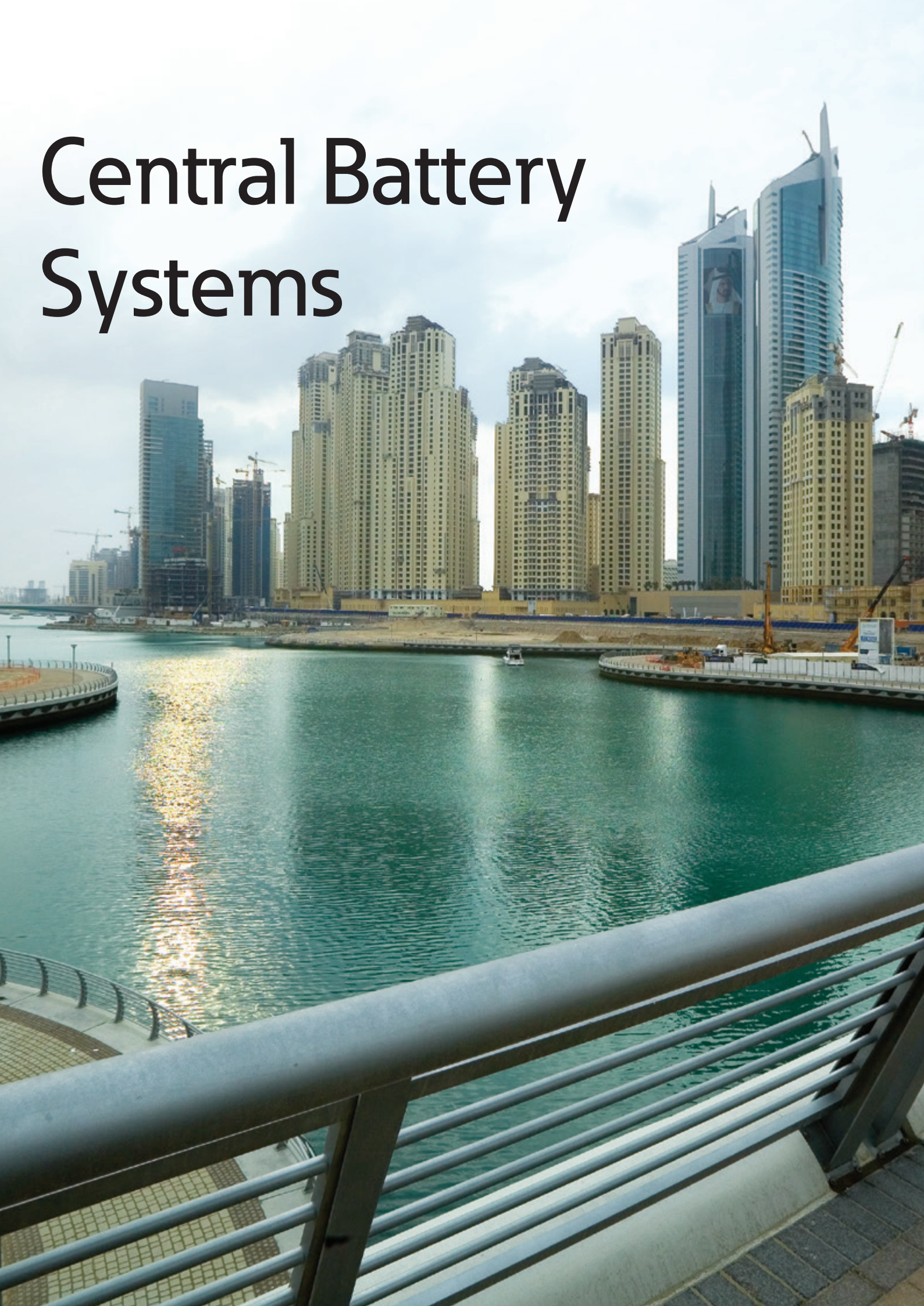
Central Battery Systems



Central Battery Systems

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Central battery system based emergency lighting is ideal for medium to large installations. For projects where central control and testing is desirable, a central battery system is a viable and cost effective alternative to self-contained emergency lighting products. The main advantages of central battery systems over self-contained systems are:

- Testing and maintenance is much easier to carry out
- Battery replacement is much quicker and less disruptive
- Battery life is generally 10 years or more
- Luminaires can be centrally controlled
- High light levels can easily be achieved
- The emergency lighting system can be completely unobtrusive

Eaton manufactures a wide range of central battery emergency lighting systems. Standard products include AC/AC static inverter systems, with the addition of a new compact, competitively priced unit for smaller installations. A comprehensive range of traditional AC/DC systems are also available, including an economy range designed for use in small premises. Bespoke systems to suit the exact requirements of the specifier are also available.

To complement the range of central battery systems, Eaton also offers a wide selection of slave luminaires and conversion modules for mains fluorescent luminaires. EasiCheck automatic self-testing can be readily incorporated into central systems.

- **Loadstar AC/DC Systems** (See page 385)
- **Economy AC/DC Systems** (See page 392)
- **Loadstar Static Inverter AC/AC Systems** (See page 395)
- **Compact Static Inverter AC/AC** (See page 405)
- **Switchgear Tripping Battery Chargers** (See page 408)
- **EasiCheck 1.5 Slave Emergency Lighting Testing System** (See page 410)
- **Slave Luminaire Technical Data** (See page 413)

Central Battery Systems

System Design

Central Battery System Design

When it has been decided that a central battery system is the most suitable system of emergency lighting for a particular site, the designer needs to give consideration to the following:

- Lighting design
- Type of system
- System control and mode of operation
- Battery type
- System sizing
- Battery room ventilation

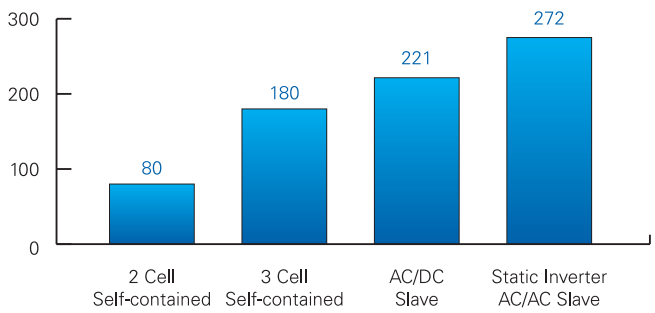
Lighting Design Considerations

Current legislation and design increases the attraction of using central battery systems to provide emergency lighting in a building.
In particular, an increase in the use of static inverter systems, which provide an alternative source of power to normal mains luminaires. These considerations can be summarised as follows:

1. BS 5266 part 7 (EN 1838) specifies increased emergency light levels than previous standards
2. Slave luminaires, operating from AC/DC and AC/AC central systems, offer a higher light output and improved spacing characteristics over comparable self-contained versions of the same luminaire
3. Compact fluorescent lamps make ideal slave luminaires, offering high efficiency and appropriate light output for areas with low ceilings
4. There is an increasing requirement from architects and users to make emergency lighting as unobtrusive as possible, so utilisation of the normal mains luminaires is an ideal solution

Through the use of dedicated slave luminaires and conversion modules for mains fluorescent luminaires, these considerations can be catered for by both AC/DC and AC/AC central systems. An illustration of the increased output that can be expected from 8W slave luminaires compared to self-contained versions is shown in figure 1.

Fig 1. Light output of different types of luminaire (nominal lamp lumens based on standard 8 watt fitting)



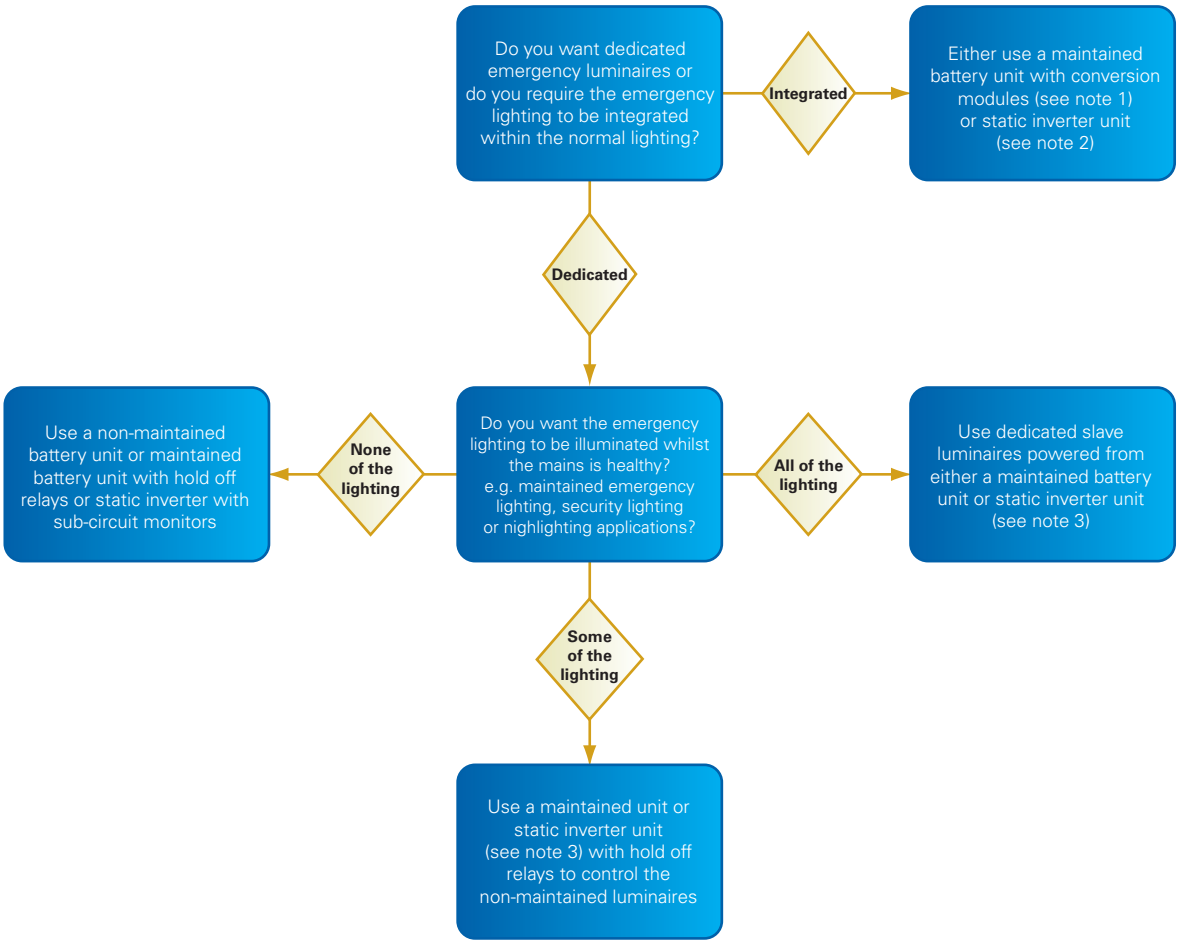
This section of the catalogue provides a guide to how to choose the most suitable type of central battery system and then how to ensure it will meet the installation requirements.

Technical assistance is available to help you with selecting and designing a system correctly. Contact Eaton's central systems technical sales department, Tel: 01302 303317

When performing photometric calculations for converted mains luminaires with static inverter systems, the full design lumen output of the luminaire must be taken into account, as the lamps are powered by conventional ballasts. It is important to ensure that the use of such high output luminaires in low ceiling areas does not exceed the uniformity factor limitations. The utilisation factor should be taken at zero reflectance in line with BS 5266 Pts. 1 and 7 1999. Typical spacing data is provided at the rear of this catalogue, to assist in the calculation of spacing.

Type of System

There are numerous different combinations of central battery system type and the correct choice depends as much on customer preference as on design criteria. The selection chart below gives some general guidance. Should you wish to discuss a proposed system type for a particular application, our technical department is available to provide assistance. Contact the central system technical sales department, Tel: 01302 303317



Notes

1. Conversion modules are designed to be incorporated into a conventional mains luminaire. During normal conditions the luminaire operates at full brightness (using the normal switched mains supply and conventional control gear). In emergency conditions the luminaire continues to operate at reduced brightness (with the emergency lamp being powered from the conversion module instead of the conventional control gear). Conversion modules are ideal for use with mains luminaires which have louvres with a sharp cut off angle, or for projects where the mains luminaires have multiple tubes, but only one tube is required to be illuminated during emergency conditions.

2. Static inverters provide mains voltage output during both normal and emergency conditions. They are designed to run conventional mains fittings at full brightness even in emergency conditions. Static inverters are ideal for projects with large open areas, or hazardous areas requiring higher than normal emergency lighting levels, or for powering compact fluorescent luminaires where there is often insufficient space within the fitting to accommodate a conversion module.

3. Static inverter systems operate the emergency luminaires at full brightness throughout the emergency autonomy period, which usually results in significantly improved luminaire spacing for mains slave luminaires compared with an equivalent low voltage AC/DC unit. In addition, the combination of higher supply voltage and the resultant reduced input current reduces installation costs by allowing the use of smaller distribution cables than would be required with a lower voltage AC/DC system.

Central Battery Systems

System Design

System Control and Mode of Operation

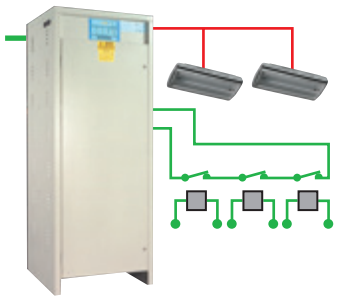
It is a requirement of any correctly designed emergency lighting system that the emergency lighting is activated both in the event of complete mains failure, and also in the event of a local mains failure. The emergency lighting system can have luminaires that are maintained or non-maintained. Similarly, the central battery unit can also be maintained or non-maintained operation. The following diagrams explain how activation of the emergency lighting is achieved, using the main types of central battery systems.

Central systems with dedicated slave luminaires

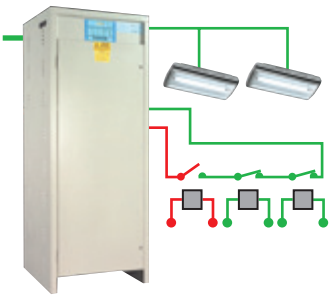
a. Non-maintained central battery unit with sub-circuit monitors

With this method, relays are used to monitor the normal lighting supplies. The contacts of these relays are wired in a series loop such that in the event of failure of any of the normal lighting supplies, the loop is broken, sending a signal to the central battery unit to activate all of the emergency luminaires. Details of purpose-made remote sub-circuit monitor units can be found in the Loadstar product section.

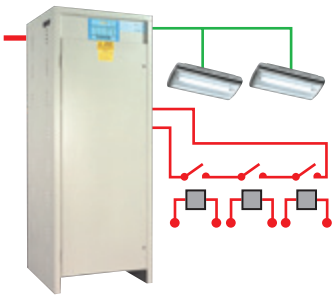
Normal mains healthy condition



Failure of normal lighting final circuit



Total mains failure

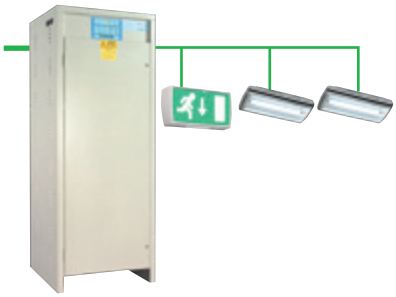


KEY
- LIVE
- DEAD

b. Maintained central battery unit with the maintained circuit continuously energised

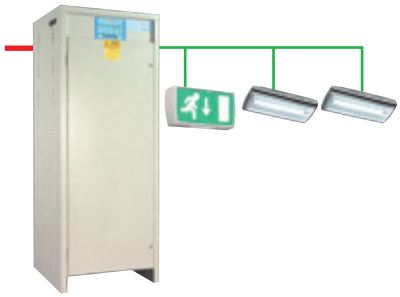
A simple installation where emergency luminaires are illuminated at all material times irrespective of the status of the normal lighting. In the event of a complete mains failure, the slave luminaires are illuminated from the battery supply.

Normal mains healthy condition



Failure of normal lighting final circuit

Total mains failure



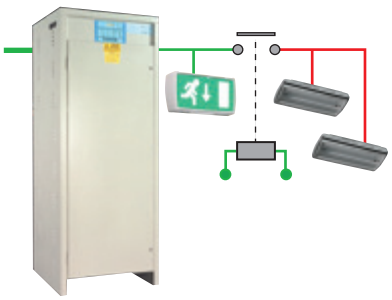
KEY
- LIVE
- DEAD

c. Maintained central battery unit with remote hold off relays

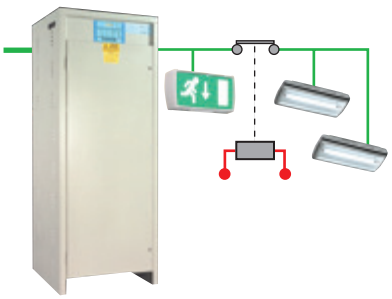
The maintained output from the battery unit is fed to a number of remote hold off relays throughout the building. The coil of the hold off relay is connected to the unswitched side of the local normal lighting supply. Assuming this supply is healthy, the relay will pull in, opening the contacts and preventing power from reaching the slave luminaires. In the event of a local mains failure, the relay drops out, the contacts close and the emergency luminaires in that particular area are illuminated from the maintained circuit of the battery unit.

In the event of a local mains failure, the relay drops out, the contacts close and the emergency luminaires in that particular area are illuminated from the maintained circuit of the battery unit. In the event of a complete mains failure, the system operates in a similar manner, except that the slave luminaires are illuminated from the battery supply. Details of purpose-made remote hold off relays can be found in the Loadstar product section.

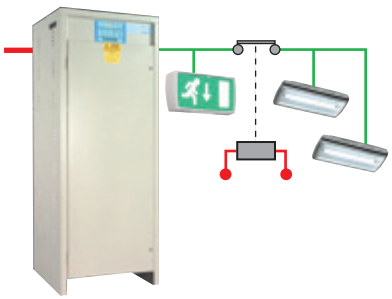
Normal mains healthy condition



Failure of normal lighting final circuit



Total mains failure



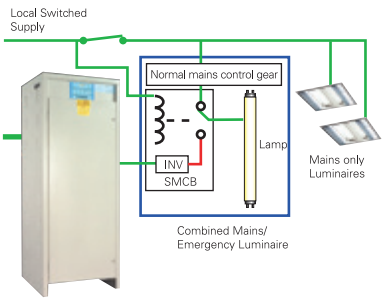
KEY
- LIVE
- DEAD

Central systems with converted mains luminaires AC/DC systems

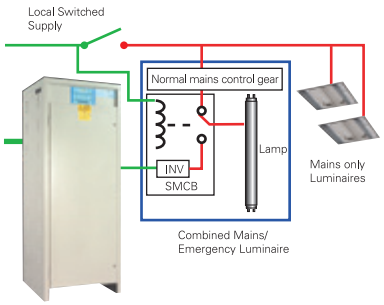
d. Maintained AC/DC central battery with conversion luminaires

With this option, the normal mains luminaires are fitted with a conversion module, enabling them to also operate as emergency luminaires in the event of mains failure. Each conversion module includes a changeover relay which, under normal circumstances, is energised by a permanent supply from the unswitched side of the normal lighting circuit. Whilst energised, it connects the lamp to the conventional mains control gear within the luminaire allowing it to operate as a standard mains fitting, powered via a switched live connection to the mains ballast. Should the normal lighting fail, the relay within the conversion module drops out, disconnecting the lamp from the conventional control gear and connecting it to the inverter within the conversion module. This illuminates the lamp at reduced brightness. In multi-lamp luminaires, the conversion module only operates a single lamp in the emergency mode. All other lamps will extinguish upon mains failure.

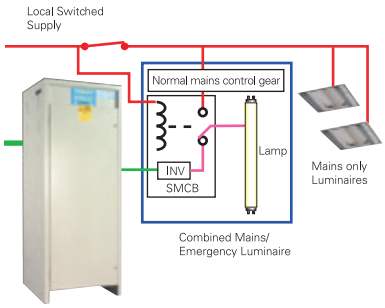
Normal mains healthy condition



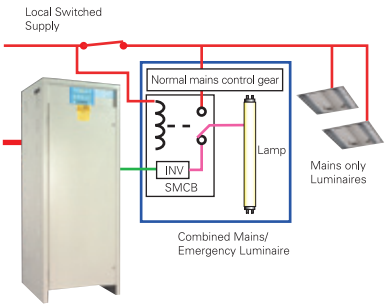
OR



Failure of normal lighting final circuit



Total mains failure



KEY
- LIVE
- DEAD
- LIVE VIA INVERTER

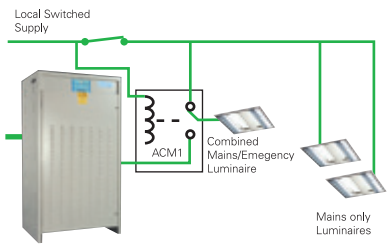
Central systems with converted mains luminaires AC/AC systems

e. Static inverter unit with conventional mains fittings

A static inverter runs conventional mains luminaires at full brightness during both mains healthy and mains failure conditions. However, there is usually a requirement for local switching of the luminaires during mains healthy conditions, with automatic illumination in the event of mains failure.

Local switching with automatic illumination in the event of mains failure can be easily achieved by use of the ACM1 module, which is purpose-designed for this application. A detailed description of the ACM1 module, including a typical wiring schematic, can be found on page 366.

Normal mains healthy condition



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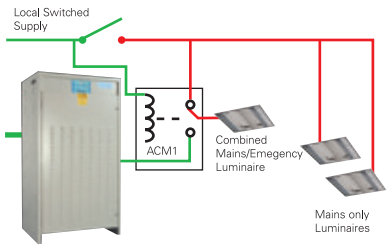
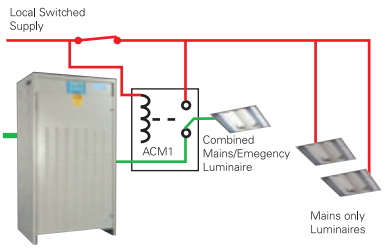
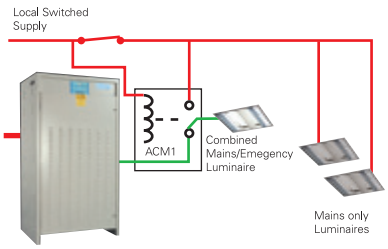


Failure of normal lighting final circuit



Total mains failure



KEY
- LIVE
- DEAD
- LIVE VIA INVERTER

Battery Type

Eaton offers a choice of five different battery types:

- Valve regulated lead acid (10 year design life)
- Valve regulated lead acid (3-5 year design life)
- Vented nickel-cadmium
- High performance plante lead acid
- Flat plate lead acid

Each battery type has specific characteristics. In order to assist with the choice of battery, full details of the characteristics and benefits can be found in the Loadstar and Static Inverter System product pages. The table below (fig. 2) provides a comparative guide to these characteristics.

The most popular battery type is valve regulated lead acid with a 10 year design life. This type of battery is used on approximately 90% of projects due to its competitive cost, good life characteristics, ease of maintenance and compact size.

Fig 2. Comparison of Battery Characteristics

Characteristics	Valve Regulated Lead Acid (10 year life)	Valve Regulated Lead Acid (3-5 year life)	Vented Nickel Cadmium	High Performance Plante Lead Acid	Flat Plate Lead Acid
Expected life	√√√	√	√√√	√√√	√
Capital cost	√√	√√√	√	√	√
Maintenance	√√√	√√√	√√	√√	√√
Resistance to damage and abuse	√	√	√	√	√
Through life costs	√√	√	√√	√√	√√

Battery Room Ventilation

Vented batteries, such as nickel cadmium, plante and flat plate lead acid emit potentially explosive gases under charge conditions. Therefore it is important when selecting rooms for emergency lighting central battery systems with these types of battery, to calculate the amount of ventilation required. The required number of air changes per hour (A) is given by the following formula:

$$A = \frac{0.045 \times N \times I}{V}$$

Where:

N = Number of cells in the battery

V = Volume of room in cubic metres

I = Charge rate in Amperes

This formula will give the number of air changes per hour required during boost charge conditions. On float charge (systems are on float charge for most of their service life), the amount of gas emitted is approximately 1.5% of that liberated whilst on boost charge and under most circumstances this will be dissipated by natural ventilation, and will not present a hazard. However, we recommend that the boost charge condition is allowed for at the design stage to ensure the appropriate decision on ventilation requirements is made.

Although Valve Regulated Lead-Acid Batteries require little ventilation under normal operating conditions, it is good practice to apply the formula to calculate the number of air changes required to achieve minimum risk under battery fault or failure conditions. Please refer to: BS 6133:1995

System Sizing

When sizing the system, it is important to allow for the full input requirement of the light fittings rather than the lamp wattages.

AC/DC systems

When using conversion modules fitted to conventional mains fittings, the lamp will be illuminated directly from the mains ballast during normal mains healthy operation and via the inverter during emergency conditions. When being driven from the battery unit via the conversion module, the emergency lamp will be illuminated at less than full output, and as a result, the fitting will consume a reduced input power.

AC/AC systems

When utilising a static inverter system, the fitting operates at full output during both mains healthy and mains failure conditions. When sizing a suitable static inverter to power a particular load, it is important to consider the input VA and the input (not lamp) wattage of the emergency luminaires. The total VA requirement defines the inverter module size, and the total input wattage defines the battery size.

Therefore, to establish the correct inverter module size, the power factor correction (PFC) rating of the luminaires must be considered in addition to lamp wattage and control gear losses. High frequency control gear circuits have excellent PFC ratings, usually of around 0.96 to 0.98. This compares with 0.85 to 0.9 for equivalent lamp magnetic control gear circuits. Care should be taken when low wattage compact fluorescent lamps are used, utilising high frequency gear or high PFC versions where possible. Low power factor versions can have PFC ratings of only 0.45 to 0.5, thereby greatly increasing the inverter rating required for the system. If utilising low voltage lighting powered via step-down transformers, it is essential to allow for the efficiency and power factor of the step-down transformers. Table (fig. 3) and graph (fig. 4) illustrate the relationship between wattage and VA rating for a typical system. For a detailed explanation of conversion operation, please refer to page 366. For details of the power consumption of slave luminaires and converted luminaires (when operating in the emergency mode via a conversion module), please refer to page 413.

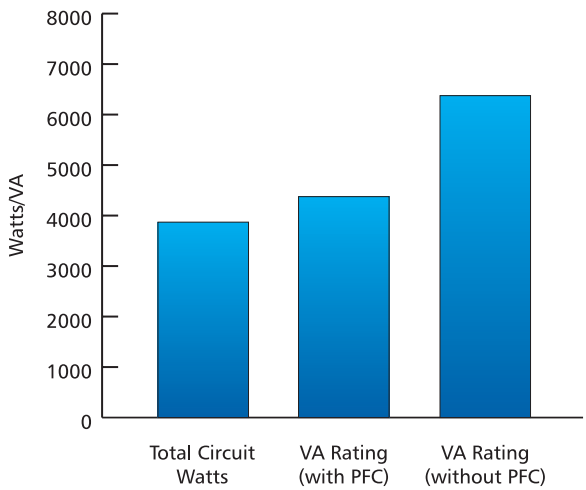
Note: BS EN 60598-2-22 prohibits the use of glow starters in fluorescent luminaires used for emergency lighting.

Fig 3. Typical system. VA rating with and without power factor correction

Qty of Luminaires	Description	Total Circuit Watts	VA Rating (Compact lamps without PFC)	VA Rating (Compact lamps with PFC)
25	1 x 58W T8 (wire wound ballasts)	1725	1925	1925
40	1 x 28W 2D (wire wound ballasts)	1360	2960	1560
15	1 x 16W 2D (wire wound ballasts)	315	690	375
15	1 x 13W TC-D (wire wound ballasts)	270	600	315
5	1 x 40W GLS incandescent	200	200	200
	Inverter Rating =	**3870**	**6375**	**4375**

Note: Use of compact fluorescent luminaires with power factor correction (PFC) leads to a reduced inverter module size and therefore savings in space and capital costs

Fig 4. Typical system. VA rating with and without power factor correction



Additional Considerations

Spare capacity

With any central battery system it is important to bear in mind that it is difficult to extend the system at a later date unless capacity has been allowed for at the design stage. For this reason, we would strongly recommend that some spare capacity is included when selecting the central battery system rating. Our technical department is available to provide assistance. Contact the Central System team, Tel: 01302 303317 or E-mail: CBUsystemsUK@Eaton.com

Fire protection of cables

Cables should be routed through areas of low fire risk.
The following cables and wiring systems should be used.

a) Cables with inherently high resistance to attack by fire
   i) Mineral-insulated copper-sheathed cable in accordance with BS 6207: Part 1
   ii) Cable in accordance with BS 6387. The cable should be at least category B

b) Wiring systems requiring additional fire protection.
   i) PVC-insulated cables in accordance with BS 6004 in rigid conduits
   ii) PVC-insulated cables in accordance with BS 6004 in steel conduit
   iii) PVC-insulated and sheathed steel wire armoured cable in accordance with BS 6346 or BS 5467

Systems should be installed in accordance with IEE Regulations and BS 5266. Additional fire protection may apply. For example, if cables are buried in the structure of the building.

British Ceramic Tiles

Cable sizes

When selecting cable sizes, due regard should be paid to limitations imposed by voltage drop and physical strength. Each conductor shall be of copper, having a nominal cross sectional area of not less than 1mm². BS 5266 states that the voltage drop in cables connecting a central battery to a slave luminaire should not exceed 4% of the system nominal voltage at maximum rated current.

Using copper conductors, volts drop can be calculated per pair of conductors as shown in table fig. 5. Total volts drop on a circuit can be calculated according to the formula:

VDT = I x VDM x D

Where:

VDT = volts drop total

I = maximum load current

VDM = volts drop per amp per metre (obtained from fig. 5)

D = cable run in metres

Example:

Fig. 6 and 7 show an example comparison for a central battery system with a total connected load of 1500W and a 50m run of 16mm² cable supplying the luminaires.

This example shows that for this configuration, a 230V system would be most suitable to meet the requirements of BS 5266. The low current value combined with greater allowable volt drop would enable much smaller cables to be used.

Fig 5.

Nominal Cross Sectional Area	Maximum Current Rating	Volt per Drop per Metre
1.0mm²	14 amps	42mV
1.5mm²	17 amps	28mV
2.5mm²	24 amps	17mV
4.0mm²	32 amps	11mV
6.0mm²	41 amps	7.1mV
10.0mm²	55 amps	4.2mV
16.0mm²	74 amps	2.7mV

The problems of volt drop can be overcome by:

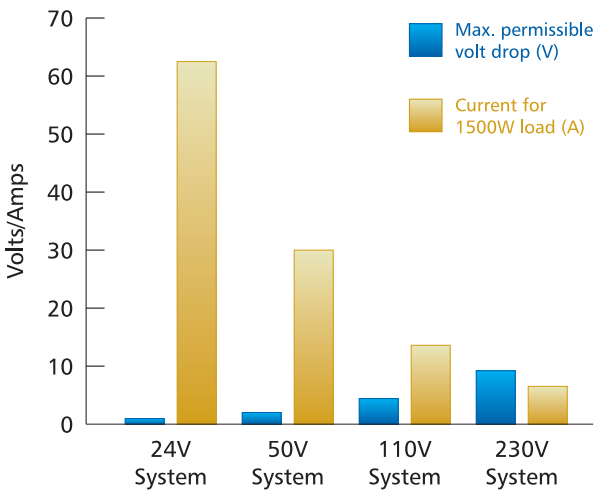
- Using higher system voltages (= lower currents and therefore lower volt drop)
- Using larger cables (= lower resistance and therefore lower volt drop)
- Using multiple outgoing circuits (= less current per circuit and therefore lower volt drop)

Fig 6.

Comparison Data	24V System	50V System	110V System	230V System
Max. permissible Volt drop (BS 5266)	0.96V	2.0V	4.4V	9.2V
Total current for total connected load of 1500W	62.5A	30A	13.6A	6.52A
Actual volt drop for 16mm² cable with 50m length	8.43V	4.05V	1.84V	0.88V

The use of larger cables or multiple outgoing circuits may permit the use of 24, 50 or 110V systems in the above example.

Fig 7.



Loadstar AC/DC Systems

IP21

BS EN50171

The Loadstar range of AC/DC central battery units comply with the latest relevant European and British standards. High quality, cost effective units provide secure sources of emergency power for escape and emergency lighting systems in a wide variety of installations. Many years of experience, gained whilst designing and manufacturing systems to customer requirements, have led to the current modular concept based on a basic specification, combined with a choice from five battery types and a number of standard optional extras. This enables the specifier to choose a standard product and select optional extras as required to customise the equipment to meet the project requirements.

- High specification systems
- Fully complies with BS EN50171:2001
- Digital display to clearly indicate system status
- Maintained or non-maintained versions with 1, 2 or 3 hour duration
- EasiCheck compatible versions available
- Simple operation and reduced complexity
- Low maintenance
- Low running cost

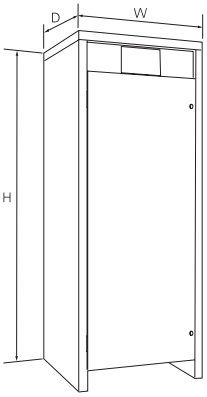
Central Battery Systems

Loadstar AC/DC Systems

System Operation

- In mains healthy condition, the system charges the batteries and stores power, ready for emergency operation
- In the event of a mains failure, the system provides emergency power to dedicated slave or converted mains luminaires, until mains power is restored (or for the rated duration of the system in the event of extended mains failure)
- Output voltage from the system batteries is 24, 50 or 110V DC nominal
- Conversion modules or dedicated slave ballasts within the luminaire convert the output of the central system to operate the emergency lamp
- Systems are available with non-maintained or maintained circuit operation
- Sub-circuit monitoring and hold off relays can be added to the system to energise the emergency luminaires in the event of a localised mains circuit failure
- Converted luminaires have a combined inverter and changeover relay in each host luminaire
- Full detail of modes of operation is shown from page 376 - 379

Dimensions



Cubicle Ref	H (mm)	W (mm)	D (mm)
931	1200	715	680
932	1800	715	680
934	1800	1015	680

Dimensions are for guidance only and may be subject to change

Standard Specification

- Cubicles
  - 1.6mm zinc coated steel panels with powder coat RAL7032 light pebble grey finish
  - Plinth base feature to prevent build up of moisture/corrosive materials and aid mechanical handling by fork or pallet truck
  - 3 standard size cubicles, for combined charger/battery, charger only or battery only
  - Most systems require only one cubicle. Some larger systems are housed in multiple sets (see selection tables)
  - Electrical control gear and battery compartments are segregated, with lockable access door(s)
  - Battery compartments supplied, where appropriate, with separate tiered sections to enable ease of electrolyte level inspection
  - Separate fixed fascia panel for mounting control/display panel
  - Option of open battery racks on larger systems

- Battery Charger
  - Solid state, constant voltage charge control module
  - Fully automatic
  - Full recharge within 24 hours of a rated discharge
  - Recharge to 80% capacity within 12 hours, complying with BS EN 50171:2001
  - Manual boost switch on systems with vented battery cells
  - Current limit facility, preventing overcharging or damage to the system in the event of battery failure or fault
  - Outputs have low AC ripple currents for maximum battery life and in compliance with BS EN 50171:2001
  - Input protection by MCB to BS 3871 Part 1 or BS 4752 Part 1

- Battery
  - Systems can be specified with:
    - Valve regulated lead acid - 5 year design life
    - Valve regulated lead acid - 10 year design life
    - Vented nickel cadmium
    - High performance plante
    - Flat plate
  - See selection tables/guides for battery characteristics

- Fuse Gear
  - Removable industrial HRC fuses, complying with BS 88

- Input Circuits
  - Cable entry via removable gland plate on top of cubicle
  - Single phase 230V ± 10% AC 50Hz supply. Other input voltages on request
  - Input terminals and MCBs DIN-rail mounted and easily accessible

- Load Circuits
  - Substantial DIN-rail mounted output terminals
  - 2 terminals per output pole for ease of connection of ring or parallel circuits
  - Option of integral distribution board (MCB or HRC fuses)

- Monitoring Circuits
  - Terminals provided for connection of remote monitors and controls
  - Maintained systems have terminals for connection of remote switch or time clock on primary control circuit

- Cables
  - Compliant with BS 6231

- Transformer
  - Double wound with earth screen to BS 171

- Rectifier
  - Full wave controlled thyristor/diode bridge

- Contactor
  - Mains failure contactor to BS 5424 Part 1

- Temperature Compensation
  - All lead acid cell systems supplied with transducer to monitor battery compartment temperature
  - Chargers pre-set for optimum performance in 20°C ambient
  - Charging voltage automatically adjusted to optimise battery life

- Low Battery Voltage Disconnect Circuit
- Fitted as standard to lead acid cell systems
- Automatically disconnects load from battery when battery voltage falls below pre-set level, during extended periods of mains supply failure
- Helps prevent potential damage from deep discharge
- Indicator remains lit until mains power restored and reset pressed

- Test Push Button
- Simulates a mains failure

- Metering and Display Panel
- Simple and easy to read status display
- LCD meter indicating battery voltage, battery current or battery compartment temperature. Voltage is default, others displayed using push buttons. Display mode indicated by LED:
  - Volts
  - Amps
  - Temperature - lead acid batteries only
- Charger indication LEDs
  - Power On
  - Maintained Lights (maintained systems only)
  - Float Mode
  - Current Limit
  - Full Charge
  - Boost mode (vented battery systems only)
- Alarm indication LEDs
  - Mains Fail
  - Charge Fail
  - Battery High Volts
  - Battery Low Volts
  - DC Earth Fault
  - Deep Discharge Protection (protection circuit has operated)
- Audible alarm fitted internally, with mute button on display, plus common volt free contacts for remote signalling of a fault condition and terminals for optional remote alarm unit

Installation Notes

- A full set of installation, operating and maintenance instructions is supplied with each system to assist the installer carry out the work efficiently and safely
- Adequate ventilation has been provided in the cubicle to allow a safe dispersal of gases but it is important to remember that when choosing where to locate systems, particularly those with large batteries, attention must be paid to ensuring a build-up of potentially explosive gases is avoided
- Please refer to the system design (see page 380) section for details of ventilation calculations
- Warning notices should be displayed on entry doors to battery rooms:

  BATTERY ROOM. EXTINGUISH ALL NAKED LIGHTS BEFORE ENTERING. NO SMOKING

Factory Fitted Options

- Dual Output Options
- Separate circuits on maintained systems for non-maintained and maintained luminaires/exit signs
- Suffix - MNM

- 3 Phase Failure Monitor
- Detects phase failure and energises output from the battery
- Suffix - P

- Multi-way Sub Circuit Monitor
- Detects mains lighting circuit failure and energises output from the battery
- Monitoring relays fitted inside cubicle and require supply from each mains lighting circuit
- Suffix - xMPF (x = number of circuits)

- Integral Distribution Board
- For output load circuits. MCB or HRC fuses

- Fire Alarm Relay
- Input contacts from building fire alarm panel
- Energises output from the battery when alarm signal received

Hold off relay monitor

Remote Mounted Options

- Remote Alarm Unit
- Visual and audible indication of system fault
- Sounder mute facility
- Surface mounting dimensions: (H)114 x (L)114 x (D)25mm
- Suffix - RAU2

- Sub Circuit Monitor
- Non load switching
- Monitors mains lighting circuits. Provides signal to central battery unit in the event of a sub circuit failure
- Standard units available to monitor 4, 8 or 12 sub circuits
- Multiple units can be used if more than 12 circuits require monitoring
- A keyswitch can be fitted if required, to enable simple testing by authorised user
- Unit dimensions: H250 x L265 x D130mm

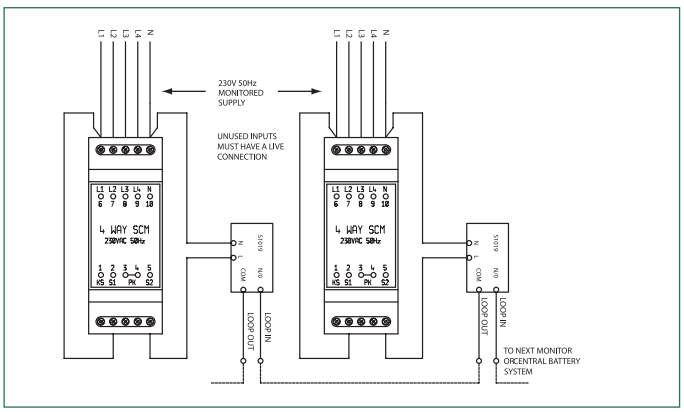
- Hold Off Relay Monitors
- Load switching
- Used to hold off maintained output from central battery unit, providing non-maintained luminaire operation
- Monitors mains lighting circuits. In the event of a sub circuit failure, contactor drops out, allowing the maintained supply to energise the emergency luminaires
- Standard units available to monitor 4, 8 or 12 sub circuits
- A keyswitch can be fitted if required, to enable simple testing by authorised user
- Unit dimensions: H250 x L265 x D130mm

Catalogue Numbers

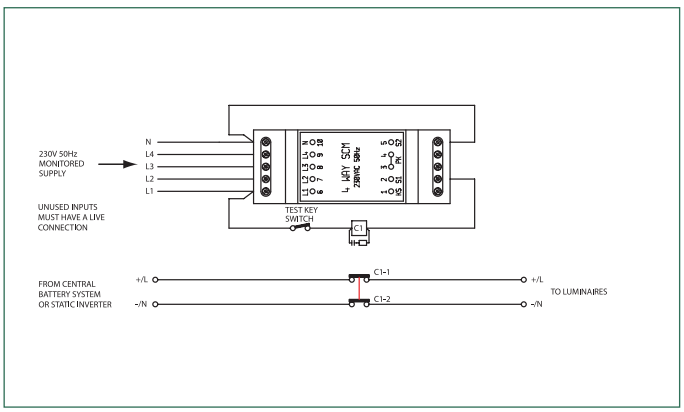
Number of Ways Monitored	Cat No of Sub Circuit Monitor	Cat No of Hold Off Relay Monitor
4	1SCM4	1HOR4
8	1SCM8	1HOR8
12	1SCM12	1HOR12

Use suffix /TS for addition of a test keyswitch, /NI for indicator, /RT for run on timer and /EC for EasiCheck

SCM and HOR units are designed to accept a single common neutral per enclosure, all monitored circuits connected to an individual unit must share a common neutral.



Typical sub-circuit monitor arrangement



Typical hold off relay arrangement

Systems with Valve Regulated Lead Acid Batteries

- Compact
- Reliable
- Cost effective
- Maintenance free
- Available with 3-5 year or 10 year design life batteries
- Low battery voltage disconnect circuit fitted as standard
- Charger temperature compensation fitted as standard

Selection Table: SLR Range - 10 year design life batteries

		1 Hour		2 Hour		3 Hour		
System Reference	**Volts**	**Watts**	**Amps**	**Watts**	**Amps**	**Watts**	**Amps**	**Cubicle**
SLR24/20*	24	250	10.6	152	6.4	110	4.7	†930
SLR24/28*	24	344	14.8	198	8.5	146	6.2	†930
SLR24/40*	24	572	24.7	326	14.0	243	10.4	†930
SLR24/75*	24	854	37.0	490	21.0	364	15.6	†930
SLR24/95*	24	1142	49.4	653	28.1	485	20.8	†930
SLR24/120*	24	1392	60.8	826	35.8	605	26.0	†931
SLR24/150*	24	1882	81.6	1104	47.6	797	34.1	†931
SLR24/200*	24	2285	98.7	1306	56.2	970	41.6	†931
SLR24/260*	24	3230	138.0	1695	69.0	2343	58.4	†932
SLR24/300*	24	3677	156.0	2123	90.8	1556	65.0	†932
SLR50/20*	50	500	10.6	303	6.4	220	4.7	†931
SLR50/28*	50	687	14.8	396	8.5	292	6.2	†931
SLR50/40*	50	1144	24.7	653	14.0	486	10.4	†931
SLR50/75*	50	1708	37.0	979	21.0	728	15.6	†931
SLR50/95*	50	2285	49.4	1306	28.1	970	20.8	†931
SLR50/120*	50	2734	60.8	1651	35.8	1210	26.0	†932
SLR50/150*	50	3763	81.6	2208	47.6	1594	34.1	†932
SLR50/200*	50	4570	98.7	2611	56.2	1939	41.6	†932
SLR50/260*	50	6461	138.0	3389	69.0	2733	58.4	†934
SLR50/300*	50	7354	156.0	4246	90.8	3111	65.0	†934
SLR110/20*	110	1126	10.6	682	6.4	496	4.7	†931
SLR110/28*	110	1547	14.8	890	8.5	657	6.2	†931
SLR110/40*	110	2575	24.7	1469	14.0	1093	10.4	†932
SLR110/75*	110	3845	37.0	2203	21.0	1637	15.6	†932
SLR110/95*	110	5141	49.4	2938	28.1	2182	20.8	†932
SLR110/120*	110	6264	60.8	3715	35.8	2722	26.0	†934
SLR110/150*	110	8467	81.6	4968	47.6	3586	34.1	†934
SLR110/200*	110	10282	98.7	5875	56.2	4363	41.6	†934
SLR110/260*	110	14537	138.0	7325	69.0	6150	58.4	†932 + 932
SLR110/300*	110	16546	156.0	9554	90.8	6950	65.0	†932 + 934

* Specify /NM1, /NM2, /NM3, /M1, /M2 or /M3 as appropriate

† See page 390 for cubical dimensions

Central Battery Systems

Loadstar AC/DC Systems

Systems with Vented Nickel Cadmium Batteries

- Extremely robust over a wide temperature range
- Reliable, with a 25 year service life
- Good "through life" costs
- Resistant to electrical and mechanical abuse
- Can be stored in any state of charge without damage
- Automatic and manual boost circuits fitted as standard

Selection Guide: NC Range

		1 Hour		2 Hour		3 Hour		
System Reference	**Volts**	**Watts**	**Amps**	**Watts**	**Amps**	**Watts**	**Amps**	**No of Cells**
NC24 Series	24	186 - 3078	7.7 – 126.9	118 - 1979	4.9 – 82.1	83 - 137	3.4 – 57.1	20
NC50 Series	50	389 - 6412	7.7 – 126.9	246 - 4122	4.9 – 82.1	174 - 2872	3.4 – 57.1	42
NC110 Series	110	855 - 14106	7.7 – 126.9	542 - 9070	4.9 – 82.1	383 - 6319	3.4 – 57.1	92

This table provides only an overview of possible system configurations. Contact our central systems technical sales department for full details, including cubicle types required. Non-maintained or maintained operation can be specified on all systems

Systems with High Performance Plante Batteries

- 25 year service life
- Reliable
- Retains virtually full capacity throughout design life
- Low battery voltage disconnect circuit fitted as standard
- Charger temperature compensation fitted as standard

Selection Guide: HP Range

		1 Hour		2 Hour		3 Hour		
System Reference	**Volts**	**Watts**	**Amps**	**Watts**	**Amps**	**Watts**	**Amps**	**No of Cells**
HP24 Series	24	236 - 2379	10.0 -102.2	148 - 1474	6.3 - 61.8	111 - 1111	4.6 - 46.2	13
HP50 Series	50	473 - 4758	10.0 - 02.2	296 - 2948	6.3 - 61.8	223 - 2215	4.6 - 46.2	26
HP110 Series	110	1001 - 10065	10.0 - 02.2	627 - 6237	6.3 - 61.8	473 - 4686	4.6 - 46.2	55

This table provides only an overview of possible system configurations. Contact our central systems technical sales department for full details, including cubicle types required. Non-maintained or maintained operation can be specified on all systems.

Systems with Flat Plate Batteries

- 10 year service life
- Low battery voltage disconnect circuit fitted as standard
- Charger temperature compensation fitted as standard

Selection Guide: HP Range

		1 Hour		2 Hour		3 Hour		
System Reference	**Volts**	**Watts**	**Amps**	**Watts**	**Amps**	**Watts**	**Amps**	**No of Cells**
FP24 Series	24	247 - 1482	10.6 - 63.6	164 - 983	6.6 - 39.6	122 - 733	5.0 - 30.0	13
FP50 Series	50	475 - 2850	10.6 - 63.6	315 - 1890	6.6 - 39.6	235 - 1410	5.0 - 30.0	26
FP110 Series	110	1045 - 6270	10.6 - 63.6	693 - 4158	6.6 - 39.6	517 - 3102	5.0 - 30.0	55

This table provides only an overview of possible system configurations. Contact our central systems technical sales department for full details, including cubicle types required. Non-maintained or maintained operation can be specified on all systems

Economy AC/DC

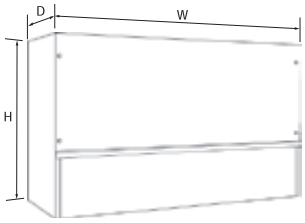
Where the benefits of central control and maintenance are desired in small premises, the Economy range of central battery systems provides a competitive solution. The compact wall mounted cubicle can be unobtrusively mounted in non-public areas, in buildings such as restaurants, pubs and community centres. All units have a 24V nominal output, with different output rating options to suit a wide range of applications. Available with 1 or 3 hour duration and non-maintained or maintained operation, all units are supplied with maintenance free valve regulated lead acid batteries. Offering reliability and non-disruptive maintenance, Economy systems offer a viable alternative to self contained emergency lighting.

- Competitive central battery system
- Compact wall mounted cubicle
- Maintained and non-maintained mode options
- Maintenance free valve regulated lead acid batteries
- Choice of battery design life - 3 to 5 or 10 years
- DC power supply unit option
- Low maintenance
- Low cost

Specification

- Battery Charger
  - Solid state, constant voltage charge control module
  - Fully automatic
  - Full recharge within 24 hours of a rated discharge
  - Current limit facility, preventing overcharging or damage to the system in the event of battery failure or fault
  - Input protection by fuse to BS88
- Battery
  - Valve regulated lead acid
  - Choice of 3 to 5, or 10 year design life
- Input Circuits
  - Cable entries on top of cubicle
  - Single phase 230V ± 10% AC 50Hz supply
  - Input terminals and fuse DIN-rail mounted and easily accessible
- Load Circuits
  - Substantial DIN-rail mounted output terminals
  - Optional double pole HRC fuses
- Monitoring Circuits
  - Terminals provided for connection of remote switch on maintained units
- Cables
  - Compliant with BS6231
- Transformer
  - Double wound with earth screen to BS171
- Rectifier
  - Full wave controlled thyristor/diode bridge
- Low Battery Voltage Disconnect Circuit
  - Automatically disconnects load from battery in the event of extended mains failure
  - Helps prevent potential damage of deep discharge
  - Automatically resets when mains supply is restored
- Indicators
  - Simple status display
  - Indication lamps
    - Power On
    - Maintained Lights (maintained systems only)
- Cubicles
  - 1.2mm zinc coated steel panels with powder coat RAL7032 light pebble grey finish
  - Wall mounting design
  - Access to charger and battery via removable cover

Dimensions



H (mm)	W (mm)	D (mm)
450	745	270

Installation Notes

- A full set of installation, operating and maintenance instructions is supplied with each system to assist the installer carry out the work efficiently and safely
- Adequate ventilation has been provided in the cubicle to allow a safe dispersal of gases but it is important to remember that when choosing where to locate systems, particularly those with large batteries, attention must be paid to ensuring a build-up of potentially explosive gases is avoided
- Refer to the system design (see page 373) section for ventilation calculations
- Warning notices should be displayed on entry doors to battery rooms:

  BATTERY ROOM. EXTINGUISH ALL NAKED LIGHTS BEFORE ENTERING. NO SMOKING

Options

- Customised versions suitable for use as DC power supplies
  - Factory modification to operate as a DC power supply with battery backup
  - Suitable as power supply to door release units, relay coils etc
  - Custom designed to meet specific requirements

Selection Table: SLA Range

		1 Hour		3 Hours		
System Reference	Volts	Watts	Amps	Watts	Amps	Battery Life
SLA24/10*	24	141	6.1	61	2.6	3-5 Yr
SLA24/15*	24	211	9.1	92	3.9	3-5 Yr
SLA24/24*	24	337	14.5	147	6.3	3-5 Yr
SLA24/38*	24	534	23.0	233	10.0	3-5 Yr
SLA24/65*	24	720	30.0	399	17.1	3-5 Yr
SLAR24/24*	24	337	14.5	147	6.3	10 Yr
SLAR24/38*	24	534	23.0	233	10.0	10 Yr
SLAR24/65*	24	720	30.0	399	17.1	10 Yr


PGM 17
THOR

Loadstar AC/AC Systems

IP21

BS EN50171

The Loadstar range of AC/AC static inverter units offer the opportunity to create a discreet emergency lighting system, utilising suitable standard mains luminaires without modification. Small or decorative compact fluorescent luminaires can also be easily incorporated. Loadstar AC/AC systems offer many benefits, including higher light levels in emergency mode, as all lamps in the luminaire are usually energised by the emergency supply. Mains voltage and lower currents enable cables of smaller cross sectional area to be used with low voltage AC/DC systems, without unacceptable levels of voltage drop. The proven and reliable modular design ensures a cost effective emergency lighting solution.

- BSI Kitemarked for peace of mind
- Cost effective modular design
- Standard mains luminaires used for emergency lighting
- Fully complies with BS EN50171:2001
- Digital display to clearly indicate system status
- EasiCheck compatible versions available
- Low maintenance
- Low running cost due to passive stand-by operation
- Three phase systems available

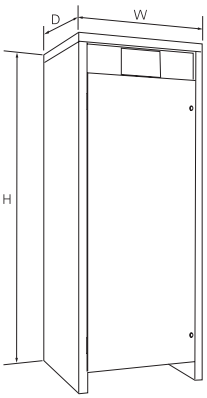
Central Battery Systems

Loadstar AC/AC Systems

System Operation

- In mains healthy condition, the system charges the batteries and stores power, ready for emergency operation
- In mains healthy condition, the power to luminaires designated for emergency use is supplied from the normal mains, via a by-pass contactor inside the cubicle. This may be switched, using a "maintained lights" switch (optional extra) or by use of a remote switch connected to terminals provided
- Local change-over switching can be achieved using an ACM1 module, controlling single or multiple luminaires (if fed from common switched mains supply - max load 750VA). The system will then supply normal mains power or emergency power via the inverter, dependant on status of mains supply at the static inverter
- In the event of a mains failure, the system provides emergency power to dedicated mains slave or designated standard mains luminaires, until mains power is restored (or for the rated duration of the system in the event of extended mains failure)
- Output voltage, from the system via the inverter, is 230V AC nominal
- Standard mains luminaires require no modification to operate with the static inverter (unless ACM1 change-over module is fitted integrally). All lamps in multi-lamp luminaires will be lit during mains failure, unless separate control gear is provided for individual lamps
- Sub-circuit monitoring and hold off relays can be added to the system to energise the emergency luminaires in the event of a localised mains circuit failure, if the ACM1 module is not used
- Full detail of ACM1 module is shown on page 366

Dimensions



Cubicle Ref	H (mm)	W (mm)	D (mm)
931	1200	715	755
932	1800	715	755
934	1800	1015	755

Depth of 931/2/4 includes a 75mm spacer fitted to back, to ensure ventilation grilles are not obstructed. Dimensions are for guidance only and may be subject to change.

Energy Efficient Standby Operation

The Loadstar range of AC/AC static inverter systems are designed specifically for long term sustainability, reduced carbon footprint and reduced running cost without compromising on the products performance criteria. Due to the passive stand-by operation of the inverter only operating when required, the quiescent running power is minimised while maximising equipment lifetime and reduced running cost.

Standard Specification

- Cubicles
  - 1.6mm zinc coated steel panels with powder coat RAL7032 light pebble grey finish
  - Plinth base feature to prevent build up of moisture/corrosive materials and aid mechanical handling by fork or pallet truck - 3 standard size cubicles, for combined charger/inverter/battery, charger/inverter only or battery only
  - Small systems require only one cubicle. Larger systems housed in multiple sets (see selection tables)
  - Electrical control gear and battery compartments are segregated, with lockable access door(s)
  - Battery compartments supplied, where appropriate with separate tiered sections, to enable ease of electrolyte level inspection
  - Separate fixed facia panel for mounting control/display panel
  - Option of open battery racks on larger systems

- Battery Charger
  - Solid state, constant voltage charge control module
  - Fully automatic
  - Full recharge within 24 hours of a rated discharge
  - Recharge to 80% capacity within 12 hours, complying with BS EN 50171:2001
  - Manual boost switch on systems with vented battery cells
  - Current limit facility, preventing overcharging or damage to the system in the event of battery failure or fault
  - Outputs have low AC ripple currents for maximum battery life and in compliance with BS EN 50171:2001
  - Input protection by MBC to BS 3871 Part 1 or BS 4752 Part 1

- Battery
  - Systems can be specified with:
    - Valve regulated lead acid
    - Vented nickel cadmium
    - High performance plante
  - See selection tables/guides for battery characteristics

- Fusegear
  - Removable industrial HRC fuses, complying with BS 88

- Input Circuits
  - Cable entry via removable gland plate on top of cubicle
  - Single phase 230V ± 10% AC 50Hz supply. Other input voltages on request
  - Input terminals and MBC's DIN-rail mounted and easily accessible

- Load Circuits
  - Substantial DIN rail mounted output terminals
  - Option of integral distribution board (MCB or HRC fuses)

- Output
  - Systems are available in single phase and true three phase (three phase + neutral) output
  - Standard systems offered are designed to 0.85 power factor, however unity power factor systems are available on request
  - Option for 50Hz or 60Hz

Standard Specification cont'd

- Monitoring Circuits
- Terminals provided for connection of remote monitors and controls

- Cables
- Compliant with BS 6231

- Transformer
- Double wound with earth screen to BS 171

- Rectifier
- Full wave controlled thyristor/diode bridge

- Contactor
- Mains failure contactor to BS5424 Part 1

- Temperature Compensation
- All lead acid cell systems supplied with transducer to monitor battery compartment temperature
- Chargers pre-set for optimum performance in 20°C ambient
- Charging voltage automatically adjusted to optimise battery life

- Low Battery Voltage Disconnect Circuit
- Automatically shuts down the inverter when battery voltage falls below pre-set level, during extended periods of mains supply failure
- Helps prevent potential damage from deep discharge
- Indicator remains lit until mains power restored and reset pressed

- Inverter
- Extensively proven and reliable modular design
- Systems with ratings up to 4 kVA incorporate a single module rated at 1.25 kVA, 2.5 kVA or 4 kVA
- Larger systems utilise multiple modules in parallel to provide a single common output, equal to sum of individual ratings
- Complies fully with BS EN50171:2001
- Modules can be quickly and easily removed/replaced, aiding installation and maintenance
- See table for detailed technical specification

- Test Push Button
- Simulates a mains failure

- Frequency
- 50 Hz +/- 0.01% (60 Hz option)

- Metering and Display Panel

  Simple and easy to read status display
- LCD meter indicating battery voltage, battery current or battery compartment temperature. Voltage is default, others displayed using push buttons. Display mode indicated by LED:
  - Volts
  - Amps
  - Temperature - lead acid batteries only
- Charger indication LEDs
  - Power On
  - Maintained Lights (maintained systems only)
  - Float Mode
  - Current Limit
  - Full Charge
  - Boost mode (vented battery systems only)
- Alarm indication LEDs
  - Mains Fail
  - Charge Fail
  - Battery High Volts
  - Battery Low Volts
  - DC Earth Fault
  - Deep Discharge Protection (protection circuit has operated)
- Inverter indication LEDs
  - Inverter Running
  - Inverter Overload (optional alarm package)
  - Inverter High Volts (optional alarm package)
  - Inverter Low Volts (optional alarm package)
- Audible alarm fitted internally, with mute button on display plus common volt free contacts for remote signalling of a fault condition and terminals for optional remote alarm unit

Inverter Technical Specification

Output Voltage	Pre-settable in the range 220-240V AC. Default setting is 230V AC. Voltage tolerance is 2% on loads of 0-100% of system rating
Frequency	50 or 60Hz. ±0.01%. Standard setting 50Hz. Waveform: Sinusoidal
Voltage Regulation	Static 2%, dynamic 6%
Isolation	2kv rms between input and output terminals
Total Harmonic Distortion	Less than 3% into a linear load
Power Factor	Will supply loads in the 0.3 lag - 0.3 lead range
Overload voltage	200% for 10 seconds, 125% for 20 minutes without reduction in output
Start-up time	Standard 30mS soft start
Noise Level	Less than 55dBA at 1 metre
Efficiency	85 - 89%
Protection	DC input and AC output MCBs DC input reverse polarity protection Short circuit protection Pre-charge protection fuse Reverse-fed mains proof
Low Voltage Shut down	Inverter module(s) automatically shut down when battery discharges to a pre-set level. Re-set is following a combination of the restoration of the mains supply and an increase in battery voltage above the disconnect threshold level
	Residual current drain when the disconnect circuit has operated is less than 1mA per module
Inhibit	An inhibit switch to control the inverter is fitted on a user control pcb in the cubicle
Technology	Pulse width modulation with high frequency switching

Installation Notes

- Note - BS EN 60598-2-22 prohibits the use of glow starters in fluorescent luminaires used for emergency lighting.
- A full set of installation, operating and maintenance instructions is supplied with each system to assist the installer carry out the work efficiently and safely
- Adequate ventilation has been provided in the cubicle to allow a safe dispersal of gases but it is important to remember that when choosing where to locate systems, particularly those with large batteries, attention must be paid to ensuring a build-up of potentially explosive gases is avoided
- Please refer to the system design (see page 380) section for details of ventilation calculations
- Warning notices should be displayed on entry doors to battery rooms:

  BATTERY ROOM. EXTINGUISH ALL NAKED LIGHTS BEFORE ENTERING. NO SMOKING

System Design

- To ensure a suitably rated system is selected, list the luminaires to be used, with their characteristics, to determine the wattage and VA power rating of the required inverter
- Where possible, utilise luminaires with high frequency control gear, compact fluorescent luminaires with high power factor correction, or dedicated 230V AC mains slave luminaires, to minimise the required VA rating of the inverter
- Using uncorrected compact fluorescent luminaires with poor power factor, will increase the size of inverter module required, leading to increased capital cost and space requirements
- See page 381 for an example of determining the required inverter rating
- For details of static inverter systems with ratings above those listed, please contact our central systems technical sales department
- It should be noted that multiple smaller units can often be more cost effective than a single large system. Distribution costs can be substantially reduced by locating units throughout a large building
- BS EN 60598-2-22 prohibits the use of glow starters in fluorescent luminaires used for emergency lighting
- Note - systems specified for emergency lighting use should not have other services connected to them

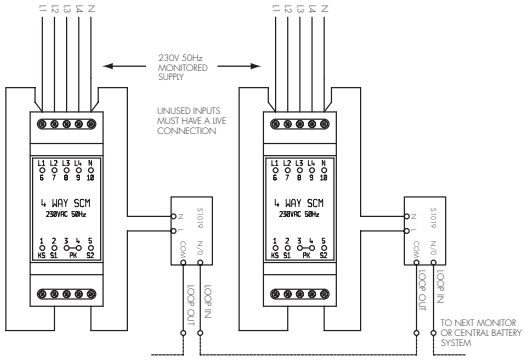
Factory Fitted Options

- 3 Phase Failure Monitor
- Detects phase failure and energises the inverter from the battery supply
- Suffix - PM

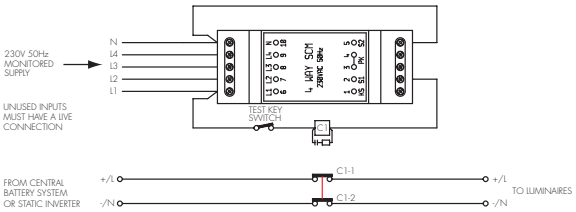
- Multi-way Sub Circuit Monitor
- Detects mains lighting circuit failure and energises the inverter from the battery supply
- Monitoring relays fitted inside cubicle and require supply from each mains lighting circuit
- Suffix - xMPF (x = number of circuits)

Remote Alarm Unit

Typical sub-circuit monitor arrangement



Typical hold off relay arrangement



Remote Mounted Options

- Remote Alarm Unit
- Visual and audible indication of system fault
- Sounder mute facility
- Surface mounting dimensions: H114 x L114 x D25mm
- Catalogue Number - RAU-2V1

- Sub Circuit Monitor
- Non load switching
- Monitors mains lighting circuits. Provides signal to central battery unit in the event of a sub circuit failure
- Standard units available to monitor 4, 8 or 12 sub circuits
- Multiple units can be used if more than 12 circuits require monitoring
- A keyswitch can be fitted if required to enable simple testing by authorised user
- Unit dimensions: (H)250 x (L)265 x (D)130mm

- Hold Off Relay Monitors
- Load switching
- Used to hold off maintained output from static inverter unit, providing non-maintained luminaire operation
- Monitors mains lighting circuits. In the event of a sub circuit failure, contactor drops out, allowing the maintained supply to energise the emergency luminaires
- Standard units available to monitor 4, 8 or 12 sub circuits, however monitors are available with up-to 24 circuits
- A keyswitch or supply healthy indicator can be fitted if required to enable simple testing by authorised user and visual indication of the supply condition
- Unit dimensions: H250 x L265 x D130mm

Catalogue Numbers

Number of ways monitored	Cat No of Sub Circuit Monitor	Cat No of Hold Off Relay Monitor
4	1SCM4	1HOR4
8	1SCM8	1HOR8
12	1SCM12	1HOR12

Use suffix /TS for addition of a test keyswitch, /NI for addition of supply healthy indicator, /RT for addition of run on timer.

SCM and HOR units are designed to accept a single common neutral per enclosure, all monitored circuits connected to an individual unit must share a common neutral.

Selection Table: AC/AC SLR Range, 0.85 Power Factor

System Reference 230V in / 230V out	Inverter Power Rating (kVA)	Output Watts (W)	1 Hour Autonomy	Cubicle Arrangement 2 Hr Autonomy	3 Hr Autonomy
AC1KVA/850/SLR*	1	850	931CBI	931CBI	931CBI
AC2KVA/1700/SLR*	2	1700	931CBI	932CBI	932CBI
AC2.5KVA/2125/SLR*	2.5	2125	931CBI	932CBI	932CBI
AC3KVA/2550/SLR*	3	2550	932CBI	932CBI	932CBI
AC4KVA/3400/SLR*	4	3400	932CBI	932CBI	934CBI
AC5KVA/4250/SLR*	5	4250	934CBI	934CBI	934CBI
AC6KVA/5100/SLR*	6	5100	934CBI	934CBI	932CI + 932B3
AC7.5KVA/6375/SLR*	7.5	6375	934CBI	932CI + 932B3	932CI + 934B2
AC8KVA/6800/SLR*	8	6800	934CBI	932CI + 932B3	932CI + 934B3
AC9KVA/7650/SLR*	9	7650	932CI + 932B3	932CI + 934B2	932CI + 934B3
AC10KVA/8500/SLR*	10	8500	932CI + 932B3	932CI + 934B2	932CI + 934B3
AC11KVA/9350/SLR*	11	9350	932CI + 932B3	932CI + 934B3	932CI + 2 x 932B3
AC12KVA/10200/SLR*	12	10200	932CI + 932B3	932CI + 934B3	932CI + 2 x 932B3
AC13KVA/11050/SLR*	13	11050	932CI + 932B3	932CI + 934B3	932CI + 932B3 + 934B3
AC14KVA/11900/SLR*	14	11900	932CI + 932B3	932CI + 934B3	932CI + 932B3 + 934B3
AC15KVA/12750/SLR*	15	12750	932CI + 932B3	932CI + 2 x 932B3	932CI + 932B3 + 934B3
AC16KVA/13600/SLR*	16	13600	932CI + 934B2	932CI + 2 x 932B3	932CI + 2 x 934B3
AC17.5KVA/14875/SLR*	17.5	14875	934CI + 934B2	934CI + 934B3 + 932B1	934CI + 3 x 932B3
AC18KVA/15300/SLR*	18	15300	934CI + 934B2	934CI + 934B3 + 932B3	934CI + 3 x 932B3
AC19KVA/16150/SLR*	19	16150	934CI + 934B2	934CI + 934B3 + 932B3	934CI + 2 x 934B3
AC20KVA/17000/SLR*	20	17000	934CI + 934B3	934CI + 2 x 934B2	934CI + 932B3 + 2 x 934B3
AC21KVA/17850/SLR*	21	17850	934CI + 932B3 + 932B1	934CI + 2 x 934B2	934CI + 932B3 + 2 x 934B3
AC22KVA/18700/SLR*	22	18700	934CI + 932B3 + 932B1	934CI + 3 x 932B3	934CI + 932B2 + 2 x 934B3
AC23KVA/19550/SLR*	23	19550	934CI + 932B3 + 932B1	934CI + 3 x 932B3	934CI + 932B2 + 2 x 934B3
AC24KVA/20400/SLR*	24	20400	934CI + 934B3	934CI + 3 x 932B3	934CI + 2 x 934B3 + 932B2
AC25KVA/21250/SLR*	25	21250	934FC + 932I + 934B3	934FC + 932I + 3 x 932B3	934FC + 932I + 2 x 934B3 + 932B3

System Reference 400V in / 400V out	Inverter Power Rating (kVA)	Output Watts (W)	1 Hour Autonomy	Cubicle Arrangement 2 Hr Autonomy	3 Hr Autonomy
AC26KVA/22100/SLR*/TPN4W	26	22100	934FC + 934I + 2 x 932B3	934FC + 934I + 2 x 934B3	934FC + 934I + 2 x 934B3 + 2 x 932B3
AC28KVA/23800/SLR*/TPN4W	28	23800	934FC + 934I + 934B3 + 932B1	934FC + 934I + 2 x 934B3 + 932B3	934FC + 934I + 3 x 934B3
AC30KVA/25500/SLR*/TPN4W	30	25500	934FC + 934I + 2 x 932B3	934FC + 934I + 2 x 934B3 + 932B2	934FC + 934I + 4 x 934B3
AC32KVA/27200/SLR*/TPN4W	32	27200	934FC + 934I + 934B3 + 932B3	934FC + 934I + 2 x 934B3 + 932B2	934FC + 934I + 4 x 934B3
AC34KVA/28900/SLR*/TPN4W	34	28900	934FC + 934I + 934B3 + 932B3	934FC + 934I + 2 x 934B3 + 932B3	934FC + 934I + 4 x 934B3 + 934B1
AC36KVA/30600/SLR*/TPN4W	36	30600	934FC + 934I + 934B3 + 932B3	934FC + 934I + 2 x 934B3 + 932B3	934FC + 934I + 4 x 934B3 + 934B1
AC38KVA/32300/SLR*/TPN4W	38	32300	934FC + 2 x 932I + 934B3 + 932B3	934FC + 2 x 932I + 3 x 934B3	934FC + 2 x 932I + 4 x 934B3 + 934B1
AC40KVA/34000/SLR*/TPN4W	40	34000	934FC + 2 x 932I + 2 x 934B3	934FC + 2 x 932I + 3 x 934B3	934FC + 2 x 932I + 5 x 934B3
AC42KVA/35700/SLR*/TPN4W	42	35700	934FC + 2 x 932I + 3 x 932B3	934FC + 2 x 932I + 4 x 934B3	934FC + 2 x 932I + 3 x 934B3 + 3 x 932B3
AC44KVA/37400/SLR*/TPN4W	44	37400	934FC + 2 x 932I + 3 x 932B3	934FC + 2 x 932I + 4 x 934B3	934FC + 2 x 932I + 5 x 934B3
AC46KVA/39100/SLR*/TPN4W	46	39100	934FC + 2 x 932I + 3 x 932B3	934FC + 2 x 932I + 4 x 934B3 + 934B1	934FC + 2 x 932I + 3 x 934B3 + 3 x 932B3
AC48KVA/40800/SLR*/TPN4W	48	40800	934FC + 2 x 932I + 2 x 934B3 + 932B3	934FC + 2 x 932I + 4 x 934B3 + 934B1	934FC + 2 x 932I + 6 x 934B3
AC50KVA/42500/SLR*/TPN4W	50	42500	934FC + 934I + 932I + 2 x 934B3 + 932B3	934FC + 934I + 932I + 4 x 934B3 + 934B1	934FC + 934I + 932I + 6 x 934B3
AC52KVA/44200/SLR*/TPN4W	52	44200	934FC + 934I + 932I + 2 x 934B3 + 932B3	934FC + 934I + 932I + 4 x 934B3 + 934B1	934FC + 934I + 932I + 4 x 934B3 + 4 x 932B3
AC54KVA/45900/SLR*/TPN4W	54	45900	934FC + 934I + 932I + 2 x 934B3 + 932B2	934FC + 934I + 932I + 4 x 934B3 + 934B1	934FC + 934I + 932I + 4 x 934B3 + 4 x 932B3
AC56KVA/47600/SLR*/TPN4W	56	47600	934FC + 934I + 932I + 2 x 934B3 + 932B2	934FC + 934I + 932I + 5 x 934B3	934FC + 934I + 932I + 4 x 934B3 + 4 x 932B3
AC58KVA/49300/SLR*/TPN4W	58	49300	934FC + 934I + 932I + 2 x 934B3 + 932B2	934FC + 934I + 932I + 4 x 934B3 + 934B1	934FC + 934I + 932I + 4 x 934B3 + 4 x 932B3
AC60KVA/51000/SLR*/TPN4W	60	51000	934FC + 934I + 932I + 2 x 934B3 + 932B3	934FC + 934I + 932I + 4 x 934B3 + 934B1	934FC + 934I + 932I + 4 x 934B3 + 4 x 932B3

* Denotes the system autonomy i.e. AC1KVA/850/SLR3 = 3Hr Backup Autonomy

≈ Denotes cubicles size/quantity information is available on application

NOTE: The above solutions may change dependant on batteries availability

Selection Table: AC/AC SLR Range, Unity Power Factor

System Reference	Inverter Power Rating (kVA)	Output Watts (W)	1 Hour Autonomy	Cubicle Arrangement 2 Hr Autonomy	3 Hr Autonomy
AC1KVA/1000/SLR3*	1.0	1000	≈	≈	≈
AC2KVA/2000/SLR*	2.0	2000	≈	≈	≈
AC2.5KVA/2500/SLR*	2.5	2500	≈	≈	≈
AC3KVA/3000/SLR*	3.0	3000	≈	≈	≈
AC4KVA/4000/SLR*	4.0	4000	≈	≈	≈
AC5KVA/5000/SLR*	5.0	5000	≈	≈	≈
AC6KVA/6000/SLR*	6.0	6000	≈	≈	≈
AC7.5KVA/7500/SLR*	7.5	7500	≈	≈	≈
AC8KVA/8000/SLR*	8.0	8000	≈	≈	≈
AC9KVA/7650/SLR*	9.0	9000	≈	≈	≈
AC10KVA/1000/SLR*	10.0	10000	≈	≈	≈
AC11KVA/11000/SLR*	11.0	11000	≈	≈	≈
AC12KVA/12000/SLR*	12.0	12000	≈	≈	≈
AC13KVA/13000/SLR*	13.0	13000	≈	≈	≈
AC14KVA/14000/SLR*	14.0	14000	≈	≈	≈
AC15KVA/15000/SLR*	15.0	15000	≈	≈	≈
AC16KVA/16000/SLR*	16.0	16000	≈	≈	≈
AC17.5KVA17500/SLR*	17.5	17500	≈	≈	≈
AC18KVA/18000/SLR*	18.0	18000	≈	≈	≈
AC19KVA/19000/SLR*	19.0	19000	≈	≈	≈
AC20KVA/20000/SLR*	20.0	20000	≈	≈	≈
AC21KVA/21000/SLR*	21.0	21000	≈	≈	≈
AC22KVA/22000/SLR*	22.0	22000	≈	≈	≈
AC23KVA/23000/SLR*	23.0	23000	≈	≈	≈
AC24KVA/24000/SLR*	24.0	24000	≈	≈	≈
AC25KVA/25000/SLR*	25.0	25000	≈	≈	≈
AC26KVA/26000/SLR*	26.0	26000	≈	≈	≈
AC28KVA/28000/SLR*	28.0	28000	≈	≈	≈
AC30KVA/30000/SLR*	30.0	30000	≈	≈	≈
AC32KVA/32000/SLR*	32.0	32000	≈	≈	≈
AC34KVA/34000/SLR*	34.0	34000	≈	≈	≈
AC36KVA/36000/SLR*	36.0	36000	≈	≈	≈
AC38KVA/38000/SLR*	38.0	38000	≈	≈	≈
AC40KVA/40000/SLR*	40.0	40000	≈	≈	≈
AC42KVA/42000/SLR*	42.0	42000	≈	≈	≈
AC44KVA/44000/SLR*	44.0	44000	≈	≈	≈
AC46KVA/46000/SLR*	46.0	46000	≈	≈	≈
AC48KVA/48000/SLR*	48.0	48000	≈	≈	≈
AC50KVA/50000/SLR*	50.0	50000	≈	≈	≈
AC52KVA/52000/SLR*	52.0	52000	≈	≈	≈
AC54KVA/54000/SLR*	54.0	54000	≈	≈	≈
AC56KVA/56000/SLR*	56.0	56000	≈	≈	≈
AC58KVA/58000/SLR*	58.0	58000	≈	≈	≈
AC60KVA/60000/SLR*	60.0	60000	≈	≈	≈

* Denotes the system autonomy i.e. AC1KVA/850/SLR3 = 3Hr Backup Autonomy

≈ Denotes cubicles size/quantity information is available on application

Typhoo Tea
Merseyside

9

Systems with Valve Regulated Lead Acid Batteries

- Compact
- Reliable
- Cost effective
- Maintenance free, 10 year design life batteries
- Low battery voltage disconnect circuit fitted as standard
- Charger temperature compensation fitted as standard

Systems with Vented Nickel Cadmium Batteries

- Extremely robust over a wide temperature range
- Reliable, with a 25 year service life
- Good "through life" costs
- Resistant to electrical and mechanical abuse
- Can be stored in any state of discharge without damage
- Automatic and manual boost circuits fitted as standard

Systems with High Performance Plante Batteries

- 20 year service life
- Reliable
- Retains virtually full capacity throughout design life
- Low battery voltage disconnect circuit fitted as standard
- Charger temperature compensation fitted as standard

Selection Guide: AC/NC Range

System Reference	Inverter Power Rating (kVA)	Inverter Wattage
AC/NC Series	1.0 - 25.0	500 - 21250

This guide provides only an overview of possible system configurations. Contact our central systems technical sales department for full details, including cubicle arrangement. 1, 2 or 3 hour autonomy systems available

Selection Guide: AC/HP Range

System Reference	Inverter Power Rating (kVA)	Inverter Wattage
AC/HP Series	1.0 - 25.0	500 - 21250

This guide provides only an overview of possible system configurations. Contact our central systems technical sales department for full details, including cubicle arrangement. 1, 2 or 3 hour autonomy systems available


Easton College
Nolfolk

Shangri La Hotel
Dubai

Compact AC/AC

IP21

BS EN50171

Many features normally only associated with larger units are included in the standard specification of the Compact AC/AC static inverter system. The inverter has a rated output of 500VA/400W or 600VA/510W and benefits from 4 independently fused outputs, battery deep discharge protection, automatic temperature compensation and a clear, informative system status display panel. The unit also fully complies with the latest BS EN 50171:2001 standard. An output voltage of 230V AC permits any suitable, unmodified mains luminaires to be operated at full output in emergency mode.

- Competitive 500VA or 600VA static inverter system
- Compact - ideal for smaller installations
- Fully complies with BS EN 50171:2001
- Four separately fused outputs
- Digital display to clearly indicate system status
- EasiCheck compatible version available

Central Battery Systems

Compact AC/AC

System Operation

- In mains healthy condition, the system charges the batteries and stores power, ready for emergency operation
- In mains healthy condition, the power to luminaires designated for emergency use is supplied from the normal mains via a by-pass contactor inside the cubicle
- In the event of a mains failure, the system provides emergency power to dedicated mains slave or designated standard mains luminaires, until mains power is restored (or for the rated duration of the system in the event of extended mains failure)
- Output voltage, from the system via the inverter, is 230V AC nominal
- Local change-over switching can be effected using an ACM1 module, controlling single or multiple luminaires (if fed from common switched mains supply)
- Suitable standard mains luminaires* require no modification to operate with the static inverter (unless ACM1 change-over module is integral). All lamps in multi-lamp luminaires will be lit during mains failure, unless separate control gear is provided for individual lamps.
  *High inrush LED or compact fluorescent may not be suitable
- Sub-circuit monitoring and hold off relays can be added to the system to energise the emergency luminaires in the event of a localised mains circuit failure, if the ACM1 module is not used
- Full details of modes of operation is shown on pages 376 - 379
- Full details of ACM1 module is shown on page 366

Metering and Display Panel

- Simple and easy to read status display
- LCD meter indicating battery voltage or current reading mode indicated by LED:
  - Volts
  - Amps
- Indication LEDs
  - Power On
  - Charge Fail
  - Battery High/Low Volts
  - Deep Discharge Protection (protection circuit has operated)
  - Inverter Running

Remote Mounted Options

- Remote Alarm Unit
- Sub Circuit Monitor
- Hold Off Relay Monitor
- ACM1s

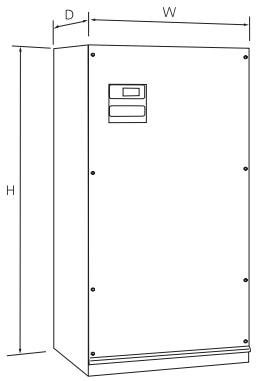
Full details of these options can be found on page 399

Design and Installation Notes

- To ensure the system is suitably rated, list the luminaires to be used, with their characteristics, to ensure the wattage and VA power rating of the inverter is not exceeded
- Using fluorescent luminaires with poor power factor will increase the VA load
- Note - BS EN 60598-2-22 prohibits the use of glow starters in fluorescent luminaires used for emergency lighting.
- A full set of installation, operating and maintenance instructions is supplied with each system to assist the installer carry out the work efficiently and safely
- Adequate ventilation has been provided in the cubicle to allow a safe dispersal of gases but it is important to remember that when choosing where to locate systems, particularly those with large batteries, attention must be paid to ensuring a build-up of potentially explosive gases is avoided
- Please refer to the system design (see page 380) section for details of ventilation calculations
- Warning notices should be displayed on entry doors to battery rooms:

  BATTERY ROOM. EXTINGUISH ALL NAKED LIGHTS BEFORE ENTERING. NO SMOKING

Dimensions



H (mm)	W (mm)	D (mm)
970	530	400

Catalogue Numbers

System Reference	Inverter Output Rating (VA)	Output Watts	Standby Time	Weight (kg)
AC500VA/M3	500	400	3 Hours	135.0
AC600VA/M3	600	510	3 Hours	136.00

Specification

General	
Cubicle	1.6mm zinc coated steel panels with powder coat RAL7032 light pebble grey finish. Removable cover retained by screws. Cable entries via removable top gland plate
Batteries	Valve regulated lead acid, 10 year design life
Charger and controls	
Mains supply	230V ± 10% AC single phase supply, 50 Hz
Input control	MCB to BS3871 Pt 1, or BS4752 Pt 1
Fusegear	HRC type to BS88
Terminals	DIN-rail mounted near to cable entry
Transformer	Double wound with earth screen to BS171
Rectifier	Full wave controlled thyristor/diode bridge
Contactor	Standard contactors comply with requirements of BS5424
Charger	Constant voltage, current limited type with electronic solid state controller. Voltage controlled to within 2% of setting at up to 10% mains supply variations. Full recharge within 24 hours. 80% capacity within 12 hours. Current limit facility
Deep discharge protection	Fitted as standard. Automatic shut down of inverter when battery voltage falls below pre-set level, during extended periods of mains supply failure
Cables	Compliant with BS6231
Load circuits	4 independent fused output circuits
Monitoring circuits	Terminals provided for connection of remote monitors and controls
Temperature compensation	Fitted as standard. Charger voltage is automatically adjusted with reference to ambient temperature to optimise charging and battery life. Pre-set for optimum performance at 20°C
Test push button	Simulates mains failure
Display panel	Composite fascia with LCD display and LED indicators
Alarm warning	Audible alarm fitted internally plus common volt free contacts for remote signalling of a fault condition and terminals for remote alarm unit option
Inverter	
Output voltage	Pre-settable in the range 220-240V AC. Default setting is 230V AC. Voltage tolerance is 2% on loads of 0-100% of system rating
Frequency	50Hz. ±0.1%. Waveform: Sinusoidal
Voltage regulation	Static 2%, dynamic 6%
Isolation	1kv rms between input and output terminals
Total harmonic distortion	Typically 3% or better. Max. 10%
Power factor	Will supply loads in the 0.7 lag - 0.7 lead range
Overload	200% for 10 seconds, 125% for 20 minutes without reduction in output voltage
Start-up time	Standard 300mS. Soft start
Noise level	Effectively silent on both charge and discharge
Efficiency	83% nominal. Typically 82-85%
Protection	DC input protection. AC output fuses DC input reverse polarity protection Short circuit protection Pre-charge protection fuse
Low voltage shut down	Inverter module automatically shuts down when battery discharges to a pre-set level. Re-set is automatic following the restoration of the mains supply
Inhibit	An inhibit switch to control the inverter is fitted on the main PCB in the cubicle
Technology	Pulse width modulation with high frequency switching

Switch Tripping Units

IP21

Eaton battery chargers for switchgear tripping and closing have been developed from the experience gained from many years of designing and manufacturing sophisticated battery charging and control equipment. Designed to provide a continuous DC supply for operating switchgear and protection equipment, these latest units are supplied with a comprehensive alarm, metering and indication package as standard. The informative and clear display panel is fixed to the fascia of both wall and floor standing units, with a remote alarm unit as an option. Extremely reliable and easy to install, these units provide a competitively priced solution.

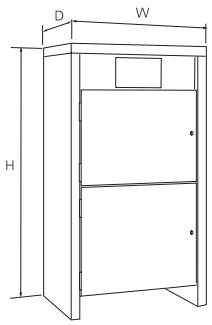
- Proven and reliable units
- Digital display to clearly indicate system status
- Comprehensive alarm and indication package
- Choice of vented nickel cadmium or valve regulated lead acid batteries
- Systems available to meet exact project requirements

Metering and Display Panel

- Simple and easy to read status display
- LCD meter indicating battery voltage and the option of battery current or battery compartment temperature. Voltage is default, others displayed using push buttons (If options specified). Display mode indicated by LED:
  - Volts
  - Amps (optional)
  - Temperature (lead acid battery systems only)
- Charger indication LEDs
  - Power On
  - Float Mode
  - Current Limit
  - Full Charge
  - Boost mode (nickel cadmium battery systems only)
- Alarm indication LEDs
  - Mains Fail
  - Charge Fail
  - Battery High Volts
  - Battery Low Volts
  - DC Earth Fault

Audible alarm fitted internally, with mute button on display. Common set of volts free changeover contacts for remote signalling and output for remote alarm unit

Dimensions



Cubicle Ref	H (mm)	W (mm)	D (mm)
Wall (S Type)	450	745	270
931	1200	715	680
932	1800	715	680

Dimensions are for guidance only and may be subject to change, depending on precise specification required

Installation Notes

- A full set of installation, operating and maintenance instructions is supplied with each system to assist the installer carry out the work efficiently and safely
- Adequate ventilation has been provided in the cubicle to allow a safe dispersal of gases but it is important to remember that when choosing where to locate systems, particularly those with large batteries, attention must be paid to ensuring a build-up of potentially explosive gases is avoided
- Refer to system design (see page 380) section for ventilation calculations
- Warning notices should be displayed on battery room doors:

BATTERY ROOM. EXTINGUISH ALL NAKED LIGHTS BEFORE ENTERING. NO SMOKING

Options

- Remote Alarm Unit
- Integral HRC fused distribution board (110V systems only)
- Integral MCB distribution board (110V systems only)

Specification

General	
Cubicle (30V systems)	Wall mounted 1.2mm zinc coated steel panels with powder coat RAL7032 light pebble grey finish. Removable cover retained by screws. Steel divider separates control gear and battery compartments
Cubicle (110V systems)	1.6mm zinc coated steel panels with powder coat RAL7032 light pebble grey finish. 2 lockable doors and segregated control gear/battery compartments. Cable entries via removable top gland plate
Batteries	Vented nickel cadmium, 25 year design life valve regulated lead acid, 10 year design life
Charger and controls	
Mains supply	230V ± 10% AC single phase supply, 50 Hz. Other input voltages available
Input control	MCB to BS3871 Pt 1. Type D
Input terminals	DIN-rail mounted near to cable entry
Transformer	Double wound with earth screen to BS171
Rectifier	Full wave controlled thyristor/diode bridge
Charger	Constant voltage, current limited type with electronic solid state controller. Voltage controlled to within 1% of setting at ±10% mains supply variations. Full recharge within 24 hours.
Cables	Compliant with BS6231
Output terminals	DIN-rail mounted
Temperature compensation	Fitted as standard to lead acid battery units. Charger voltage is automatically adjusted with reference to ambient temperature to optimise charging and battery life. Pre-set for optimum performance at 20°C
Display panel	Composite fascia with LCD display and LED indicators
Alarm warning	Audible alarm fitted internally plus common volt free contacts for use in conjunction with integral on-board power supply to operate the remote alarm unit option

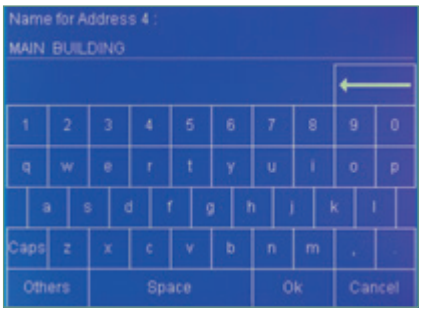
Catalogue Numbers

System Reference	Nominal Battery Ah Capacity	Nominal System Voltage	Output Voltage Float	Output Voltage Max	No of Cells	Cubicle Type
Systems With Nickel Cadmium Batteries						
ST30/10/*	10	30	36	41.25	25	Wall(S)
ST30/18/*	18	30	36	41.25	25	Wall(S)
ST30/24/*	24	30	36	41.25	25	Wall(S)
ST30/30/*	30	30	36	41.25	25	Wall(S)
FST110/10/*	10	110	132.5	151.8	92	932
FST110/18/*	18	110	132.5	151.8	92	932
FST110/24/*	24	110	132.5	151.8	92	932
FST110/30/*	30	110	132.5	151.8	92	932
Systems with Valve Regulated Lead Acid Batteries						
FSLRT110/19/*	19	108	122.5	122.5	54	931
FSLRT/110/29/*	29	108	122.5	122.5	54	931
FSLRT110/38/*	38	108	122.5	122.5	54	932

Notes:
1. * = Specify charger size. Contact us for guidance
2. Diode regulators can be fitted to control the output terminal voltage to pre-determined limits. Contact central systems technical sales for details
3. Other size batteries and chargers are available on request

EasiCheck 1.5 Slave

IP20



EasiCheck 1.5 Slave is a purpose designed emergency lighting testing system for central battery slave systems, providing a simple to operate, labour saving alternative to manual testing. Avoiding the need for separate secure manual test keys and the need to manually inspect fittings during and after tests, EasiCheck 1.5 automatically tests the emergency lighting luminaires and central battery system at a user controlled, convenient, non-disruptive time, then gathers the test results and displays them in a simple to understand manner at a central control panel. EasiCheck 1.5 has been designed to ensure quick and simple installation, ease of operation and simple system re-configuration. System extensions and changes can easily be incorporated without the need for specialist software or re-programming.

- Reduces time and cost of testing and maintenance as required by law
- Testing in compliance with EN50172
- Easy to use touch screen panel
- 250 luminaire capacity per panel
- Stand alone or network up to 63 panels
- Event logs and test reports can be downloaded or printed
- Selection of central monitoring software (text or graphic)

System Operation

The main element of the EC1002TS is a large (120mm x 90mm visible area) touch screen display, which provides comprehensive user information and also acts as a multifunctional keypad.

The EC1002TS touch screen display automatically reconfigures to suit the selected function, for example, if the change device text menu option is selected, the touch screen is automatically formatted as a full QWERTY keyboard to enable fast and simple text entry.

The use of the touch screen display enables a wide range of user and engineering facilities to be incorporated into the panel whilst still offering simple operation. There are a number of system status LEDs (power on, emergency mode, general fault, system fault, comms fault, luminaire fault, test in progress, disable luminaire, fault indication) designed to give clear status information to non-technical users.

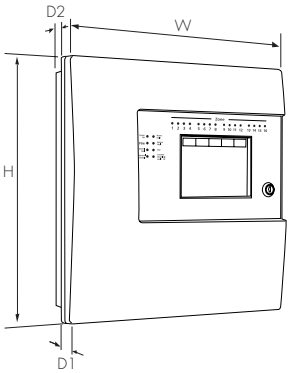
Panel is used to facilitate following functions:

- Set up test types and times
- Initiate manual tests
- Display real time single luminaire status
- View fault log/panel configuration
- Download/upload fault log and panel configuration
- Re-configure luminaire text locations for ease of installation and commissioning

An EasiCheck interface module is fitted into all suitable dedicated emergency luminaires and mains luminaires converted for emergency operation.

- Each module shall be addressed using a hand held programmer during installation with a unique address number in the range 0-250
- Every luminaire is connected to a 2 core data BUS cable in a loop configuration, which is linked back to the control panel. A single panel can accommodate up to 250 luminaires
- It is important to maintain accurate 'as fitted' drawings to identify the respective luminaire and its assigned address/location
- Text information can be allocated to each system component, during commissioning by an Eaton service engineer
- The panel can then be programmed to carry out automatic test sequences according to BS 5266/EN 50172 or any regional testing regime. Testing can also be initiated manually. All test data is sent back and stored at the control panel. Additionally, the system carries out continuous real time monitoring of all connected devices
- In the event of a fault, the precise location of the device is displayed at the control panel along with accurate details of the nature of the fault, time/date stamp and an alarm is raised
- The system can be enhanced by networking up to 63 panels. Central PC monitoring can also be incorporated

Dimensions



H (mm)	W (mm)	D1 (mm)	D2 (mm)
375	357	50	45

Catalogue Numbers

Cat No	Description
EC1002TS	EasiCheck1.5 Slave control panel
EC1002TSNC	EasiCheck1.5 Slave control panel (networked)
EC141	Luminaire interface module with changeover relay
EC140	Luminaire changeover relay (non-monitoring)
EC125	Luminaire interface module
EC160	Hand-held programmer
EC170EC2	Printer
EC400	LON/IP Echelon router
CFSFL01	Fibre optic router
EC460	Network booster

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Slave luminaires for use with central emergency lighting systems must be compatible with the central battery supply unit.

The most common types are:

- Dedicated slave luminaires, with specially designed housings and circuits
- Converted mains luminaires, which have been modified by the addition of an emergency circuit, normally to operate on 110V AC/DC supplies
- Mains luminaires which are suitable to be powered by 230V AC inverter systems

To be compatible with the power supply unit and to comply with the luminaire product standard, whilst being installed to meet the requirements of the BS 5266 Pt.1 code of practice, the luminaires should meet the following requirements:

- Voltage compatibility - the luminaire operating range must be within the central system output voltage range, minus an additional 4% cable voltage drop
- Static inverter systems - luminaires must fully meet the requirements of EN 60598-2-22, which ensures they are suitable for use as emergency luminaires

Eaton's systems and slave luminaires meet these requirements in full.

System and Luminaire Technical Data

Cat No	110V AC/DC	230V AC/DC
Central System Output		
Maintained voltage output range including cable voltage drop	89.1 - 116.6V	194.4 - 254.4V
Initial emergency output voltage range including cable voltage drop	99.0 - 110.0V	200.0 - 223.0V
End of duration output voltage range including cable voltage drop	89.0 - 99.0V	200.0 - 223.0V
Compatible Dedicated 8W Luminaires		
Minimum strike volts (0°C)	82.5V	198.0V
Minimum run volts (0°C)	82.5V	198.0V
Maximum run volts (0°C)	138.0V	264.0V
Converted or Dedicated Luminaire Fitted with SMCB Module		
Minimum strike volts (0°C)	95.0V	-
Minimum run volts (0°C)	82.5V	-
Maximum run volts (0°C)	138.0V	-

Note: SMCB units use changeover relays, so the maintained function should be provided by the normal mains control gear. However, the module will operate on either AC or DC enabling it to operate with a maintained central system in the emergency conditions.

Central Battery Systems

Slave Luminaire Technical Data

Power Consumption and Performance

Dedicated Slave

		AC/DC Systems 110V		AC/AC Systems 230V High Frequency Ballast		
Lamp Watts	**Type**	**Lumens**	**Amps**	**Lumens**	**Watts**	**VA**
8W	T5	275	0.07	272	8	9
11W	TC-S	-	-	900	14	16
2x21W	Tungsten	2x300	0.50	2x300	55	60

Mains Luminaires Converted with an AC/DC SMCB Unit

		AC/DC Systems 110V		AC/AC Systems 230V	
Lamp Watts	**Lamp Type**	**Lumens**	**Amps**	**Lumens**	**Amps**
18W	T8	350(0.44)	0.095	594(0.44)	11.20
36W	T8	650(0.33)	0.14	1105(0.33)	16.50
58W	T8	740(0.24)	0.165	1248(0.24)	19.54
70W	T8	700(0.18)	0.17	1179(0.18)	20.00
16W	2D	400(0.65)	0.11	-	-
28W	2D	500(0.40)	0.145	-	-
38W	2D	560(0.33)	0.15	-	-
9W	TC-S	250(0.71)	0.09	-	-
11W	TC-S	375(0.70)	0.10	-	-
13W	TC-DE	330(0.63)	0.10	-	-
18W	TC-DE/TC-L	330(0.63)	0.10	408(0.34)	11.80
26W	TC-DE	425(0.40)	0.13	684(0.38)	15.80
36W	TC-L	600(0.35)	0.15	928(0.32)	17.60

Mains Luminaires Powered from a Central Inverter

			230V AC/AC systems			
			High Frequency Ballast		Wire Wound Ballast	
Lamp Watts	**Lamp Type**	**Lumens**	**Watts**	**VA**	**Watts**	**VA**
18W	T8	1100	20.2	20.8	26	29.5
36W	T8	2700	38	39.2	43	45.3
58W	T8	4200	58.1	59.9	67	77
70W	T8	5300	72.4	74.6	80	92
16W	2D	850	17	17.9	21	45.7
28W	2D	1655	31.2	32.5	34	37.4
38W	2D	2300	43.2	45	45	49.5
13W	TC-DE	725	16.1	16.6	18	20.7
18W	TC-DE/TC-L	970	20.6	21	24	26.4
26W	TC-DE	1450	28.8	30	32	35.6
36W	TC-L	2300	37.6	38.4	45	53

Notes:

1. VA ratings assume power factor capacitors are fitted
2. Watts and VA figures based on typical control gear data, for system design purposes
3. The above lumen data is based on output from triphosphor lamps. De-rate by 15% if halophosphate lamps are used
4. Lumen output figures include the effects of lamp and luminaire ageing, end of discharge voltage and cable volt drop
5. Data for 230V AC/AC SMCB unit available on application

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