glazed Door (Modified TMN851T)
JN212a	JN2 MCCB Panelboard 12 Ways 125A Plain Door (Modified TMN851T)
JN212aG	JN2 MCCB Panelboard 12 Ways 125A Glazed Door (Modified TMN851T)
JN216B	JN2 MCCB Panelboard 16 Ways 125A Plain Door (Modified TMN851T)
JN216BG	JN2 MCCB Panelboard 16 Ways 125A Glazed Door (Modified TMN851T)
JN201PM	JN2 Meterpack 400A EW Pluggable Meter Kit (Modified TMN851T)
JN201SPD	JN2 250A Surge Type 1 Protection Kit (New Product Introduction)
JN202SPD	JN2 250A Surge Type 2 Protection Kit (New Product Introduction)

Phoenix Type 1 SPD



Phoenix Type 2 SPD

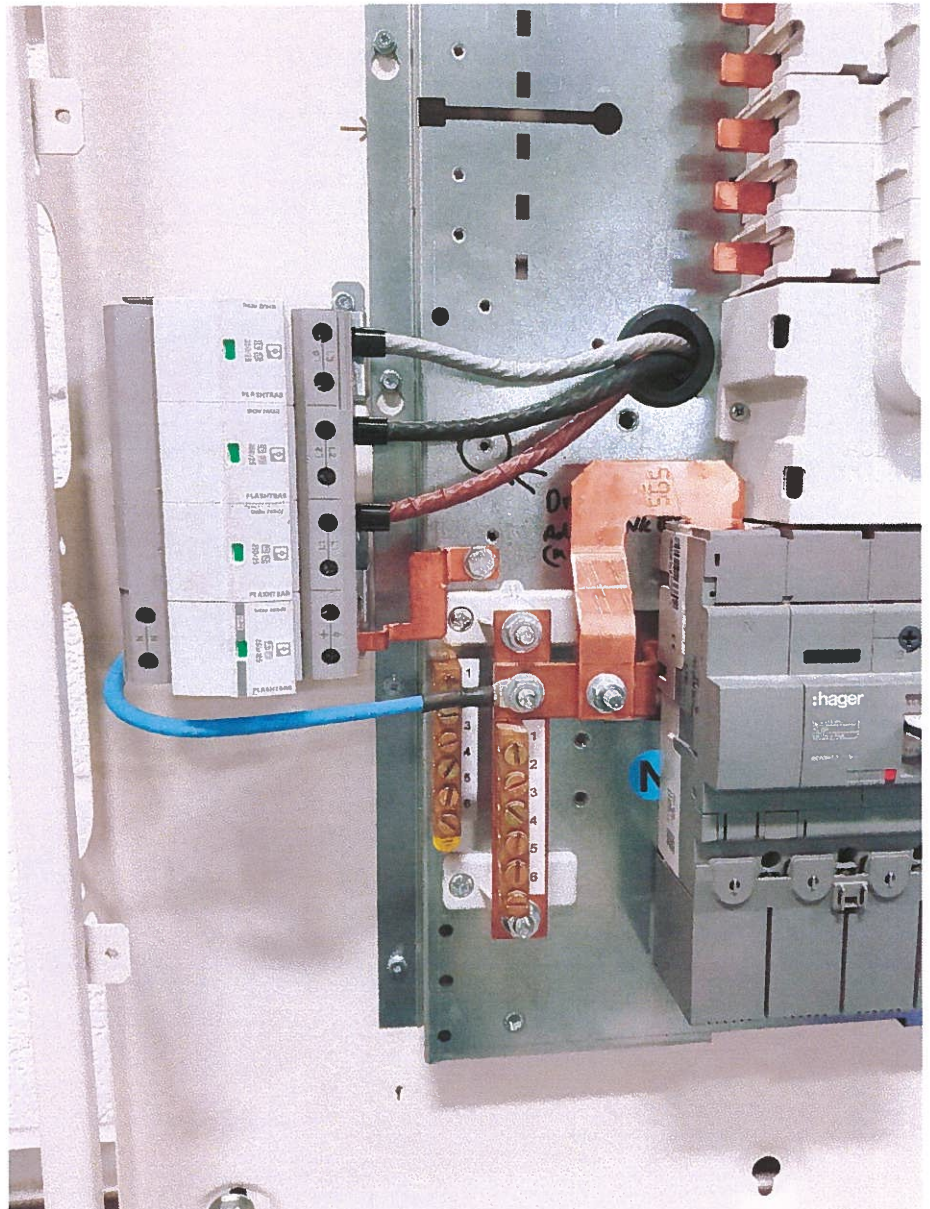


TEST ENGINEER:	D.Kelly Complies
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REPORT No:	G2077	DATE OF TEST	Mar - Oct 2019
PRODUCT TESTED:	JN204BG fitted with JN201/2SPD SPD and JN201PM Meterpack		
APPLICABLE STANDARD:	BS EN 61439-2:2011 Clause 10 Design Verification		
REASON FOR TESTS:	Integrate new Type 1&2 SPD's inside JN2**B(G) MCCB Distribution Board for 18 th edition Wiring Regulation Main Panel		

Kit reference: JN201SPD

Type 1 Surge Kit



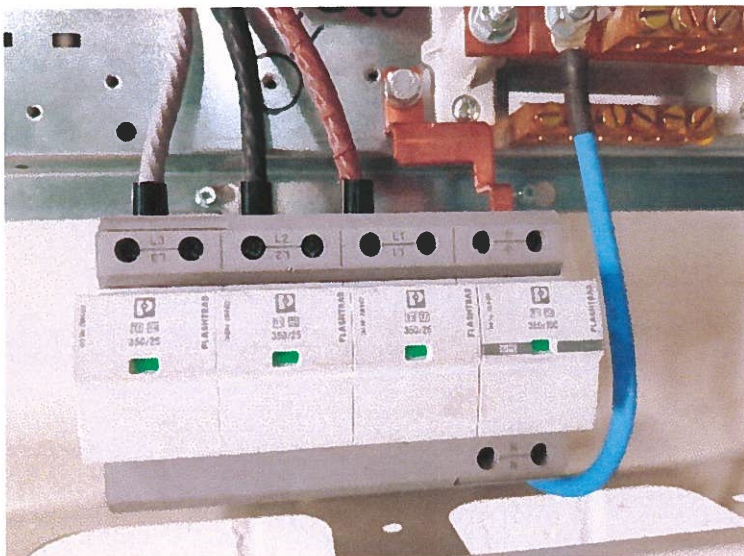
TEST ENGINEER:	D.Kelly Complies
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REPORT No:	G2077	DATE OF TEST	Mar - Oct 2019
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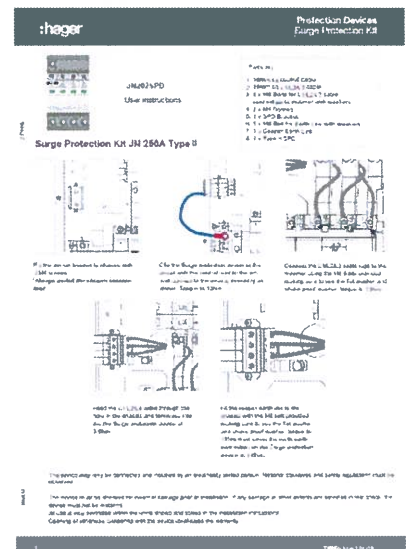
Clause 6 Assembly designation marking

JN201SPD Carton label	JN202SPD Carton label	Rating labels
<p>250A Surge Protection Kit Type 1/2 - Class III</p> <p>CE</p> <p>Hager Ltd-Hortonwood 50-Telford SHROPSHIRE-TF1 7FT-UK</p> <p>JN201SPD</p> <p>5 015652 606604</p> <p>1 x</p>	<p>250A Surge Protection Kit Type 2 - Class II</p> <p>CE</p> <p>Hager Ltd-Hortonwood 50-Telford SHROPSHIRE-TF1 7FT-UK</p> <p>JN202SPD</p> <p>5 015652 606611</p> <p>1 x</p>	<p>250A Surge Protection Kit Type 1/2 - Class III</p> <p>Hager Ltd-Hortonwood 50-Telford SHROPSHIRE-TF1 7FT-UK</p> <p>JN201SPD</p> <p>250A Surge Protection Kit Type 2 - Class II</p> <p>Hager Ltd-Hortonwood 50-Telford SHROPSHIRE-TF1 7FT-UK</p> <p>JN202SPD</p>

Device marking: Type 1 SPD



ZD0862 User Instructions



TEST ENGINEER: **D.Kelly Complies**

REPORT No:	G2077	DATE OF TEST	Mar - Oct 2019
PRODUCT TESTED:	JN204BG fitted with JN201/2SPD SPD and JN201PM Meterpack		
APPLICABLE STANDARD:	BS EN 61439-2:2011 Clause 10 Design Verification		
REASON FOR TESTS:	Integrate new Type 1&2 SPD's inside JN2**B(G) MCCB Distribution Board for 18 th edition Wiring Regulation Main Panel		

Clause 10.3 Degree of Protection of ASSEMBLIES

IP rating claimed door closed - IP30 (Probes selected = 2.5mm)
 IP rating claimed door open – IP2XC (Probes selected = 2.5mm + finger)
 First Numeral Definition – The access probe of 2.5mm shall not penetrate.

Changes to front cover panel verified by test: -
 ZM0137S blanks fitted (x8)
 JN201SPD fitted

Complies

Clause 10.4 Clearances & Creepage Distances

Declared Ratings (Clearances) JN201SPD (type 1) fitted:
 Uimp = 6kV:
 Pollution degree = 3, From Table 1, minimum clearance in air = 5.5mm

<u>Distances Between</u>	<u>Distance</u>	<u>Result</u>
SPD L1 – SPD L2	8.9mm	> 5.5mm ✓
SPD L2 – SPD L3	8.9mm	> 5.5mm ✓
SPD E – SPD L1	8.9mm	> 5.5mm ✓
SPD N – SPD E	>10mm	> 5.5mm ✓

Smallest clearance recorded = 8.9mm
 Refer to G1875-2a for previous clearances around main MCCB incomer & busbar stack.

Complies

Declared Ratings (Clearances) JN202SPD (type 2) fitted:
 Uimp = 6kV:
 Pollution degree = 3, From Table 1, minimum clearance in air = 5.5mm

<u>Distances Between</u>	<u>Distance</u>	<u>Result</u>
SPD L1 – SPD L2	6.2mm	> 5.5mm ✓
SPD L2 – SPD L3	6.1mm	> 5.5mm ✓
SPD N – SPD E	>33mm	> 5.5mm ✓
SPD L1 – SPD E	6.1mm	> 5.5mm ✓

Smallest clearance recorded = 6.1mm
 Refer to G1875-2a for previous clearances around main MCCB incomer & busbar stack.

Complies

TEST ENGINEER:	D.Kelly Complies
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REPORT No:	G2077	DATE OF TEST	Mar - Oct 2019
PRODUCT TESTED:	JN204BG fitted with JN201/2SPD SPD and JN201PM Meterpack		
APPLICABLE STANDARD:	BS EN 61439-2:2011 Clause 10 Design Verification		
REASON FOR TESTS:	Integrate new Type 1&2 SPD's inside JN2**B(G) MCCB Distribution Board for 18th edition Wiring Regulation Main Panel		

Clause 10.4 Clearances & Creepage Distances - cont.

Declared Ratings (Creepages) JN201SPD (type 1) fitted:

Ui = 690V, Pollution degree = 3, Table F1 x = 1.5mm

From Table 2, minimum creepage distance = 8.0mm

For Nylon PA6 & PA66 (Material group 1, CTI = 600), Min creepage distance = 8.0mm

<u>Distances Between</u>	<u>Distance</u>	<u>Result</u>
SPD L1 – SPD L2	15.5mm	> 8.0mm ✓
SPD L2 – SPD L3	15.5mm	> 8.0mm ✓
SPD E – SPD L1	15.5mm	> 8.0mm ✓
SPD N – SPD E	22.0mm	> 8.0mm ✓

Smallest creepage distance recorded = 15.5mm

Refer to G1875-2a for previous creepage distances

Complies

Declared Ratings (Creepages) JN202SPD (type 2) fitted:

Ui = 690V, Pollution degree = 3, Table F1 x = 1.5mm

From Table 2, minimum creepage distance = 8.0mm

For Nylon PA6 & PA66 (Material group 1, CTI = 600), Min creepage distance = 8.0mm

<u>Distances Between</u>	<u>Distance</u>	<u>Result</u>
SPD L1 – SPD L2	>20mm	> 8.0mm ✓
SPD L2 – SPD L3	>20mm	> 8.0mm ✓
SPD L1 – SPD E	>34mm	> 8.0mm ✓
SPD N – SPD E	>20mm	> 8.0mm ✓

Smallest creepage distance recorded = > 20mm

Refer to G1875-2a for previous creepage distances

Creepage distances not affected by fitting of SPD's - Assessed

Complies

TEST ENGINEER:

D.Kelly
Complies

REPORT No:	G2077	DATE OF TEST	Mar - Oct 2019
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APPLICABLE STANDARD:	BS EN 61439-2:2011 Clause 10 Design Verification		
REASON FOR TESTS:	Integrate new Type 1&2 SPD's inside JN2**B(G) MCCB Distribution Board for 18 th edition Wiring Regulation Main Panel		

Clause 10.6 Incorporation of switching devices and components

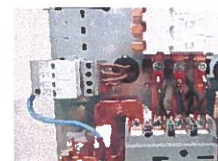
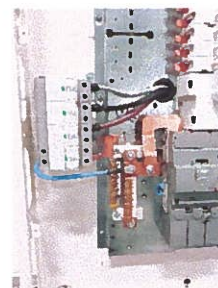
Incomer Arrangement
No change

Outgoing Circuits
No change

Accessory Kits

SPD: ZF0696 (Phoenix T1 2905421) suitable for TT/TN-S earthing systems
 SPD: ZF0694 – (Phoenix T2 2905345) suitable for TT/TN-S earthing systems
 SPD: Suitable for Indoor Use only
 SPD: Type 1&2 EN 61643-11, Class 1 IEC 61643-11
 SPD: Temperature range -40°C to +80°C
 SPD: Relative Humidity (RH) 5% - 95%
 SPD: IP20 – basic insulation

Meter Pack: Same meter JKM01
 Meter Pack: Same RI CT 330mV 250A Class 1
 Meter Pack: Same cables, shorter lengths



Assessed and being used in accordance with Manufacturer's Instructions

Complies

Clause 10.7 Internal electrical circuits and connections

Compliance with the design requirements of 8.6 for internal electrical circuits and connections shall be confirmed by the original manufacturer's inspection.

Supplementary checks for SPD device (Phoenix T1 2905421 / Phoenix T2 2905345)

Cable size for SPD 2.5mm² CSA or bigger

Cable size : Type 1 for SPD 35mm² CSA or less / Type 2 25mm² (solid) or 16mm² (flexi) or less

Cable actual: Type 1 25mm² CSA class 6 Ø0.2mm flexi strand silicon rubber / solid 20mm² CSA

Cable actual: Type 2 16mm² CSA class 6 Ø0.2mm flexi strand silicon rubber

Cable insulation suitable for high temperatures behind terminal shield

Cable routed behind chassis through 38mm rubber grommet holes

Cable meets requirements of SPD instructions and manufacturers inspection.

Supplementary checks for JN201PM Meter device (JKM01)

No change to cable specifications / terminations

Cables shortened only

Cable routed more directly

Complies

TEST ENGINEER:

D.Kelly
Complies

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REPORT No:	G2077	DATE OF TEST	Mar - Oct 2019
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APPLICABLE STANDARD:	BS EN 61439-2:2011 Clause 10 Design Verification		
REASON FOR TESTS:	Integrate new Type 1&2 SPD's inside JN2**B(G) MCCB Distribution Board for 18th edition Wiring Regulation Main Panel		

Clause 8 External Cables

No change to Incoming Cables
No change to Outgoing Cables
No change to earth cables

Cable restriction when JN201SPD type 1 kit used

Clause 10.9.2 Di-Electric Properties (Power Frequency Withstand Voltage)

Declared Ratings:

Ui = 690V, Uimp = 6kV, 50/60Hz, Pollution degree = 3
From Table 8, di-electric test voltage **1890V a.c. r.m.s.**

SPD's are not designed to be connected when this type of test is carried out.
ALL cable links should be disconnected to SPD when voltage testing is applied. Assessed

Cable links tested at 1890V a.c. rms – see Test Report G2078

Complies

Clause 10.9.3 Impulse Withstand Voltage

Declared Ratings:

Ui = 690V, Uimp = 6kV, 50/60Hz, Pollution degree = 3
From Table 10, impulse withstand test voltage 5100V a.c. r.m.s. or **7300V U_{1,2/50}**
Test Voltage at sea level = 7300V U_{1,2/50}

SPD's are not designed to be connected when this type of test is carried out.
JN201PM Meterpack fitted. Fuses to be disconnected for meter and neutral cable disconnected.

Cable links tested at 7300V U_{1,2/50} – see Test Report G2078

Complies

TEST ENGINEER:

D.Kelly
Complies

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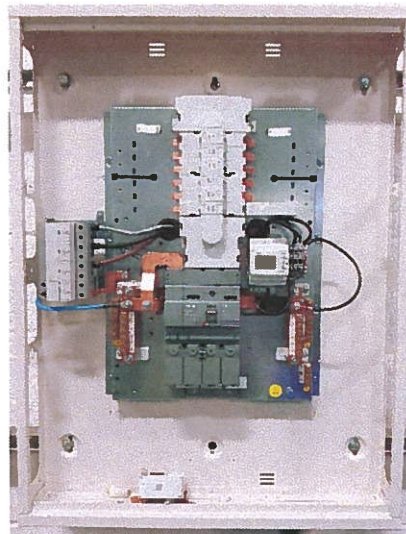
REPORT No:	G2077	DATE OF TEST	Mar - Oct 2019
PRODUCT TESTED:	JN204BG fitted with JN201/2SPD SPD and JN201PM Meterpack		
APPLICABLE STANDARD:	BS EN 61439-2:2011 Clause 10 Design Verification		
REASON FOR TESTS:	Integrate new Type 1&2 SPD's inside JN2**B(G) MCCB Distribution Board for 18 th edition Wiring Regulation Main Panel		

General layout JN204BG

JN201PM Meterpack

JN201SPD fitted

JN224BM 250A 4P MCCB Incomer



Clauses not affected or requiring further validation: -

- 6.1 Assembly designation marking: **Complies by inspection**
- 6.2 Documentation: **Complies by inspection**
- 6.3 Device Identification: **Complies by inspection**
- 10.2 Strength of materials & parts: No change: Complies G1875-2a
- 10.3 Degree of protection: No change: Complies G1875-2a
- 10.4 Clearances & creepage distances: **Complies by Test**
- 10.5 Protection against electric shock: No change: Complies G1875-2a
- 10.6 Incorporation of switching devices & components: **Complies by inspection**
- 10.7 Internal electric circuits & connections: No change: **Complies by inspection**
- 10.8 Terminals for external conductors: No change: Complies G1875-2a
- 10.9 Dielectric properties: No change: **Complies by Test**
- 10.10 Temperature Rise: Complies G1875-2a
- 10.11 Short Circuit Withstand: Complies G1875-2a
- 10.12 EMC: Complies G1875-2a
- 10.13 Mechanical Operations: Complies G1875-2a

TEST ENGINEER:

D.Kelly
Complies

AP 01 Issue 2 02/03/2016