



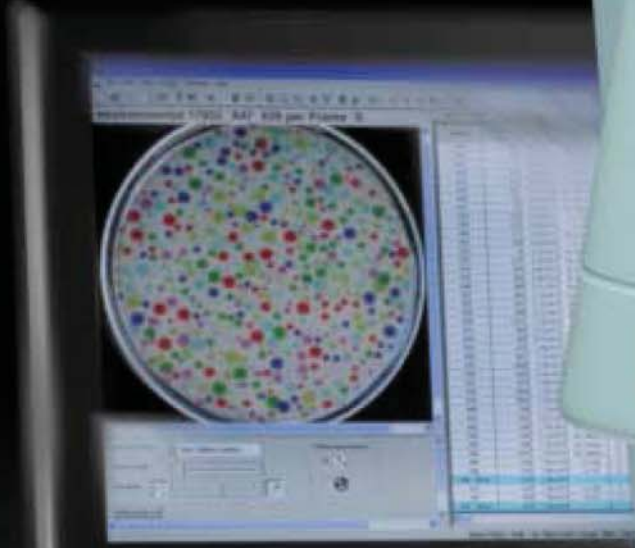
ADVANCED  
AUTOMATION

# ProtoCOL

AUTOMATED COLONY COUNTING AND ZONE SIZING



ProtoCOL

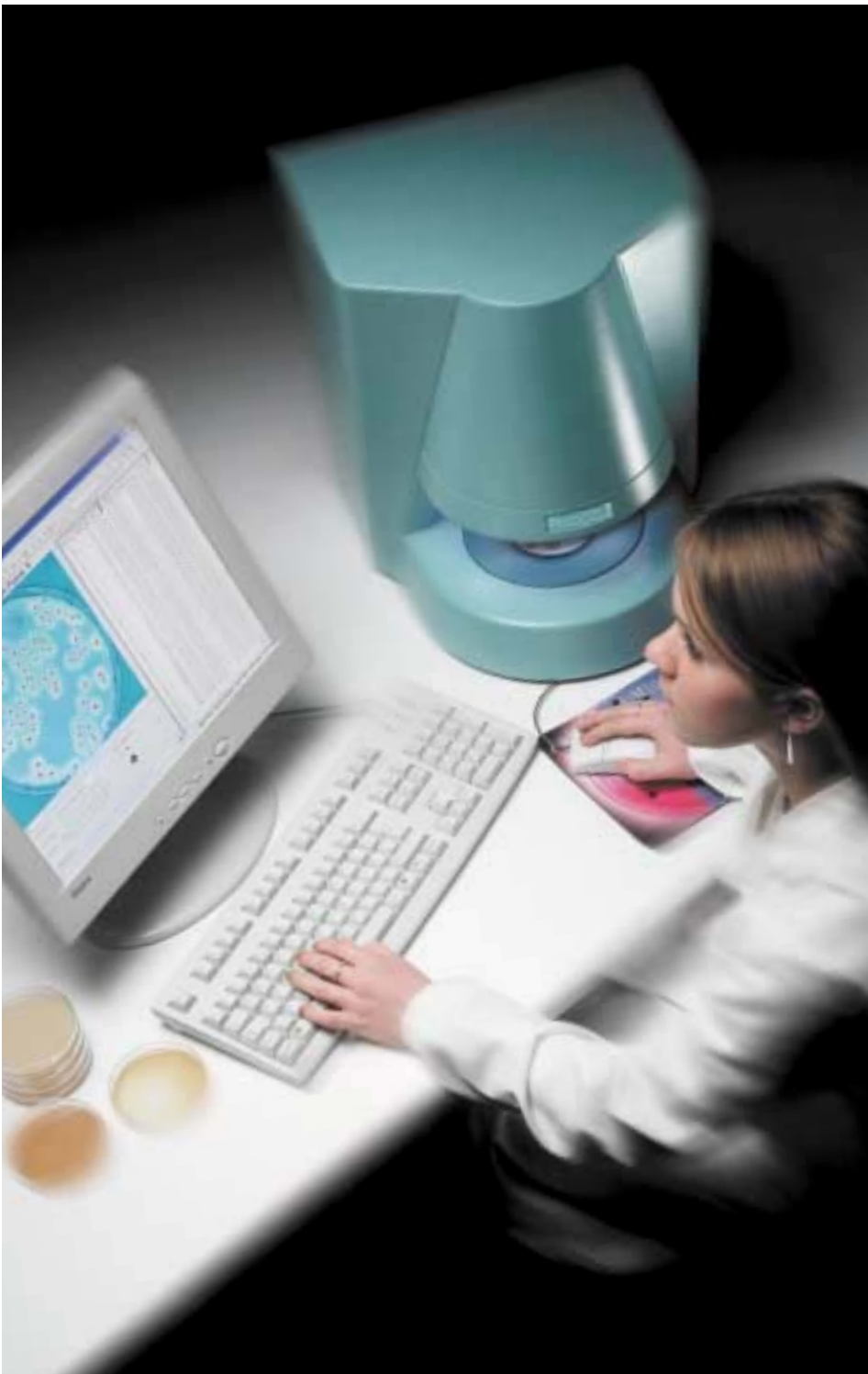


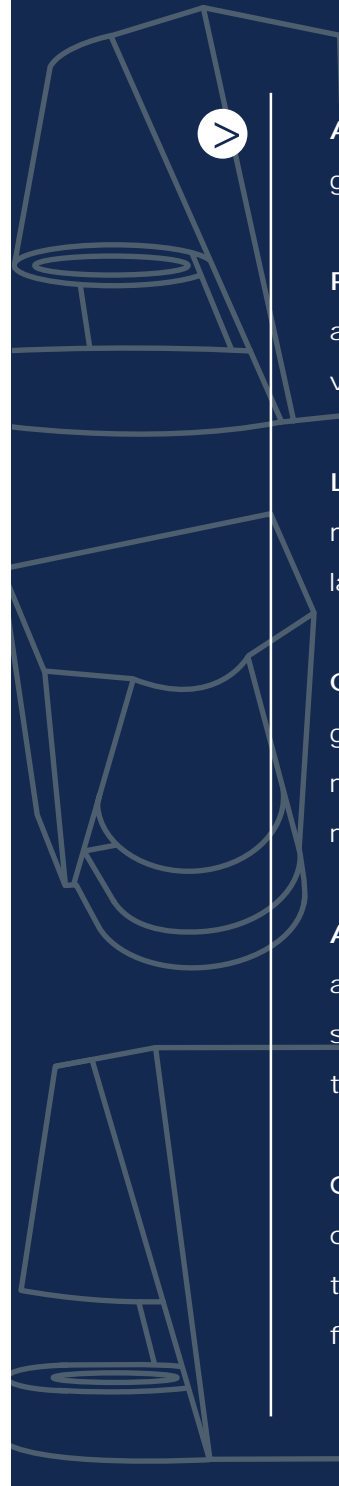
**800EZMICRO.com**  
Microbiology made EZ

Synbiosis, the manufacturer and supplier of the world's most popular automated microbiological analysers, proudly introduces the new ProtoCOL range. These tailor-made systems have been designed to provide dedicated solutions for microbiological applications.

Advanced automation and efficiency in microbiology >

SYNBIOISIS  
DELIVERS REAL SOLUTIONS





**AUTOMATIC** plate reading, giving time savings of over 80%

**REPEATABILITY** for all counts and measurements, avoiding the variability of manual methods

**LIBERATION** of staff from tedious manual activities, increasing laboratory productivity

**CONSISTENCY** of results guaranteed through the complete removal of manual data transcription requirements

**ACCURACY** of each analysis achieved using the most advanced systems available, totally dedicated to microbiology applications

**QUALITY** assured through secure data handling and monitoring, meeting the most demanding requirements for GLP & QA

- Counting colonies and measuring zones using traditional manual methods are tedious tasks requiring high levels of concentration. Automating the process and recording the results accurately and consistently with ProtoCOL is the answer to increasing efficiency, reliability and productivity.
- ProtoCOL: automating microbiology



- ProtoCOL creates true colour, high resolution images, with comprehensive software facilities allowing the analysis of every known type of sample. Numerous configurations covering sample parameters can be adapted, stored and immediately recalled to save valuable laboratory time.

ProtoCOL: a solution for every application



MICROBIOLOGY  
WITH QUALITY IN MIND



# Reliable, fast colony counting >

ProtoCOL is full of features which ensure that the widest range of plates can be read. It automatically compensates for:

- writing on plates
- variations in agar thickness
- touching colonies
- meniscus effects
- spreaders
- bubbles
- debris
- different sized colonies
- different coloured media

To achieve this level of automation, ProtoCOL is equipped with a unique colony detection system which combines special LED illumination and digital colour camera control with powerful software. The technology built into ProtoCOL produces results of the highest consistency and repeatability.



## POUR PLATES

Obtaining a count is simplicity itself - the plate is placed on the plate holder and either the space bar or mouse button pressed. The colonies are detected immediately, the count displayed and the data recorded in the results sheet. ProtoCOL is used to count both colonies and plaques for a host of applications including food, dairy, beverages, hygiene, environmental monitoring, water, paints, toxicology, sterility testing, pharmaceuticals, sterile fluids and fungal contamination.

## SERIAL DILUTIONS

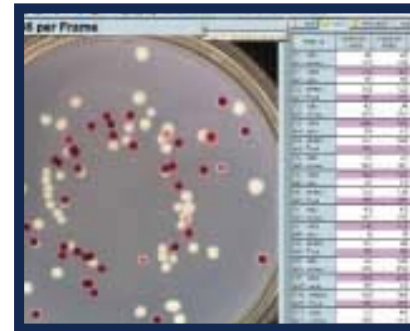
Counting plates from a series of dilutions is easy with ProtoCOL. A series is established and read with the mean count automatically calculated and reported.

## SPIRAL PLATES

Symbiosis has worked closely with the world's leading manufacturers of spiral platers for many years to ensure the best interface for the handling of these types of plates. Sectors are automatically analysed in precise accordance with published methods. The counting of each plate takes no more than a few seconds and the results are instantly displayed.

## OPTIONAL COLOUR DISCRIMINATION

All ProtoCOL systems are equipped with a colour camera. By adding the optional colour analysis module, different coloured colony types can be counted simultaneously. If your laboratory uses chromogenic media, then add this to achieve automatic, true colour colony differentiation.



## DETAILED COLONY SIZE STATISTICS

Instant size distribution histograms and tables provide immediate comparisons between plate populations and can be used to highlight colonies of specific sizes. This is an ideal way to count different types of colonies for applications such as toxicological studies. Users can easily create their own size class intervals and store them for re-use.

## AREA EXCLUSION

Users can remove selectable areas of the plate image from the calculation of the count. ProtoCOL automatically allows for this so that the average count per unit area is applied to the whole plate.

## SEPARATION OF TOUCHING COLONIES

Powerful automatic algorithms maintain highly accurate counts by identifying and separating touching colonies. This increases laboratory productivity by removing the need for time-consuming user interaction.

## CORRECTION FOR UNEVEN AGAR

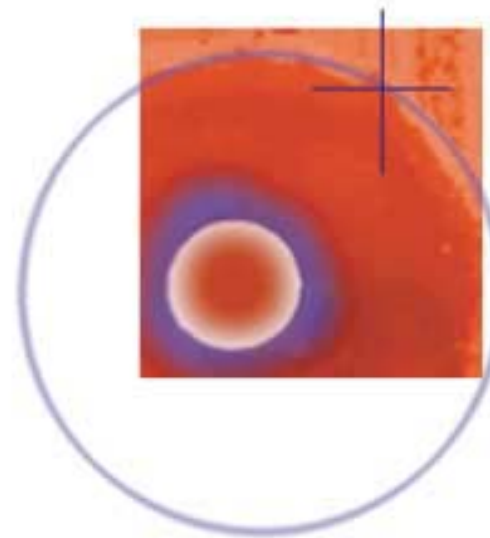
A combination of special lighting, automatic camera control and novel software ensures that changes in agar thickness have no effect on count accuracy. Changes in background intensities are corrected automatically at every point in the sample image.

## SAMPLE ILLUMINATION

ProtoCOL is equipped with stable, even illumination positioned both above and below the sample. Lighting can be software controlled to guarantee optimum colony detection even with non-transparent media.



## Accurate, efficient zone sizing



### MICs & ANTIBIOTIC SUSCEPTIBILITY TESTING

Automatic sizing of zones surrounding disks or multipoint inoculations is simplified with ProtoCOL. The size of each zone is accurately measured and can be transferred to EXCEL in an instant. Measurement of 6 zones on a plate takes as little as 2 seconds.

### RADIAL DIFFUSION AND HAEMOLYSIS

Measuring zones of haemolysis or diffusion is quick and efficient with ProtoCOL, providing the most popular method of automating this assay.

Zones can be measured on both petri dishes and larger bioassay plates. They can be measured singly or several at a time. Alternatively, large bioassay plates containing up to 81 zones, can be scanned using Synbiosis's unique automatic stage system.

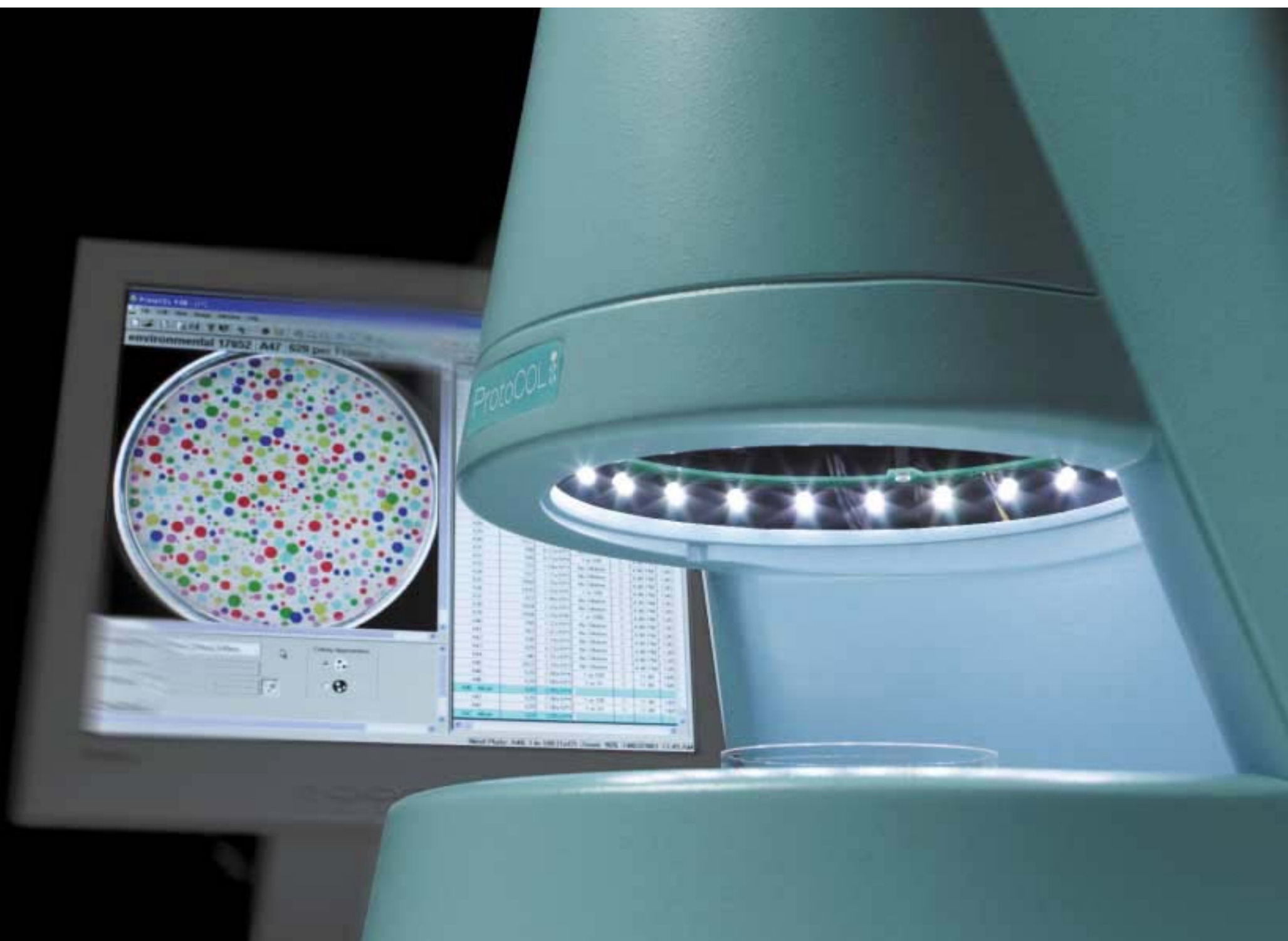
Each zone is measured to very high levels of accuracy and reproducibility.

### ZONE SIZING FOR ANTIBIOTIC MANUFACTURERS

Every antibiotic manufacturer is required to demonstrate that the potency of finished products meets the required specifications. One of the most common, but time consuming, methods is based on inhibition zones.

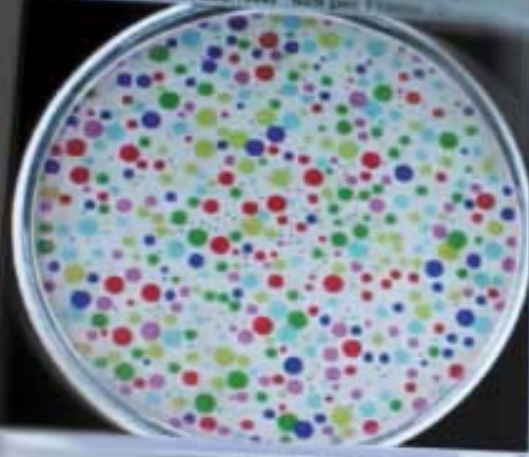
Manual measurements are often unreproducible and cannot meet the majority of published standards for accuracy and repeatability.

ProtoCOL offers the ideal way to simultaneously ensure conformance to standards and elimination of errors.



Protocol

environmental 17802: A47 628 per Frame



Time	Frame	Count	Rate	Std. Dev.	Min.	Max.
0.00	1	100	100.0	10.0	80	120
0.01	2	110	110.0	11.0	90	130
0.02	3	90	90.0	9.0	70	110
0.03	4	120	120.0	12.0	100	140
0.04	5	80	80.0	8.0	60	100
0.05	6	130	130.0	13.0	110	150
0.06	7	70	70.0	7.0	50	90
0.07	8	140	140.0	14.0	120	160
0.08	9	60	60.0	6.0	40	80
0.09	10	150	150.0	15.0	130	170
0.10	11	50	50.0	5.0	30	70
0.11	12	160	160.0	16.0	140	180
0.12	13	40	40.0	4.0	20	60
0.13	14	170	170.0	17.0	150	190
0.14	15	30	30.0	3.0	10	50
0.15	16	180	180.0	18.0	160	200
0.16	17	20	20.0	2.0	0	40
0.17	18	190	190.0	19.0	170	210
0.18	19	10	10.0	1.0	0	30
0.19	20	200	200.0	20.0	180	220

Serial Number: 146 146 14612345 14612345 14612345 14612345

# Powerful data handling >



## NO TRANSCRIPTION ERRORS

As each plate is counted or each zone sized, results are instantly transferred to a results table in ProtoCOL's secure database. This can hold a reference to the sample image, eliminating transcription errors.

## PASSWORD SECURITY

Different levels of users are governed by password control, maintaining system security. This ensures that batches of results cannot be deleted in error. Such features are designed to follow compliance with quality procedures and GLP.

## HANDLING SAMPLES

Most microbiology laboratories create batches of samples. To reduce the risk of data entry errors for such, sample lists can be pre-defined. The user is prompted to load each sample in turn until all have been read.

## AUDIT TRAIL

Users sometimes wish to re-read previously analysed samples using automatic or manual methods. Wherever a system setting is adjusted and a sample re-read, ProtoCOL automatically creates a copy of the original result in addition to the new result. This ensures a comprehensive audit trail for all results. Users can configure ProtoCOL to request a 'reason for change' free text comment which is recorded in a comments field. Data is maintained in a secure format, as directed by Good Laboratory Practice protocols.

## VALIDATION

A Validation Certificate is issued with every ProtoCOL, guaranteeing every system has been checked against validation standards before shipment. A full ProtoCOL Validation Kit is supplied as standard for use in colony counting to check system performance.

## PRINTED REPORTS

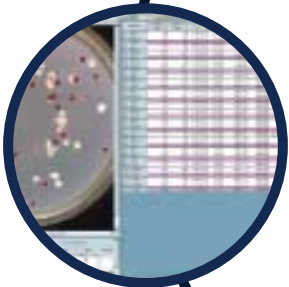
ProtoCOL can connect to any Windows supported printer. All results can be recorded and produced as a professional report.

## IMAGE ARCHIVING

Users can choose to save true colour sample images for archive purposes. Single sample images can be printed out directly from the ProtoCOL software, alongside the appropriate sample result.

## RESULTS TRANSFER

One button click automatically transfers results to an Excel spreadsheet. Sophisticated facilities provide ready made data sorting so that results of multiple tests on the same sample can be combined into a single report.



In a class of its own >

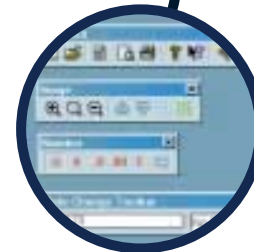
ProtoCOL is designed to be simple to use with no compromise on functionality. It is packed with advanced automation features designed to make tasks quick, efficient and accurate. All the user has to do is enter the first plate ID and click the mouse. The system then automatically generates reliable and consistent results, improving both laboratory performance and productivity.

#### OPTIMISING SAMPLE ANALYSIS

Making optimum use of the Windows environment, a live colour image of the sample is presented on the screen, with results alongside. To further automate sample analysis, the menu and 'properties' structure is complemented by an instant access icon toolbar. Right clicking over the image window brings up a menu allowing the user to perform all image related functions. A similar results menu appears when 'right clicking' over the results table.

#### TIPS AND HELP

To increase the usability of the software, extensive use is made of 'Tool Tips' which provide immediate explanations of various software controls. This facility includes 'Data Tips' which show useful information about the image. A comprehensive help system is built into ProtoCOL, giving clear and well presented advice whenever assistance is needed.



PROTOCOL  
ADVANCED AUTOMATION



# ProtoCOL systems >

Every ProtoCOL system is supplied with a fully integrated viewing, illumination and electronics unit. A crystal clear, colour image is delivered by the very latest digital camera technology.

ProtoCOL is perfectly configured for the analysis of samples and takes up very little bench space. The electronics, which include a high specification PC, are housed at the rear of the main unit. A floppy disk drive, network card, serial and parallel ports are provided as standard.

Users can choose the system resolution and functionality they need from the options below.

Applications such as 15cm petri dish colony counting and large inhibition zone plates will require the use of the macrostand, camera and lens. A popular option for the fully automated reading of large bioassay plates containing up to 81 zones is the Auto-Zone system. For users wishing to count features on a microscope slide, a high quality c-mount external camera can be provided in the Micro-System.

Illumination of your sample is critical to ensure optimum performance. ProtoCOL includes the most advanced technology based on an array of LEDs placed above and below the sample holder. The result is a bright, superbly illuminated sample. This lighting enables even the faintest colonies and zone edges to be accurately detected.

## Standard systems

For colony counting and inhibition zone sizing on petri dishes (up to 90mm). You can choose from two system resolutions, ProtoCOL SR and ProtoCOL HR

## Colour differentiation option

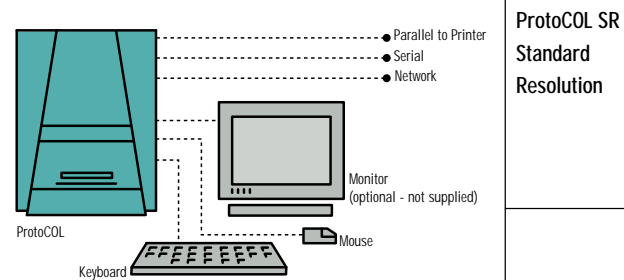
Add this powerful software module to allow you to count up to 7 different coloured colony types simultaneously

## Auto-Zone system

Macro system with automatic stage for the automated reading of large bioassay plates containing multiple inhibition zones (64-81 typically)

## Micro-System

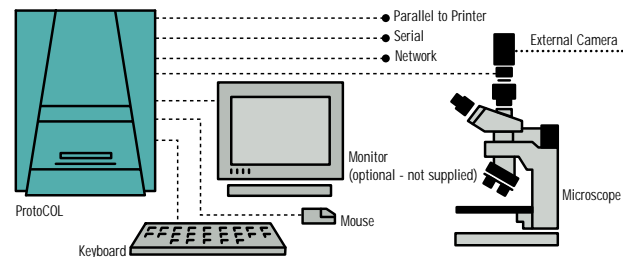
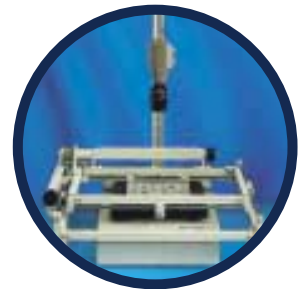
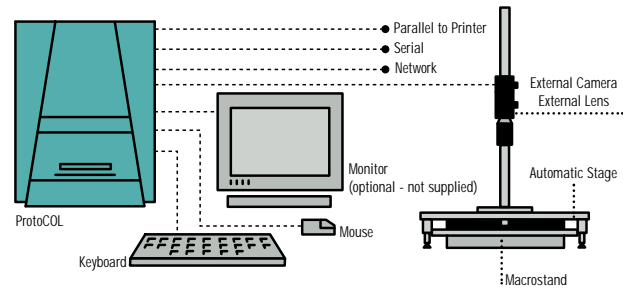
Standard system with an external camera for attachment to a microscope for counting and sizing applications



ProtoCOL SR  
Standard  
Resolution



ProtoCOL HR  
High  
Resolution



# Software specification >

<b>Data organisation</b>	<ul style="list-style-type: none"> <li>• Studies, batches and samples</li> <li>• Study &amp; batch labels, comments, re-usable configurations</li> <li>• Automatic recording of study properties</li> <li>• Batch details &amp; measurement type</li> </ul>	<b>Results handling</b>	<ul style="list-style-type: none"> <li>• Automatic data entry into results table</li> <li>• Customisable display format - integer, floating point, general &amp; exponential</li> <li>• Export to Excel including automatic data sorting</li> <li>• Direct printing</li> <li>• Optional transfer to LIMS</li> </ul>
<b>Image handling</b>	<ul style="list-style-type: none"> <li>• Full colour, high resolution</li> <li>• Multiple image file formats</li> <li>• Automatic subtraction of excluded regions</li> </ul>	<b>GLP and validation</b>	<ul style="list-style-type: none"> <li>• Comprehensive automatic results flags reporting all changes and conditions</li> <li>• Generation of copy of original result following editing</li> <li>• Reusability and storage of configurations</li> </ul>
<b>Colony counting</b>	<ul style="list-style-type: none"> <li>• Automatic functions:-               <ul style="list-style-type: none"> <li>• Colony detection and counting</li> <li>• Camera shutter control</li> <li>• Adjustable size limit controls</li> <li>• Shape discrimination</li> <li>• Selectable detection sensitivity</li> <li>• Colony size distribution</li> <li>• Definable sample details</li> <li>• Serial dilutions with automatic mean calculation</li> </ul> </li> <li>• Pour plates               <ul style="list-style-type: none"> <li>• Automatic or manual spreader removal</li> </ul> </li> <li>• Spiral plating               <ul style="list-style-type: none"> <li>• Preloaded spiral sector volumes</li> <li>• Spiral count rules</li> <li>• 2 sector or whole frame methods</li> </ul> </li> <li>• Count editing               <ul style="list-style-type: none"> <li>• Manual methods, combined automatic and manual method, plate re-read facility, multiple region exclusions, comments</li> </ul> </li> <li>• Colony sizing</li> <li>• Pre-incubation count automatically subtracted from post-incubation count</li> <li>• Debris exclusion</li> </ul>	<b>Monitoring of studies &amp; properties</b>	<ul style="list-style-type: none"> <li>• Each study is monitored and properties reported</li> <li>• Full user password system with administrator and user levels</li> <li>• User activity automatically monitored and reported in a log file</li> <li>• Data edit with reason for change comment</li> <li>• Validation Certificate issued with each ProtoCOL, Validation Kit available with secure batch configurations for colony counting applications</li> <li>• All reports printed with date, time and user name from optional password entry</li> <li>• Automatic saving and shutdown option after preset time avoiding unauthorised use</li> <li>• Data storage in proprietary format</li> </ul>
<b>Zone sizing</b>	<ul style="list-style-type: none"> <li>• Automatic and manual methods</li> <li>• Specific batches for standard zone sizing or antibacterial susceptibility testing</li> <li>• Selectable single or multi-zone analysis</li> <li>• Auto-Zone system with automatic stage for large bioassay samples</li> </ul>	<b>Utilities</b>	<ul style="list-style-type: none"> <li>• ProtoCOL administration program for graphics colours, stage controller type, automatic shutdown mode, size distribution display</li> <li>• System settings control program</li> <li>• ProtoCOL security program with user usage report</li> </ul>
		<b>Report printing</b>	<ul style="list-style-type: none"> <li>• Automatic generation of full reports including all study and batch conditions</li> <li>• Tables of data tailored to show specific data columns</li> <li>• Time, date and user automatically recorded</li> <li>• Report constantly updated during sample reading</li> <li>• Image printing with results</li> </ul>

# Configuration



## Standard system configuration

<b>ProtoCOL SR (PROC-SR)</b>	
Typical Measurement Time	0.9 sec
Resolution	For standard 90mm petri dishes, smallest detectable colony >0.2mm Higher magnifications available with external camera Zone sizing resolution >0.05mm
Illumination	Upper incident light, bottom transmitted light and dark field using LED arrays
Measurement Modes	Pour plate, spiral plate, inhibition zone, antibacterial susceptibility
Detection	Fully automatic with manual override
Count Modes	Separation of touching colonies; discrimination by area; excluded areas; individual manual count & exclude mode
Dilution Series	User defined dilution series
Results	Display, storage and printing of up to 20 data items for each sample
Image Storage/Retrieval	Storage of >20,000 images on local hard disk
External Connections	Mouse, keyboard, bar code reader, monitor, external camera, ethernet
Storage	Hard disk and floppy disk
Camera	Zero distortion colour CCD video camera with electronically variable shutter speed
Camera Lens	6mm high resolution f 1.2 - closed
Power Input	110/240V 50/60Hz
Approx Weight	15kg
Approx Dimensions	452mm x 380mm x 452mm

## High-resolution system configuration

<b>ProtoCOL HR (PROC-HR)</b>	
Typical Measurement Time	0.9 sec
Resolution	4 times the resolution of ProtoCOL SR For standard 90mm petri dishes, smallest detectable colony >0.1mm Higher magnifications available with external camera Zone sizing resolution >0.05mm
Accuracy	Ideal for samples requiring the highest levels of accuracy, such as microcolony counting and potency zone sizing
Illumination	Upper incident light, bottom transmitted light and dark field using LED arrays
Measurement Modes	Pour plate, spiral plate, inhibition zone, antibacterial susceptibility
Detection	Fully automatic with manual override
Count Modes	Separation of touching colonies; discrimination by area; Excluded areas; individual manual count & exclude mode
Dilution Series	User defined dilution series
Results	Display, storage and printing of up to 20 data items for each sample
Image Storage/Retrieval	Storage of >20,000 images on local hard disk
External Connections	Mouse, keyboard, bar code reader, monitor, external camera, ethernet
Storage	Hard disk and floppy disk
Camera	Zero distortion colour CCD video camera with electronically variable shutter speed
Camera Lens	8.5mm high resolution f 1.2 - closed
Power Input	110/240V 50/60Hz
Approx Weight	15kg
Approx Dimensions	452mm x 380mm x 452mm

## Colour differentiation option

<b>COL-OPT</b>	Software option for the simultaneous, true colour analysis of different colony types. For use with chromogenic media, giving up to 7 different colony colours
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## Product codes and optional accessories

<b>Product</b>	
<b>PROC-SR</b>	Standard Resolution system, including digital colour camera, built-in LED illumination, integrated high performance PC, latest Windows operating system, connections for up to 2 external digital colour cameras, network connection, validation plate kit, standard plate holder, Microsoft Office SBE, parallel and serial ports, keyboard, mouse, (monitor not included)
<b>PROC-HR</b>	High-Resolution system with all of the above features but including high resolution colour digital camera, giving 4 times the resolution of the standard resolution system (monitor not included)
<b>COL-OPT</b>	Colour differentiation option
<b>PROC-17</b>	17" monitor for use with PROC-SR and PROC-HR
<b>PROC-LCD17</b>	17" LCD SVGA display for use with PROC-SR and PROC-HR
<b>CAMXT-SR</b>	External standard resolution colour digital camera for use with PROC-SR and PROC-HR
<b>CAMXT-HR</b>	External high resolution colour digital camera for use with PROC-SR and PROC-HR
<b>PROC-LENS</b>	Lens for use with CAMXT-SR and CAMXT-HR
<b>PROC-MACLGE</b>	Macrostand for imaging samples larger than 90mm diameter
<b>PROC-IZ-STAMAC</b>	Automatic stage system for the analysis of large bioassay plates
<b>PROC-PH</b>	Special sized plate holder (requires sample blank petri dish to be sent to manufacturer)
<b>BARCOCCD</b>	Bar code reader, CCD sensor type with wide reader area for instant sample reading

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