

Product Data



Permanent Inverter Charger

(Charger PSU – 12th July 2023)

Timekeeping and power back-up system for synchronous clock movements

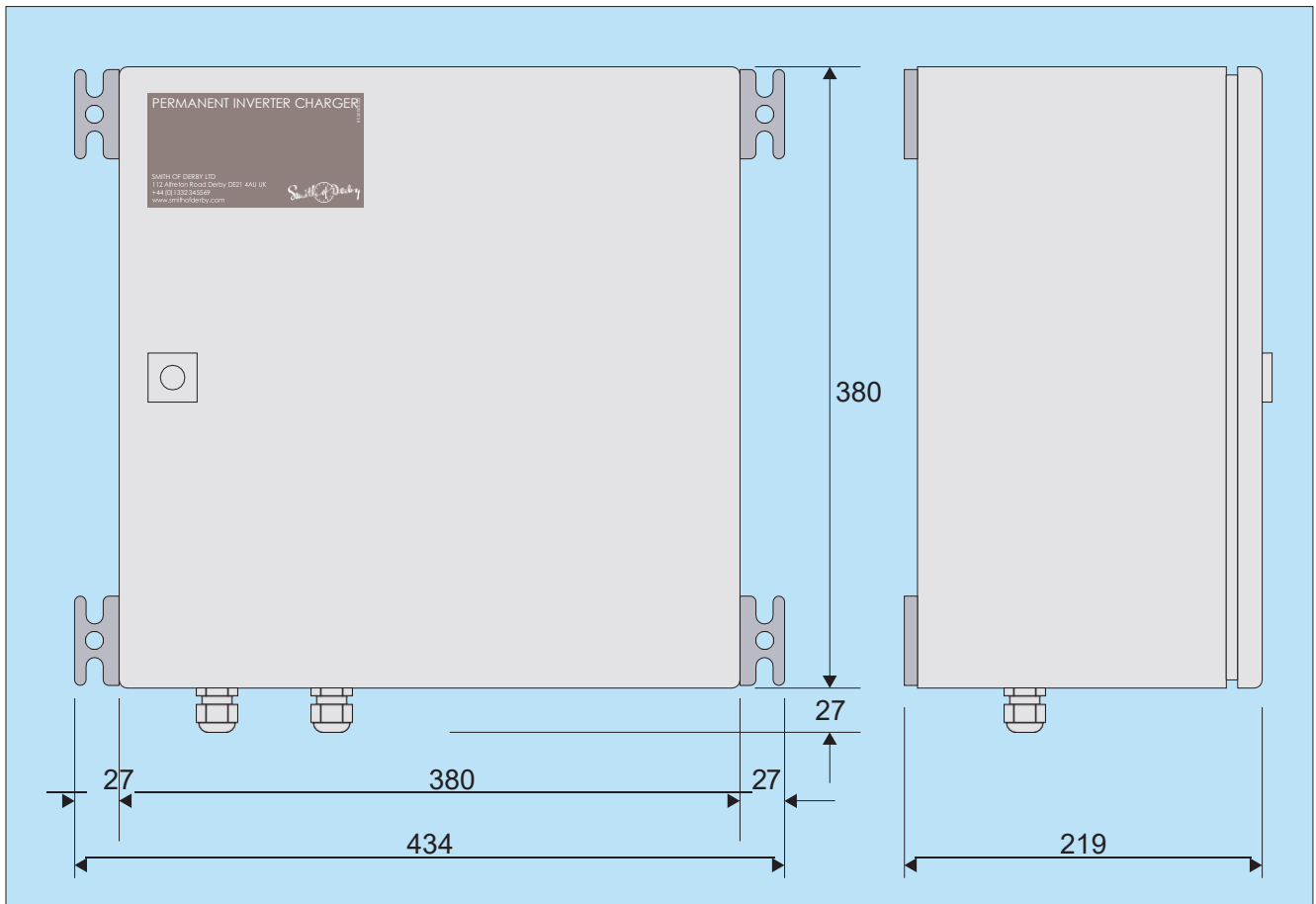
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Issue date: 25 May 2022

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Specification of unit supplied with these instructions		
Input voltage	<input type="checkbox"/> 100 – 120V	<input type="checkbox"/> 220 – 240V
Output voltage	<input type="checkbox"/> 100 – 120V	<input type="checkbox"/> 200 – 220V
Frequency	<input type="checkbox"/> 50 Hz	<input type="checkbox"/> 60 Hz
Timekeeping	<input type="checkbox"/> GPS	<input type="checkbox"/> Quartz
Serial No.		

1 DIMENSIONS, SPECIFICATION



SA19/Permanent Inverter Charger overall dimensions.

NOTE: clearance for wiring, access and servicing must be allowed, see 3.1.4.

TECHNICAL SPECIFICATION

Suitable for internal or enclosed fixing locations only.

Case constructed in sheet steel, grey epoxy powder finish.

Splash and dust proof door seals to IP66.

Weight: 19.05kg.

Power failure backup battery: 12 V @ 17Ah. Type Yuasa NP17-12I
Life expectancy: 5 years.

Memory back-up battery: 3V @ 0.1Ah. Type CR2032 (factory return for replacement).
Life expectancy: 10+ years.

Power supply: 230V AC 50Hz standard
110V AC 50Hz or 110V AC 60Hz to special order

Operating temperature range: -5 degrees to +30 degrees Celsius (non-fan equipped)
-5 degrees to +30 degrees Celsius (fan equipped)

Power consumption: maximum 2 watts
plus maximum 5 watts per clock movement, T100/200/300/400 synchronous type.

Timekeeping accuracy: quartz controlled option: better than +/- 1 second/week.
GPS controlled option: fully synchronised with World Time Clock standard.

2 OPERATION

2.1 Application

The Automatic Permanent Inverter Charger Unit (PIC) is specifically designed to control and power up to four synchronous clock movements, ideally Smith of Derby T100/T200/T300/T400/T500 series. No other electrical device or equipment should ever be connected to the clock output connectors.

THE CONNECTION OF ANY OTHER ELECTRICAL DEVICE OR EQUIPEMENT WILL INVALIDATE THE WARRANTY AND COULD CAUSE DAMAGE TO THE INVERTER CIRCUIT

2.2 Power to clock movements

- 2.2.1 The Inverter Charger Unit generates a permanent supply of approximately 220V AC at 50Hz to run the clocks. The accuracy of this 50Hz supply is extremely accurate and stable compared to the supply in the UK. This voltage is derived from a 12V power supply/battery combination. When fully charged the battery is capable of running four synchronous clock movements for up to 24 hours before requiring recharging.
- 2.2.2 The battery is on a constant, 'float charge' whenever the local mains supply voltage is available and has an expected life of 5 years, dependent on working temperature and humidity. During power outages, a battery control circuit ensures that the battery voltage does not drop to a level which would cause inaccurate operation of the clock(s) or damage to the battery.
- 2.2.3 The system also incorporates an auto-restart function which will switch off the Inverter and stop the clock/(s) for 12 hours.
- 2.2.4 When the power is reinstated the battery will begin recharging and then, providing power is still on or the battery is sufficiently charged, the clock(s) will start exactly 12 hours from the point where they were originally stopped. This 12-hour auto-restart function can be switched to 24-hour mode if required. Therefore, if a lengthy power outage results in a discharged battery, the clock(s) will automatically stop and then restart again at the exact time showing on the clock dial(s).

2.3 Time and Date

- 2.3.1 The clock time and date are pre-programmed at the factory and under normal circumstances should not need resetting. However, if the need arises, please follow the instructions in section 6.4 to reset the time and date.
- 2.3.2 Inverter Charger Unit is programmed to adjust the clock(s) automatically for each summer/winter time alteration. The unit is set to the correct summer/winter or daylight saving time formula for the location, and no attention to the unit or clock(s) should be necessary.
- 2.3.3 The unit is programmed with known dates for the country/locality to which it is supplied.

2.4 Control

All the above functions are controlled by the on-board computer, the memory of which also contains the currently available Daylight Savings dates. These enable the system to automatically make the necessary changes at the correct times each year. At these times the clock(s) will stop for 11 hours or 1 hour to effect the hour change.

2.5 GPS Control

2.5.1 Timekeeping for your Inverter Charger Unit may, if required be governed by GPS time, for which an optional aerial/receiver is available. This must be located with a clear view of the sky or immediately adjacent to a window that gives a good view of the sky.

2.5.2 The GPS aerial should be wired as shown in the wiring diagrams and be in full view of the sky. This can be outside or very close to a glass window.



2.6 Dial illumination switching

Your Inverter Charger Unit may be used to control dial backlighting, up to a maximum power requirement of 800W. Lights on/off times are pre-programmed, or the lights can be on permanently. Please refer to section 3.6 for details.

2.7 Cooling fan

An internal cooling fan is fitted in units which will operate in temperatures which will regularly exceed 25° Celsius. The fan is installed on the right hand side of the cabinet and is powered via a separate fuse, see sections 4.7 and 4.8.

2.8 Normal Operation

DO NOT TOUCH ANY CONTROLS WHEN THE CLOCK(S) HAVE BEEN SWITCHED OFF BY THE INVERTER CHARGER AS THE TIMING FUNCTIONS WILL RESTART THE CLOCK(S) AT THE CORRECT TIME

WARNING: High voltage on clock terminals. The battery connector plug (N) must be disconnected and the external Isolator/Consumer unit switch MUST be switched off before any work is carried out on wiring or clocks connected to the Inverter/Charger outputs.

There is a green neon (L) indicator by the clock output connectors to indicate when 110/220 volts is present on the clock connectors. The neon indicator should only be used as a visual aid ONLY. All clock connections should be treated as ALWAYS LIVE, and correct safety precautions taken by competent persons.

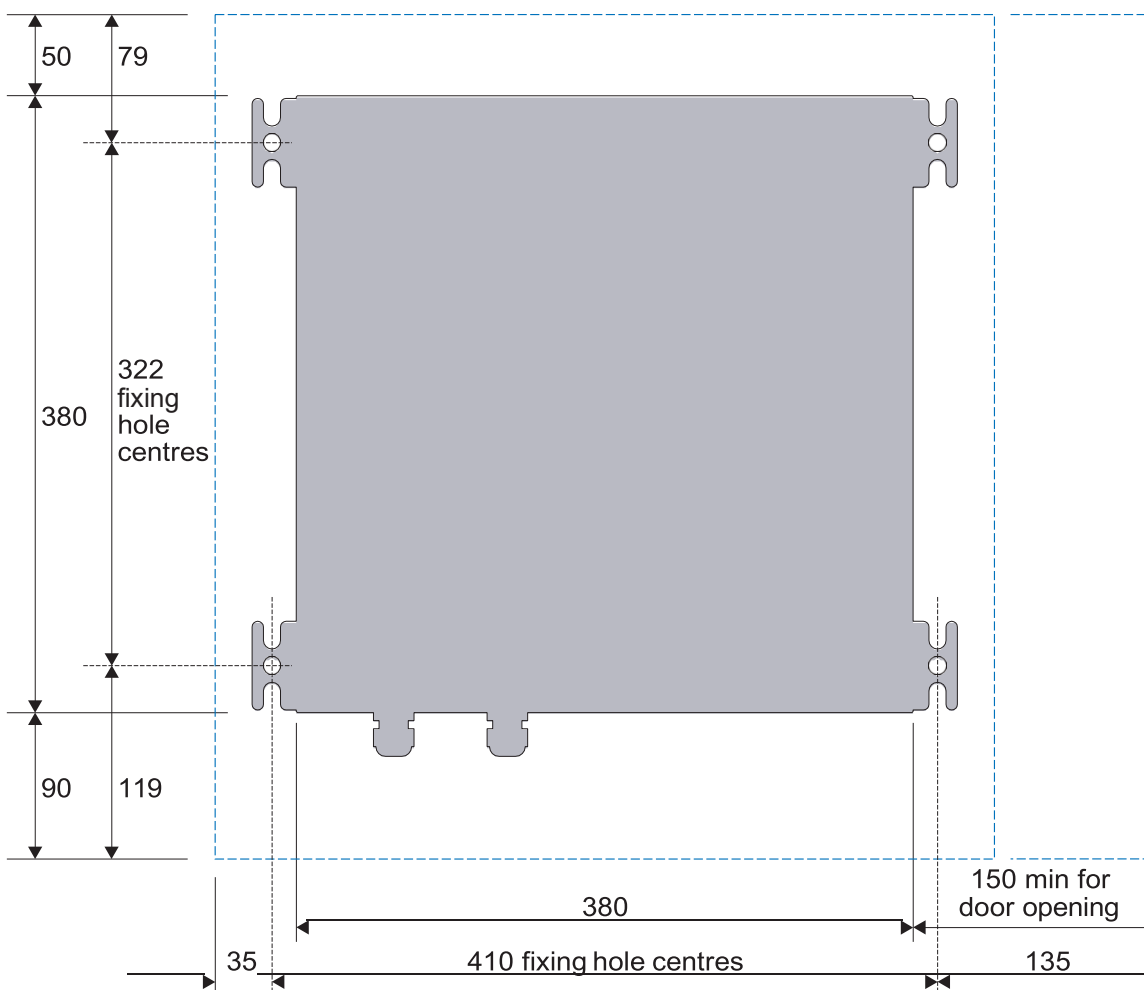
2.9 Before Installation

To comply with regulations, power cables to the Inverter Charger Unit, power cables between the unit and the clock dials, and 5A switched fused spurs must be installed by the qualified site electrical contractor in readiness for Smith of Derby engineers to install the system.

3 INSTALLATION

3.1 Location

- 3.1.1 The unit is for internal use only and must not be installed where it will be subjected to great temperature variation or dampness, such as exposed walls, window openings etc., or direct sunlight. The unit must be easily accessible for maintenance and adjustments, and may be remote from the clock/s. A switchgear or plant room is an ideal location.
- 3.1.2 The electrical outputs on this system are specifically designed for the functions stated below and no other electrical systems or non-specified apparatus should be connected to them.
- 3.1.3 Failure to comply with the above parameters can result in permanent damage to the Inverter/Charger System and will invalidate the warranty.
- 3.1.4 Allow minimum clearances as shown for access and wiring connections.

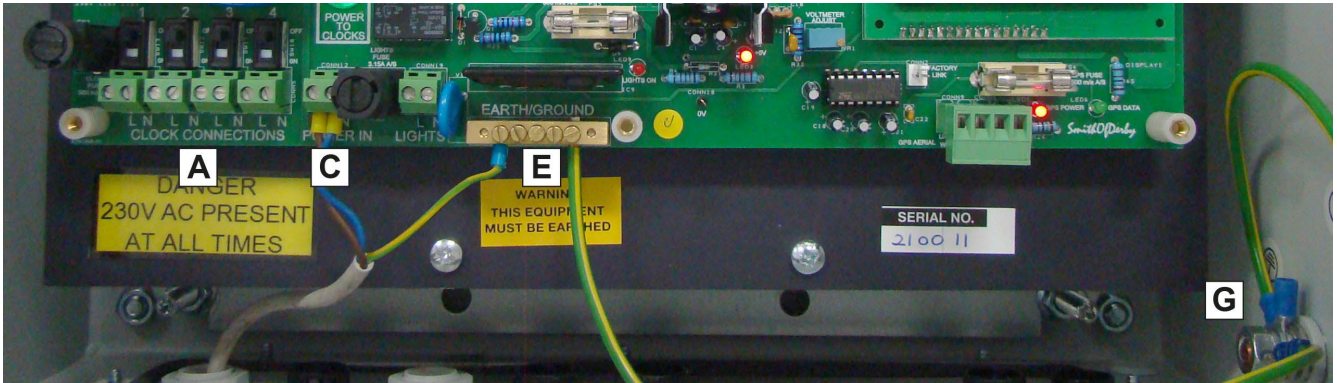


SA19/Permanent Inverter Charger installation and clearance dimensions

3.2 Installation Procedure

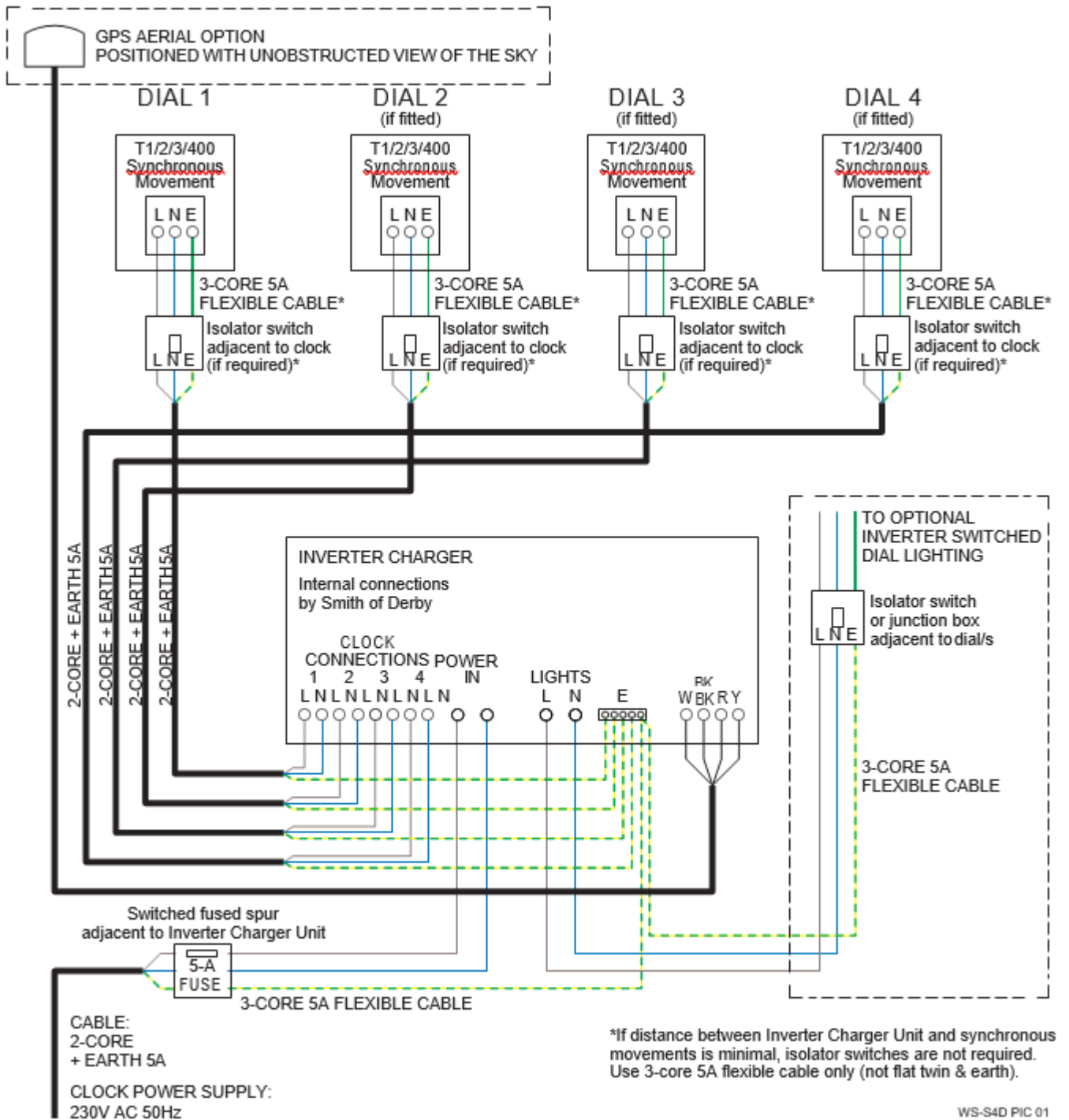
- 3.2.1 The unit must be installed by competent personnel in order that guarantees are not invalidated.
- 3.2.3 Confirm the location of the unit and mark the fixing holes in the wall.
- 3.2.7 Secure with wall plugs and screws compatible with the wall material.

3.3 Power and clock connections



- A- Clock connections
- C- Power interinals
- E- Earth/ground terminal on circuit board
- G- Earth/ground terminal on case

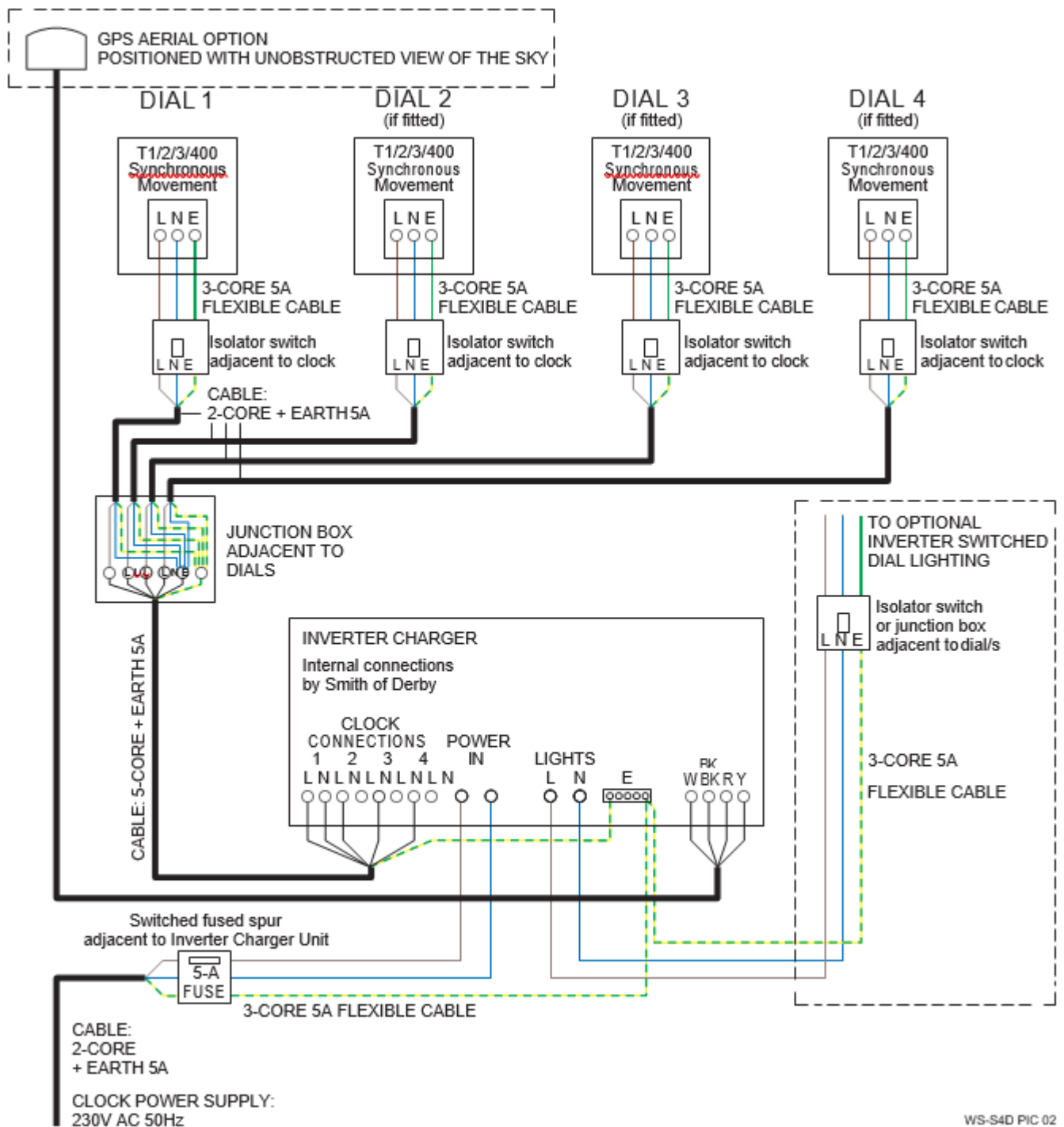
- 3.3.1 To comply with regulations, power cables and 5A switched fused spurs must be installed by the qualified site electrical contractor in readiness for Smith of Derby engineers to install the Inverter Charger Unit.
- 3.3.2 The wiring diagrams show the maximum number of clocks per Inverter Charger Unit installation. Please disregard the wiring to dials 2, 3 and 4 if not required.
- 3.3.3 Each movement should be connected via an isolator switch when the clock movements are a distance from the Inverter Charger Unit. These switches are used to isolate individual movements for maintenance.
- 3.3.4 Each clock movement also has its own individual switched live connector within the Inverter Charger Unit, adjacent to the Clock Connections terminals for isolation purposes.



Wiring diagram method 1. Items shown within dotted lines are optional.

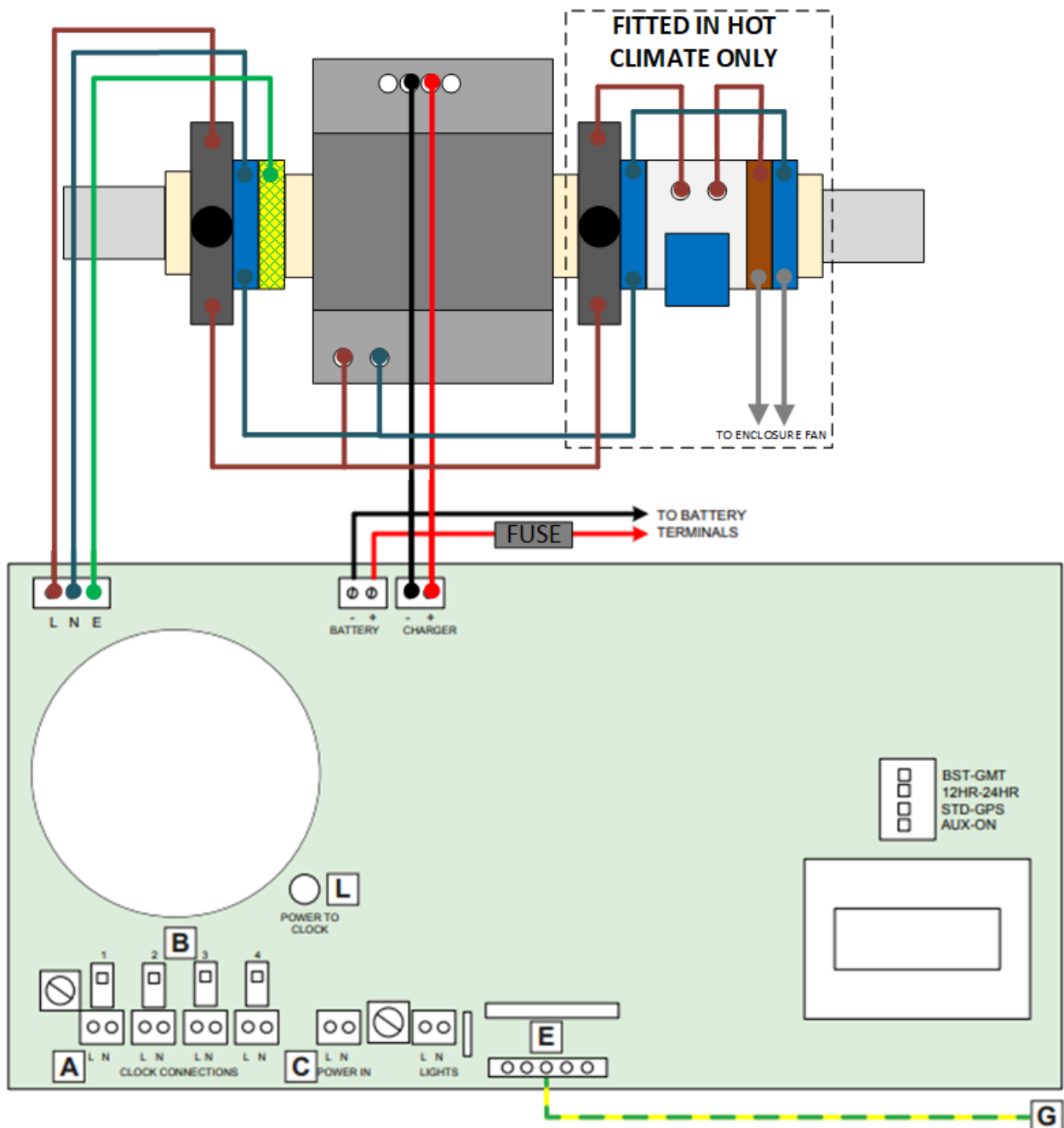
3.3.5 If the Inverter Charger Unit is sited adjacent to the clocks, connections should be made as shown in wiring diagram method 1. This requires up to four separate cables from the unit to the individual clock movements.

3.3.6 If the Inverter Charger Unit such close proximity to the clock movements that the isolator switches are not necessary, they may be omitted, and isolation be performed using the switches within the unit. The entire cable runs from the unit to the clock movements should be 3-core 5A flexible cable, secured to the wall or structure in accordance with regulations.



Wiring diagram method 2. Items shown within dotted lines are optional.

- 3.3.7 If the Inverter Charger Unit is sited remote from the clocks and the clocks are adjacent to each other, connections may be as shown in wiring diagram method 2 with the main run of fixed cable being up to 5 cores plus earth. As neutral connections are in parallel on the motherboard, only one neutral return is required between Inverter Charger Unit and the clock movements. The same is true of the earth connection.
- 3.3.8 The multicore cable should be terminated adjacent to the clock movements in a junction box having 6 terminals. Use one terminal for each of the line (L) connections, one for the neutral and one for the earth.
- 3.3.9 Each movement must be connected via an isolator switch as the clock movements are a distance from the Inverter Charger Unit. These switches are used to isolate individual movements for maintenance.



- 3.3.10 Connect the incoming mains power supply to the POWER IN connector (C), ensuring a good earth connection to the earth/ground block.
- 3.3.11 Connect the clock movement(s) to the CLOCK CONNECTIONS (A) 1 TO 4 as required, and the earth/ground block (E). The four clock connectors must only be connected to synchronous clock movements and MUST NOT be in common to any other wiring. Four Line and Neutral connectors are provided so that independent control of each clock dial is possible from the corrector switches (B). If this procedure is not followed, then independent control of each dial will be lost.
- 3.3.12 Wiring method 1: where the dials are some distance apart from the Inverter Charger Unit and/or each other, they can have a separate Line, Neutral and Ground taken from the individual Clock Connections (A). This can be flexible, 0.5mm, 3-core mains cable or standard twin and earth terminated in junction boxes at each end, close to the Inverter Charger Unit and the clock movement. The Inverter Charger Unit and clock movements should then be connected to the junction boxes using flexible cable.
- 3.3.13 Wiring method 2: where the dials and Inverter Charger Unit are close together, separate Line connections can be taken from the individual Clock Connections Line terminals (A), with a common Neutral from any of the four connectors, and a single Earth connection from the earth bar (E). Use a mains rated multicore cable terminating in a junction box close to the clock dials. Then use 3-core flexible spurs to complete the circuits to the clock movements.



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