ASG-2.0

Goniophotometer *

*** Shown here with automated 5 metre photocell stand**

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Part 1. ASG-2.0 Compact Goniophotometer System.

Mechanical and Motion

The goniometer has +/- 20 degrees vertical (tilt) movement and +/- 180 degrees horizontal (rotation) movement. Both axes have 0.1-degree accuracy and 0.01-degree resolution.

Motorised Z-axis movement has a total travel of approximately 150 mm, from 150 mm below pivot point down to 300 mm. There is a maximum of 20kg load for the test item plus mounting jig.

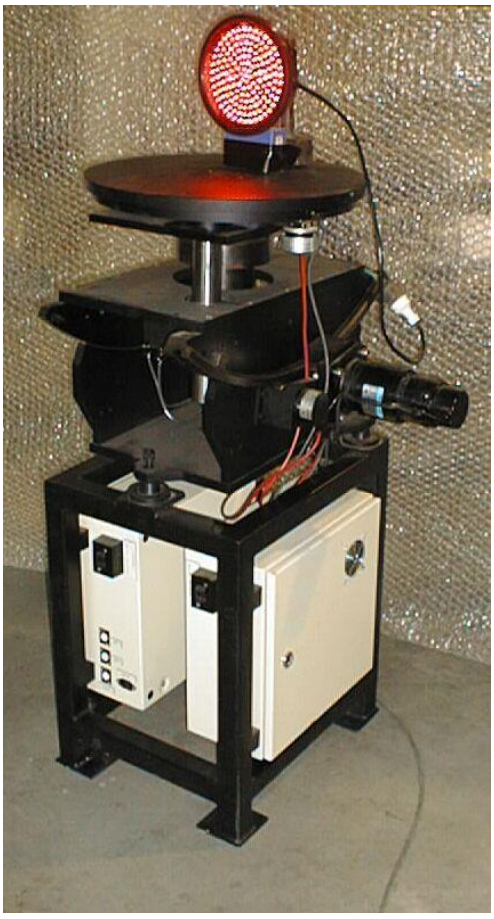

Figure 1: ASG-2.0 Goniophotometer

Control Cabinet

A control cabinet is integrated with the goniometer. This houses the motor controller and other circuitry required to coordinate the motion and measurement. The control

cabinet has an ON/OFF switch, and contains interfaces for electrical power and communications with the PC and data acquisition systems.

Test Item Alignment

A remote, handheld controller can be provided (see Optional Extras) so that the operator can walk around the test item during the alignment process. This makes the process of alignment much easier and more convenient for the operator.

An alignment laser is provided which is mounted on the wall coincident with the tilt axis to assist the process of alignment.

A mounting table is included with many drilled and tapped holes to attach test item mounting jigs to it. No mounting jigs are provided with the system, however design suggestions can be provided by PSI on request.

Measurement System

The measurement system consists of a photocell, photocurrent preamplifier and analogue-to-digital converter. The photocell is thermostatically controlled at 35 degrees Celsius and has an 8 mm receptive area and a responsivity of around 14 nA/lx.

The photocell has a V (lambda) response with $f_1' < 1.50\%$ (Class L), which is consistent with CIE recommendations for photocells for measurement of automotive and signalling devices, and is therefore suitable for LEDs and coloured signals.

The photocell is fed into a multi-ranging photocurrent preamplifier, with built-in analogue-to-digital conversion, that is controlled by the PC.

Digital or software triggering from the motor controller to the data acquisition card means that fast sampling of test scans can be achieved.

The photocell is mounted on a sturdy stand and appropriately masked and baffled. The client has the option to have one fixed test distance (usually 25 m or 5 m), or to have a mobile photocell stand to accommodate any test distance up to 25 m. A second photocell with photocell stand automation can also be provided (see Optional Extras) to fully automate the transition between test distances.

Figure 2: Photocell and Amplifier

The photocell and amplifier combination has a combined measurement resolution of around 10 microlux, which corresponds to around 1 millicandela (0.01 cd) at a test distance of 25 metres.

Professional Rack System

A rack system with a secondary monitor display can also be provided for display of supplementary test information and for demonstration (see Optional Extras).

Figure 3: Professional Rack System

Power Supplies

No test item power supplies or electrical parameter measurement interfaces have been included in this quotation, however they can also be provided and incorporated into the system (see Optional Extras).

Filament Switch

An automated filament switch can be incorporated into the system so that a single power supply can power both the sub and main filaments of a dual filament lamp. Thus items such as passing/driving beam or stop/tail lamp assemblies can be tested together as part of the one test. See Optional Extras.

Software

The comprehensive software provided with the system is in two parts – the control software and the report generation software.

The control software operates in an easy-to-use and step-by-step manner. It is not menu-driven, rather it operates more like a software wizard so that it is very user-friendly.

Figure 4: The ASGControl Software Main Menu

You can see from the main menu shown above that the major functions are clearly identified and easy to access.

Choice of Test Type

When you select to perform a test, you will be shown a Test Specifications window to select the type of test and the test parameters.

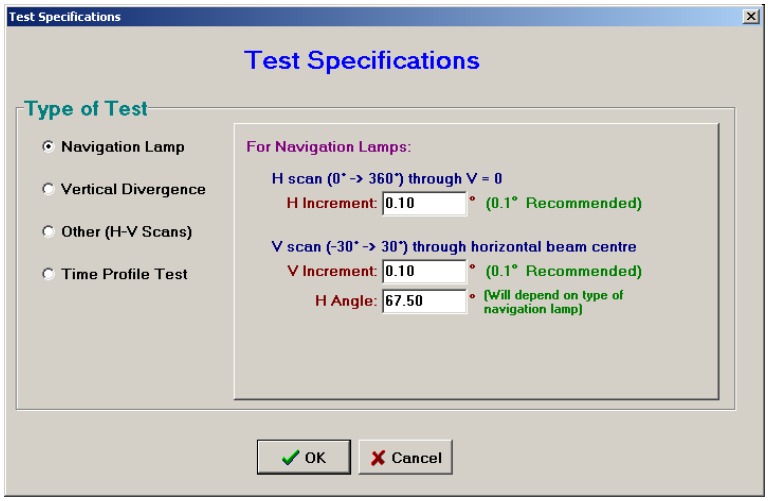

Figure 5: Test Specifications – Navigation Lamps

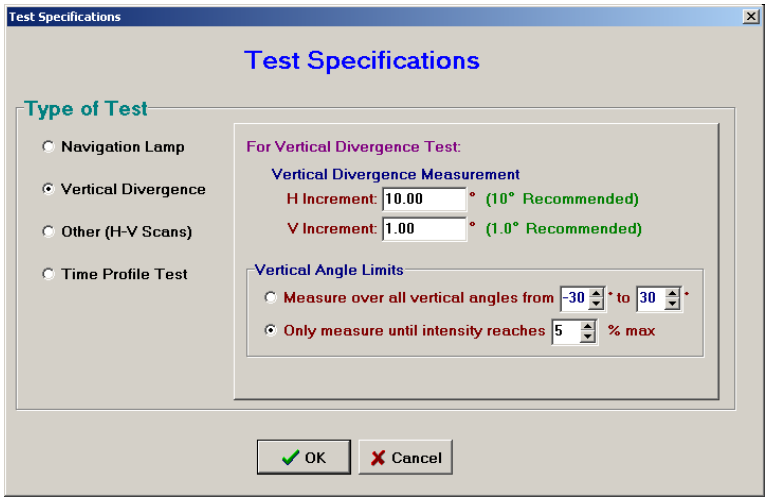

Figure 6: Test Specifications – Vertical Divergence

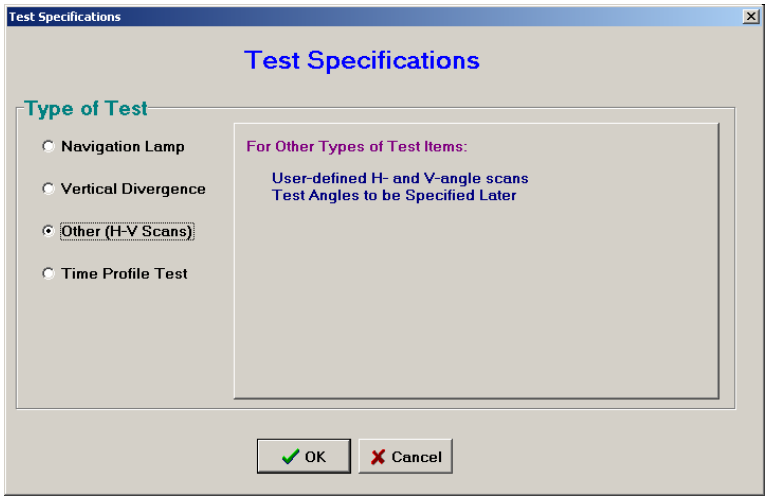

Figure 7: Test Specifications – Other (H-V Scans)

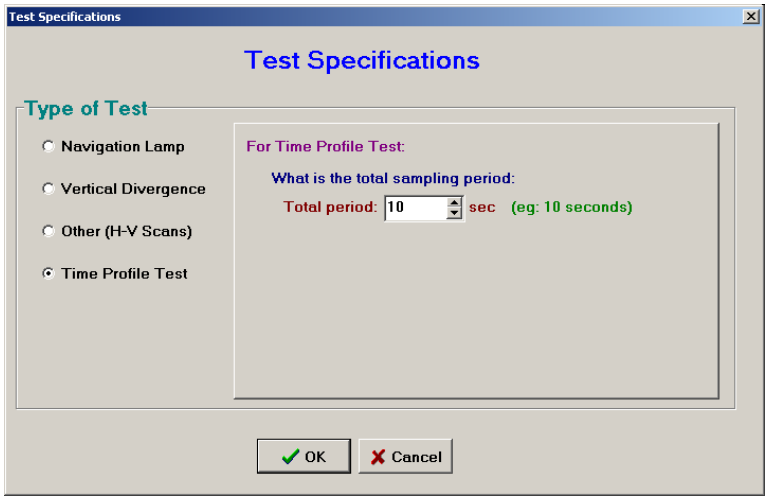

Figure 8: Test Specifications – Time Profile Test

Note: in the Time Profile Test, as shown in Figure 8, for the standard goniophotometer system the software will be limited to a time resolution of around 35 ms between measurement points and is only suitable for slow flashes. For measurement of faster flashes we recommend our FP-250 Flash Photometer add-on (see Optional Extras).

Joystick control for arbitrary movement of goniometer.

This includes moving the goniometer to H and V angles, plus access to other functions.

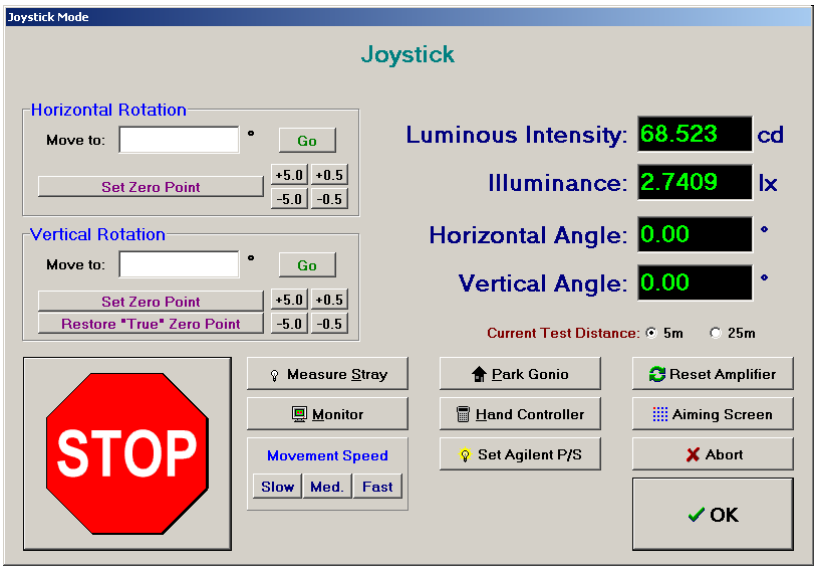

Figure 9: Joystick Control Window

Photocell monitoring screen to view lamp stability.

This can be used to ensure that the test item is fully stabilised and warmed up before starting the test. Includes some basic statistics and an "Auto-start" option to automatically start the test after a given time.

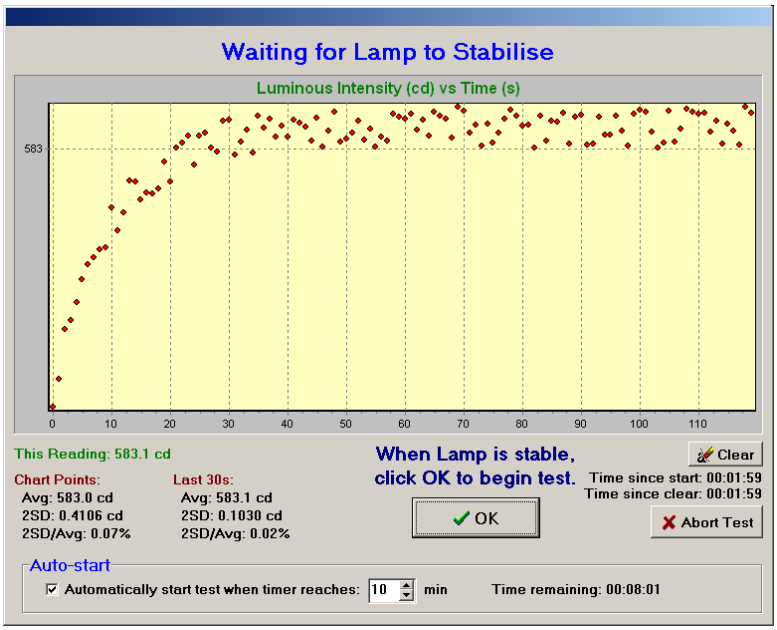

Figure 10: Photocell Monitor Window

Configuration

The ASG-2.0 Config allows the user to perform system configuration tasks such as:

- Setting the test distance(s);
- Adjusting the photocell responsivity settings in case of re-calibration;
- Applying a correction factor in circumstances where the full lamp lumens cannot be used (eg: testing an indicator which would melt if the lamp is run continuously at its normal operating parameters);
- Setting the home positions on the goniometer axes;
- Adjusting the number of triggers per second that the software will use when acquiring test scan data.

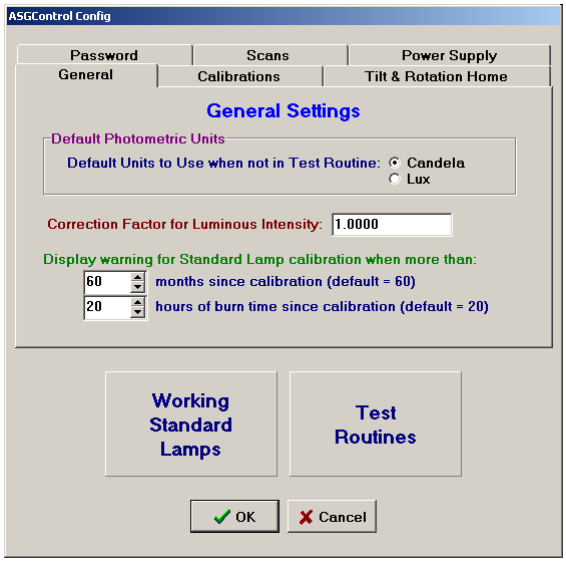

Figure 11: ASGControl Config Window

Report Generation Software

The report generator provides several different formats of reports, including:

- Specialised reports for Vertical Divergence, Navigation Lamps and H-V Scans;
- Tables of data;
- H-V plots;
- IsoCandela diagrams;
- Calculation of effective intensity according to the methods of:
  - Allard;
  - Blondel-Rey;
  - Blondel-Rey-Douglas;
  - Schmidt-Clausen;
  - Modified Allard

PC

The client is to supply a PC according to PSI's specifications. The most common problems encountered are usually computer related, so we prefer that the client supply a PC so that any problems can be serviced locally under warranty.

Documentation

The goniometer comes with a User Manual (in English) which provides a review of the photometric theory of goniophotometry and details the procedures for measuring luminous intensity distributions and testing the test items to various international standards on the ASG-2.0 in easy to follow instructions. It also contains connection diagrams and a troubleshooting guide to the goniophotometer system.

The documentation will give a brief overview of uncertainty calculations and provide a framework for the users to establish the uncertainty in measurement of the luminous intensity distribution of a test item.

Installation and Training

PSI will install and commission the equipment, including:

- Unpacking and laying out the equipment;
- Levelling of the equipment;
- Alignment with optic axis;
- Placement of photocell stand;
- Installation of software.

Additionally, the installation team will perform a photometric calibration of the system and three (3) days training will be provided on site. The quoted price includes all airfares, meals and accommodation for the installation team. For clients who are new to photometry, further training on the basics of photometry and photometric measurement can be provided on request (not included in price).

Installation Requirements

The building arrangements are the responsibility of the client. This includes:

- Laboratory construction;
- Painting of wall, floor and ceiling surfaces a matt black colour;
- Construction of solid floor;
- Construction of stray light baffles and curtains;
- Dust-proofing and air conditioning.

The room should be at least 4m wide, preferably wider, and must be at least four meters longer than the longest required test distance. For test distances greater than 10m, stray light baffles such as wooden panels or curtains should be placed on the walls, floor and ceiling. PSI staff can advise the client of the requirements in advance or at the time of installation.

The entire room should be light-tight and dust-proof. An air lock is preferable, however a partitioned area around the entrance where visitors can replace their shoes with slippers is acceptable. The room needs to be maintained at 25 degrees Celsius and preferably around 50-70% humidity.

Mains supply should be properly earthed, stabilised and filtered. The mains electrical supply for the entire system should be provided through an uninterruptible power supply (UPS) system, or at the very least through a voltage stabiliser, and should include an isolation transformer and line filter. PSI can advise the client regarding the best locations of power outlets.

PSI will professionally pack the equipment in solid wooden crates and deliver the crates to the airport or seaport in Melbourne. The cost of freight out of Melbourne is not included in this price. The client will be responsible for shipping the equipment from the port to their facility, and for any other costs incurred in getting the equipment into the laboratory, eg: forklifts, cranes, etc. If the equipment is to be installed in an existing building, the client is responsible for any costs in removing and rebuilding doors or walls to allow entry of the equipment.

Warranty

PSI provides an unconditional warranty on all equipment supplied for 12 months from the date of installation. During the warranty period, PSI will repair any faulty equipment at no charge to the client if the repair can be carried out by our local staff or representatives. If the repair requires attendance by our staff in Australia, the Client will be responsible for any travel and accommodation expenses incurred by PSI to effect the faulty equipment.

This warranty does not cover misuse, abuse or accidental damage to the equipment. In such a case all repairs and travel and accommodation expenses will be born by the Client.

Part 2. Optional Extras

Additional Photocell

An additional photocell will be supplied with baffle tube, stand and amplifier for measurement at second test distance. The photocell stand will have a manual mechanism to raise or lower the photocell at the closer test distance so that it does not interfere with the measurement at the longer test distance(s).

Additional Photocell with Photocell Stand Automation

This is the same as the Additional Photocell option above, except that both photocell stands will be motorised so that the photocell in use does not have its view of the test item impaired.

- For measurement of signals, the 5 m photocell will be raised.
- For measurement of headlamps, the 25 m photocell will be raised and the 5 m photocell will be lowered.
- For measurements on the reflex reflector, both the 5 m and 25 m photocells will be lowered.

This is a very useful add-on. It gives the laboratory a very professional look and feel;

- It makes the measurement process more automated;
- The operator does not need to move the photocell back-and-forth; and
- Because the photocells are bolted permanently in position it can yield more consistent results.
- The 5 m and 25 m photocells can be used to measure a lamp within a few seconds of each other to provide a system calibration check.

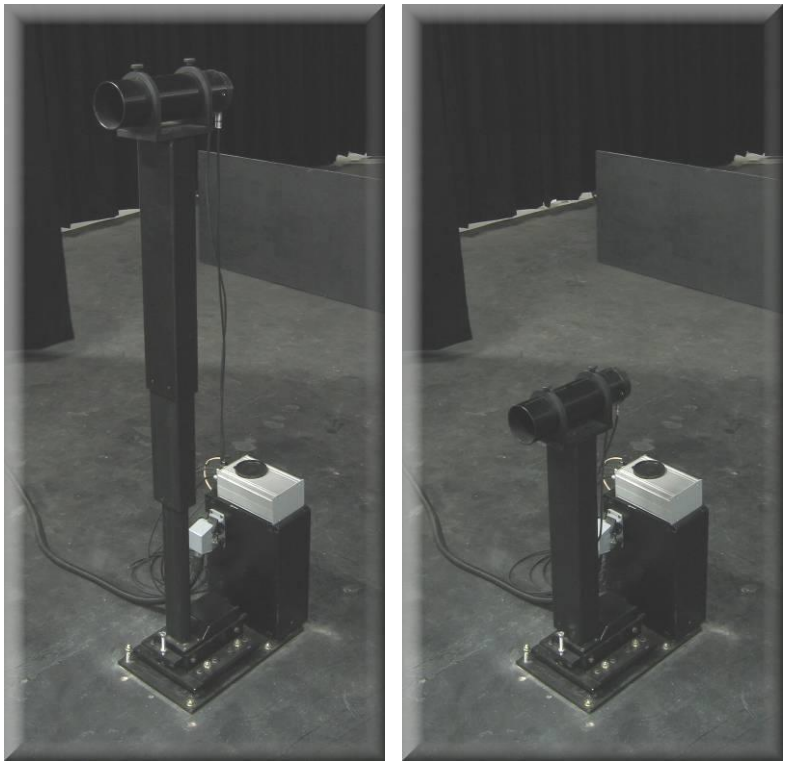

Figure 12: Automated Photocell Stands

FP-250 Flash Photometer Add-on

We will use the photometer head and amplifier supplied with the goniophotometer. An Agilent 34411A DMM is supplied and interfaced with the analogue output of the amplifier and can measure the flashes at up to 50,000 samples per second. The combination of photometer head, amplifier and DMM have a time response of around 0.2 ms (90% of full scale) on the least sensitive ranges.

The flash measurement system can be used for various transient luminous intensity functions such as:

- Lamp activation profile;
- PWM light source frequency;
- Flicker analysis;
- Indicator flashes;
- Rotating beacons and flashing emergency beacons;

This functionality is built into the ASGControl software that comes with the goniophotometer system.

The flash photometer is calibrated automatically using the photometer that is part of the goniophotometer system using a Config option from the control software that is supplied with the system.

Programmable Power Supply with Software Interface

An Agilent 6653A 35V 15A DC Power Supply will be supplied, along with a GPIB Interface and Software Control. The user enters the required voltage or current into the software and the software will automatically power up and power down the test item and read the lamp's electrical parameters and save these along with the test data.

DVMs & Current Shunt with Software Interface

Two Digital Voltmeters and a Current Shunt will be supplied, along with Software Control. The software will interface the two DVMs and automatically read the lamp's current and voltage to display in the test report. The DVMs and shunt will come with calibration certificates.

This method is widely recognised (by the UN-ECE, the IEC and most accreditation bodies) as the correct way to conduct lamp voltage and current measurement.

Filament Switch

A Filament Switching system will be supplied and interfaced to the software. Using this, the operator can automatically switch between two filaments, for example passing/driving beams or stop/tail. This option also requires the Power Supply option above to be selected.

A professional 19” rack system will be supplied which will house a secondary display system.

Figure 13: Secondary Display Mounted in Rack

The secondary display system consists of a flatscreen monitor in a panel mounted in the rack or on a wall of the laboratory. The display shows both of the angular components, the candela measurement, the lux measurement and other important information.

This is very useful for seeing the luminous intensity or illuminance emitted by the test item when aligning test items. It also gives the laboratory a modern, professional feel.

Figure 14: Sample Secondary Display (more at end of quote)

As can be seen in the figures above, while a test is being performed the secondary monitor shows a greyscale image of the beam while measuring test scans, which is very useful for immediately noticing any anomalies or aiming issues.

The rack is normally positioned next to the desk where the operator sits, and can also house the power supply, DVMs, shunt and filament switch options as selected above (these options must be included separately). The rack will contain a system On/Off switch rather than this being placed on the goniometer itself.

Remote Handheld Controller

A Remote Handheld Controller gives the operator extra flexibility when aligning test items. The operator can move around the goniometer holding the hand-held controller and so see the test item alignment from different perspectives.

Figure 15: Remote Handheld Controller

Manual X-Y Stage

A Manual X-Y Stage is used for transverse (X and Y) movement for fine-tuning the test item alignment. There is at least 100mm translation in each direction.

Note: this option reduces the height clearance of the goniometer by approx. 50 mm.

Motorised X-Y Stage

A Motorised X-Y Stage is used for transverse (X and Y) movement for fine-tuning the test item alignment. There is at least 100 mm movement in each direction.

With a Motorised X-Y Stage it is also possible to perform automated licence plate measurements if the client has PSI's licence plate measurement equipment.

Note: this option reduces the height clearance of the goniometer by approx. 90 mm.