



GEANEY ENGINEERING CONSULTANTS

PROFESSIONAL BUILDING SERVICES & ENERGY REDUCTION CONSULTANTS

ELECTRICAL EQUIPMENT SCHEDULE

PROJECT NAME:

Emergency Works Scheme

*LOETB Electrical Upgrade at Mountmellick FET,
Mountmellick, Co. Laois*

PROJECT REFERENCE: 0840

PROJECT STAGE: Tender

1.1 GENERAL REQUIREMENTS

All equipment shall be supplied by manufacturers and suppliers who meet the following minimum requirements:

1. References and Proven Performance

- Suppliers shall provide, on request, a minimum of ten satisfactory references for previous installations utilising the same or similar equipment.

2. Fitness for Purpose and Environmental Suitability

- All equipment shall be demonstrably suitable for its intended function and capable of reliable operation under the environmental and weather conditions prevailing at the project site.

3. Regulatory and Standards Compliance

- All equipment and associated systems shall comply with all relevant statutory regulations, including the current Irish Building Regulations, associated Technical Guidance Documents and all applicable DoEY TGD/SDG Documents, EU directives and industry standards.
- All plant and equipment shall bear the CE mark or equivalent approved certification where applicable.

4. Technical Support

- Suppliers shall provide a technically competent representative who is fully knowledgeable in the design, installation, commissioning, and operation of the proposed equipment.

5. Triple E Scheme Compliance

- Where applicable, equipment falling under a Triple E technology category shall be listed on the Triple E Register or shall meet all criteria defined for that technology.

WARRANTIES

- The contractor shall provide manufacturer warranties or extended warranties for all equipment for a minimum period of 15 months beyond Practical Completion.
- Warranty documents shall be submitted as part of the handover documentation.

NOTES

- Schedules must be read in conjunction with relevant parts of the Electrical Specification.
- The contractor shall ensure all proposed equipment fully complies with this specification before procurement.
- Any equipment installed that does not comply with the specification shall be removed and replaced at the contractor's cost.
- References to "equipment" include all plant, components, accessories, and materials.
- All required as-built documentation, commissioning sheets, and certification shall be submitted.
- Alternative products must be submitted for approval with full datasheets. No substitutions may be installed without prior written approval from the Engineer.

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1. LUMINAIRE SCHEDULE

Reference	Description	Lamp (Wattage /Lumens Output /Colour K)	Dimmable	Manufacturer	Model	Dimensions/ Weight	Image
A/A1	Surface Mounted High efficiency, shallow-profile luminaire manufactured with a co-extruded 'Satin-Glo' polycarbonate lighting controller finished full polyester non-yellowing white. Choice of opal or Satin-Glo diffuser low glare optic for EN12464-1 / LG7 (<3000 cd/m_ @ 65_) compliance. Screw-on end caps with concealed fixings, designed to exclude dust, dirt and flies. Diffuser designed to uplight the ceiling. IP40. LED light engine providing 67,000 hour life, 4000K, CRI 80+ and LUX Guard LED PCB protection. Control gear and LED circuit boards replaceable for future maintenance.	LED 21 W / 3545lm /4000K	Yes	Thorlux	Ref: Jubilee	1500x200mm/ 6.5 kg	
B/B1	Surface Mounted High efficiency, shallow-profile luminaire manufactured with a co-extruded 'Satin-Glo' polycarbonate lighting controller finished full polyester non-yellowing white. Choice of opal or Satin-Glo diffuser low glare optic for EN12464-1 / LG7 (<3000 cd/m_ @ 65_) compliance. Screw-on end caps with concealed fixings, designed to exclude dust, dirt and flies. Diffuser designed to uplight the ceiling. IP40. LED light engine providing 67,000 hour life, 4000K, CRI 80+ and LUX Guard LED PCB protection. Control gear and LED circuit boards replaceable for future maintenance.	LED 30 W / 5010lm /4000K	Yes	Thorlux	Ref: Jubilee	1500x200mm/ 6.5 kg	
G	Surface Mounted Circular LED luminaire manufactured from spun aluminium finished full polyester non-yellowing white with high efficiency satin sparkle or opal fire-retardant TP(a) polycarbonate diffuser, IP40. LED light engine providing 100,000 hour life, 4000K, CRI 80+ and LUX Guard LED PCB protection.	LED 17W / 3305lm / 4000K	Yes	Thorlux	Ref: Dot	450mm dia./ 2.8 kg	
H	Surface Mounted Circular LED luminaire manufactured from spun aluminium finished full polyester non-yellowing white with high efficiency satin sparkle or opal fire-retardant TP(a) polycarbonate diffuser, IP40. LED light engine providing 100,000 hour life, 4000K, CRI 80+ and LUX Guard LED PCB protection.	LED 14W / 1910lm / 4000K	Yes	Thorlux	Ref: Dot	350mm dia./ 1.4kg	
K	Circular surface LED luminaire manufactured from die-cast aluminium finished full polyester non-yellowing satin white (RAL 9016). IK09. IP40. LED light engine providing 100,000 hour life, 4000K, CRI 80+ and LUX Guard LED PCB protection. Suitable for wall or ceiling mounting. Control gear and LED circuit boards replaceable for future maintenance.	LED 20W / 3050lm / 4000K	Yes	Thorlux	Ref: Clara 360	426mm dia.	
R/E	Circular surface mount luminaire, with strong high-pressure die-cast LM2 aluminium body and cover frame finished full polyester powder coated graphite. High efficiency, high impact resistance, IK10, fire retardant UV stabilised polycarbonate cover, IP66, LED light engine providing 100,000 hour life, 4000K, CRI 80+ and LUX Guard LED PCB protection. Control gear and LED circuit boards replaceable for future maintenance	LED 16W / 2070 lm / 4000 K	No	Thorlux	Ref: Cobalt	340mm dia./ 3kg	

S	High performance and stylish wall mounted bulkhead manufactured from strong die-cast LM2 aluminium full polyester powder coated graphite. Available in wide and area distributions. High impact resistant, IK10, one-piece over moulded polycarbonate cover allowing precise optical control, IP66. LED light engine providing 100,000 hour life L90/B10, 2700 K or 4000 K, CRI80. Zero upward light . LUX Guard LED PCB protection. Control gear replaceable for future maintenance.	LED 18W / 3255 lm / 4000K	No	Thorlux	Ref: Realta	290x210mm / 2.3 kg	
S/E	As above c/w 3hour emergency Battery Pack	LED 18W / 695 lm/ 4000K	No	Thorlux	Ref: Realta	290x210mm / 2.3 kg	
W	Anti-corrosive, highly efficient, LED luminaire manufactured from injection moulded polycarbonate finished grey with an opalised polycarbonate cover, IK08. With smooth easy clean lines and secure and easy to operate polycarbonate cover clips (stainless steel option). Fast installation via external stainless-steel brackets that maintains the IP rating. IP66. LED light engine providing 100,000 hour life L80/B10, 4000K, CRI 80+. Flexible mounting options surface, suspended or adjustable wall mount. Control gear and LED circuit boards replaceable for future maintenance.	LED 24W / 4870 lm/ 4000K	No	Thorlux	Ref: Thoroproof	1453x99mm / 2.6 kg .	

Reference	Description	Lamp (Wattage /Lumens Output /Colour K)	Dimmable	Manufacturer	Model	Dimensions/ Weight	Image
E	Emergency surface luminaire with polycarbonate body finished satin white (RAL9016). Choice of three optical distributions, designed for maximum spacings in corridors and open areas. Three hour non-maintained operation, powered from an easily replaceable Nickel Metal Hydride (NIMH) battery. Available in two body styles, IP54 square or IP66 circular.	LED 3 W / 235 – 270 lm	No	Thorlux	Firefly Surface	204mm dia.	
E2	Non-maintained LED emergency bulkhead luminaire with off-white polycarbonate body and either linear prismatic or opal diffuser. IP65. LED light engine providing 100,000 hour life, 4000K, CRI 80+	LED 4 W / 590 – 685 lm	No	Thorlux	Mini-8	355 x 120mm.	
E3	Adjustable emergency 4.5W LED twin head spotlight for open areas. IP20 version has a steel body finished silver (RAL9006) with two adjustable cast aluminium LED heads whilst the IP65 version has a light grey polycarbonate gear housing and additional seals fitted to the LED heads. Choice of narrow or wide beam distribution. Three-hour non-maintained operation, powered from an easily replaceable battery. IP20 or IP65. Suitable for ceiling or wall mounting.	2 x LED 4.5W / 2 x 585 lm	No	Thorlux	Duo-Spot	545 x 160mm	
Exit Sign	Emergency exit sign with polycarbonate body finished white (RAL9016) with acrylic legend panel. Three-hour maintained operation (or non-maintained by removal of a wire link), powered from an easily replaceable Lithium Iron Phosphate (LiFePO4) battery. Integral downlight for exit illumination. Hinged battery compartment provides fast battery replacement. Choice of ISO7010 or Euro legends. IP40. Suitable for ceiling or wall mounting with optional 3m wire suspension or cantilever bracket.	LED 1W	No	Thorlux	Lexi	300x184	
Double Sided Exit Sign	Emergency exit sign manufactured from zinc plated steel with polycarbonate end caps finished full polyester powder coated RAL9016 white. Three-hour maintained operation (or non-maintained by removal of a wire link), powered from an easily replaceable Lithium Iron Phosphate (LiFePO4) battery. 19.5 m maximum viewing distance in accordance with BS EN 1338. IP40. Optional mounting kits for wall, cantilever or semi-recessed mounting.	LED 1W	No	Thorlux	Lex	255x117	
Exit Sign IP65 Rated	Emergency bulkhead luminaire polycarbonate body finished white (RAL9016) and clear polycarbonate cover. Three-hour maintained operation (or non-maintained by removal of a wire link), powered from an easily replaceable, reliable Lithium Iron Phosphate (LiFePO4) battery Optional integral downlight for exit illumination. May be used as an exit sign with choice of self-adhesive ISO7010 or Euro Legends. IP65 / IK10.	LED 1W	No	Thorlux	Lexi-65	275x158	

Notes:

1. All luminaires are to be supplied complete with lamps and control gear.
2. All equipment is to be supplied as specified, or equivalent and approved by the Engineer, Architect, Lighting Designer and Client.
3. Where a discrepancy between the model number and other luminaire details occurs, the Contractor shall allow for the most expensive option. The Engineer should be notified of the discrepancy immediately. No claims for delays arising from information discrepancies / inaccuracies will be considered valid.
4. As per manufacturer's recommendations
5. Control gear to be mounted within the joinery in a location not subject to steam and moisture. Length of LED strip to be calculated by Contractor using onsite measurements

2. SWITCHGEAR SCHEDULE

REFERENCE	DESCRIPTION	IMAGE
Miniature Circuit Breakers	Thermal-magnetic circuit-breaker (MCB) with indication of the contacts position for control, protection against short-circuits and overloads and isolation of electrical circuits. Energy limiting circuit-breaker. 1 Module (17,8 mm) per pole Instantaneous tripping characteristics according to IEC/EN 60898-1: B type. C type. D type Time-current characteristic according to IEC/EN 60898-1: - Reference temperature: 30°C. - Non-tripping current (I_{nt}): 1,13 I_n. - Tripping current (I_t): 1,45 I_n. Instantaneous tripping characteristics according to IEC/EN 60947-2: - B type = 4 I_n +/- 20%. - C type = 7 I_n +/- 20%. - D type = 12,5 I_n +/- 20% Time-current characteristic according to IEC/EN 60947-2: - Reference temperature: 50°C. - Non-tripping current: 1,05 I_n. - Tripping current: 1,3 I_n. Overall Dimensions 1P 17.8 mm 2P 35.6 mm 3P 53.4 mm 4P 71.2 mm Fixing: On symmetric rail IEC/EN 60715 or DIN 35 rail. Operating positions: Vertical Horizontal Upside Down On the side Power supply: From the top or the bottom. Marking on the front side: By permanent ink pad printing: - Trade name: DX3 - Tripping curve. [W] - Rated current (in A) [XX]. - I_{cn} in A rated breaking capacity according to IEC/EN 60898-1 (in a rectangle) - Energy limiting class "3" according to EN 60898-1 (in a square) Short circuit breaking capacity In accordance with IEC/EN 60898-1: 1P/1P+N @ 230V: 6kA 3P @ 400V: 6kA In accordance with IEC/EN 60947-2: 1P/1P+N @ 230V: 10kA 3P @ 400V: 10kA In accordance with IEC/EN 60898-1: 1P/1P+N @ 230V: 6kA 3P @ 400V: 6kA Minimum operating voltage: 12 V Rated impulse withstand voltage: U_{imp} = 4 kV Insulation rated voltage: U_i = 500 V Pollution degree: - 2 according to IEC/EN 60898-1. - 3 according to IEC/EN 60947-2. Resistance to environmental conditions: - according to IEC/EN 60068-2-30 (55° C, 90% RH) - severity 2 (marine environment) in accordance with standard IEC/EN 60068-2-52. Dielectric strength at power frequency: 2500 V Operation at 400Hz. The instantaneous tripping threshold increase by 45%. Force necessary to close and to open by the handle: - 0.075 Nm per pole to open. Mechanical and electrical endurance: - 20000 operations without load. - 10000 operations with load (under I_n*cos φ = 0,9).	 

	Enclosure material: - Glow-wire test at 960°C according to IEC/EN 60898-1 and IEC 60695-2-12. - Halogens-free Average weight: 0.150kg Degree of protection: - Degree of protection in the terminals area: IP 20, (in accordance with standards IEC/EN 60898-1 and IEC/EN 60529). - Degree of protection of the remaining parts: IP 40 (in accordance with standards IEC/EN 60529). - Protection index against mechanical shocks: IK 02 (in accordance with standards IEC/EN 62262). CONFORMITIES AND APPROVALS In accordance with standards: - IEC/EN 60898-1 with 6000 A breaking capacity. IEC/EN 60947-2 with 10 kA breaking capacity. - EU guidelines: 2014/35/EU + 2014/30/EU. Classification according to Annex Q (standard IEC/EN 60947-1): - Category C with a range test temperature -25 °C / +70 °C. - Salt fog atmosphere according to IEC 60068-2-52 Environment respect – Compliance with EU directives: - Compliance with Directive 2011/65/EU of 08/06/11 (RoHS) and subsequent modifications and integrations.	
Residual Current Circuit Breaker (RCBO)	Residual Current Circuit Breaker with Overload (RCBO) with positive contact indication for control, protection against short-circuits and overloads, and isolation of electrical circuits. Technology: - Limiting device. - The Neutral contact closes before and opens after the Phase contact. - The phase pole provides protection and isolation for the phase circuit. - The neutral pole provides isolation for the neutral circuit Polarity: - 2 poles including 1 protected pole and 1 neutral pole Width: - 2 modules (2 x 17.8 mm) Rated Magnetic tripping curve: - C curve (between 5 In and 10 In) Sensitivity: - 10 mA in AC type. - 30 mA in AC type, A type and F type. Rated voltage and frequency: - 230 V~, 50 Hz with standard tolerances Breaking capacity: - Icn = 6000 A in accordance with standard EN/IEC 61009-1 - Icu = 6 kA in accordance with standard EN/IEC 60947-2 Degree of pollution: - 2 in accordance with standard EN/IEC 61009-1 Dielectric strength: - 2,000 V Rated impulse withstand voltage. - Uimp = 4 kV (wave 1.2/50 μs) Protection from false tripping: - 8/20 μs wave resistance: 250 A for AC / A type 3000 A for F type. - 0.5 μs/100 kHz damped recurring wave resistance: 200 A for AC type and A / F type Degree or class of protection: - Terminals protected against direct contact, class of protection against solid objects and liquids (wired device): IP20 in accordance with standards IEC 529 / EN 60529 and NF 20-010. - Front side protected against direct contact: IP40 - Class II in relation to metallic conductive parts - Class of protection against mechanical impacts IK02 in accordance with standard EN 62262.	

REFERENCE	DESCRIPTION	IMAGE
Moulded-Case Circuit Breakers (MCCB)	General Moulded-Case Circuit Breakers (MCCB) shall comply with IEC 60947-1 and 60947-2 - they shall be of category A with a rated service breaking capacity (Ics) equal to the ultimate breaking capacity (Icu) on all the operational voltage ranges - they shall have a rated operational voltage of 690 V AC (50/60 Hz), - they shall have a rated insulation voltage of 800 V AC (50/60 Hz), - they shall be suitable for isolation, as defined by IEC 60947 –1 and -2, § 7.1.7 for the Overvoltage Category IV for a rated insulation voltage up to 690 V according to IEC 60664-1 - Materials shall be of halogen free type - MCCBs shall be available in fixed or plug-in/with-drawable versions as well as in 3-pole and 4-pole versions. For plug-in/with-drawable versions, a safety trip shall provide advanced opening to prevent connection and disconnection of a closed-circuit breaker. - MCCBs shall be designed for both vertical and horizontal mounting, without any adverse effect on electrical performance. It shall be possible to supply power either from the upstream or downstream side. - MCCBs shall provide class II insulation (according to IEC 60664-1 standard) between the front and internal power circuits Construction, operation, environment - Production site organisation shall be certified to comply with ISO 9002 and ISO 14001 standards. - For maximum safety, the power contacts shall be insulated in an enclosure made of a thermosetting material from other functions such as the operating mechanism, the case, the trip unit and auxiliaries - All poles shall operate simultaneously for circuit breaker opening, closing and tripping. - MCCBs shall be actuated by a toggle or handle that clearly indicates the three positions: ON, OFF and TRIPPED. - In order to ensure suitability for isolation complying with IEC 60947-2 § 7-27: - the operating mechanism shall be designed such that the toggle or handle can only be in OFF position (O) if the power contacts are all actually separated, - in OFF position, the toggle or handle shall indicate the isolation position. - Isolation shall be provided by a double break on the main circuit. - MCCBs shall be able to receive a device for locking in the “isolated” position, with up to 3 padlocks, Ø8 maximum. - MCCBs shall be equipped with a “push to trip” button in front to test operation and the opening of the poles. - MCCB rating, “push to trip” button, performances and contact position indication must be clearly visible and accessible from the front, through the front panel or the door of the switchboard. Current limitation, discrimination, durability - For short-circuits, the maximum thermal stress I^2t shall be limited to: - 106 A2s for ratings up to 250 A, - 5 x106 A2s for ratings between 400 A and 630 A. - MCCBs shall be equipped with a tripping unit independent of the thermo-magnet or electronic one. This unit will trip the circuit-breaker for high value short-circuit currents. The breaking will be carried out in less than 10ms for short-circuit currents above 25In. - MCCBs, the current ratings of which are identical with the ratings of their trip units, shall ensure discrimination for any fault current up to at least 35 kA rms, with any downstream circuit-breaker having a current rating less or equal to 0.4 times that of the upstream circuit-breaker. - The electrical durability of MCCBs, as defined by IEC 60947-2 standard, shall be at least equal to 3 times the minimum required by the standard. Auxiliaries and accessories - MCCBs shall be designed to enable safe on-site installation of auxiliaries such as voltage releases (shunt and under voltage releases) and indication switches as follows: - they shall be separated from power circuits, - all electrical auxiliaries shall be of the snap-in type and fitted with terminal blocks, - all auxiliaries shall be common for the entire range, - auxiliary function and terminals shall be permanently engraved on the case of the circuit breaker and the auxiliary itself, - the addition of auxiliaries shall not increase the volume of the circuit breaker. Protection function - MCCBs with ratings up to 250 A shall be equipped with fully interchangeable trip units in order to ensure the protection against overcharge and short-circuit. The trip units shall be either of: - thermal-magnetic or electronic - MCCBs with ratings over 250 A shall be equipped with electronic trip units. - Electronic and thermal-magnetic trip units shall be adjustable and it shall be possible to fit lead seals to prevent unauthorised access to the settings - Electronic trip units shall comply with appendix F of IEC 60947-2 standard (measurement of rms current values, electromagnetic compatibility, etc. - Protection settings shall apply to all circuit breaker poles - The trip units shall not augment overall circuit breaker volume - All electronic components shall withstand temperatures up to 125 °C. Thermal-magnetic trip units (up to 250 A) - Adjustable thermal protection from 0.7 to 1.0 times the current rating - Fixed magnetic protection for current ratings up to 200 A - Adjustable (from 5 to 10 times the current rating) for current ratings greater than 200 A. Electronic trip units (from 250 A) - Long time protection (LT) Selectable Ir threshold settings from 36% to 100 % of the trip unit rating	

	Short time protection (ST) Isd threshold shall be adjustable from 1,5 to 10 times the thermal setting I_r, The time delay shall be either adjustable or fixed at 40 ms, - Instantaneous protection The threshold shall be either adjustable or fixed (starting from 1.5 times I_n and up to a value between 11 and 15 time I_n, depending on the rating) - Load monitoring function 2 LED for load indication, one lighted above 90 % of I_r, and one lighted above 105 % of I_r A test connector shall be installed for checks on electronic and tripping mechanism operation using an external device. - 3.4.4 Thermal memory - In the event of repeated overloads, the electronic trip unit shall optimise protection of cables and downstream devices - by memorising temperature variations. -	
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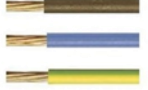
3. ENERGY METER

REFERENCE	DESCRIPTION	IMAGE
Energy Meter	Panel Mounted Backlit display Multiple viewing screens with pushbutton access Display +kWh, +kVAR, I, U, V, F, O, Q, S, PF Dimensions: 96mm x 96mm Compliance with: IEC 61557-12; IEC 62053-22 class 0.5s; 62053-23 class 2	

4. SURGE PROTECTION

REFERENCE	DESCRIPTION	IMAGE
Surge Protection	4-pole lightning current & Surge Protective Device for TNS-Power Net Systems, protection category T1 T2 T3 (BCD), class I+II+III Type: PP BCD TNS 25/100 /FM Protection category: T1 + T2 + T3 Nominal voltage 50/60 Hz: 230 / 400 v Rated voltage 50/60 Hz: 255 v Insulation resistance [Ω]: $> 10^{10}$ Voltage protection level at 100% lightning impulse spark over voltage (1,2/50μs) [kV]: $\leq 1,0$ Response time [ns]: < 50 Lightning impulse current Imp (10/350μs) kA / As / kJ/Ω 25 / 12,5 / 160 Follow current extinguishing [kA_{peak}] capability at U_c 4,0 (IEC: 3.0) Short-circuit withstand capability at max. pre-fuse Max. permissible line resp. back fuse F2 at parallel wiring [kA_{eff} / A] / 250 A gL/gG Max. cross-sectional area [mm²] stranded 50 / flexible 35 mm² Max. switching capacity of remote signal contact 250V/0,5A Material of housing / colour Polycarbonate (halogen free) UL 94-V0 / yellow Environment protection category IP 20 (IEC/EN 60529) Mounting on DIN rail 35 mm (DIN/EN 50 022)	

5. CABLING

REFERENCE	DESCRIPTION	IMAGE
LV Singles Cable	Conductor: Flexible, annealed, plain copper conductor, class 5 based on standard IEC 60228. Insulation: PVC/LSF 6491B Minimum Reaction to fire:	
LV Unarmoured Cable	Conductor: Flexible, annealed, plain copper conductor, class 5 based on standard IEC 60228. Insulation: Cross-linked polyethylene (XLPE) according to International standard IEC 60502-1 Assembly of conductors: In multicore cables, the cores are cabled helically. Filler: Extruded. Optional for multicore cables. Halogen free thermoplastic material, suitable for the operating temperature of the cable and compatible with the insulating and sheathing material. Oversheath: Extruded polyolefin type ST8 according to International standard IEC 60502-1. Minimum Reaction to fire: Cca-s1, d1, a1 (EN 50575:2014+A1:2016) BASEC Approved	
LV Armoured Cable	Conductor: Class 2 stranded copper conductor according to BS EN 60228 Insulation: Cross-linked polyethylene (XLPE) according to International standard IEC 60502-1 Bedding: LSZH (Low Smoke Zero Halogen) Armour: SWA (Steel Wire Armour) Sheath: LSZH (Low Smoke Zero Halogen) Minimum Reaction to fire: Cca-s1, d1, a1 (EN 50575:2014+A1:2016) BASEC Approved	

6. CONTAINMENT

REFERENCE	DESCRIPTION	IMAGE
Cable Tray & Cable Ladder	Medium Duty Cable tray and Cable Ladder to IS EN 61537:2007 Type: Post Galvanised to BS EN ISO 1461 Size: Refer to drawings Multiple Reducer, Bend, Tee and Riser options. Installation is to be completed using all accessories from the same manufacturer and class.	
Cable Trunking	Type: Hot Dip Galvanised to EN 10346 Size: 150mm(W) x 150mm (H) Stock lengths: 3000mm BS EN 50085-1:2005 compliant. Multiple Elbows, Bends, Tee and Bracket options. End caps supplied with each end. Screw fixing system. Installation is to be completed using all accessories from the same manufacturer and class.	
Conduit and Boxes	Made from Grade Q195 Steel Tubes are full formed and electrical resistance welded. Hot dipped galvanised to BS EN 61386 Class 4 Resistance to compression: Heavy Grade - Classification 5 Resistance to impact: Heavy Grade - Classification 5 Tensile Strength: Heavy Grade - Classification 5 Standards: BS 4568-1, BS EN 61386-21 Boxes are galvanised after manufacture meeting Class 4 corrosion protection standard. Boxes c/w tapped M4 hole for earth terminal in base. Installation is to be completed using all accessories from the same manufacturer and class	

7. GENERAL DISTRIBUTION

REFERENCE	DESCRIPTION	IMAGE
Dado Trunking	3 Compartment Contour Trunking Material: High impact self-extinguishing PVC-U, antimicrobial Trunking assembly: 195 x 50 mm Body, lids and dividers included in 3m lengths. Lid width: 2 x 42 curved + 1 x 85 mm Fitting allowances: End caps; Internal angles; External angle; Flat angle; Flat tee; Bridge for flat tee C/W Clip-in steel dividers	
Socket Wall mounted	For recessed/surface mounted wall mounted sockets Brushed chrome finish. Contoured at the top to blend into the Wall/ Surface mounted curved design. Double Pole Switching 3mm Switch Contact Gap Dual earth terminals 1 GANG: 86 x 86mm / 2 GANG: 86 x 146 mm Terminal capacity: 3 x 2.5mm² / 3 x 4mm² / 2 x 6mm² (stranded) Outboard rockers, switch indicator/neon 3-PIN Child Resistant Shutter System BS 1363-2:2023 Fits flush with the backbox giving chamfered edges	 
Unswitched Type Socket Wall mounted	For recessed/surface mounted wall mounted sockets in SEN Wing Brushed chrome finish. Contoured at the top to blend into the Wall/ Surface mounted curved design. Dual earth terminals 1 GANG: 86 x 86mm / 2 GANG: 86 x 146 mm Terminal capacity: 3 x 2.5mm² / 3 x 4mm² / 2 x 6mm² (stranded) 3-PIN Child Resistant Shutter System BS 1363-2:2023 Fits flush with the backbox giving chamfered edges	 
Socket – Dado mounted	Made from high grade thermoset material which has an inherent antimicrobial property. Contoured at the top to blend into the Wall or Dado 3-PIN Child Resistant Shutter System Double Pole Switching, 13A Socket. 3mm Switch Contact Gap Dual earth terminals 1 GANG: 86 x 86mm 2 GANG: 86 x 146 mm Terminal capacity: 3 x 2.5mm², 3 x 4mm², 2 x 6mm² (stranded) Outboard rockers, switch indicator/neon 3-PIN Child Resistant Shutter System BS 1363-2:2023 Part M compliant Graphite coloured socket outlet to be used on white dado trunking	 

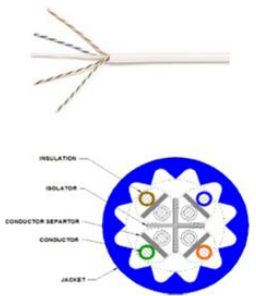
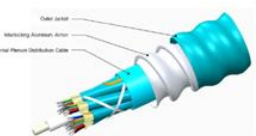
REFERENCE	DESCRIPTION	IMAGE
Fuse Spur Outlet - Switched	Brushed chrome finish. Surface mounted/Recessed Curved design. Can be padlocked for safety. Double Pole Switched 13A Fused Outlet with Neon 1 GANG 86 x 86mm TERMINAL CAPACITY: 2 x 6mm² stranded (max) BS 1363-4:2023 With or without flex outlet as required	
Fuse Spur Outlet- Unswitched	Brushed chrome finish. Surface mounted/Recessed Curved design. Can be padlocked for safety. Double Pole Switched 13A Fused Outlet with Neon 1 GANG 86 x 86mm TERMINAL CAPACITY: 2 x 6mm² stranded (max) BS 1363-4:2023	
Switches	Colours: White or Red or Black (As required) Do not have to be derated when used with fluorescent or inductive loads. BS EN 60669 -1: 2000 10 Amp Two-Way Fish key supplied with each switch. Push or Push to Make or Rocker or Fish Key (As required)	
Grid plate	Brushed chrome finish. Wide rockers 1 - 4 Modules as required 3 & 4 Module: 86 x 146mm 1 & 2 Module: 86 x 86mm BS 5733:2010+A1:2014	
H/O/A or A/O Switch	Brushed chrome finish. Surface mounted curved design Double Pole Key Operated 20A Switch Flush: 51mm 1 GANG: 86 x 86 x 51mm FIXING CENTRES: 1 TERMINAL CAPACITY: 2 x 6mm² stranded (max) Fits flush with the backbox giving chamfered edges. BS EN 60669-1: 2000	

REFERENCE	DESCRIPTION	IMAGE
Double Pole Isolator Switch	Brushed chrome finish. 32A DP SWITCH WITH NEON Earth terminal fitted in base of box. DIMENSIONS: 86 x 86mm TERMINAL CAPACITY: 1 x 10mm² (max) BS EN 60669-1:2018	
Three Phase Isolator Switch	Brushed chrome finish. Utilisation category of AC22A – switching of mixed resistive and inductive loads including moderate overloads for a continuous duty of 32 amps. Making capacity is 2000 amps peak. TERMINAL CAPACITY: 16mm² conductors. DIMENSIONS: 146 x 86mm BS EN 60947-3:2009+A2:2015	
Industrial Isolator switch	Switch mounted in ABS / polycarbonate (optional) enclosure. Round padlocking device (Max.3 padlocks) to prevent the Switch from being made to ON by unauthorised personnel. Switch rear mounted for easy connection. Degree of protection : IP65. RED / YELLOW-handle colour for MAIN / EMERGENCY Switches. Enclosure colour : Dark grey base and light grey cover. Single Phase & Three Phase Ratings: 16A – 63A	

8. LIGHTING CONTROLS

REFERENCE	DESCRIPTION	IMAGE
Light Switch	Made from high grade thermoset material which has an inherent antimicrobial property. 10 Amp 1G/2G Graphite Plate switch with White Rocker/s 3mm Switch Contact Gap 86 x 86mm Terminal capacity: 3 x 2.5mm² BS EN 60669-1:2018. Part M compliant	
Switches	Colour: White BS EN 60669-1:2018. 10 Amp Fish key supplied with each switch. Push or Push to Make or Rocker (As required)	
Dimmable PIR for DSI/Dali Ballasts – Presence/Absence Detector	Voltage: 220-240 Volts AC 50 Hz Load Rating: 10A Diameter/Depth/Bezel: 76.0mm / 65mm / 3.7mm Time Out Period Range: Adjustable between 1 and 99 minutes Terminal Capacity: 2.5mm² Material: Flame retardant ABS Sensing Range: 8m Dia, Height to suit. Lux Hold Off: Yes Walk Test LED: Behind detector lens Programming: Programmed & controlled by remote control Conformity: EMC-89/336/EEC; LVD-73/23/EEC Inputs: DALI Control wiring	
Lighting Control Module	Voltage: 220-240 Volts AC 50 Hz Load Rating: 10A total per box Dimensions: 332mm x 150mm x 100mm Dimming: Maximum 22 ballasts per box Channels: 10 Cable Lengths for Dimming: 100m using 0.5mm² wire, 150m using 1.00mm² wire Terminal Capacity: 4.00mm² Material: Flame retardant nylon and ABS Switching: ELV Lighting Connection: 6 pin Wieland plug with a 'side latching' Detector Connections: RJ45 patch leads Switch Connections: Extra-low-voltage via the 3 switch input connections Min Functions: Presence detection, Absence detection, Daylight linking Programming: Pre- programmed to requirements Conformity: EMC-89/336/EEC; LVD-73/23/EEC	

9. DATA INSTALLATION DATASHEETS

REFERENCE	DESCRIPTION	IMAGE
Cat 6A Cable	Conductor: Class 1 solid annealed plain copper Core Diameter: 1.06mm Nominal Insulation: PETP (Polyethylene Terephthalate) CPR Class: CCA, s1b, d1, a1 Max. Oper. Freq: 550MHz Operating Temperature: -20°C to 60°C dc Resistance, max: 7.61 W/100m Compliant standards: ANSI/TIA-568-C.2 ISO/IEC 11801 Class EA Cable Type: U/UTP Capacitance: 6.0nF/100m@100kHz Warranty: 25 Year	 The image shows a cross-section of a Cat 6A cable. The top part is a perspective view of the twisted pairs. The bottom part is a circular cross-section diagram with labels: INSULATION, ISOLATOR, CONDUCTOR SEPARATOR, CONDUCTOR, and JACKET.
Fibre Optic Cable	Armour Type: Interlocking aluminium Fibre Type: Multimode OM4 50/125 Flame test listing: NEC OFCP (ETL) and c(ETL) Flame test method: NFPA 262 Compression: 85N/mm Compression Test Flex: FOTP-41 Flex: 25 cycles Flex Test Method: FOTP-104 Impact: 35N-m Impact Test Method: FOTP-85 Twist: 10 cycles Twist Test Method: FOTP-85 Heat Age: -20oC to +85 oC Low High Bend -20oC to +70 oC Low High Bend Test: FOTP-37 Temp Cycle: -20oC to +70 oC Temp Cycle Test: FOTP-3 Cable Qualification Standards: ANSI/ICEA S-83-596-2001 / Telcordia GR 409-CORE Issue 2 RoHS 2011/65/EU: Compliant ISO 9001:2008: Designed, manufactured and/or distributed under this quality management system. Warranty: 25 Year	 The image shows a cross-section of a fibre optic cable. Labels include: Cable Jacket, Winding Armour, and Internal Fibre Distribution Cable.
I.C.T. Intermediate distribution frame (IDF-01)	Type: Wall mounted 18U data cabinet with welded steel frame finished in black, lockable/removable toughened glass front door with steel surround, lockable/removable steel rear door, removable steel side panels, adjustable 19" mounting profiles front and rear and removable gland plates top and bottom for cable access. Dimensions (W x H x D): 600mm x 940mm x 600mm Power Distribution Unit: 1 x 16A 8-Way Rack Mounted switched UK Power Unit with surge protection	 The image shows a black, wall-mounted 18U data cabinet with a glass front door and a steel rear door.

10. PUBLIC ADDRESS

REFERENCE	DESCRIPTION	IMAGE
SEN Area speakers	Type: 100V Line Material: ABS Frequency response: 130Hz-17000Hz Sensitivity: 92dB Max SPL: 99dB @ 100V Power taps: 6/3/15/.75 Watts Driver: 5.5" Paper Grill: Powder Coated Iron Mesh Colour: White Talk Back: YES Local ON/Off and Volume Control: YES Ensure compatibility with existing system/devices if applicable.	
Corridor speakers	Type: 100V Line Material: ABS Frequency response: 130Hz-17000Hz Sensitivity: 92dB Max SPL: 99dB @ 100V Power taps: 6/3/15/.75 Watts Driver: 5.5" Paper Grill: Powder Coated Iron Mesh Colour: White Talk Back: NO Ensure compatibility with existing system/devices if applicable.	
External Speakers	Type: 100V Line Material: ABS Frequency response: 300Hz-8000Hz Sensitivity: 102dB Max SPL: 113dB @ 100V Power taps: 15/7.5/3.8/1.9 Watts Driver: 1" Re-entrant Grill: Powder Coated Steel Colour: Grey Talk Back: NO Minimum mounting height: 2.5m Ensure compatibility with existing system/devices if applicable.	

11. FIRE ALARM & DETECTION

REFERENCE	DESCRIPTION	IMAGE
Fire Alarm Control Panel in Extension	Open protocol analogue addressable Supporting a minimum of two industry leading protocols Up to 200 Zones 20 LED Type Zonal Indicators 4 loops User Controls: Sound Alarms, Silence/Resound, Mute Buzzer, Accept, System Reset LED Type General Panel Status Indicators: FIRE, FAULT, Acknowledged, Disablement, Test, Sounder Fault, Status Indicators Delayed Mode, Relays Disabled, Earth Fault, System/CPU Fault, Sounders Disabled, Alarms Silenced, Supply Fault, Power Serial Interface: plug-in communication cards Auxiliary Relays: 1 fault and 1 fire relay voltage free, changeover outputs contacts rated at 24V AC/DC, 1A, 0.6 PF maximum. Sounder Outputs: 4 programmable outputs. Open and short circuit monitoring. 1A maximum per output Loop Capacity: 4 loops @ 460mA per loop (Max) No. of Devices per loop: 126 min to 198 Construction: Sheet steel painted, sealed to IP30 Stand-by Batteries: 2 x 12V, 12Ah (min) Access: Program via Code; Panel via key. Ensure compatibility with existing system/devices if applicable.	
Cable	Class PH120 Nominal cross-sectional area = 2.5mm² Mean overall diameter = 11.5mm Approximate cable weight kg/km = 176 Maximum conductor resistance at 20°C = 7.4 ohms/km Current rating DC or single-phase AC Enclosed = 23 Amps Current rating DC or single-phase AC Clipped direct = 27 Amps Volt drop DC or single-phase AC = 18 mV/A/m Complies to BS7629-1:2008; BS EN 50200 Class PH120; shock and water test BS8434-2 for 120 minutes. BASEC and LPCB approval to BS5839-1:2002 for enhanced applications. Robust thermoplastic enhanced LSOH sheath Colour - Red Recommended clip spacing 300 mm horizontal and 400mm vertical when not in containment.	
Manual Call Point	Open protocol analogue addressable. Red Surface Mounted with Resettable element. Supplied with Transparent Hinged Cover. LED status Indicator. Voltage: 17-28V DC Dimensions (mm): 89mm x 93mm x 26.5mm (without backbox) Material: Red Polycarbonate / ABS IP Rating: IP24 Compliance: EN54-11:2001 (when cover not used) Ensure compatibility with existing system/devices if applicable.	
Smoke Detector	Optical Analogue addressable with separate mounting base White Surface Mounted on separate mounting base. LED status Indicator. Voltage: 17-28V DC Dimensions (mm): 100mm x 42mm Material: White Polycarbonate V-o rated to UL 94	

	IP Rating: 23D Compliance: EN54-7:2000 Ensure compatibility with existing system/devices if applicable.	
Heat Detector	Optical Analogue addressable with separate mounting base White Surface Mounted on separate mounting base. LED status Indicator. Voltage: 17-28V DC Dimensions (mm): 100mm x 42mm Material: White Polycarbonate V-o rated to UL 94 IP Rating: 23D Compliance: EN54-5:2000 Ensure compatibility with existing system/devices if applicable	
Remote Indicator	For use with all void detectors, installed in visible location below (or beside) void. Separate mounting base. White Surface Mounted on separate mounting base. LED status Indicator. Voltage: 5-36V DC Dimensions (mm): 80mm dia x 20mm Material: White Polycarbonate V-o rated to UL 94 IP Rating: 23D Compliance: EN54-5:2000 Ensure compatibility with existing system/devices if applicable.	
Sounder Base	2 Volume ranges 55-75dB and 75-91dB Synchronisation of alert and evacuate tones. Synchronisation of beacon flash Individual and group addressing Acoustic self-test Loop powered. Ensure compatibility with existing system/devices if applicable.	
Internal LED flashing beacon / Sounder	Selectable Tones Sound output up to 100dB. RED with Flashing LED Beacon Ensure compatibility with existing system/devices if applicable.	
External LED flashing beacon / Sounder	IP: 65 Sound Output: 99dB @ 1m Voltage 12-24v Synchronisation of tones & flashes Dimensions (mm): 104 x 97.5mm Ensure compatibility with existing system/devices if applicable	
Interface Unit	Input/Output Unit with Isolator Surface mounted to walls C/W backbox with knockouts. PCB assembly & protective cover Dimensions (mm): 150 x 90 x 48mm 2 types - Standard and Mains Switching Ensure compatibility with existing system/devices if applicable	

Door hold open device	Release on Fire alarm C/W Universal armature Vandal Resistant Wall mounted with Test release button IP53 24V DC; 80mA Dimensions: 80 x 70 x 42mm / 113x70x65mm Extension Mount to be supplied where required White metal housing with 50kg holding force Door mounted receiver - all metal.	
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12. CO2 MONITOR

REFERENCE	DESCRIPTION	IMAGE
CO2 Monitor	Carbon Dioxide (CO2) Traffic Light Display Indicator Ranges Optimum Range <1500ppm Profile to control the audible alarm, the relay set point and the traffic light changeover levels: Green: <800ppm Amber: 801 to 1000ppm Orange: 1001 to 1500ppm Red: >1500ppm	 The image shows three traffic light display indicators stacked vertically on the left. The top indicator is green and displays '739' and '2.01'. The middle indicator is yellow and displays '1238' and '2.01'. The bottom indicator is red and displays '1112' and '2.01'. To the right of these indicators is a white CO2 monitor unit with a digital display showing '739' and '2.01'.