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IPC Irwin Timer Scaler & Frequency Meter

Part Number IPC-3342-T

User Instructions



INTRODUCTION.

Our long established Timer Scaler & Frequency Meter combines the functions of a multi-purpose timer, scaler/ratemeter and frequency meter. All the functions have a large 4-digit auto-ranging LED display making the instrument ideal for classroom demonstrations. The microprocessor based design minimises the number of controls required, and the clearly labelled settings make this instrument very straightforward to use.

This is an invaluable instrument in the physics laboratory, its uses are many and varied covering a wide range of the physics syllabus.

DESCRIPTION.

The Timer Scaler & Frequency Meter is simple to switch to each function using a 4-position rotary switch on the front panel. The Timer function measures to a resolution of 1 millisecond, and provides the connection of two control switches, therefore allowing a multiple range of timing experiments, including 'g' by Freefall and Dynamic Acceleration, it can also be used as a simple stopwatch. When used as a Frequency Meter the instrument will accept diversified waveforms and may be used, for example, to determine the rotational frequency of a stroboscope disc and for displaying the frequency of a waveform from a signal generator. When set to the radiation

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functions the instrument can be used as a Scaler (counter) and Ratemeter (counts per 100mS). Using these two functions allow numerous radioactive experiments to be undertaken, for example, variations in background radiation, half-life determination and investigation of absorption coefficients. The instrument offers the connection of two different types of Radiation Detector, these being the standard Geiger Muller Tube (GM option) using a TNC socket for connection, and a Solid State Detector (SS option) using a BNC socket, either option can be selected using a single throw switch.

A single biased-off double throw switch enables both the Reset and Hold functions to be momentarily selected, while a single throw switch allows the Sounder (radiation count beep) to be turned off.

The rear panel contains an illuminated (green) mains on/off switch and a mains input IEC socket containing an in-built protection fuse. Normally the unit is supplied with a separate UK plug to IEC plug 2.0m mains lead. The instrument itself is built into a robust metal case with a durable powder coated finish.

INSTRUCTIONS.

Each of the four main functions can be selected using the 4-position rotary switch.

Timer (sec) Function.

The Timer function can be operated using either a mechanical switch or electronic switch (usually a photo gate), we recommend the use of electronic switches/gates (ie. IPC Irwin Photo Timing Gate, part number: IPC-3210-T) due to the reaction speed and zero switch bounce of these switches. However, the instrument is fitted with switch bounce suppression capacitors to help eliminate this when using mechanical switches.

The instrument allows the connection of two control switches 'A' and 'B', when used with a mechanical switch the polarity is not important, however when used with an electronic switch the green 4mm sockets are the ground (0V) connection and the blue 4mm sockets are the signal input connections (internally pulled high).

When using an electronic switch, the 'A' switch input will alternately start and stop the timer (to an accuracy of 1 millisecond) on the falling edge of a signal applied to it. If using a mechanical switch, start and stop will operate on the closure of a switch contact.

When using an electronic switch, the 'B' switch input will alternately start and stop the timer on the rising edge of a signal applied to it. If using a mechanical switch, start and stop will operate on the opening of a switch contact.

For additional information on the switching functions, plus experiments, please see our: '*g*' by *Freefall Experiment Notes*, these can be found on our website home page (top banner), titled 'Experiments/Video', or using the link:- <https://www.ipcel.co.uk/blog-video/>

Frequency Meter (kHz) Function.

The Frequency Meter input connections are via the 4mm sockets labelled 'A', the green socket is the ground (0V) and the blue socket is the signal input. The meter range is 10Hz to 1MHz in three auto ranges, an input frequency above 1MHz will be indicated by the display flashing '0.000'.

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Scaler (10^3) Function.

When set to the Scaler function the instrument will count the radiation particles picked-up by the detector, this count can be reset to zero at anytime using the 'Reset' switch, the display will start to count again from zero once released. The count can also be held using the 'Hold' switch, once released the display will then jump to the current count (ie. elapsed count).

Two types of radiation detectors can be used with this instrument, the most common type is a Geiger Muller Tube, when using this type of detector, the 'GM' option must be selected using the detector switch. When using a GM Tube detector, a High Tension (HT) voltage must be applied to the Tube, therefore using the HT voltage control increase the voltage until the Tube voltage threshold is reached and the detector is active, ie. until radiation particles are detected, this HT voltage is usually in the region of 350 to 400VDC.

Note: this IPC Irwin instrument uses a TNC socket for the GM Tube connection, previous versions used a PET socket, however this is now obsolete. Should you require a suitable GM Tube to fit the TNC socket please consider our 'GM Tube & Holder' product, part number: IPC-6200-R), you are also welcome to contact IPC Irwin for alternative solutions regarding the GM Tube connection.

The second option is the Solid State detector, when using this type of detector, the 'SS' option must be selected using the detector switch. The connection for this type of detector is a BNC socket, and no High Tension (HT) voltage is required, therefore making the HT voltage control inactive. Note, due to the high sensitivity of the preamplifier when in the 'SS' option, there may be an erratic count until the detector is connected.

Note: Solid State radiation detectors are not very common and therefore in most cases only the GM Tube option will be required. However, the SS input connection can also be used in conjunction with our 'Alpha Particle Detector/Spark Counter' product number: IPC-6001-R, please use the link:- <https://www.ipcel.co.uk/product/alpha-particle-detectorspark-counter/>

Ratemeter (10^3 s^{-1}) Function.

When switch to the Ratemeter function, the instrument displays the radiation particle rate-of-count per 100 milliseconds, this is an active count ie. continuously updating this rate-of-count every 100 milliseconds. This rate-of-count can be reset to zero at anytime using the 'Reset' switch, the display will revert to the current rate-of-count once released, the 'Hold' switch operation is inactive when set to this function.

All other operations and functions are exactly the same as the 'Scaler' details above.

ADDITIONAL INSTRUCTIONS.

Reset and Hold Functions.

These two functions are operated on the same switch (this switch is biased to the middle 'off' position). Lifting the switch up 'Reset' will set the display to 0.000, no matter what function is set, if the switch is continuously held up the display will remain at 0.000, when released the display will begin to count as normal. Pushing the switch down 'Hold' and keeping it there will hold the current count, once released the display will then jump to the current count (ie. elapsed count). However, when set to the Ratemeter function the 'Hold' operation will be inactive.

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Sounder Function.

This instrument is fitted with an internal sounder, this will only operate when set to the Scaler and Ratemeter functions, ie. to provide a beep each time a radioactive particle is detected, similar to a standard Geiger Counter. This beep option can be turned off by simply setting the 'Sounder' switch to the up position.

ADDITIONAL RADIATION NOTES:

Routine leak tests and contamination checks are the responsibility of the School and College's Radiation Protection Supervisor. In order to comply with these requirements, we recommend the implementation of following document issued by Cleapss:-

Radioactivity: Instrumentation for leak tests and contamination checks (revised July 2015).

Document Ref: PS79 JRE/RW 07/15.

This document details the type of GM Tube detector required to meet the testing specifications, this being a detector with a window greater than 15mm diameter, which is capable of detecting alpha and beta emissions. GM Tubes meeting this specification can be obtained from IPC Irwin, part number: IPC-6200-R.

Also required to fulfil these tests is the correct 'Standard Test Source', these Test Sources must contain the precise amount (300mg) of potassium chloride, resulting in 0.0117% of potassium-40 (knowns K-40). These 'Standard Test Sources' are also available from IPC Irwin, part number: IPC-6225-R.

Note: Cleapss is an advisory service in the UK providing support in science and technology for a consortium or local authorities and their schools and colleges etc..

SPECIFICATIONS.

Instrument:-

Electrical Supply	= 220-240VAC, 50-60Hz
Fuse Ratings	= IEC Socket Inlet: F500mA, UK Mains Plug: 3A
Dimensions	= 255 x 220 x 120mm overall
Mass	= 2.4kg

Timer:-

Range	= 1ms to 9,999 seconds
Auto Ranges (four)	= 0.000 to 9.999s, 10 to 99.99s, 100 to 999.9s & 1000 to 9999s
Accuracy	= +/- 0.1%

Frequency Meter:-

Range	= 10Hz to 1MHz
Auto Ranges (three)	= 0.000 to 9.999kHz, 10 to 99.99kHz & 100 to 999.9kHz
Accuracy	= +/- 0.01%
Input Signal (Max.)	= 20V (rms)
Input Sensitivity (Min.)	= 250mV (rms)

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Scaler:-

Range	= 0 to 999.9×10^3 counts
Auto Ranges (three)	= 0 to 9.999×10^3 , 10 to 99.99×10^3 & 100 to 999.9×10^3 counts
Input Sensitivity	= 160mV (peak)

Ratemeter:-

Range	= 0 to $999.9 \times 10^3 \text{ s}^{-1}$
Auto Range (three)	= 0 to $9.999 \times 10^3 \text{ s}^{-1}$, 10 to $99.99 \times 10^3 \text{ s}^{-1}$ & 100 to $999.9 \times 10^3 \text{ s}^{-1}$ counts
Input Sensitivity	= 160mV (peak)

Please Note: This Equipment is for Education, Training, or research Purposes Only.

IMPORTANT- ELECTRICAL SAFETY NOTICE

Only connect the product to single phase mains electrical supply (with neutral nominally at each potential), also check that supply voltage and frequency are within the products stated range. Before connecting to the mains electrical supply, examine the information on the products rating label (the value of the fuse fitted to the product is also stated), ensure that the mains plug or outlet circuit is fitted with an appropriate fuse of higher value.

WARNING: THIS PRODUCT MUST BE EARTHED

This product is designed for Electrical Safety Class 1.

If a mains lead is not fitted or supplied, connect the wires to a Standard UK, 3-pin plug as follows:-

Green/Yellow wire to the terminal marked: E (Earth) or coloured Green or Green/Yellow.

Brown wire to terminal marked: L (Live) or coloured Brown.

Blue wire to terminal marked: N (Neutral) or coloured Blue.

LIVE PARTS SHOULD NEVER BE EXPOSED UNLESS THE PRODUCT HAS BEEN SWITCHED OFF AND ISOLATED FROM THE MAINS ELECTRICITY SUPPLY.

Thank you for choosing this IPC Irwin product, which has specifically been designed for education and we know it will bring you good service long into the future. This is just one product of a wide range of UK designed and manufactured products to enhance a STEM education, please see www.ipcirwin.com website for more details on the products and service we provide to support teaching and learning in science and technology.

IPC Irwin also provide Portable Appliance Testers and a Calibration service, for more details please go to www.ipcirwin.com or call our sales and technical support line on 015395 58555.

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Declaration of Conformity (In Accordance with EN ISO 17050-1:2010).

Manufacturer: **IPC Irwin, Holker School, Cark-in-Cartmel, Grange-over-Sands, Cumbria, LA11 7PQ, United Kingdom.**

Product/Part No: **Timer Scaler & Frequency Meter (230V AC, 50Hz main voltage)/IPC-3342-T**

This conformity certificate approves the compliance of the product with the essential safety requirements of the following UK Standards and Regulations:

SI 2005 No.1803	General Product Safety Regulation (implements Directive 2001/95/EC).
SI 2016/1101	Electrical Equipment (Safety) Regulation (implements Directive 2014 /35/EU.
EN 61010-1: 2010	Electrical Requirements for Laboratory Test & Measurement Equipment.
EN 61000-6-1: 2019	EMC, Generic Standards, Immunity for Residential, Commercial and Light Industrial Environments.
EN 61000-6-3: 2019	EMC, Generic Standards, Emission for Residential, Commercial and Light Industrial Environments.
SI 2012 No. 3032	Restriction on Hazardous Substances (RoHS) in Electrical and Electronic Equipment Regulation, (implements Directive 2011/65/EU).



Mark can be used only in the case of conformity assessment according to all relevant UK Standards and Regulations.

EU Declaration of Conformity (In accordance with European Parliament and Council Decision No: 768/2008/EC Annex III).

This conformity certificate approves the compliance of the product with the essential safety requirements of the following EC/EU Directives (Manufacturer, Product/Part No: as above).

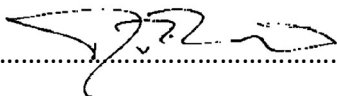
2001/95/EU	General Product Safety Directive.
2014/35/EU	Low Voltage Directive (LVD).
2014/30/EU	Electromagnetic Compatibility (EMC) Directive.
2011/65/EU	Restriction on Hazardous Substances Directive (RoHS).

European harmonised Standards used for conformity assessment and declaration:

EN 61010-1: 2010 **Electrical Requirements for Laboratory Test & Measurement Equipment.**



Mark can be used only in the case of conformity assessment according to all relevant EC/EU Directives.

Dickon Knight (Director):  Date of Issue: 24th May 2023.

In the event of any correspondence concerning this product, please contact your supplying agent quoting the catalogue number and serial number shown on the apparatus rating label, together with the voltage and frequency of the mains electrical supply. This will help us to process your enquiry quickly. Any spare parts which may be required are supplied on the understanding that the replacement of those requiring the exposure of live electrical connections **will** be undertaken by an electrically qualified person.

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