# cellZscope® — Compatibility With Cell Culture Inserts

All cellZscope systems are compatible with a variety of standard cell culture inserts from different manufacturers. Three versions of cellZscope electrodes are available, which are tailored for use with small, mid-sized, or large inserts, respectively. If required, different electrode sizes can also be combined in a single Cell Module. The lists below show some of the compatible inserts.
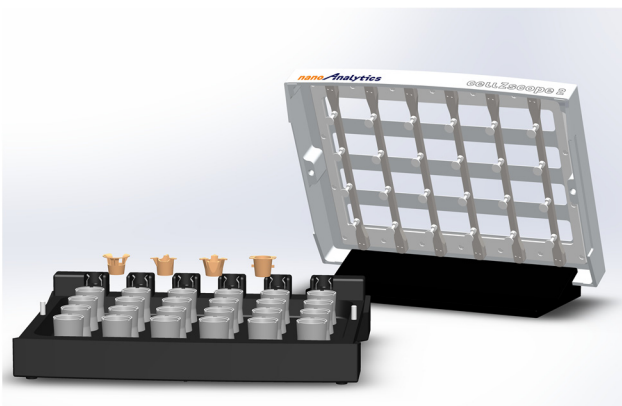
"24-Well" Type Inserts

Manufacturer	Part No.	Membrane				Insert Type
		Material	Pore Size	Pore Density	Optics	
Corning Transwell	3413	PC	0.4 µm	$1.0\times10^8/cm^2$	translucent	hanging
	3470	PET	0.4 µm	$4.0\times10^6/cm^2$	transparent	hanging
	3415	PC	3.0 µm	$2.0\times10^6/cm^2$	translucent	hanging
	3472	PET	3.0 µm	$2.0\times10^6/cm^2$	transparent	hanging
Corning Falcon	353495	PET	0.4 µm	$1.6\times10^6/cm^2$	translucent	hanging
	353095	PET	0.4 µm	$1.6\times10^6/cm^2$	transparent	hanging
	353104	PET	1.0 µm	$1.6\times10^6/cm^2$	translucent	hanging
	353492	PET	3.0 µm	$2.0\times10^6/cm^2$	translucent	hanging
	353096	PET	3.0 µm	$8.0\times10^5/cm^2$	transparent	hanging
Greiner Bio-One ThinCert	662 640	PET	0.4 µm	$1.0\times10^8/cm^2$	translucent	hanging
	662 641	PET	0.4 µm	$2.0\times10^6/cm^2$	transparent	hanging
	662 610	PET	1.0 µm	$2.0\times10^6/cm^2$	translucent	hanging
	662 631	PET	3.0 µm	$2.0\times10^6/cm^2$	translucent	hanging
	662 630	PET	3.0 µm	$6.0\times10^5/cm^2$	transparent	hanging
Merck Millipore Millicell	MCHT 24H 48	PET	0.4 µm	$1.0\times10^8/cm^2$	translucent	hanging
	MCRP 24H 48	PET	1.0 µm	$2.0\times10^6/cm^2$	transparent	hanging
	MCSP 24H 48	PET	3.0 µm	$2.0\times10^6/cm^2$	transparent	hanging
Brand	7827 00	PS	0.4 µm	$1.0\times10^8/cm^2$	translucent	standing
Nunc	140620	PC	0.4 µm	$8.5\times10^7/cm^2$	translucent	standing
	140627	PC	3.0 µm	$1.7\times10^6/cm^2$	translucent	standing
Sarstedt	83.3932.040	PET	0.4 µm	$1.0\times10^8/cm^2$	translucent	hanging
	83.3932.041	PET	0.4 µm	$2.0\times10^6/cm^2$	transparent	hanging
	83.3932.101	PET	1.0 µm	$2.0\times10^6/cm^2$	translucent	hanging
	83.3932.300	PET	3.0 µm	$2.0\times10^6/cm^2$	translucent	hanging
SABEU cellQART	932 04 02	PET	0.4 µm	$1.0\times10^8/cm^2$	translucent	hanging
	932 10 02	PET	1.0 µm	$2.0\times10^6/cm^2$	translucent	hanging
	932 30 02	PET	3.0 µm	$2.0\times10^6/cm^2$	translucent	hanging
	932 04 12	PET	0.4 µm	$2.0\times10^6/cm^2$	transparent	hanging
	932 10 12	PET	1.0 µm	$2.0\times10^6/cm^2$	transparent	hanging
	932 30 12	PET	3.0 µm	$6.0\times10^5/cm^2$	transparent	hanging
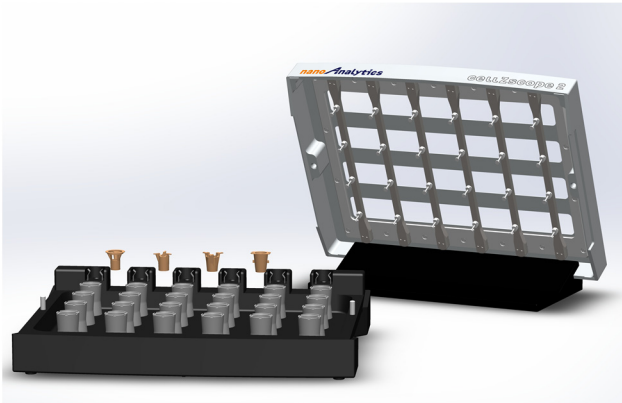
"12-Well" Type Inserts

Manufacturer	Part No.	Membrane				Insert Type
		Material	Pore Size	Pore Density	Optics	
Corning Transwell	3401	PC	0.4 µm	$1.0\times10^8/cm^2$	translucent	hanging
	3460	PET	0.4 µm	$4.0\times10^6/cm^2$	transparent	hanging
	3402	PC	3.0 µm	$2.0\times10^6/cm^2$	translucent	hanging
	3462	PET	3.0 µm	$2.0\times10^6/cm^2$	transparent	hanging
Corning Falcon	353494	PET	0.4 µm	$1.6\times10^8/cm^2$	translucent	hanging
	353180	PET	0.4 µm	$1.6\times10^6/cm^2$	transparent	hanging
	353103	PET	1.0 µm	$1.6\times10^6/cm^2$	transparent	hanging
	353292	PET	3.0 µm	$2.0\times10^6/cm^2$	translucent	hanging
	353181	PET	3.0 µm	$8.0\times10^5/cm^2$	transparent	hanging
Greiner Bio-One ThinCert	665 640	PET	0.4 µm	$1.0\times10^8/cm^2$	translucent	hanging
	665 641	PET	0.4 µm	$2.0\times10^6/cm^2$	transparent	hanging
	665 610	PET	1.0 µm	$2.0\times10^6/cm^2$	transparent	hanging
	665 631	PET	3.0 µm	$2.0\times10^6/cm^2$	translucent	hanging
	665 630	PET	3.0 µm	$6.0\times10^5/cm^2$	transparent	hanging
Millipore Millicell	MCHT 12H 48	PET	0.4 µm	$1.0\times10^8/cm^2$	translucent	hanging
	MCRP 12H 48	PET	1.0 µm	$2.0\times10^6/cm^2$	transparent	hanging
	MCSP 12H 48	PET	3.0 µm	$2.0\times10^6/cm^2$	translucent	hanging
Brand	7827 20	PS	0.4 µm	$1.0\times10^8/cm^2$	translucent	standing
Nunc	140652	PC	0.4 µm	$8.5\times10^7/cm^2$	translucent	standing
	140654	PC	3.0 µm	$1.7\times10^6/cm^2$	translucent	standing
Sarstedt	83.3931.040	PET	0.4 µm	$1.0\times10^8/cm^2$	translucent	hanging
	83.3931.041	PET	0.4 µm	$2.0\times10^6/cm^2$	transparent	hanging
	83.3931.101	PET	1.0 µm	$2.0\times10^6/cm^2$	transparent	hanging
	83.3931.300	PET	3.0 µm	$2.0\times10^6/cm^2$	translucent	hanging
SABEU cellQART	931 04 02	PET	0.4 µm	$1.0\times10^8/cm^2$	translucent	hanging
	931 10 02	PET	1.0 µm	$2.0\times10^6/cm^2$	translucent	hanging
	931 30 02	PET	3.0 µm	$2.0\times10^6/cm^2$	translucent	hanging
	931 04 12	PET	0.4 µm	$2.0\times10^6/cm^2$	transparent	hanging
	931 10 12	PET	1.0 µm	$2.0\times10^6/cm^2$	transparent	hanging
	931 30 12	PET	3.0 µm	$6.0\times10^5/cm^2$	transparent	hanging

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"6-Well" Type Inserts

Manufacturer	Part No.	Material	Pore Size	Pore Density	Optics	Insert Type
Corning Transwell	3412	PC	0.4 µm	$1.0\times10^{8}/cm^{2}$	translucent	hanging
	3450	PET	0.4 µm	$4.0\times10^{6}/cm^{2}$	transparent	hanging
	3414	PC	3.0 µm	$2.0\times10^{6}/cm^{2}$	translucent	hanging
	3452	PET	3.0 µm	$2.0\times10^{6}/cm^{2}$	transparent	hanging
Corning Falcon	353493	PET	0.4 µm	$1.6\times10^{8}/cm^{2}$	translucent	hanging
	353090	PET	0.4 µm	$1.6\times10^{6}/cm^{2}$	transparent	hanging
	353102	PET	1.0 µm	$1.6\times10^{6}/cm^{2}$	transparent	hanging
	353092	PET	3.0 µm	$2.0\times10^{6}/cm^{2}$	translucent	hanging
	353091	PET	3.0 µm	$8.0\times10^{5}/cm^{2}$	transparent	hanging
Greiner Bio-One ThinCert	657 640	PET	0.4 µm	$1.0\times10^{8}/cm^{2}$	translucent	hanging
	657 641	PET	0.4 µm	$2.0\times10^{6}/cm^{2}$	transparent	hanging
	657 610	PET	1.0 µm	$2.0\times10^{6}/cm^{2}$	transparent	hanging
	657 631	PET	3.0 µm	$2.0\times10^{6}/cm^{2}$	translucent	hanging
	657 630	PET	3.0 µm	$6.0\times10^{5}/cm^{2}$	transparent	hanging
Millipore Millicell	MCHT 06H 48	PET	0.4 µm	$1.0\times10^{8}/cm^{2}$	translucent	hanging
	MCRP 06H 48	PET	1.0 µm	$2.0\times10^{6}/cm^{2}$	translucent	hanging
	MCSP 06H 48	PET	3.0 µm	$2.0\times10^{6}/cm^{2}$	translucent	hanging
Brand	7827 40	PS	0.4 µm	$1.0\times10^{8}/cm^{2}$	translucent	standing
Nunc	140660	PC	0.4 µm	$8.5\times10^{7}/cm^{2}$	translucent	standing
	140663	PC	3.0 µm	$1.7\times10^{6}/cm^{2}$	translucent	standing
Sarstedt	83.3930.040	PET	0.4 µm	$1.0\times10^{8}/cm^{2}$	translucent	hanging
	83.3930.041	PET	0.4 µm	$2.0\times10^{6}/cm^{2}$	translucent	hanging
	83.3930.101	PET	1.0 µm	$2.0\times10^{6}/cm^{2}$	translucent	hanging
	83.3930.300	PET	3.0 µm	$2.0\times10^{6}/cm^{2}$	translucent	hanging
SABEU cellQART	930 04 02	PET	0.4 µm	$1.0\times10^{8}/cm^{2}$	translucent	hanging
	930 10 02	PET	1.0 µm	$2.0\times10^{6}/cm^{2}$	translucent	hanging
	930 30 02	PET	3.0 µm	$2.0\times10^{6}/cm^{2}$	translucent	hanging
	930 04 12	PET	0.4 µm	$2.0\times10^{6}/cm^{2}$	transparent	hanging
	930 10 12	PET	1.0 µm	$2.0\times10^{6}/cm^{2}$	transparent	hanging
	930 30 12	PET	3.0 µm	$6.0\times10^{5}/cm^{2}$	transparent	hanging
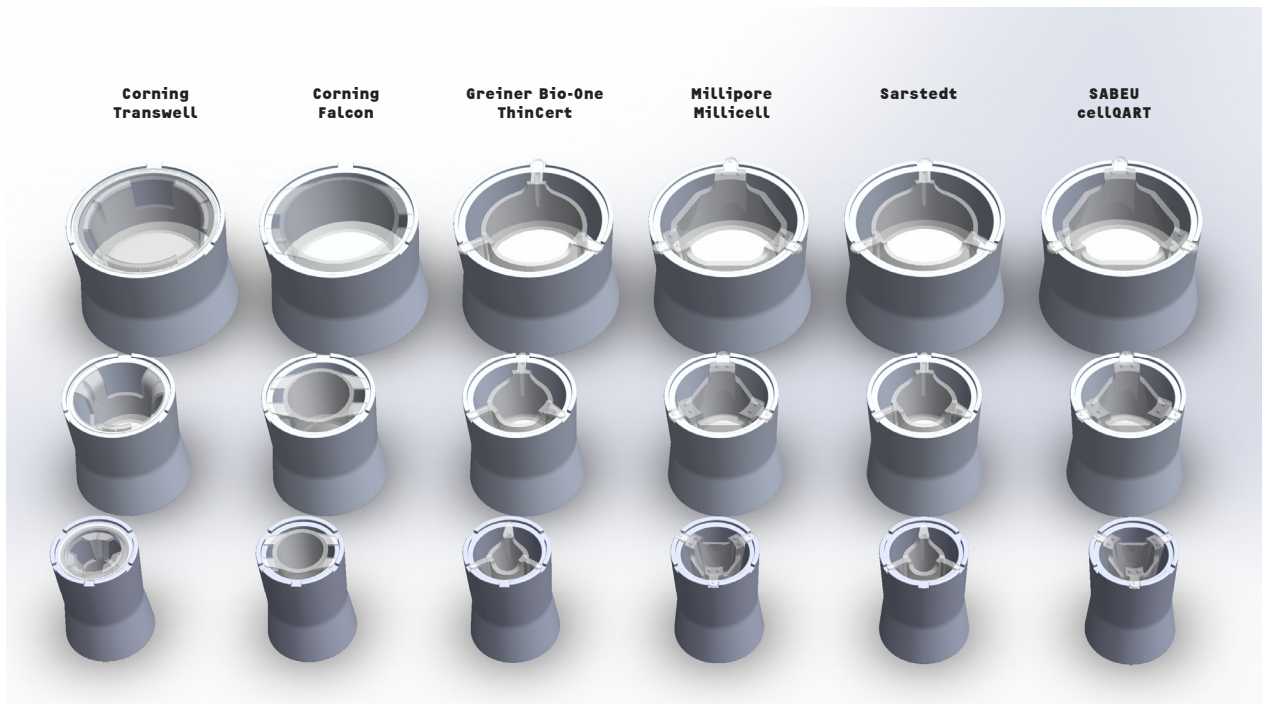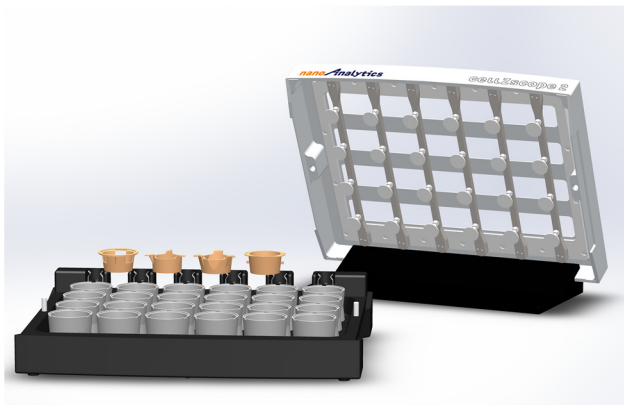
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cellZscope systems measure the transepithelial / -endothelial impedance of cell layers under physiological conditions. They are computer-controlled and allow automated, long-term monitoring experiments with up to 96 different cell cultures simultaneously. Various types of barrier-forming cells cultured on permeable membranes can be analyzed. The ohmic resistance (TER, transepithelial / -endothelial resistance) and optionally the capacitance (C_{cl}) of the cell layers under investigation are determined in real-time. The cellZscope is easy to operate and has a broad range of possible applications. In particular, it is ideally suited for studying the influence of substances such as drugs, toxins etc. on the barrier function of cell layers.

As the original innovator of label-free automated monitoring of barrier forming cells grown in standard cell culture inserts, nanoAnalytics designed the cellZscope systems with highest precision engineering and quality materials. Features are a convincing performance, great measurement flexibility, and instrument operations and maintenance that are truly a snap. These and other features have made the cellZscope systems the ideal tool for controlling cellular barriers. The real strength of the cellZscope lies in its capability to sweep fast and accurately over a wide frequency range instead of measuring at just a few frequency points. Only the full spectral information detected by the cellZscope ensures a reliable and unambiguous detection of cell layer properties and changes thereof.

Maximum flexibility – don't stick to one size

Depending on the model, cellZscope systems can be loaded with up to 96[‡] inserts simultaneously. Three well sizes are available for use with small ("24-well" type), mid-sized ("12-well" type), or large ("6-well" type) inserts, respectively. The Cell Module features individual (stand-alone) stainless steel wells. This also allows the user to combine different well sizes within one Cell Module, measuring simultaneously and comparing cell layers grown on small, mid-sized, or large inserts in a single experiment. With its innovative design the cellZscope offers full compatibility with standard cell culture inserts from all major manufacturers, like Corning Transwell / Falcon, Greiner Bio-One ThinCert, Sarstedt and Millipore Millicell.

![nanoAnalytics logo]

During an experiment the Cell Module is typically placed inside a standard incubator while the external Controller is connected to a computer running the cellZscope software.

Easy to clean – sustainable and effortless

The electrode design makes cleaning very easy. Single-piece stainless steel "pots" serve as bottom electrodes, as vessels for holding the cell culture medium, and as supports for cell culture inserts. They can be detached easily without the use of tools. The innovative design of the lid stands out with its high user-friendliness and makes handling of the upper electrodes comfortable. All stainless steel electrodes and all parts of the Cell Module lid are autoclavable. These features make the cellZscope systems a snap to clean and sterilize. No additional device-specific disposables are required, keeping customer operating costs at a minimum.

The crucial parts are designed using the highest quality stainless steel – ensuring long-lasting durability and excellent compatibility with all standard cleaning and sterilization methods.


cellZscope systems are designed to ensure simple operation and maximum flexibility. The Cell Module provides investigators full apical and basolateral access to all wells.

Software — intuitive and clear layout

The cellZscope software features advanced multi-channel data acquisition with data processing. The software is highly intuitive providing the user complete control of the experiment. TER and capacitance of the cell layer are displayed in real time. Other features of the cellZscope software include visualization of raw data acquisition, statistical analysis, and comprehensive documentation of experimental parameters and events. The measurements can be scheduled by specifying time intervals according to experimental requirements. User-friendly functions for exporting cellZscope data into popular file formats are also included.
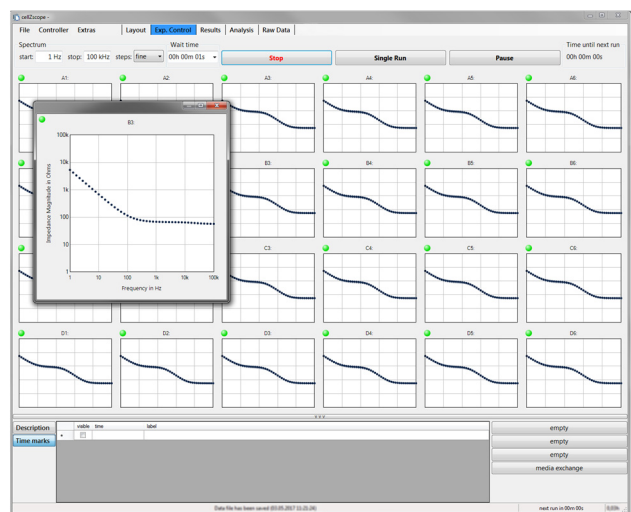
Setting up and controlling the experiment is easy and intuitive. Barrier property dynamics can be visualized in real-time.
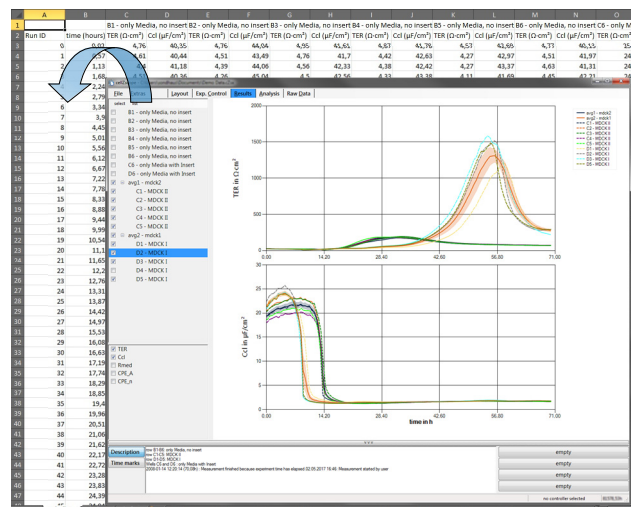
Powerful offline data processing and easy export of graphs, results and raw data are supported.

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cellZscope E

- 6 individual wells, measurement of TER every hour.

- Entry-level model that goes easy on the budget. Later upgrade to a full cellZscope+ possible.

cellZscope +

- 24 individual wells, measurement of TER and C_{cl} every 20 minutes[†].

- Sustainable, easy to use and maintenance without the use of tools.
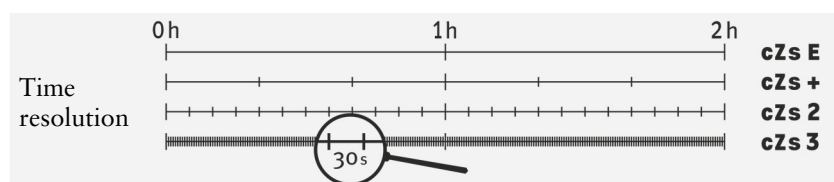
cellZscope 2

- 24 individual wells, measurement of TER and C_{cl} every 5 minutes[†].

- Exceptional ease of use: handling during experiments is a snap with the Docking Station.

cellZscope 3

- High-end model with up to 96 individual wells per Controller[‡], measurement of TER and C_{cl}.

- Top performance: standard time resolution of 30 seconds[†] with full spectral information.

	Output parameters	Number of wells	Supported insert sizes	Compatibility with std. cell culture inserts	Electrodes unlimited autoclavable	Measuring interval adjustable	Docking Station	High-speed measurement
cZs E	TER	6	6-/12-/24-well	✓	✓			
cZs +	TER, C_{cl}	24	6-/12-/24-well	✓	✓	✓		
cZs 2	TER, C_{cl}	24	6-/12-/24-well	✓	✓	✓	✓	
cZs 3	TER, C_{cl}	up to 96[‡]	6-/12-/24-well	✓	✓	✓	✓	✓

Time resolution

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	cellZscopeE	cellZscope+	cellZscope2	cellZscope3
Dimensions (L×W×H)				
Controller	26 × 6 × 27 cm³ 10.2 × 2.4 × 10.6 in³	26 × 6 × 27 cm³ 10.2 × 2.4 × 10.6 in³	26 × 6 × 27 cm³ 10.2 × 2.4 × 10.6 in³	26 × 6 × 27 cm³ 10.2 × 2.4 × 10.6 in³
Cell Module	18 × 15 × 7 cm³ 7.1 × 6.0 × 2.8 in³	32 × 24 × 7 cm³ 12.6 × 9.5 × 2.8 in³	32 × 24 × 7 cm³ 12.6 × 9.5 × 2.8 in³	32 × 24 × 7 cm³ 12.6 × 9.5 × 2.8 in³
Station	-	-	32 × 24 × 4 cm³ 12.6 × 9.5 × 1.6 in³	32 × 24 × 4 cm³ 12.6 × 9.5 × 1.6 in³
Space required in incubator	26 × 20 × 9 cm³ 10.2 × 7.9 × 3.6 in³	40 × 29 × 9 cm³ 15.8 × 11.5 × 3.6 in³	40 × 29 × 13 cm³ 15.8 × 11.5 × 5.1 in³	40 × 29 × 13 cm³ 15.8 × 11.5 × 5.1 in³
Connector Cable				
Length	150 cm (59 in)	150 cm (59 in)	150 cm (59 in)	150 cm (59 in)
Cross-section (W×T or Dia.)	15 × 4 mm² 0.6 × 0.16 in²	35 × 4 mm² 1.4 × 0.16 in²	29 × 4 mm² 1.2 × 0.16 in²	3 mm 0.12 in

Usually the cable can be fed through the front door past the rubber gasket of the incubator.

Power Supply	100 – 240 Vac; 0.8 A; 47 – 63 Hz			90 – 264 Vac; 0.84 A; 47 – 63 Hz
Cell Module				
Number of wells	6	24	24	24 (96[‡])
6 well size	✓	✓	✓	✓
12 well size	✓	✓	✓	✓
24 well size	✓	✓	✓	✓
Measurement Parameter				
Output parameter	TER	TER, C_{cl}	TER, C_{cl}	TER, C_{cl}
Frequency range	1 Hz to 100 kHz	1 Hz to 100 kHz (adjustable)	1 Hz to 100 kHz (adjustable)	1 Hz to 100 kHz (adjustable)
Time resolution[†]	6 wells in 1 h	24 wells in 20 min	24 wells in 5 min	24 (96[‡]) wells in 30 s
Recommended specifications for the control computer	QuadCore with 1.6 GHz processor speed; 8 GB RAM; USB 2.0 port; SSD			
Compatible OS	Microsoft Windows® 7/8/10			

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