

Technical Data Sheet

Experts in what we do.



ClareHAL Solar designed specifically for the Solar market.

- Improving productivity
- Increasing efficiency
- Safety Guard operation
- Full traceability for Quality control
- UL/IEC/EN International standards compliance
- Fast Testing
- Complete production integration when used with Safety e-Base software

Clare HAL Solar. A dedicated tester for solar panel, solar modules and other components used in the solar industry.

ClareHAL Solar is designed to offer advanced automation techniques which can make dramatic improvements in productivity and efficiency of the production line manufacturing test process.

COMPLIANCE – Standards and Directives

Validation testing is essential for manufacturers to ensure compliance with legislation for their products including CE marking. Electrical safety testing specialists Seaward have produced the HAL series that performs all of the applicable tests needed for demonstrating compliance with EU Directives, International, European and UK standards in one convenient package.

The ClareHAL Solar will help you meet your legal obligations.

All basic tests, as specified in widely used product and safety standards, are included:

- Earth Bond/ Ground Bond testing
- DC Insulation/Wet Current Leakage Test
- AC/DC Flash/ Hipot/Dielectric withstand testing
- Multi-Measurement Display

ClareHAL Solar Test Methods

The ClareHAL Solar Tester can be used in three modes – automatic, manual and direct pc control via the external communications port.

Automatic Mode

In automatic mode complete test sequences are stored in the memory and new sequences can be programmed using testcodes. Up to 5 tests can be linked into 1 sequence, all tests are timed and all results are stored in memory.

Automatic mode provides a structured, repeatable route to testing which ensures all data is collected for traceability and auditing.

This mode is intended for standard production line use.

Manual Mode

Manual mode provides a quick, simple route to tests and is intended for use in the laboratory, repair or re-test environments where ease of use and quick repeatable tests are paramount.

Manual mode can be initiated by a one button press and allows individual tests to be performed more freely.

The type of test and its parameters are entered into the tester. The output can be maintained continuously, varied by means of the rotary encoder or timed as in automatic mode.

A facility to store results is available although this is not necessary to perform tests.

Key features

- Flash/Hipot/Dielectric Strength test
- Ground/Earth Bond test at 40A
- Fast testing – production efficiency savings
- Compact unit
- Tests in accordance with IEC/EN/UL International Standards
- Isolated test outputs on Flash/Hipot/Dielectric Strength/Insulation test to aid with EN 50191 and for safety
- Arc Detect
- Regulated outputs on Flash/Hipot/Dielectric Strength, Insulation and Ground/Earth Bond tests – independent of supply fluctuations
- PLC control. Simple command protocol for external control via communications port
- Visual and audible pass/fail indication
- Full production system integration with Safety e-Base software

Solar Testing Requirements

The ClareHAL Solar has been specifically designed for the Solar Industries, due to the massive growth in renewable energy sector. PV systems operate at 1000V DC so to ensure full traceability and safety the HAL Solar gives electrical safety compliance, to International Standards UL/IEC/EN 61730, 61215, 61646.

The 40 Amp Ground Continuity test allows for PV panels fuse rated at up to 15 A (test current required as per 61730 MST 13 is 37.5A).

The Dielectric Withstand test MST 16 requires a DC ramped voltage of 6kV with a high sensitivity leakage (uA) detection circuit followed by an Insulation Resistance test. The Wet Leakage Current test MST 17 is also applied by the HAL Solar. The ClareHAL Solar performs all of these functions and provides a multi display showing all of the readings required.

The ClareHAL Solar also provides a AC HiPot tester for Cable, Connectors and Inverter electrical safety testing.

Safety e-Base Software

Safety e-Base has been specifically designed for the ClareHAL range of safety compliance testers used in advanced production environments.

In modern production plants the need for a total integrated systems approach is required to ensure quality, traceability, efficiency and safety.

The usual solution is to provide software to interface to test units to allow the selection of various test sequences, and store test data to improve and simplify the test process.

Safety e-Base not only provides this level of functionality, but allows users to customize the software to suit their own business requirements.

This is possible because Safety e-Base provides the user a host of advanced features and options as shown below.

- Control multiple production test lines from a single application instance
- Full remote mode operation without the need for the operator to be near the PC
- Fully scriptable interface (ECMAScript) allows full control over tests, procedures, remote operation, sessions, operators, user-interface and more. For example:
- Operator Interaction: Create a set of customs screens for the display

to guide the operator though test procedures remotely

- Customizable User Interface: Script pop-up windows in Safety e-Base to warn of unusually high test failures
- Conditional Testing: Perform a different tests if a particular test fails
- Manage Human Resources: Have operators log on using a barcode
- Live Telemetry: View current session information and progress from within Safety e-Base
- Flexibility: Have Safety e-Base generate serial numbers for you or use existing barcodes on appliances
- Configurability: Switch test sequences based on appliance serial numbers
- Traceability: Save results per session, per appliance, after a certain time or even put all results in one file - you have control!
- Legacy Support: Download results from HAL units for tests performed in manual/automatic mode
- Open Data Formats: Project data and results data stored in intuitive XML format for use with external data mining tools

As can be seen from the above, the only limitation is the imagination to utilise the power of Safety e-Base.

Seaward can offer optional scripting support service to provide bespoke scripting for custom installations.

PLC Control

A PLC can be used to control the ClareHAL unit via the external control ports. PLC control can be initiated with a barcode reader or simulation of the barcode protocol.

TESTING - General

The unit can perform either continuous or timed tests, except the Earth/ Ground bond test which is timed. If during the Flash test, the arc detect level is exceeded the test will be halted and the output removed.

A beeper is present to let the user know that a test fail condition has occurred. The Reset button will clear the condition back to a default screen.

If the programmed limit is exceeded at any time during a test, the unit will display the appropriate test fail message. If the test fails

Key features

- **40 Amp Ground Continuity Test (MST 13)**
- **Dielectric Withstand Test (MST 16)**
- **Wet Leakage Current Test (MST 17)**
- **Operation from 115 and 230 V (nom.), 50 or 60 Hz mains supply**
- **Barcode scanner support**
- **Storage of test results**
- **Large graphical display**
- **Selectable 50 or 60 Hz output frequency for AC tests**

the unit will light the red fail indicator, and sound the audible alarm.

If hazardous voltages (50V AC or DC) are present on the outputs of the unit, this will be indicated by a red warning indicator and a “lightning strike” icon will blink on the display. Also the HT present LED indicator will illuminate adjacent to the test output sockets.

Auto discharge - at the end of Insulation and Flash testing test all capacitances and inductances will be automatically discharged.

The tester would normally be used with a test fixture or guard system and no tests can be performed without positive confirmation that the guard is in place. If the guard is opened or the RESET button is pressed at any time, the test will be halted and an appropriate test fail message will be displayed.

Earth/ Ground Bond test

The unit generates a constant current output independent of input voltage, which is ramped linearly to the set value. The voltage across and current through the ground connections of the equipment under test are continuously measured and the impedance calculated and displayed in real-time

The parameters that can be set with this test are:

- Test Current – the desired test current up to 40A
- Ramp up – the time required for the current to be ramped from zero to the desired test current.
- Ramp hold - the time required for the constant test current to be applied.
- Ramp down - the time required for the test current to be ramped down to zero amps.
- Resistance Limit in ($m\Omega$)

Flash/Hipot/Dielectric Withstand test

The voltage generated by this test is isolated at the test outputs for assisting with complying with EN 50191. This test can be timed or continuous.

The unit will generate a regulated flash test voltage (independent of the supply voltage), which is ramped linearly to the desired value. The unit will then sample the total leakage current and display it in real-

time. The unit will compare the instantaneous measured total leakage against the upper programmed leakage limit to indicate pass or fail. There is a programmable upper and lower limit which ensures that there is a positive indication that the Flash probe has been connected.

The parameters that can be set with this test are:

- Test Voltage – the desired test voltage.
- Ramp up – the time required for the voltage to be ramped from zero to the desired test voltage.
- Ramp hold - the time required for the constant voltage to be applied.
- Ramp down - the time required for the test voltage to be ramped down to zero volts.
- Total Leakage limit upper (μA)
- Total Leakage limit lower (μA)
- Arc detection level

All times will be configurable between 0.1 and 300s. The displayed Total Leakage value will be displayed from 0-9999 μA (DC) and 0.01 to 20mA (AC). The arc detection level can be programmed between 0 and 10, where 0 disables the function altogether, and 10 provides the least sensitive setting.

Insulation Test (Wet Leakage Current Test)

An insulation resistance measurement at a DC test voltage of 250V, 500V or 1000V is available. This test can be continuous or timed.

The selected voltage is ramped linearly to the desired value, where it is then held. The insulation resistance is displayed in real time.

If this value is less than the minimum pass value programmed, then the appropriate fail message is displayed along with the red fail indicator

The parameters that can be set with this test are:

- Test Voltage – which can be pre-selected for 250V, 500V or 1000V
- Ramp up – the time required for the voltage to be ramped from zero to the desired test voltage.
- Ramp hold - the time required for the constant voltage to be applied.

- Ramp down - the time required for the test voltage to be ramped down to zero volts.
- Insulation Resistance value, lower limit ($M\Omega$)

SPECIFICATIONS: ClareHAL Solar

Power Requirement

AC Voltage	Selectable 115 or 230 VAC RMS
Frequency	50/60 Hz

Mechanical Specification

Size (HxWxL)	300mm-200mm-370mm
Weight	15kg Approx

Ground Bond Test

Test Voltage	Nominal 6V AC
Frequency	50 or 60 Hz (Independent of supply)
Display Range and Accuracy	0-1500m Ω \pm 2% \pm 5 Counts
Display Resolution	1 m Ω
Compliance Test Ranges:	
Current/Load Resistance/Time	5 A-1000m Ω - Continuous 10 A-500m Ω - Continuous 25 A-200 m Ω - Continuous 30 A-150 m Ω - 120 secs 40A-100 m Ω - 120 secs
Settable Output Current Range	0.1A-40.0A
Selectable Range of Pass/Fail Levels	0-1500m Ω

Insulation Resistance Test

DC Output Voltage	250V, 500V, or 1000V Selectable
Display Range	0M Ω -500M Ω
Display Range / Accuracy	0M Ω -350M Ω \pm 5% \pm 5 Counts 350M Ω -1000M Ω Indication Only
Display Resolution	1M Ω
Pass/Fail Level	0M Ω -1000M Ω

AC Flash / Hipot Test (mA Display)

Programmable Voltage Range	0.10kV-5.00kV (10V/Step Resolution)
Voltage Display Range and Accuracy	0.10kV-5.00kV \pm 1% \pm 5 Counts
Voltage Display Resolution	0.01kV
Current Display Range and Accuracy	0.01mA-20.00mA \pm 1% \pm 5 Counts
Current Display Resolution	0.01mA
Selectable Range of Pass/Fail Levels	0.01mA-20.00mA
Maximum Current Output	20.00mA
Optional Arc Detection	9 Levels

Accessories

- **Hipot Probe & lead**
Part number: 03918/2
- **Hipot Clip (Std. Black) & lead**
Part number: H-5003
- **Hipot Clip (Red) & lead**
Part number: H-5003/R
- **Ground Bond Clip Lead**
Part number: 01521/1
- **Hand Held Guard Switch**
Part number: DCS317
- **Calibration Checkbox**
Part number: V242
- **CCD Barcode Scanner**
Part number: 194A922
- **Status Beacon**
(mains cord 230/110V)
Part number: H – 5017

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DC Flash / Hipot Test (μA and $\text{M}\Omega$ Display)

Programmable Voltage Range	0.10kV-6.00kV (10V/Step Resolution)
Voltage Display Range and Accuracy	0.10 kV-6.00kV $\pm 1\% \pm 5$ Counts
Voltage Display Resolution	0.01kV
Current Display Range and Accuracy	0 μA -9999 μA $\pm 1\% \pm 5$ Counts
Current Display Resolution	1 μA
Selectable Range of Pass/Fail Levels	1 μA -9999 μA
Maximum Current Output	9999 μA
Optional Arc Detection	9 Levels

Also available

■ ClareHAL 104

A combined AC Ground Bond, AC/DC Flash Test, DC Insulation Resistance with Power, Load and Leakage capabilities.

Part No: H104

■ ClareHAL 103

AC/DC Hipot (flash dielectric strength) and DC Insulation and Ground/Earth Bond Tester

Part No: H103

■ ClareHAL 102

AC/DC Hipot and DC Insulation Tester with built-in scanner switching matrix

Part No: H102

■ ClareHAL 101

AC/DC Hipot and DC Insulation Tester

Part No: H101

■ ClareHAL 100

40A Ground/Earth Bond Tester

Part No: H100



Thank you for reading this data sheet.

For pricing or for further information, please contact us at our UK Office, using the details below.



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Please note - Product designs and specifications are subject to change without notice. The user is responsible for determining the suitability of this product.