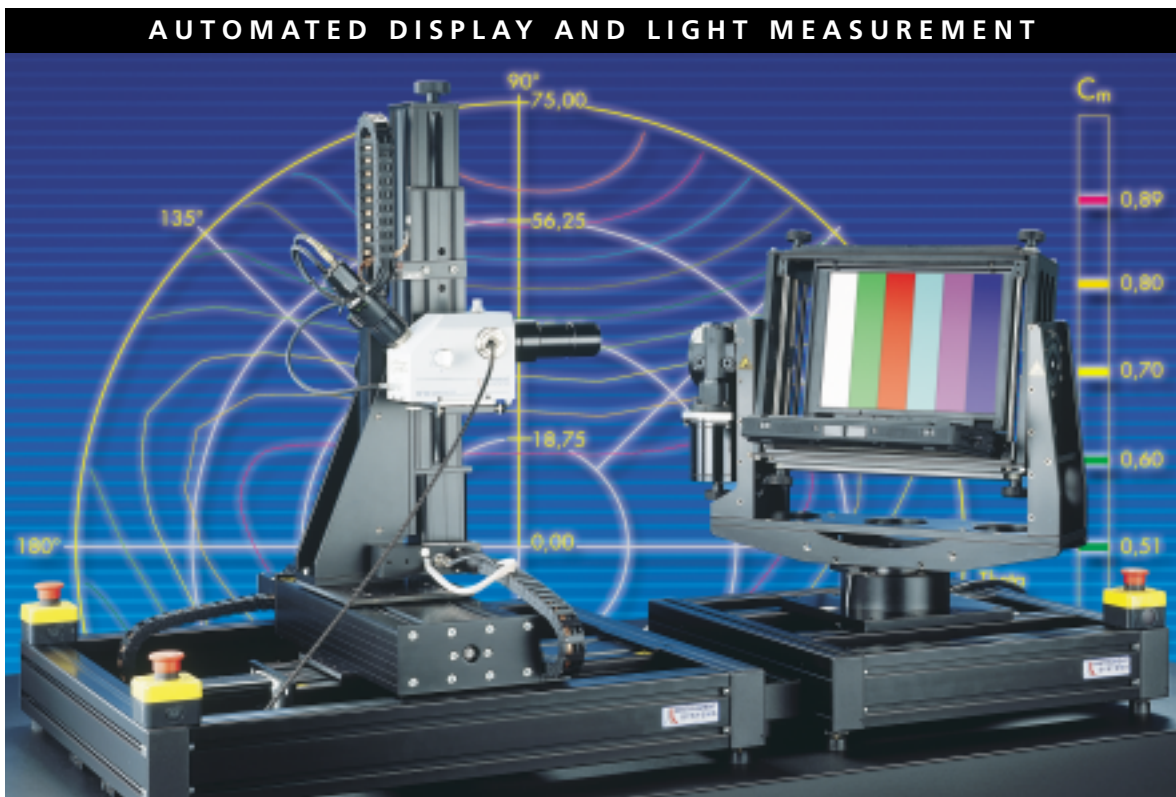


DTS 500

Positioner Systems



- Standalone XYZ positioners (260 to 560 mm max. travel range)
- Standalone 2-axis goniometers (up to 70 cm diagonal sample size)
- Complete turnkey 5-axis positioners with optical table
- Integrated with SpecWin software for Windows 95/98/NT
- Luminance and color measurements of graphics and switches
- Goniometric measurements of lamps and LED modules
- Display testing in conformance with VESA and ISO standards
- BRDF reflection measurement of displays

Automated display and light measurement

Instrument Systems is one of the leading manufacturers of spectrometers for carrying out spectral and light measurements. The motorized positioning systems in the DTS 500 series allow you to create a complete system for automated measurement sequences. Ideal applications include determining the angle-dependent properties of displays and LED lamp modules. The DTS 500 saves you valuable time by eliminating the tedious manual positioning of the device under test. In addition, you obtain measurement results that are more accurate and easier to reproduce. Instrument Systems also supplies software drivers and mechanical adapters for photometers from other manufacturers.

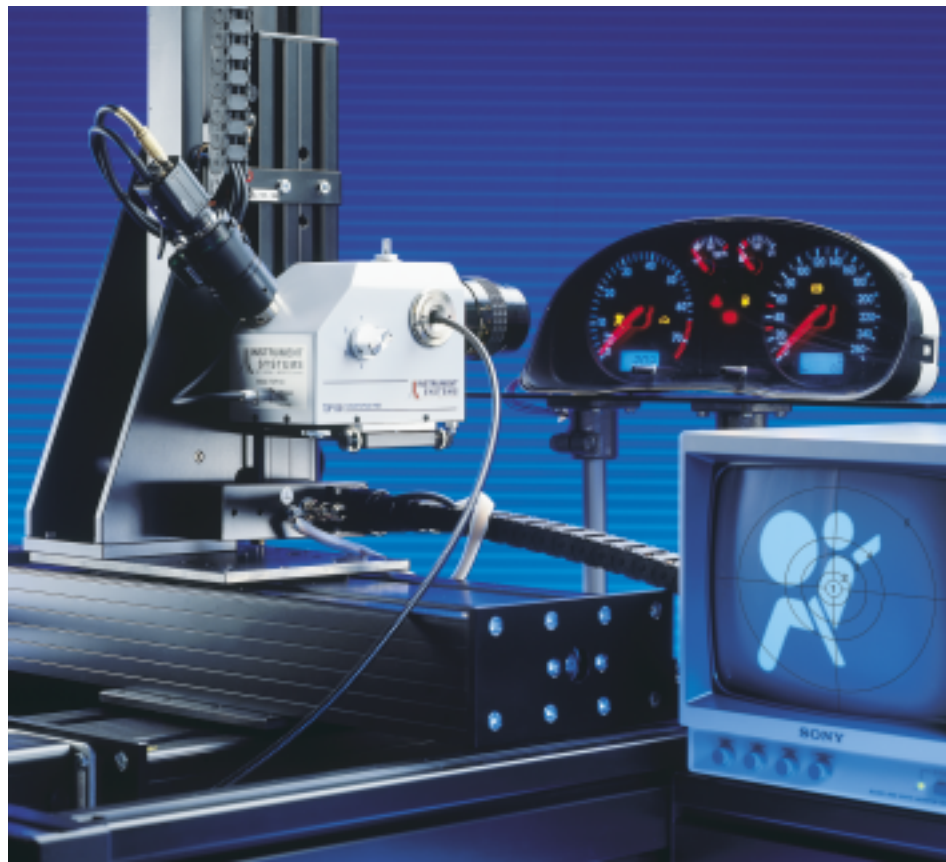


The DTS 500 System is supplied in three different configurations:

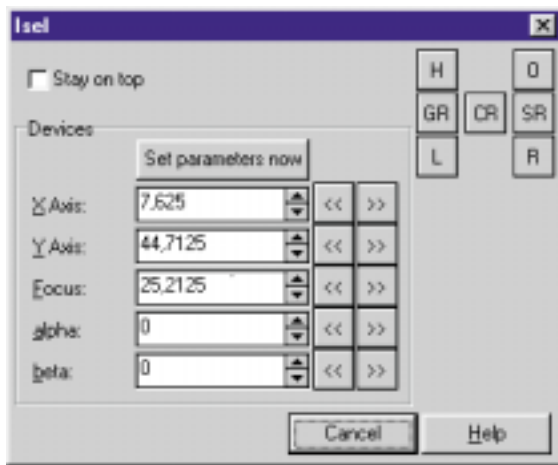
- Standalone XYZ positioners (e.g. for testing automotive or avionic instrument panels)
- Standalone 2-axis goniometers (e.g. for goniophotometry of lamps)
- Complete 5-axis systems (e.g. for display testing)

Measuring-spot check with video camera

When carrying out display measurements, the measurement spot location can be monitored using a video camera that is attached to the eyepiece on the TOP 100 telescope probe. This allows the user to easily define and verify a complete measurement sequence. The output of the video camera is connected to a monitor that can be placed next to the control computer of the positioner for convenient operation.



Instrument Systems has expanded the SpecWin spectral analysis software to include many new functions for the DTS500 Positioner system. SpecWin also includes an MS Word™ compatible report generator and an MS Excel™ compatible spreadsheet program for fast analysis of results during measuring operations.



Manual positioning using the control pad

The control pad allows convenient control of the positioning system and simple definition of measurement sequences. All five axes and three different travel speeds can be selected.

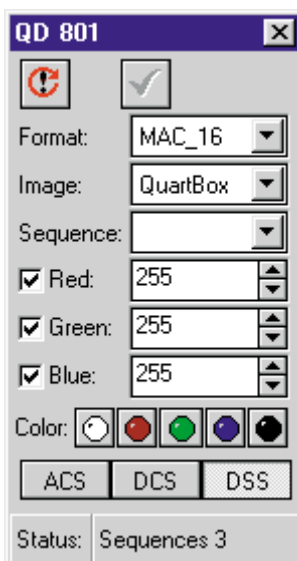
The 'Parameter' window contains a table with 5 rows and 6 columns (A-F). The first column is 'Title' and the others are 'Measure?', 'X Axis', 'Y Axis', 'Focus', 'alpha', and 'beta'.

Title	A	B	C	D	E	F
1	1	0	0	0	0	0
2	1	31.2375	10.625	0	0	0
3	1	46.0125	15.25	0.7625	0	0
4	1	50.5875	23.4625	0.5525	0	0
5	1	72.35	32.2625	-1.725	0	0

Buttons on the right include 'OK', 'Cancel', 'Help', 'Teach in..', and 'Edit step..'.

The Teach-in mode allows the user to define and edit a sequence of measurement positions and then store it in an Excel™ compatible spreadsheet. If measurement series are intended for a number of similar test samples, positioning deviations of each successive test sample can be corrected for using the reference coordinates option. This option sets all measurement positions relative to a reference coordinate position

that is located on each sample. An additional fine-tuning mode also allows users to correct the coordinates of individual measurement locations separately during the measurement series. This means that even large manufacturing tolerances (e.g. individual switches on an instrument panel) in test samples can be compensated for.



Flat panel displays may be characterized automatically in conformance with VESA or ISO standards by video-generator control (optional). A selection of appropriate test images is available for testing full-screen luminance, contrast ratio and color coordinates. The video generator functions can also be used in the measurement sequence mode.

SpecWin: Software for high productivity

Benefits at a glance:

- Runs under Windows 95/98 and Windows NT
- Easy positioning using a control pad
- Teach-in mode for custom measurement sequences
- Automated measurement sequences in XY and goniometric coordinates
- Display testing in conformance with VESA and ISO standards
- Software control of a video generator

Teach-in for user-defined measuring sequences

Control of a video generator

XYZ Positioners

Benefits at a glance:

- Robust mechanical setup: the frame design eliminates the need of an optical table in the standalone configuration
- Three sizes for different travel ranges
- Mount for TOP 100 optical probe or photometer
- Sample holder

XYZ positioners from Instrument Systems have been specially designed for use in both the automotive and avionic industry. The software supports user-defined sequences for automated testing of panels and switches.

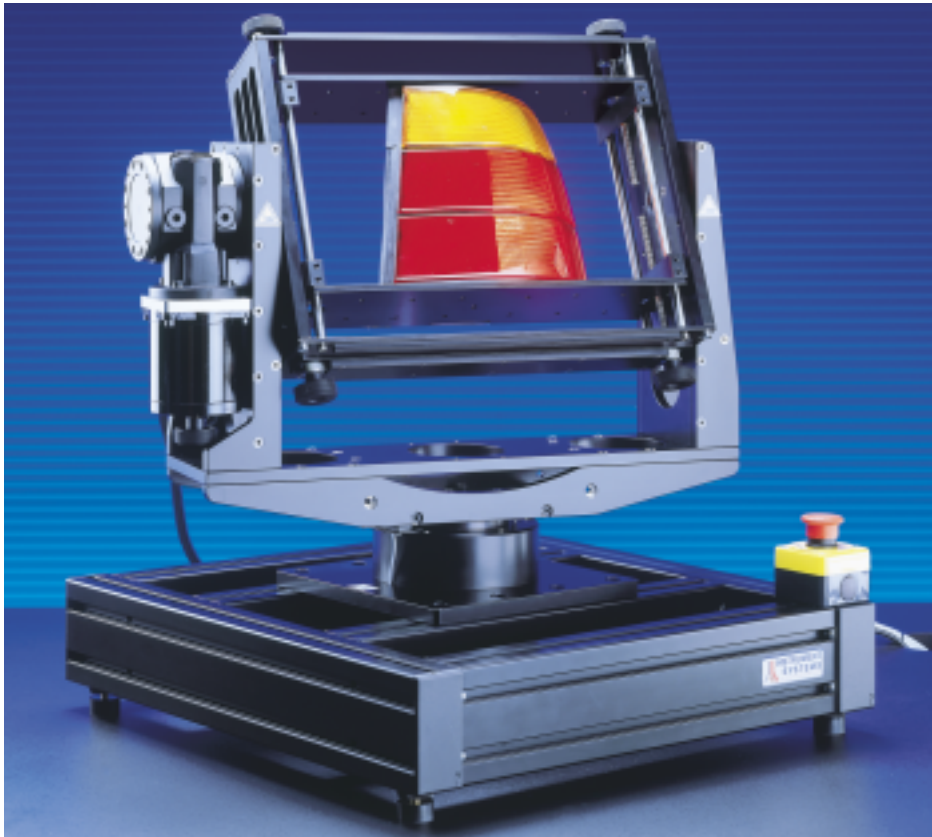
Using the control pad or keyboard, the user focuses on individual measurement locations on the panel. Each location is then stored in a sequence table such that a complete test series is built up. Alternatively the entire surface may be scanned by specifying the XY starting coordinates, the number of steps to be taken, and the step size.



SPECIFICATIONS FOR XYZ POSITIONER			
Model	DTS500-101	DTS500-103	DTS500-105
Positioner			
Travel range (X, Y, Z) mm	260 x 180 x 260	360 x 280 x 360	560 x 480 x 460
Reproducibility	± 0.013 mm	± 0.013 mm	± 0.013 mm
Absolute accuracy	± 0.025 mm	± 0.025 mm	± 0.025 mm
Travel speed	40 mm/sec	60 mm/sec	60 mm/sec
Max. weight for telescope probe or photometer	6 kg (10 kg optional)	6 kg (10 kg optional)	6 kg (10 kg optional)
Dimensions (L x W x H)	80 x 70 x 80 cm	90 x 80 x 90 cm	100 x 100 x 110 cm
Weight (approx.)	60 kg	70 kg	80 kg
Stepper motor control			
Dimensions (W x H x D)	33 x 17 x 28 cm	41 x 19 x 48 cm	41 x 19 x 48 cm
Interface	RS-232	RS-232	RS-232
Power consumption	72 W	154 W	154 W
Weight	9 kg	29 kg	29 kg

2-AXIS GONIOMETERS

The 2-axis goniometers from Instrument Systems allow users to test all angle-dependent properties of light sources. As stand-alone units they are ideally suited for measuring illuminance and luminous intensity of luminaires, lamps and LED modules. The software generates iso-contour plots and diagrams of the radiation pattern.



2-Axis Goniometers

Benefits at a glance:

- Rotation in ϵ_H and ϵ_V (horizontal and vertical axes)
- Automated software transformation into different coordinate systems (e.g. theta / phi and thetaH / thetaV)
- Quick clamp for rapid fixturing of the test sample (not DTS 500-111)
- Mounting plate for easy mounting of flat panel displays
- Mounting bracket for Instrument Systems' LED test sockets

SPEZIFICATIONS FOR 2-AXIS GONIOMETER			
Model	DTS500-111	DTS500-113	DTS500-115
Goniometer			
Display size (max. W x H) with clamping device	N/a	350 x 280 mm	550 x 440 mm
Display size (max. W x H) without clamping device	290 x 200 mm	395 x 300 mm	590 x 490 mm
Rotation range	-95° bis +95°	-100° bis +100°	-100° bis +100°
Reproducibility	± 0.1°	± 0.01°	± 0.01°
Absolute accuracy	± 0.2°	± 0.05°	± 0.05°
Rotation speed	30°/sec	25°/sec	25°/sec
Max. weight for test sample	on request	10 kg	25 kg
Dimensions (L x W x H) approx.	55 x 55 x 60 cm	60 x 55 x 70 cm	80 x 60 x 90 cm
Weight (approx.)	30 kg	35 kg	55 kg
Stepper-motor control			
Dimensions (W x H x D)	33 x 17 x 28 cm	41 x 19 x 48 cm	41 x 19 x 48 cm
Interface	RS-232	RS-232	RS-232
Power consumption	72 W	154 W	154 W
Weight	9 kg	29 kg	29 kg



Complete 5-axis positioners

Benefits at a glance:

- XYZ positioner and 2-axis goniometer on stable optical table
- Light-tight hood (optional) eliminates the need for a darkroom
- Automatic tracking of the measuring spot when the display rotates
- Turnkey solution with system controller
- Optional camera with video monitor for TOP 100 eyepiece
- On-site installation and training included

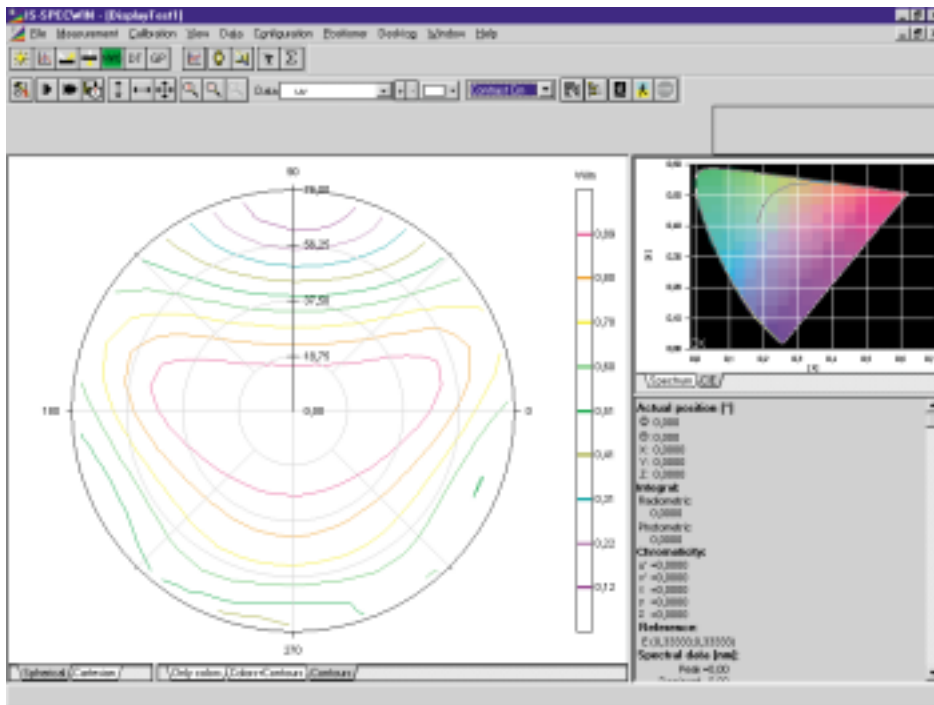
The 5-axis systems comprise a 2-axis goniometer and a XYZ positioner. The complete setup is mounted on a robust optical table and positioned under a light-tight hood (optional). A system controller with pre-configured interfaces and settings is included allowing an immediate start of operation.

ADDITIONAL SPECIFICATIONS FOR COMPLETE 5-AXIS SYSTEM

Model	DTS500-213	DTS500-215	
Comprises:			
● XYZ positioner	DTS500-103	DTS500-105	
● 2-axis Goniometer	DTS500-113	DTS500-115	
● Optical table			
● System controller			
Tracking accuracy at different distances between the measuring spot and the rotational center point.	0 cm	± 0.1 mm	± 0.1 mm
	10 cm	± 0.3 mm	± 0.3 mm
	20 cm	± 0.6 mm	± 0.6 mm

SPEZIFICATIONS FOR THE OPTICAL TABLE AND SYSTEM CONTROLLER

Optical table	
External dimensions (length x width x height)	approx. 190 x 120 x 82 cm
Weight (without positioner)	approx. 250 kg
DTS 500-250 light-proof hood (option)	
External dimensions (length x width x height) (is mounted on the optical table)	approx. 190 x 120 x 113 cm
Weight (without positioner)	approx. 50 kg
System controller	
Computer	Pentium class
Accessories	Monitor, keyboard, mouse
5-axis movement control	compact control pad
Operating system	Windows 95/98 or Windows NT
Printer	Color ink-jet printer
Mobile frame	For PC, printer and video monitor



Software evaluation

The operation of the complete 5-axis system is fully integrated in the SpecWin software. Results are plotted as luminance and contrast distribution in cartesian or spherical coordinates. SpecWin automatically enters iso-contour lines in the diagrams. The data can also be saved as tables in an Excel™-compatible ASCII text file.

The axes of rotation generally lie outside the plane of measurement during goniometric movements of the display. Furthermore, the measurement locations rarely lie directly on the axis of rotation. Thus, it is inevitable that rotation of the display leads to shifts in the measuring spot. For this reason, the tracking accuracy of the measuring spot is an important parameter for a 5-axis positioner. A refined software algorithm calculates the shift in the measuring spot for each rotational movement. The system moves the telescope probe or photometer by the calculated displacement for precise tracking. This ensures that the system is always focussed on the same measuring spot, allowing the display to be mounted outside the center of rotation.

A simple software procedure that takes less than a minute to perform calibrates the precise location of the measurement surface relative to the center of rotation. In addition, the software corrects any beam alignment error generated by a glass window in front of the display (taking into account the thickness and refractive index of the glass).

Precise tracking of the measuring spot when rotating the display



Flat panel displays have extremely complex reflection properties in ambient light. Generally there is a combination of specular, diffuse, and haze reflection. The BRDF (Bi-directional Reflection Distribution Function) concept was specially developed for LCD and TFT displays to take into account the fact that conventional procedures for measuring reflection are unable to evaluate haze reflectance properly. In combination with the 5-axis positioner, Instrument Systems supplies a BRDF option that comprises a light source with collimating optics. This configuration is able to measure the BRDF automatically in the $\Phi = 0^\circ$ plane.

BRDF reflection measurements

Specular reflectance

Direct reflectance of a point light source. The specular reflection from CRT tubes is generally very strong and particular disturbing to an observer.

Diffuse reflectance

Reflection independent of the viewing angle. Generally only occurs as a small proportion of total reflectance.

Haze reflectance

Haze is a diffuse but relatively intense luminous halo close to the specular reflectance. Haze is dominant in most LCD and TFT screens because the multi-element sandwich structure generates multiple reflections.

ORDERING INFORMATION	
XYZ POSITIONER (other travel ranges available on request)	
DTS500-101	260 x 180 x 260 mm travel range in XYZ
DTS500-103	360 x 280 x 360 mm travel range in XYZ
DTS500-105	560 x 480 x 460 mm travel range in XYZ
2-axis goniometer	
DTS500-111	290 x 200 mm max. display Size (W x H); sample weight on request
DTS500-113	350 x 280 mm max. display Size (W x H); sample weight max. 10 kg
DTS500-115	550 x 440 mm max. display Size (W x H); sample weight max. 25 kg
Complete 5-axis positioner	
DTS500-213	Complete system incl. on-site installation, comprising: <ul style="list-style-type: none">● DTS500-103 XYZ Positioner (360 x 280 x 360 mm travel range)● DTS500-113 Goniometer (350 x 280 mm max. display size)● Optical table● System controller
DTS500-215	Complete system incl. on-site installation, comprising: <ul style="list-style-type: none">● DTS500-105 XYZ Positioner (560 x 480 x 460 mm travel range)● DTS500-115 Goniometer (550 x 460 mm max. display size)● Optical table● System controller
Options	
DTS500-250	Light-tight hood for optical table
TOP100-600	Video camera and monitor for the TOP 100 telescope optical probe with modification for motorized view/measure switching
Accessories for reflection measurements	
DTS500-363	BRDF option with manual adjustment of light source for DTS500-113 Goniometer
DTS500-365	BRDF option with manual adjustment of light source for DTS500-115 Goniometer
Other accessories	
DTS500-611	Adapter for LED test sockets (for DTS500-111 Goniometer)
DTS500-613	Adapter for LED test sockets (for DTS500-113 Goniometer)
DTS500-615	Adapter for LED test sockets (for DTS500-115 Goniometer)

Internet: www.instrumentsystems.de



Distributor/Representative

International (World Headquarters)

INSTRUMENT SYSTEMS GmbH
Neumarkter Str. 83, 81673 Munich, Germany
Tel: +49-89-454943-0 Fax: +49-89-454943-11
E-mail: info@instrumentsystems.de

North America

INSTRUMENT SYSTEMS Canada
576 Golden Avenue, Ottawa, Ontario, Canada K2A 2E9
Tel: (613) 729-0614, Fax: (613) 729-9067
E-mail: info@instrumentsystems.com