elcometer®

User Guide

Elcometer 215

Oven Temperature Profiler / Oven Temperature Profiling System

CONTENTS

CONTENTS (continued)

For the avoidance of doubt, please refer to the original English language version.

Dimensions:	Gauge only:	191 x 73 x 25mm (7.52" x 2.87" x 0.98")
	Gauge in Thermal Barrier:	336.3 x 252.6 x 112.5mm (13.24" x 9.94" x 4.43")
Weight:	Logger only:	464g (16.4oz)
	Gauge in Thermal Barrier:	5.62kg (12.4lb)

A Material Safety Data Sheet for the insulation material used in the Elcometer 215 Thermal Insulation Barrier, sales part number T21533250, is available to download via our website:
www.elcometer.com/images/stories/MSDS/elcometer_215_thermal_barrier_T21533250.pdf

1 GAUGE OVERVIEW

The new Elcometer 215 Oven Temperature Profiling System is designed to monitor and record temperature levels inside conveyor & batch ovens ensuring that the ovens have been correctly set up to reach the required temperature conditions.

In the powder coating industry, the new Elcometer 215 is crucial for ensuring a precise and consistent curing process. It continuously monitors both the temperature inside the curing oven and the surface temperature of the product, helping to guarantee that the powder coating adheres correctly without compromising the finish or causing damage.

The Elcometer 215 helps identify issues such as over-baking or under-baking which can lead to problems such as brittleness, discoloration, poor adhesion or inconsistent gloss.

By providing detailed thermal profiles, the Elcometer 215, in conjunction with Elcometer's ElcoMaster® software application (available to download via www.elcometer.com or by following the QR code), allows operators to optimise oven settings for each coated product, improving fuel efficiency and ensuring high quality finishes.

Download ElcoMaster®

MAGNETIC WARNING - PACEMAKER / ICD SAFETY

This product contains a high strength **N52 neodymium magnet** with a pull force of 3.32 kg.

The magnetic field may interfere with pacemakers, ICDs, or other implanted medical devices.

Maintain a minimum distance of 6" (15cm) between the product and any implanted device.

Consult a healthcare professional if unsure.

2 BOX CONTENTS

The Elcometer 215 Oven Temperature Profiler is available to purchase as a standalone logger, sales part number T215-DL, or as complete system with thermal barrier supplied in a robust plastic carry case, sales part number G215-DL.

Elcometer 215 Oven Temperature Profiler (T215-DL)

1 Elcometer 215 Oven Temperature Profiler

2 USB Cable – Male 'A' to Male 'C'

3 AA Batteries; x3

4 ElcoMaster Software App Download Card

5 Two Year Warranty Extension Card

6 Calibration Certificate

7 User Guide

Elcometer 215 Oven Temperature Profiling System (G215-DL)

As above plus;

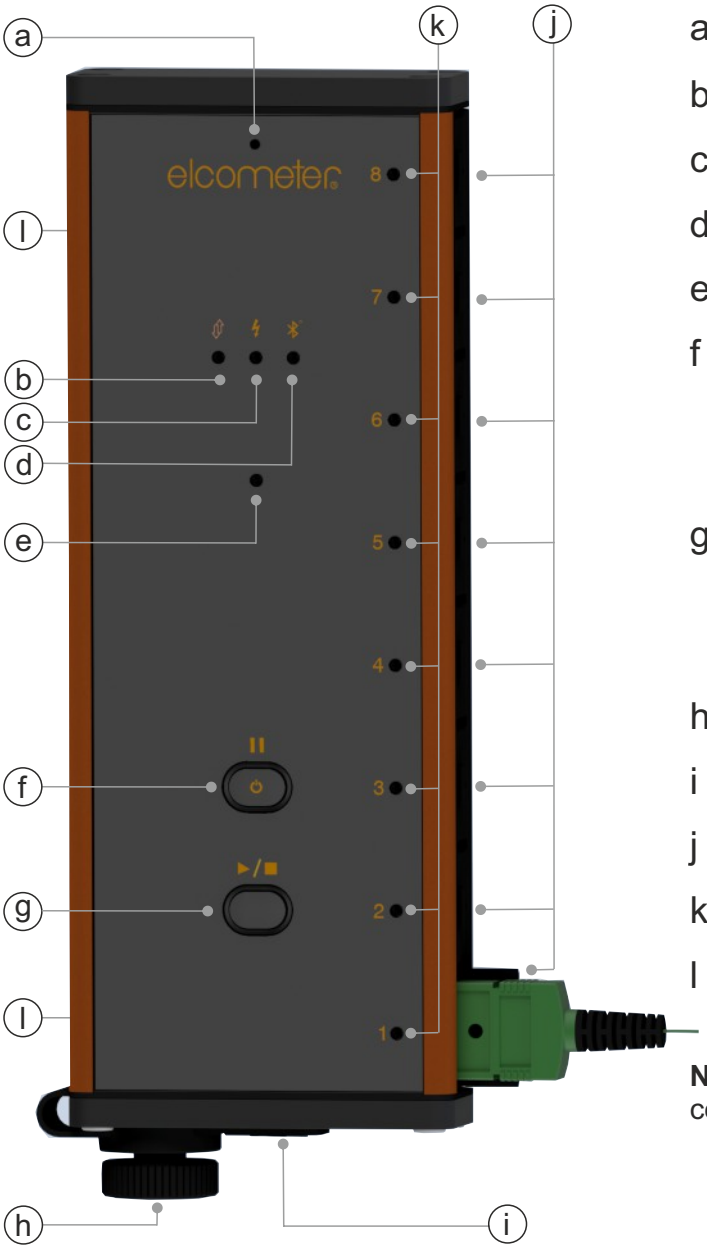
8 Thermal Insulation Barrier
(complete with temperature probe attachment strip & handle/hook)

9 Transit Case

Note: Thermocouples are not supplied as standard and must be ordered separately – see Section 4 on page 10 for details of the probes available.

3 GETTING STARTED

3.1 GAUGE OVERVIEW



a Integrated Ambient Light Sensor

b LED: Transmission / Measurement

c LED: Power (USB or Battery)

d LED: Bluetooth® Status

e LED: Gauge Status

f Multi-Function Button:
Power On / Off
Pause Logging
Enable[a] / Disable[a] Bluetooth®

g Multi-Function Button:
Start Logging
Stop Logging
Enable[a] / Disable[a] Bluetooth®

h Battery Door & Retaining Seal

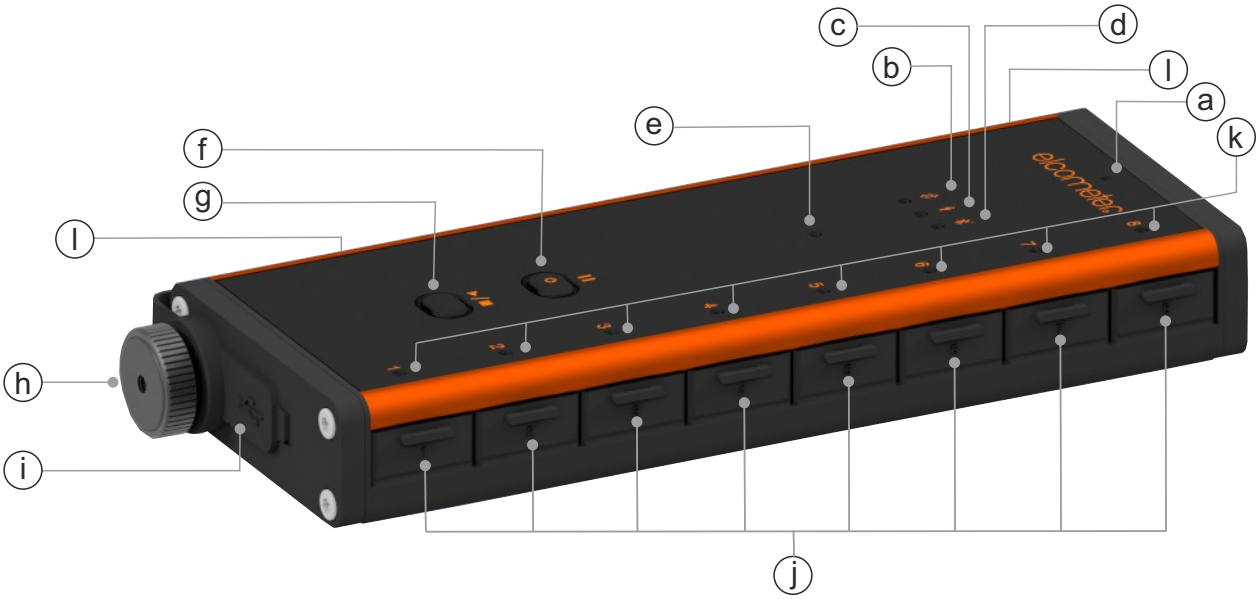
i USB Connection Port (below cover)

j Thermocouple Connection Ports (x8)

k LED: Thermocouple Status

l Integrated Magnet (x2)
(not visible - built in to the rear of the gauge.)

Note: For more information on the LED status conditions, see Section 6.6 on page 16.



[a] To enable or disable Bluetooth®, buttons f and g are pressed simultaneously.

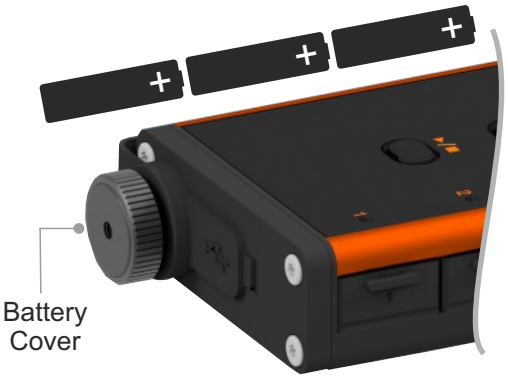
3 GETTING STARTED (continued)

3.2 POWERING THE GAUGE

The Elcometer 215 can be powered using either 3 x AA batteries[b] or via the USB cable supplied as standard with each gauge.

To insert or replace the batteries:

1 Unscrew the battery cover.
2 Insert 3 x AA batteries taking care to ensure correct polarity.
3 Refit the battery cover.



The power LED ( ) will light up continuously indicating sufficient charge and correct orientation.

The power LED ( ) will flash amber every second when the battery charge is less than 20% indicating that the batteries should be replaced.

The Elcometer 215 can also be powered using a male ‘A’ to male ‘C’ USB cable (supplied as standard with each gauge).

When the USB cable is connected and powered, the power LED ( ) will flash amber for 3 second pulses (on for 3 seconds off for 100ms), and the gauge will automatically disconnect the battery supply.

Note: Batteries must be disposed of carefully to avoid environmental contamination. Please consult your local Environmental Authority for information on disposal in your region. **DO NOT DISPOSE OF ANY BATTERIES IN FIRE.**

3.3 GAUGE TEMPERATURE WARNING

The maximum operating temperature of the gauge electronics is 85°C (185°F). For this reason, the Elcometer 215 must be placed inside the thermal insulation barrier **BEFORE** being placed in the oven.

The Elcometer 215 is fitted with internal temperature sensors which trigger a warning when the gauge PCB temperature reaches 60°C (140°F) - the status LED will flash red indicating to the user that the electronics are getting too warm. The operator will also receive a notification on the ElcoMaster® software application.

[b] Alkaline batteries are supplied. Lithium or rechargeable batteries can also be used.

3 GETTING STARTED (continued)

If a paint cure cycle is in process, the gauge will not stop running at this point. It will stop if /when the absolute maximum temperature of 85°C (185°F) is reached.

If the user stops logging when the temperature warning has been activated, logging can not resume until the unit has cooled to 35°C (95°F) or less[c].

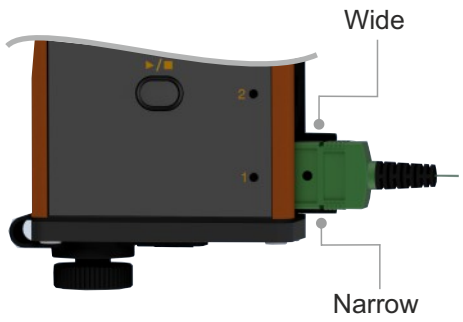
3.4 CONNECTING THE THERMOCOUPLE PROBES

The Elcometer 215 has eight input sockets (channels) for thermocouple temperature probes.

Thermocouples are not supplied as standard and must be ordered separately – see Section 4 on page 10 for details of the probes available from Elcometer.

Probes should be connected to each socket in turn, starting with channel 1, followed by channel 2, etc. Channel 1 is used for all Start/Stop triggers; see Section A4.2 on page 25 for more information.

Each thermocouple probe plug has a narrow and a wide terminal, ensure that the plug is orientated correctly before making the connection.



The Elcometer 215 is designed to be used with the following 'types' of Thermocouples:

Type K, Type T, Type J, Type N ,
Type S, Type E, Type B, Type R

The 'type' of thermocouple connected is set up via ElcoMaster® / Logger Setups, see Section A4 on page 25 for further information.

Note: All thermocouples connected to the Elcometer 215 must be of the same 'type'. If using non-Elcometer supplied thermocouple probes, please ensure that they are suitable for use in the temperature and environment being assessed.

[c] When tested under laboratory conditions, the time period required for the gauge to cool down from 60°C (140°F) to 35°C (95°F) was approximately 22 minutes.

3 GETTING STARTED (continued)

The Elcometer 215 is fitted with smart technology which not only identifies when a thermocouple has been connected (the channel LED is illuminated), but also indicates if there is a broken connection within the thermocouple when connected to the Elcometer 215 (the channel LED does not illuminate).

When logging, the channel LED will toggle on/off indicating that a paint cure profile is running.

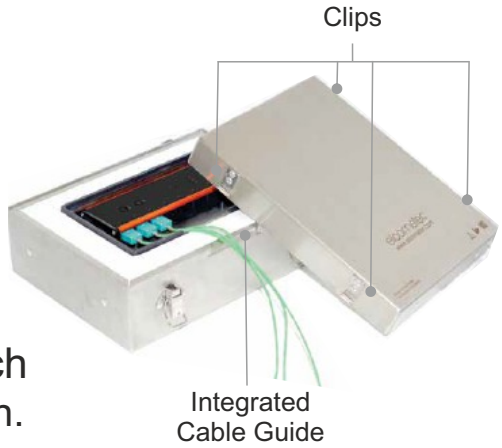
3.5 THERMAL INSULATION BARRIER[d]

The Elcometer 215 thermal insulation barrier[d] is designed to ensure that the gauge electronics and batteries are protected from the high temperatures as it passes through the oven.

The maximum operating temperature of the gauge electronics is 85°C (185°F). For this reason, the Elcometer 215 must be placed inside the thermal insulation barrier **BEFORE** being placed in the oven.

Position the gauge within the thermal barrier ensuring that the probe leads are properly routed through the barrier's integrated cable guide, ensuring that the cables are not be twisted or trapped.

Attach the lid using the four clips, two on each side. The lid can only be fitted in one orientation.



DO NOT touch surfaces which become hot during high temperatures.

The Elcometer 215 is fitted with internal temperature sensors which will indicate to the user when the electronics are getting too warm, see Section 3.3 on page 6 for further details.

A Material Safety Data Sheet for the insulation material used in the Elcometer 215 Thermal Insulation Barrier is available to download via our website:

www.elcometer.com/images/stories/MSDS/elcometer_215_thermal_barrier_T21533250.pdf

[d] Thermal insulation barrier is supplied as standard with the Elcometer 215 Oven Temperature Profiling System (G215-DL) and is available to purchase separately as a spare / accessory, sales part number T21533250.

3 GETTING STARTED (continued)

When used in accordance with instructions in this user guide, the thermal characteristics of the barrier are as below

External Temperature	Time at Temperature	
	Duration Minutes	Duration (HH:mm:ss)
100°C (212°F)	180 minutes	03:00:00
150°C (302°F)	120 minutes	02:00:00
200°C (392°F)	90 minutes	01:30:00
250°C (482°F)	80 minutes	01:20:00
300°C (572°F)	60 minutes	01:00:00

3.6 ENSURING THE GAUGE HAS THE LATEST FIRMWARE / UPGRADING THE GAUGE

To ensure that your gauge has the most up-to-date gauge firmware, allowing you to benefit from the latest features and functionality, we recommend that the gauge is connected to ElcoMaster® on a regular basis and before first use.

Simply connect the gauge via USB to an internet connected computer running ElcoMaster®, select ‘Gauge Firmware Updates’ from the main navigation screen and follow the on-screen instructions.

If a later version of the gauge firmware is available, ‘Update Gauge’ will be displayed to the right of the gauge details. Click ‘Update Gauge’ to install the latest firmware.

4 ELCOMETER K-TYPE THERMOCOUPLE PROBES

A wide range of k-type temperature probes with 1.5m (4' 9"), 3m (9' 8") or 6m (19'7") cable lengths are available from Elcometer.

All probes offer:

- Perfect contact between the probe and the surface.
- Low mass and optimised shape to avoid influence on the temperature of the sample.
- Extremely strong, highly flexible and easy to clean Teflon® coated cables.

The probes listed have a continuous maximum operating temperature of 250°C (428°F) and a short term maximum temperature of 300°C (570°F).

Note: Thermocouples are not supplied as standard and must be ordered separately.

Probe Type	Cable Length / Part Number		
	1.5m (4' 9")	3m (9' 8")	6m (19' 7")
Clamp Air Probe	T21521275	T21521276	T21521277
Magnetic Air Probe	T21521287	T21521288	T21521569
Clamp Surface Probe	T21521278	T21521279	T21521280
Magnetic Surface Probe	T21521281	T21521282	T21521283
Combined Clamp Air and Magnetic Surface Probe	T21521284	T21521285	T21521286

5 GAUGE SET-UP USING ELCOMASTER®

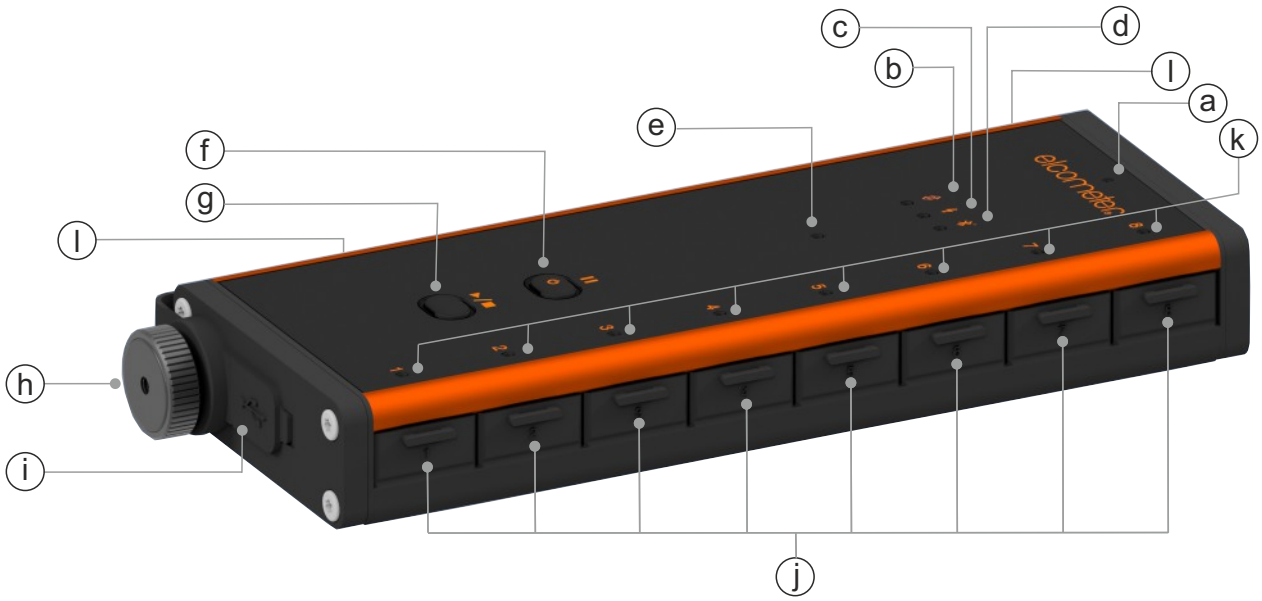
The ElcoMaster® software application is used to setup and configure the Elcometer 215 Oven Profiler for a wide range product / oven temperature profile settings.

Once created the user can select the appropriate product / oven temperature profile setting and transfer the setup to the Elcometer 215.

For detailed information on ElcoMaster and how to set-up and configure the Elcometer 215, see Appendix A: Elcometer 215 & ElcoMaster® on page 20.

6 OPERATING THE ELCOMETER 215

6.1 GETTING TO KNOW THE GAUGE



a Integrated Ambient Light Sensor
Used by the gauge to increase battery life.

b LED: Transmission / Measurement (Yellow or Green)
An yellow light indicates when data is being transmitted to or from the PC/mobile device. A green flashing LED indicates when measurements are being taken.

c LED: Power - Battery & USB (Amber)
Indicates whether battery or USB is powering the device & if battery is low.

d LED: Bluetooth® Status (Blue)
Indicates when Bluetooth® is linked to PC/mobile device.

e LED: Gauge Status (Green, Red, Lilac or White)
Provides instant feedback on the gauge status.

f Multi-Function Button:
Power On / Off
Pause Logging
Enable / Disable Bluetooth® - press button f and g simultaneously

g Multi-Function Button:
Start Logging
Stop Logging
Enable / Disable Bluetooth® - press button f and g simultaneously

h Battery Door & Retaining Seal
The Elcometer 215 is powered by 3 x AA batteries. Alkaline batteries are supplied. Lithium or rechargeable batteries can also be used.

Note: For more information on the LED status conditions, see Section 6.6 on page 16.

6 OPERATING THE ELCOMETER 215 (continued)

i USB Connection Point
USB 'C' socket, protected by rubber cover.

j Thermocouple Connection Ports (x8)
Up to 8 thermocouple probes (k-type and others of the same type) can be connected and selected via ElcoMaster® at any one time.

k LED: Thermocouple Channel (Green)
Each channel has green LED which powers up when a thermocouple is connected and pulses when a paint cure in is progress.

l Integrated Magnets (x2)
Built in to the rear of gauge (not visible) for mounting outside batch ovens.

Note: For more information on the LED status conditions, see Section 6.6 on page 16.

6.2 SWITCHING THE GAUGE ON AND OFF

6.2.1 To switch on:

Press and hold the power On/Off button (⏻) until the amber power LED (ϟ) illuminates then release the buttons. If connected via USB, power on will be instantaneous.

The power LED will flash (two slow, followed by two quick flashes) and all the channel LEDs will flash once as the gauge runs an internal diagnostics check. Any channels with thermocouples connected will remain green, unless the thermocouple is defective.

Once the diagnostics check is complete, the power LED will:

a) Remain permanently on; indicating running on battery power.

b) Flash every second; indicating running on battery power and the battery charge is less than 20%.

c) Flash for 3 second pulses (on for 3 seconds off for 100ms); indicating the USB cable is connected and powering the gauge.

6.2.2 To switch off:

Press and hold the power On/Off button (⏻) until the amber power LED (ϟ) flashes then release the buttons. All LEDs will be off indicating the gauge is switched off.

6.3 CONNECTING THE GAUGE TO ELCOMASTER®

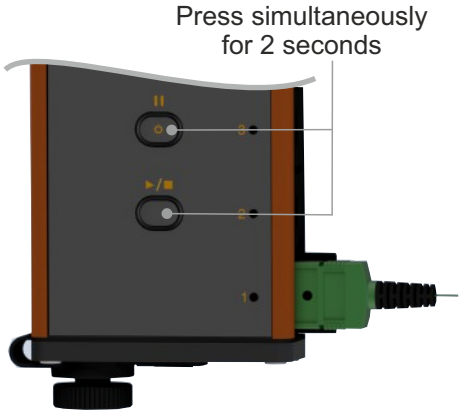
6.3.1 Connecting via USB:

To plug in the USB cable via the USB port, lift the protective rubber USB cover located next to the battery door and insert the USB connection.

Connecting the USB will disconnect the batteries and automatically power on the gauge.

6.3.2 Connecting via Bluetooth®:

With the gauge switched on, press & hold the power On/Off button and Start/Stop button simultaneously for 2 seconds then release.



The Bluetooth® LED ( ) will flash blue indicating that it is in broadcasting mode, awaiting connection to ElcoMaster®.

When the Elcometer 215 is connected to ElcoMaster®, the Bluetooth® LED ( ) will remain permanently on.

To switch off Bluetooth®, press & release the power On/Off button and Start/Stop button simultaneously. The Bluetooth® LED ( ) will no longer be illuminated.

Note: For information on the Bluetooth® range, see Section 7 on page 17.

6.4 MANUALLY OPERATING THE GAUGE

A logger profile must be downloaded to the gauge, see Appendix A: Elcometer 215 & ElcoMaster® on page 20, before logging can commence.

6.4.1 To start logging:

1. Press the power On/Off button ( ) to switch the gauge on.
2. Press and hold the Start button ( ) for 3 seconds to start logging data in a new batch. The status LED will flash green twice in quick succession to indicate that logging has started.

6 OPERATING THE ELCOMETER 215 (continued)

The status LED will illuminate red and the channel LEDs will flash green indicating that the gauge is logging in accordance with the logger profile settings.

Note: Logging will not commence if no thermocouples are connected, there is a fault on the gauge or the gauge is above the warning temperature of 35°C (95°F), see Section 3.3 on page 6 for details. If start / stop triggers are set, a thermocouple must be connected to channel 1.

6.4.2 To pause logging:

Press and release the pause (II) button. The measurement LED ( ) will illuminate green (permanently on, not flashing) indicating logging is paused.

6.4.3 To restart logging:

Press and release the pause (II) button. The measurement LED ( ) will go out, and the gauge will resume logging readings in accordance with the logger profile settings.

When restarting a paused batch, the start trigger (if set) is disabled and readings will be logged immediately.

6.4.4 To stop logging:

Press and hold the stop (■) button for 3 seconds. The status LED will flash red twice in quick succession to indicate that logging has stopped and the existing batch will be closed.

Logging will stop automatically when the stop trigger has been reached, if set.

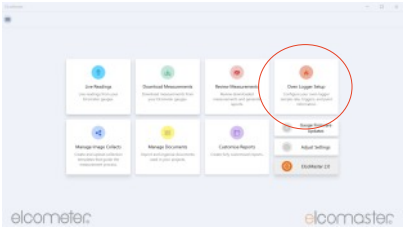
6.5 OPERATING THE GAUGE USING ELCOMASTER®

The Elcometer 215 is fitted with Bluetooth® connectivity, enabling the gauge to communicate with ElcoMaster® wirelessly. This allows the operator to access the product / oven temperature profile in real time without the need to remove the lid of the thermal insulation barrier.

The user can also start, stop or pause data logging wirelessly without removing the gauge from the thermal insulation box via the 'Remote Control' function in ElcoMaster® .

Note: Bluetooth® must be enabled on the gauge for the 'Remote Control' function to work. To enable Bluetooth®, see Section 6.3.2 on page 13.

To access the 'Remote Control' function, select 'Oven Logger Setup' from the main navigation screen.



The software wizard will ask the user to select the gauge to connect to. Select the relevant gauge from the list and press 'Next'. Once connected, the user can start, stop or pause data logging wirelessly.

For information on the Bluetooth range of the gauge, see Section 7 on page 18.

ElcoMaster® is available as a free download via www.elcometer.com or by following the QR code. For more information on ElcoMaster®, see Appendix A on page 20.

Download ElcoMaster®

6 OPERATING THE ELCOMETER 215 (continued)

6.6 ELCOMETER 215 LEDs EXPLAINED

When operating the Elcometer 215, the various LED's indicate the current state of the gauge and the paint profile under test, as below:

LED	OFF	ON	Double Flash	Toggle/Pulse
Status: Green	No paint profile running	Paint profile active and all channels cured	Measurement system started	n/a
Status: Red	No paint profile running	Paint profile active but cure on active channel(s) not yet complete	Measurement system stopped Logging start error	PCB board too hot ≥60°C (logging disabled)
Status: Lilac	n/a	n/a	n/a	File system 80% usage warning
Status: White	n/a	Power on system failure Measurement system fault	n/a	n/a
Power: Amber	Device is powered off	Device is powered on via batteries	n/a	Device is powered on via USB
Bluetooth: Blue	Bluetooth is switched off	Bluetooth connection established	n/a	Bluetooth on and in "Discoverable" mode
Transmission / Measurement: Green	Measurement system not running	Measurement system paused due to delayed start, temperature threshold or pause button pressed	n/a	Measurement taken
Transmission / Measurement: Yellow	n/a	n/a	n/a	Device is transmitting data to PC or mobile
Channel: Green	No thermocouple Connected Thermocouple error	Thermocouple connected, no errors	n/a	Paint curing profile running, channel not yet cured

7 TECHNICAL SPECIFICATION

Gauge Measurement Range	-200°C to 1300°C (-328°F to 2372°F)	
Gauge Operating Temperature	-20°C to 85°C (-22°F to 185°F)	
Thermal Insulation Barrier Operating Temperature	100°C (212°F) 150°C (302°F) 200°C (392°F) 250°C (482°F) 300°C (572°F)	180 minutes 120 minutes 90 minutes 80 minutes 60 minutes
Accuracy	0°C to 500°C: ±0.5°C (32°F to 932°F: ±1.0°F) >500°C: ±1.0°C (>932°F: ±2.0°F)	
Resolution	0.1°C (0.2°F)	
Number of Channels	8	
Compatible Thermocouple Types	Type K, Type T, Type J, Type N , Type S, Type E, Type B, Type R	
Measurement Intervals	Adjustable from 1 per second to 1 per hour	
Memory	1,008,000 readings	
Multiple Run Capability	Up to 40 profile runs before returning to PC	
Batches	Up to 40 sequential batches (25,200 readings per batch)	
Display	LEDs	
Data Output	USB or Bluetooth	
Power Supply	3 x AA Batteries[b] or USB (Male ‘A’ to Male ‘C’)	
Battery Life[e]	150+ hours	
Dimensions	Gauge only: Gauge in Barrier:	191 x 73 x 25mm (7.52" x 2.87" x 0.98") 336.3 x 252.6 x 112.5mm (13.24" x 9.94" x 4.43")
Weight	Gauge only: Gauge in Barrier:	464g (16.4oz) 5.62kg (12.4lb)

[b] Alkaline batteries are supplied. Lithium or rechargeable batteries can also be used.
[e] Using alkaline batteries supplied. Battery life when using lithium or rechargeable batteries will differ.

7 TECHNICAL SPECIFICATION (continued)

Bluetooth® Range[f]		
	Gauge Only	**Gauge in Thermal Insulation Barrier**
Visible	11m (36ft)	4m (13ft)
Connectable	10m (32.8ft)	3m (9.8ft)
Upload / Download	9m (29.5ft)	1.5m (4.9ft)
Live Transmission - Connection Pre-Established	11m (36ft)	4m (13ft)

8 WARRANTY STATEMENT

The Elcometer 215 Oven Data Profiler is supplied with a 12 month warranty against manufacturing defects, excluding contamination and wear, which can be extended to two years via website registration.

To extend your warranty visit www.elcometer.com or scan the QR code.

Extend Your Warranty

The Elcometer 215 Thermal Insulation Barrier is supplied with a 12 month warranty against manufacturing defects, excluding contamination and wear.

Elcometer K-Type Thermocouple probes are supplied with a 12 month warranty against manufacturing defects, excluding contamination and wear.

[f] Typical ranges. The Bluetooth® range can be affected by any obstruction between the gauge software device (PC) as well as the type of Bluetooth® used within the software device (typically older devices will have reduced range). For optimum Bluetooth® range when inside the thermal insulation barrier, ensure that the software device is in the 'line of sight' of the thermocouple exit point of the barrier.

9 LEGAL NOTICES & REGULATORY INFORMATION

Declaration of Conformity - CE:

Elcometer 215 complies with the requirements of the following EU Directives:

2014/53/EU	Radio equipment - Directive
2014/30/EU	EMC - Directive
2011/65/EU	Restriction of the Use of certain Hazardous Substances in Electrical and Electronic Equipment (RoHS) - Directive

CE Declaration of Conformity is available to download via:
www.elcometer.com/images/stories/PDFs/Datasheets/Declaration_of_Conformity/English/DoC_215_NEW.pdf

Declaration of Conformity - UKCA

Elcometer 215 complies with the requirements of the following UK Standards:

S.I. 2017 No. 1206	Radio Equipment Regulations 2017
S.I. 2016 No. 1091	Electromagnetic Compatibility Regulations 2016
S.I. 2012 No. 3032	Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (RoHS) Regulations 2012

UKCA Declaration of Conformity is available to download via:
www.elcometer.com/images/stories/PDFs/Datasheets/Declaration_of_Conformity/English/DoC_215_NEW_UKCA.pdf

This product is a Class A product: Group 1 ISM equipment according to CISPR 11. equipment suitable for use in all locations other than those allocated in residential environments and those directly connected to a low voltage power supply network which supplies buildings used for domestic purposes.

Group 1 ISM product: A product in which there is intentionally generated and/or used conductively coupled radio frequency energy which is necessary for the internal functioning of the equipment itself.

The USB is for data transfer only and is not to be connected to the mains via a USB mains adapter.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

The Giteki mark, its product identification code, the FCC ID and Bluetooth SIG QDID can be found on the label on the rear of the gauge.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

-- Reorient or relocate the receiving antenna.

-- Increase the separation between the equipment and receiver.

-- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected

-- Consult the dealer or an experienced radio/TV technician for help.

To satisfy FCC RF Exposure requirements for mobile and base station transmission devices, a separation distance of 20 cm or more should be maintained between the antenna of this device and persons during operation. To ensure compliance, operation at closer than this distance is not recommended. The antenna(s) used for this transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Modifications not expressly approved by Elcometer Limited could void the user's authority to operate the equipment under FCC rules.

This device complies with Industry Canada license exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

The product complies with the Canada portable RF exposure limit set forth for an uncontrolled environment and are safe for intended operation as described in this manual. The minimum separation distance for portable use is limited to 15mm assuming use of antenna with 2 dBi of gain. The further RF exposure reduction can be achieved if the product can be kept as far as possible from the user body or set the device to lower output power if such function is available.

This product complies with the requirements set forth by The Innovation, Science and Economic Development Canada (ISED), and complies with the updates published in ICES-003, Issue 7, Information Technology Equipment (Including Digital Apparatus).

The Elcometer 215 is packed in a cardboard package. Please ensure that this packaging is disposed of in an environmentally sensitive manner. Consult your local Environmental Authority for further guidance.

Appendix A
Elcometer 215 & ElcoMaster®

A1 ELCOMASTER® OVERVIEW

ElcoMaster® is a **comprehensive data management software application**, designed by **Elcometer** to streamline the collection, analysis and reporting of inspection data for a wide range of Elcometer inspection equipment and measurement parameters including:

Oven temperature profiles, climatic conditions (Ts, Ta, RH, Dewpoint, etc.), dry film coating thickness, coating adhesion, gloss measurement, surface profile, surface cleanliness, and material thickness

ElcoMaster® provides a unified platform which means that there is no need to learn different software for different gauges. ElcoMaster® provides a single interface for all Elcometer products fitted with data output capabilities.

Widely used in sectors such as the **protective coatings, industrial finishing, and powder coatings industries**, its key features include:

- **Seamless Data Import**: Connects via **Bluetooth® or USB** to a range of Elcometer gauges, including surface profile, salt contamination, climatic conditions, coating thickness, adhesion testing, and gloss measurement.
- **Advanced Data Organization**: Stores inspection data in a **structured file tree**, categorized by project and inspection type.
- **Real-Time Analysis**: Offers **histograms, statistics, measurement limits, notes, diagrams, and photographs** for easy on-screen evaluation.
- **Instant Report Generation**: Creates **professional, customizable reports** in seconds, even on-site.
- **Cloud Integration**: Enables **multi-site access** for real-time quality control and collaboration.
- **Flexible Export Options**: Supports **Microsoft Excel, CSV, TXT, and other formats, reducing manual data entry errors.**
- **Elcometer Gauge Updates:** Allows operators to upgrade the gauge's firmware to the most up to date software version, free of charge.

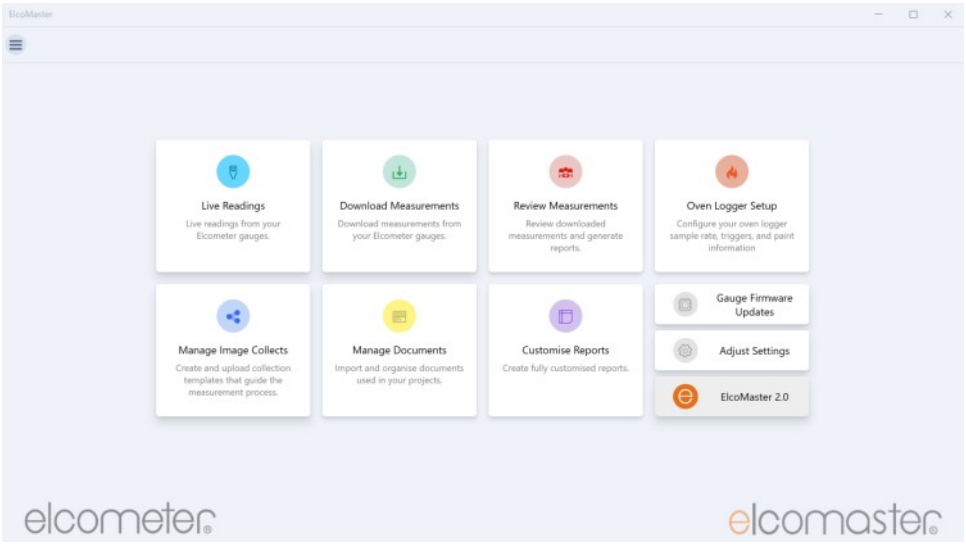
A2 INSTALLING ELCOMASTER®

ElcoMaster® is available as a free download via www.elcometer.com or by following the QR code.

Download ElcoMaster®

Once installed, open ElcoMaster® by double clicking the ElcoMaster® icon.

Once open, the user will see the main navigation screen, which includes:



Live Readings	Where measurement readings can be seen in real time.
Download Measurements	Where recorded batches of data can be downloaded from the gauge.
Review Measurements	Where downloaded measurements can be reviewed and reports generated.
Oven Logger Setup	Where the user can configure and setup all relevant parameters for the oven temperature profiling and upload to Elcometer 215 gauges.
Manage Image collects	Where users can create and upload inspection collection templates for prompting the user during coating inspection - not used for oven temperature profiling.

A2 INSTALLING ELCOMASTER® (continued)

Manage Documents	Import and organise key documents used during your inspection process.
Customise Reports	Users can design a customised report from scratch, scan blank documents for automatic completion or edit a wide range of pre-designed reports.
Gauge Firmware Updates	Allows users to check for, and upgrade the firmware of the gauge free of charge (internet access required).
Adjust Settings	Users can adjust ElcoMaster's® global settings including: Language, Measurement Units, Report Footer Setting, Cloud Settings, Default Storage Location & Export Format. Users can also import from older versions of ElcoMaster®

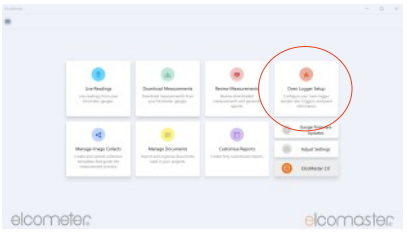
A3 ELCOMETER 215 & ELCOMASTER®

ElcoMaster® is used to setup and configure the Elcometer 215 Oven Temperature Profiler for a wide range product and oven temperature profile settings. Once created, these can be transferred to the gauge.

Using ElcoMaster® the user can:

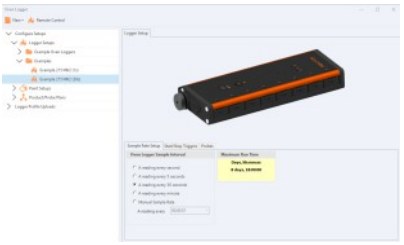
- Configure the gauge for different oven applications.
- Create a 'Paint Cure Library' by manufacturer and / or paint type with automatic calculation of the percentage.
- Set up templates for different products incorporating annotated images with diagrams of measurement locations.
- Create and transmit PDF reports incorporating all data in a professional, easy to read format via USB or Bluetooth®.

To access the Elcometer 215 settings, select 'Oven Logger Setup' from the main navigation screen.

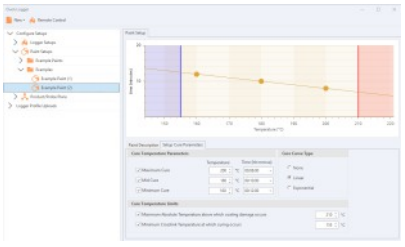


Oven logger setups is broken down into four areas:

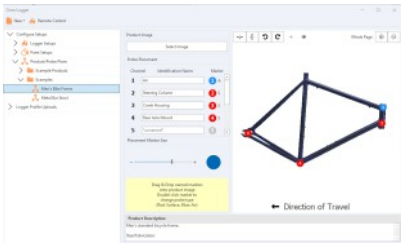
- ***Logger Setups;*** configure sample rate. start / stop triggers and probe types.



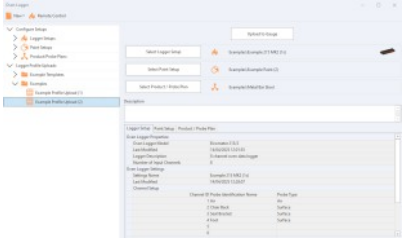
- ***Paint Setups;*** create paint and powder profiles including cure time and temperature information for the cure calculation.



- ***Product / Probe Plans;*** add supplementary information regarding the product including diagrams and thermocouple probe location.



- ***Logger Profile Uploads;*** combine all or any of the above into a template which can be uploaded to the logger.



A4 CREATING A NEW LOGGER SETUP

To create a new logger setup:

- Left click ‘New, Logger Setup, Elcometer 215/2' or;
- Left click ‘Logger Setups’ then right click ‘New, Logger Setup, Elcometer 215/2'.

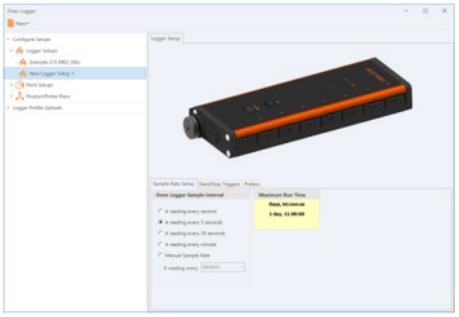
Note: Elcometer 215 under the Logger Setups menu relates to the original Elcometer 215.

After generation, the new Logger Setup file should be renamed by the user as required.

Once a New Logger Setup has been generated, the user can now create the relevant oven logger settings by selecting each of the three Logger Setup Tabs.

A4.1 SAMPLE RATE SETUP

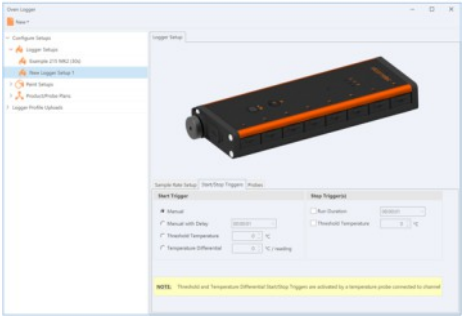
The user can define the oven logger’s sample rate, how often readings are taken. Select between:



- 1 reading every second, every 5 seconds, every 30 seconds, every minute or;
- Set up a user specific rate by selecting ‘Manual Sample Rate’ and keying in the time period (fastest measurement sampling rate is 1 reading every second).

A4.2 SETTING START / STOP TRIGGERS

Configure when to start and stop taking temperature measurements by setting start and stop triggers.



Start Triggers: The user can select the start trigger from the following options to determine when the Elcometer 215 begins taking measurements after the Start button is pressed:

A4 CREATING A NEW LOGGER SETUP (continued)

- **Manual:** Measurements begin immediately after the Start button is pressed on the Elcometer 215.

- **Manual with Delay:** Measurements will commence after a user defined delay.

- **Threshold Temperature:** Measurements will commence when the temperature of the thermocouple probe connected to channel 1 reaches the temperature set.

- **Temperature Differential:** The Elcometer 215 will begin recording measurements once the rate of change in temperature measured on the thermocouple probe connected to channel 1 reaches the user defined setting.

Note: Threshold Temperature and Temperature Differential require a thermocouple probe to be connected to channel 1.

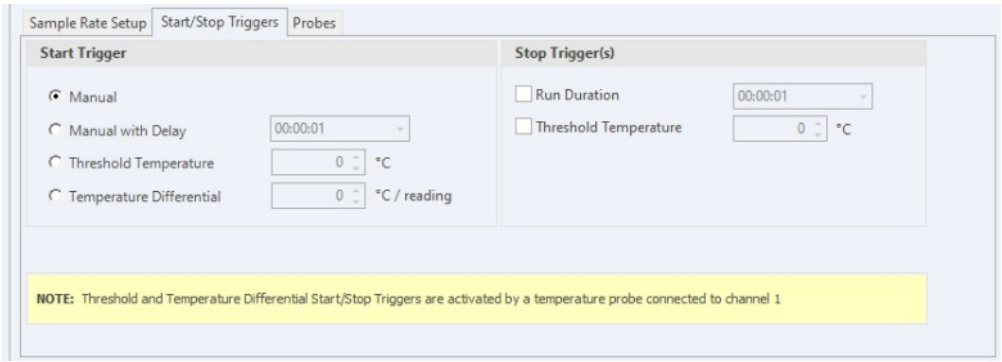
Stop Triggers: The user can set the stop trigger from:

- **Run Duration:** Set a user defined time frame. The Elcometer 215 will automatically stop taking measurements after the defined time duration has elapsed.

- **Threshold Temperature:** The Elcometer 215 will stop taking measurements when the temperature at the thermocouple connected to channel 1 falls below the user defined temperature.

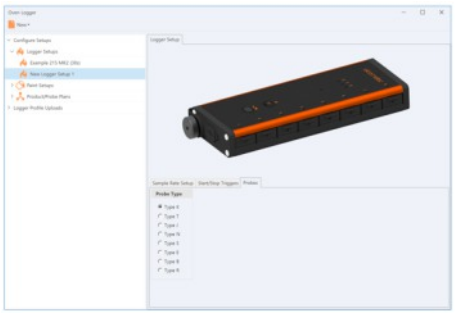
Note: Threshold Temperature requires a thermocouple probe to be connected to channel 1.

If neither of the above are selected, logging will stop when either the maximum run time is reached or it is stopped manually by the user by pressing the Stop button.



A4 CREATING A NEW LOGGER SETUP (continued)

A4.3 THERMOCOUPLE PROBES DETAILS



Different thermocouple ‘types’ may have different measurement ranges, temperature stability or measurement precision.

The user can therefore, define the ‘type’ of thermocouple probes connected to the Elcometer 215. The default is Type-K, however Types T, J, N, S, E, B or R thermocouples can also be used.

Note: All thermocouples connected to the Elcometer 215 must be of the same ‘type’. If using non-Elcometer supplied thermocouple probes, please ensure that they are suitable for use in the temperature and environment being assessed.

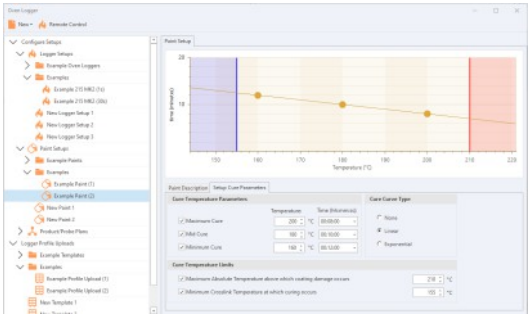
When a logger setup has been configured, should the user wish to use the Elcometer 215 as a simple temperature recording device, they can upload the logger setup to a gauge via ‘Logger Profile Uploads’. Paint setups and/or Product/Probe Plans do not have to be configured.

To upload a logger setup to the gauge, see Section A7 on page 32.

A5 CREATING A NEW PAINT SETUP

To create a new paint setup:

- Left click ‘New, Paint Setup’ or;
- Left click ‘Paint Setups’ then right click ‘New, Paint Setup’.



After generation, the new Paint Setup file should be renamed by the user as required. The user can then define the paint / powder settings.

When a paint setup has been configured, it can be uploaded a gauge via ‘Logger Profile Uploads’.

To upload a paint setup, see Section A7 on page 32.

A5 CREATING A NEW PAINT SETUP (continued)

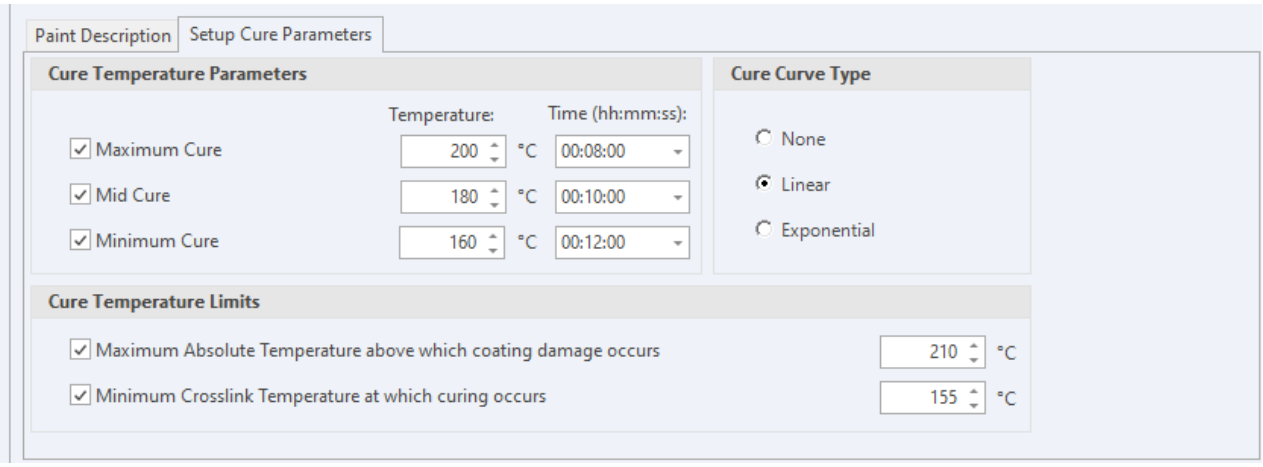
A5.1 SETTING THE CURE PARAMETERS

Time and temperature data for the paint / powder type can be added to enable the Elcometer 215 to perform a cure calculation and create a curve providing the user with a numerical value for how well the coating has cured at each thermocouple probe location. Time and temperature data which can be entered includes:

- **Cure Temperature Parameters:** At least two of these must be populated for the cure calculation to work
    - Maximum Cure temperature and time at temperature.
    - Mid Cure temperature and time at temperature.
    - Minimum Cure temperature and time at temperature.

- **Cure Temperature Limits:** These should be entered, if known, to increase the accuracy of the cure calculation and provide a warning if the product is getting too hot.
    - Maximum Absolute Temperature above which coating damage occurs.
    - Minimum Cross-link Temperature at which curing occurs.

The user can also choose to display a linear or exponential cure curve based on how well the line on the cure curve fits with the time / temperature points or no curve at all.



A5 CREATING A NEW PAINT SETUP (continued)

A5.2 PAINT DESCRIPTION

Paint / powder cure parameters are typically found on the coating manufacturers' product data sheet.

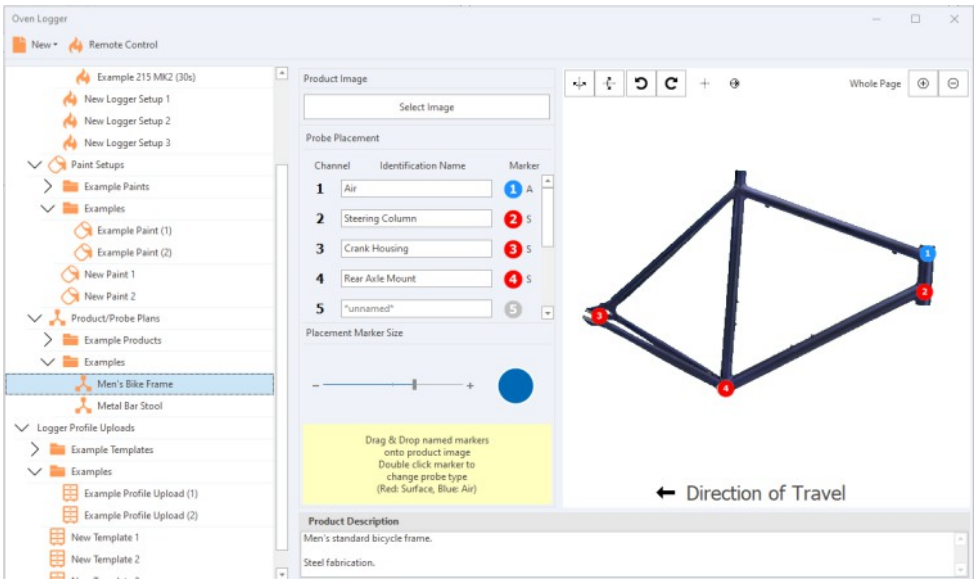
A copy of the datasheet, together with the name of the paint manufacturer & description of the paint or powder can be added under the paint description tab, and viewed by clicking the view button.

A6 CREATING A NEW PRODUCT/PROBE PLAN

A Product/Probe plan is a useful way to record thermocouple probe positioning for each product.

Users can upload an image or drawing, assign up to 8 thermocouples by channel and place an identification placement marker onto the image via the 'drag and drop' method.

Double clicking on the identification marker changes the thermocouple probe between a red surface temperature probe (S) or a blue air temperature probe (A).



When a Product/Probe Plan has been configured, it can be uploaded a gauge via 'Logger Profile Uploads'.

To upload a Product/Probe Plan, see Section A7 on page 32.

A6 CREATING A NEW PRODUCT/PROBE PLAN (continued)

To create a new product/probe plan:

- Left click ‘New, Product / Probe Pan’ or;
- Left click ‘Probe/Probe Plans’ then right click ‘New, Product/Probe Plan’.

After generation, the new Product/Probe Plan should be renamed by the user as required.

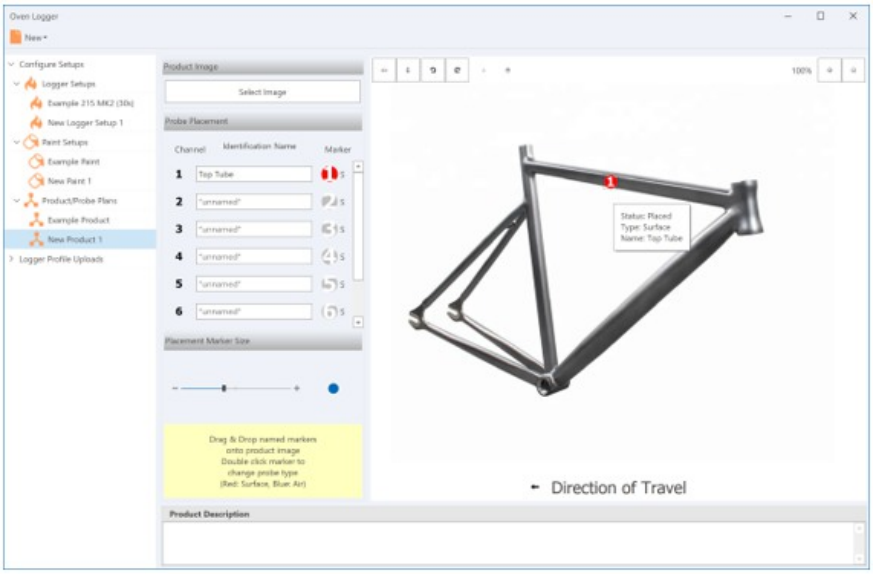
To import a product image press ‘Select Image’ and choose the appropriate image file (.png,.jpg,.bmp,.wmf or .emf).

The imported image can be rotated or flipped, enlarged or reduced using the buttons located directly above the imported image.

If the product is to be cured in a conveyor oven, the direction of travel can be changed by clicking on the “Direction of Travel” wording below the image. None should be used for Batch Ovens.

Starting at channel 1, which is the channel that controls the Start & Stop triggers, if set (see Section A4.2 on page 25), enter the location description of the first thermocouple. This will then enable the placement marker identification #1.

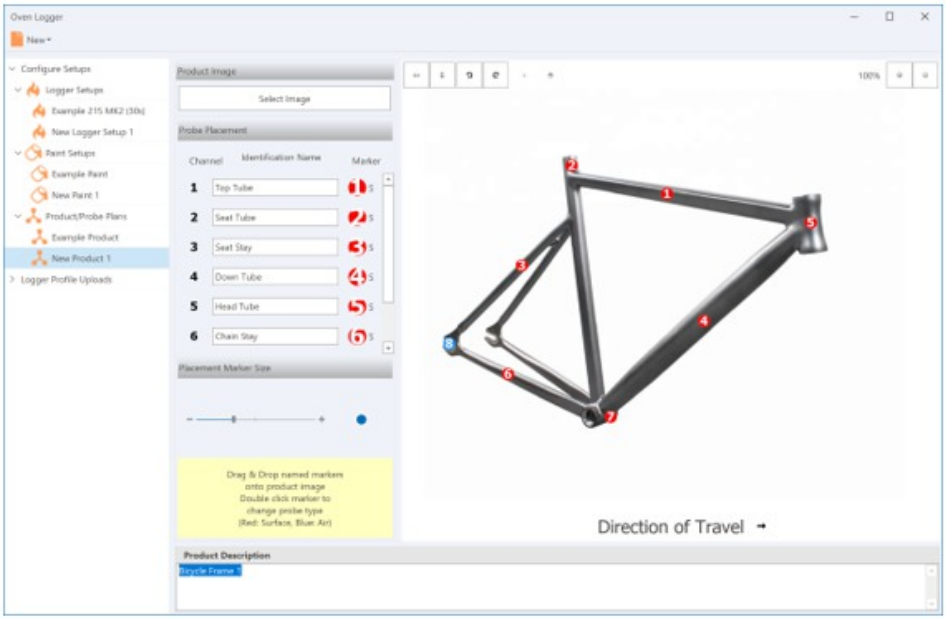
Change the marker probe type from red (surface) to blue (air) as necessary by double clicking the placement marker and then ‘drag and drop’ the marker into the correct location on the image where the channel 1 thermocouple will be attached.



A6 CREATING A NEW PRODUCT/PROBE PLAN (continued)

To adjust the placement marker's size use the "Placement Marker Size" slide bar.

Repeat the steps above for all remaining channel/place markers and add a product description (if required) in the box provided.



A7 UPLOADING SETTINGS TO THE ELCOMETER 215

A7.1 USING THE ELCOMETER 215 AS A DATA RECORDER ONLY

Once a logger setup has been created (see Section A4 on page 25) the setup can be uploaded to the Elcometer 215.

As neither paint setups nor product/probe plans have been created, no pass/fail feedback will be provided by the Elcometer 215 and the gauge will act as a data recorder, saving the measurement values into memory in accordance with the parameters created within the logger setup.

Once data has been recorded and transferred back to ElcoMaster®, users can retrospectively apply paint setups and product/probe plans.

To upload the Logger Setup, see Section A7.3 below.

A7.2 USING THE ELCOMETER 215 AS AN OVEN TEMPERATURE PROFILING SYSTEM

In order for the Elcometer 215 to function as an Oven Temperature Profiling system, providing the user with immediate pass/fail results, in addition to a logger setup, a paint setup must be created and uploaded to the gauge.

A product/probe plan can also be created and uploaded for a more enhanced system, but is not essential, as the product/probe plan can be allocated retrospectively within ElcoMaster® after measurements have been downloaded to ElcoMaster®.

To upload the Paint Setup and Product/Probe Plan, see Section A7.3 below.

A7.3 UPLOADING SETUPS AND PRODUCT/PROBE PLANS

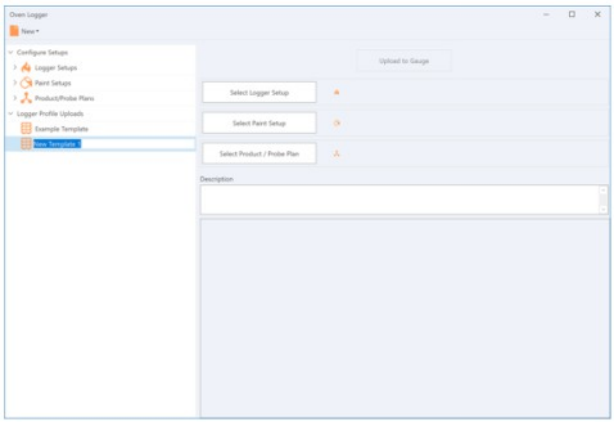
To upload settings to a gauge, a template must be created. A Profile Template combines Logger Setups, Paint Setups and Product/Probe Plans required for uploading to a gauge.

To create a new Profile Upload template:

- Left click ‘New, Logger Profile’ or;
- Left click ‘Logger Profile Uploads’ then right click ‘New, Logger Profile’.

A7 UPLOADING SETTINGS TO THE ELCOMETER 215 (cont)

After generation, the new Logger Profile Upload Template should be renamed by the user as required.

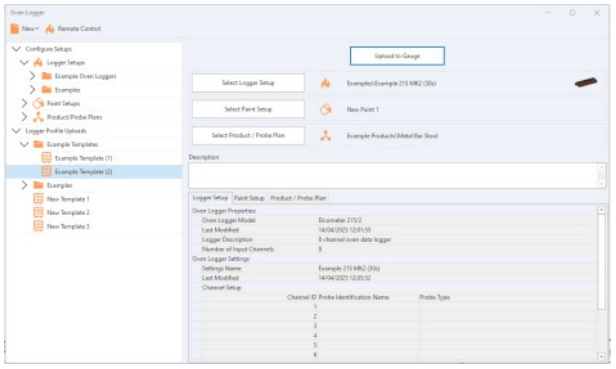


Once named, the user can then:

(a) Select the appropriate Logger Setup by clicking on the ‘Select Logger Setup’ button.

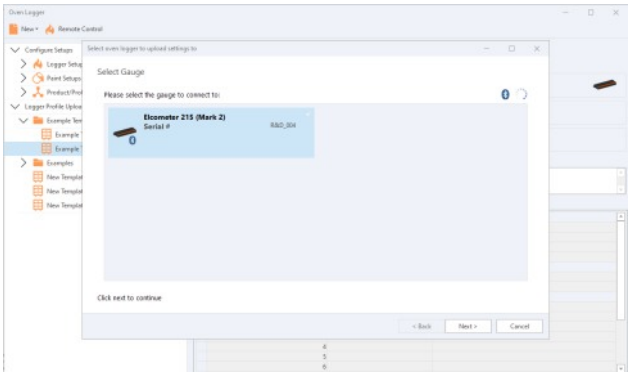
(b) Select the appropriate Paint Setup by clicking on the ‘Select Paint Setup’ button.

(c) Select the appropriate Product/Probe Plan by clicking on the ‘Select Product/Probe’ Plan button.



Once (a) or (a) & (b) or (a) & (b) & (c) have been selected, the user can add a Template Description. Alternatively, select a previously created Profile Template from the list.

Press the ‘Upload to Gauge’ button to begin transferring the Profile Template to the gauge. The software wizard will ask the user to select the gauge to connect to.

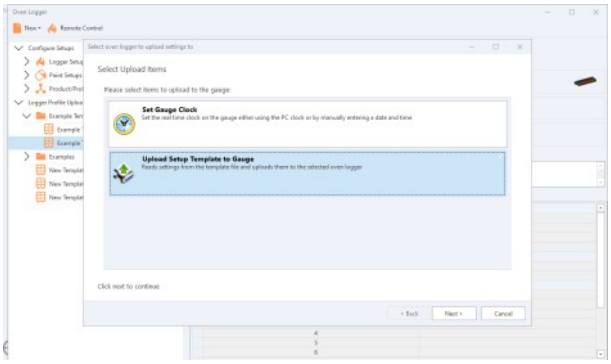


Connecting via Bluetooth®:
With the gauge powered on and Bluetooth® enabled (blue LED flashing, see Section 6.3.2 on page 13), select the relevant gauge from the list and press ‘Next’.

Connecting via USB: With the gauge powered on and the USB cable connected, select the relevant gauge from the list and press ‘Next’.

A7 UPLOADING SETTINGS TO THE ELCOMETER 215 (cont)

The user will now be asked to select upload items. There are two options to choose from

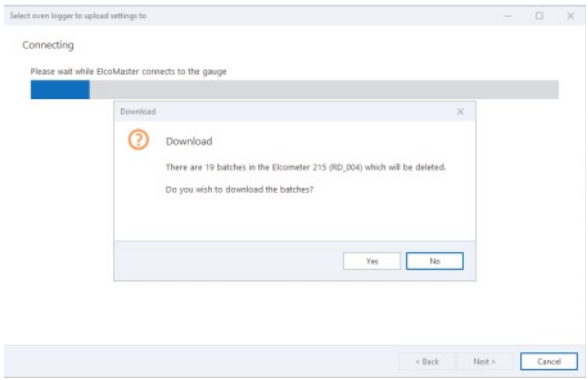


- **Set Gauge Clock:** This option allows the user to define the date and time within the gauge, whilst recommended, it is not essential.

- **Upload Setup Template to Gauge:** This option must be selected to upload the template to the gauge.

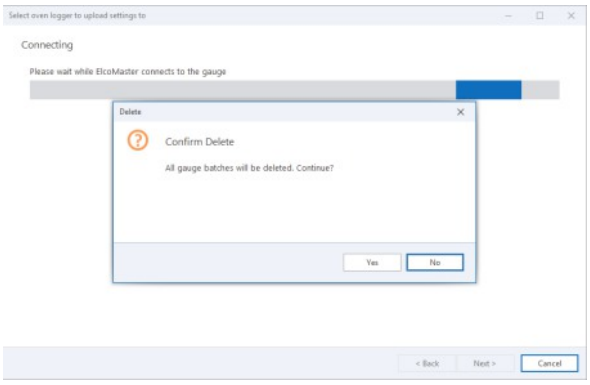
Once 'Next' has been selected:

- **If there are no batches in the gauge:** the logger profile will simply be uploaded to the gauge.



- **If there are batches in the gauge:** an logger profile ***cannot*** be uploaded if batches exist in the gauge. The user will be advised that the batches will be deleted and asked if they wish to download.

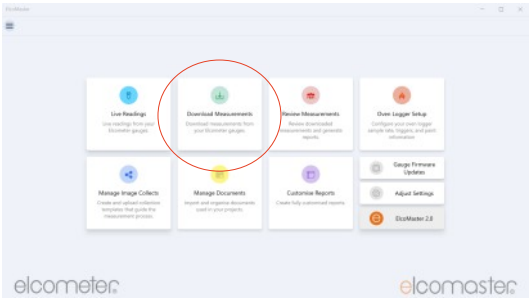
    - ***If 'Yes' is selected:*** the 'Download Measurements' process will begin, see Section A8 on page 35. Once complete and the batches have been successfully downloaded, the 'Upload to Gauge' process can begin again.



    - ***If 'No' is selected:*** the batches will be deleted from the gauge when the logger profile is uploaded. The user will be advised and asked to confirm that they wish to continue with the logger profile upload.

A8 DOWNLOADING DATA

Batch data can be downloaded at any time by clicking on the 'Download Measurements' tab on the main navigation menu.



Data can be downloaded directly into Excel or into ElcoMaster® for further analysis and reporting.

Data can be downloaded from a gauge connected via either USB or Bluetooth®. However, we recommend using USB for downloading, especially when handling a large number of batches or measurements, as Bluetooth® may take longer to transfer the data.

A8.1 DOWNLOADING DATA TO ELCOMASTER®

1 Select 'Download to ElcoMaster'.
2 Choose an existing Project Folder or create a new one to store the downloaded data.
3 Select the gauge to download data from, connected via USB or Bluetooth®.
4 Select the batches to be downloaded
5 Press 'Download' to start transferring the data.

The batch data will be downloaded and saved into the selected Project Folder.

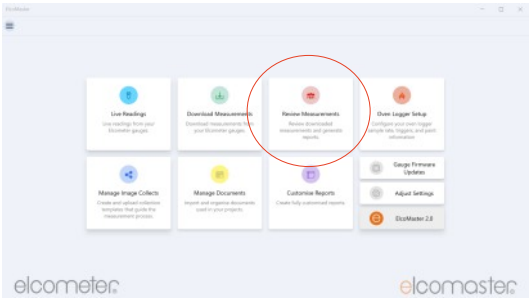
A8.2 DOWNLOADING DATA TO EXCEL

1 Select 'Download to Excel'.
2 Choose the file location to store the downloaded data.
3 Select the gauge to download data from, connected via USB or Bluetooth®.
4 Select the batches to be downloaded
5 Press 'Download' to start transferring the data.

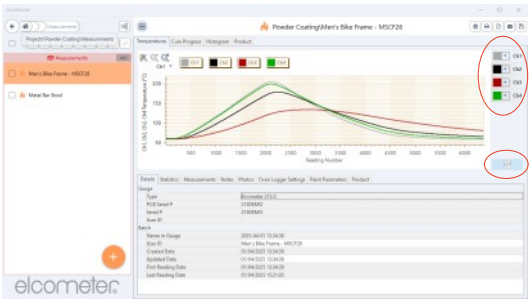
The batch data will be downloaded and saved into Excel in the selected file location.

A9 VIEWING DOWNLOADED DATA

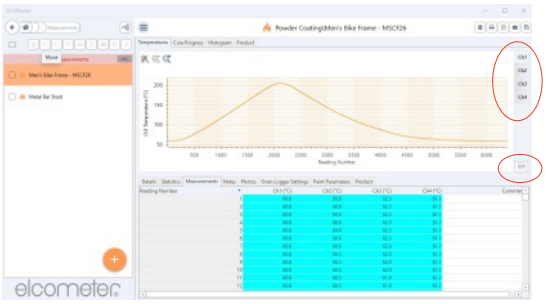
Downloaded data can be viewed at any time by clicking on the ‘Review Measurements’ tab on the main navigation menu and selecting the appropriate Elcometer 215/2 project.



The temperature trace graph is displayed with tabs to view the ‘Cure Progress’, ‘Histogram’ and ‘Product’ information (if available).

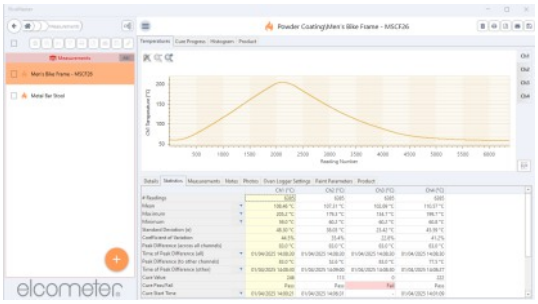


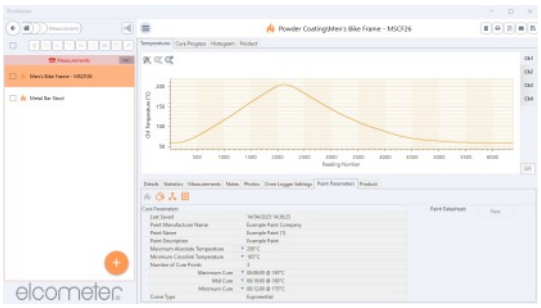
Toggle the ‘Showing Multiple Lines’ button to view the temperature trace lines for all channels on one graph. Toggle off to view the temperature trace line for the selected channel only.



Below the graph are a series of tabs containing the following batch information:

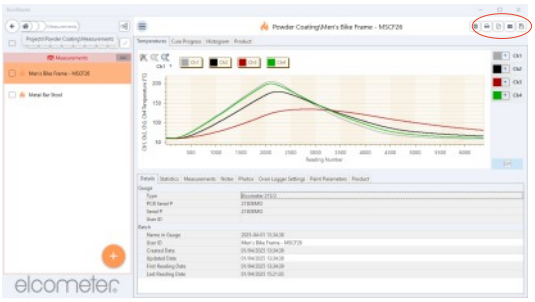
- **Details:** batch header and traceability information including serial numbers and dates / time that logging commenced.
- **Statistics:** summary statistics for each channel including cure value information, maximum temperature warnings and cure pass/fail.
- **Measurements:** a list of all the measurement taken.
- **Notes / Photos:** add supplementary information, images or drawings as required.
- **Oven Logger Settings:** summary of the logger settings used for the batch.
- **Paint Parameters:** summary of the paint parameters used for the batch.
- **Product:** summary of the product information used for the batch.





A10 CREATING A REPORT

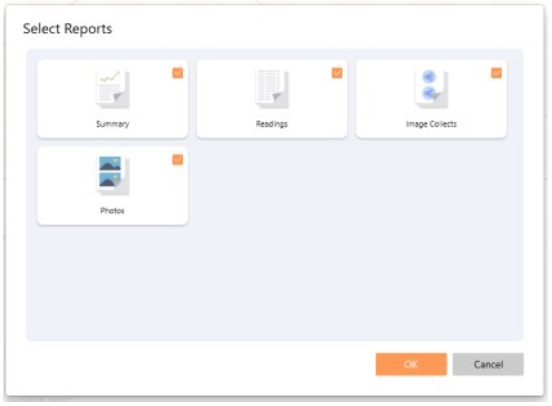
ElcoMaster® includes a built-in report generator to create simple but effective reports on oven runs. Four quick report functions are available via to top right menu buttons when in a project:



- **Print:** sends the report directly to a printer.
- **PDF:** creates and saves the report on the PC as a pdf file.
- **Email:** attaches the report to a blank e-mail using the default e-mail client. The user will be asked to select the file format - pdf, Excel, CSV or Archive.
- **Save:** saves the report on the PC. The user will be asked to select the file format - pdf, Excel, CSV or Archive.

Selecting any of these options will start the report wizard.

To create a full oven logger report, select all four options displayed (this is the default setting).



To show some but not all of the options on the report, untick as required.

Note: 'Readings' can be selected to create pages of all the individual measurements however, as an oven run usually consists of hundreds of readings, this is not recommended.