

EnVision™ Multilabel Reader



2104

EnVision™

Multilabel Reader
Valid for instruments with software version 1.12



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Warning

This equipment must be installed and used in accordance with the manufacturer's recommendations. Installation and service must be performed by personnel properly trained and authorized by PerkinElmer Life and Analytical Sciences.

Failure to follow these instructions may invalidate your warranty and/or impair the safe functioning of your equipment.





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Chapter 1

Introduction

Introduction

The EnVision™ microplate reader from PerkinElmer Life and Analytical Sciences is a complete platform for quantitative detection of light-emitting or light absorbing markers in research and drug discovery applications. It is suitable for measurement of fast or glow luminescence, fluorescence intensity, fluorescence polarization ([FP]²™), high-sensitivity time-resolved fluorometry (DELFLIA®) and homogeneous time-resolved fluorometry (LANCE™). It can also be used to measure absorbance.

EnVision may be equipped with a monochromator option. In measuring absorbance and fluorescence intensity, monochromators provide an alternative to the use of specific waveband filters, and allow greater flexibility. The quad monochromator option includes two double monochromators. A single monochromator option is also available for absorbance assays.

Very high sensitivity measurements can be made with the Ultra Sensitive luminescence option.

A laser-equipped model allows AlphaScreen measurements to be made. HTS AlphaScreen allows faster throughput than standard AlphaScreen.

A model with an external laser provides enhanced time-resolved fluorescence capabilities for TRF, LANCE and HTRF.

EnVision is a very compact, small footprint bench top unit with features such as shaking, reading from above or below and scanning.

Also available are a dispenser with up to two pumps and temperature control of the instrument chamber.

The single point reading technology with extremely fast and accurate mechanical movement allows the reading of high-density plates as well as use of a wide variety of plates or sample matrix formats. It accepts all types of microtitration plate. It measures 96-well plates in less than 20 seconds and 1536-well formats in under one minute. Plates can be loaded manually or plates can be loaded using 20 or 50-plate free access magazines which fit in a stacker.

Alternatively, robot-friendly EnVision is easy to connect to laboratory automation.

The software is a 32-bit application running under Windows XP® or Windows Vista®. Output can be to a file on the PC and/or to a laser printer or on the network.



Figure 1. Wallac EnVision with a stacker



Figure 2. Wallac EnVision without a stacker

Wallac EnVision is designed to be customizable to suit your specific application needs without you having to invest in features you do not want. If in the future you wish to add new features, this is also possible.

Conventions used

Buttons or other software items to be clicked with the mouse are in bold text e.g. **File**.

Items in the main Navigation Tree are in bold italic e.g. ***Protocols***.

Buttons on the instrument that need to be pressed are in block letters e.g. **START**.

Note! The term "AlphaScreen" refers to both standard AlphaScreen and HTS AlphaScreen unless a distinction is specifically made.

Chapter 2

Functional description

Functional description

This section contains information about the technical features of your instrument such as supported assays and technologies, designs and measurement features.

Application information

EnVision supports several kinds of assays.

Reporter gene assays

When you need to measure either the level of expression or the functional effect of a drug candidate in terms of transcriptional activity of cells, EnVision provides the features you need for reliable detection of reporter gene expression.

The instrument has comprehensive and versatile scanning and kinetics capabilities. It supports GFP assays with dual reading from below. You can also measure, for example, Luciferase and B-lactamase in the same protocol. Dual emission reading is possible for all technologies.

Enzyme assays

In Kinase, Protease, Helicases or Caspase assays, for example, EnVision reads very rapidly using a two-detector system. The temperature control option enables enzyme applications to be run in stabilized conditions. The instrument's kinetics facility and, for example, its flexible stacker system option, allow you to work fast and effectively.

Time-resolved fluorometry

DELFLIA and LANCE assays are based on time-resolved fluorescence methods using proprietary chelates from PerkinElmer. You can choose DELFLIA separation assays of extreme sensitivity, or fast and convenient LANCE homogenous assays. PerkinElmer supply a wide range of reagents or you can benefit from these superior technologies through our assay service. EnVision also supports other TRF chemistries such as LanthaScreen™ and HTRF®

Receptor ligand binding assays

One of the most common molecular targets for drug discovery are G protein-coupled receptors (GPCR). Assays based on fluorescence polarization provide today's most effective means of their detection. Fast-reading EnVision is ideal, for example, for B2-Bradykin, MC3, MC4 and MC5.

Cellular assays

Reading from below, scanning and kinetics are some of the features that make Wallac EnVision the ideal tool for cellular assays such as cAMP, Ca²⁺ or any ADME/tox assays. The temperature control option further enhances these possibilities.

Genotyping assays

A feature of single nucleotide polymorphisms (SNPs) research is the need for fast results. With a two-detector configuration, stacker, plate barcode reader, as well as factory set protocols to cover all labels, plates and filters, EnVision provides a complete facility for fast detection of SNPs.

Image FlashPlate™ assays

Ultra Sensitive Luminescence enables measurement of Image FlashPlate assays. This assay measures radioactive samples. The radioactivity is detected using energy transfer via a scintillant and a europium chelate (emission at 615 nm). The Image FlashPlate is a 384 shallow well microplate, coated with scintillant emitting in the red range of the spectrum, thus eliminating most of the interference from colored compounds.

AlphaScreen assays

AlphaScreen is an ideal tool for screening a broad range of targets. The technology provides an easy and reliable means to determine the effect of compounds on biomolecular interactions and activities. AlphaScreen offers the possibility to assay many biological interactions including low affinity interactions as well as enzymes, receptor-ligand interactions, second messenger levels, DNA, RNA, proteins, peptides, sugars and small molecules).

Assays with dispensing

The dispenser option enables applications that require immediate measurement after the activation step. The dispenser is needed, for example, in assays such as calcium ion-channel. The signal is measured simultaneously during the dispensing step followed by a 30 second kinetic measurement. In a flash luminescence application the substrate is dispensed into the well, the plate is mixed for 2 seconds and the signal is registered.

Technologies

The instrument uses the following measurement technologies if the appropriate options are installed:

Time-resolved fluorescence (TRF) (240-850 nm)

- Multiple time window TRF
- Simultaneous dual emission measurements above or below
- Sequential dual emission measurements above or below
- Sequential dual emission measurements for LANCE assays or other homogenous TRF such as HTRF and LANTHSCREEN
- Ratio measurements

Fluorescence intensity (240- 850 nm)

- Ratio measurements
- Simultaneous dual emission measurements above or below
- With the monochromator option, 2 double monochromators support flexible wavelength selection. Alternatively, filters may still be chosen to provide excellent speed and performance

Fluorescence polarization (450-750 nm)

- Simultaneous dual emission measurements

Luminescence

- Simultaneous dual emission measurements
- Glow luminescence measurements

Ultra Sensitive luminescence

- Radioluminescence measurements with Image FlashPlate
- Glow luminescence measurements

Absorbance (240-950 nm)

- Ratio measurements
- Measurements in the UV range
- With the monochromator option, double or single monochromator represents an easy-to-use alternative to filters

AlphaScreen/HTS AlphaScreen (520-620 nm)

- High sensitivity measurements of biomolecular interactions using laser excitation

Mechanical design overview

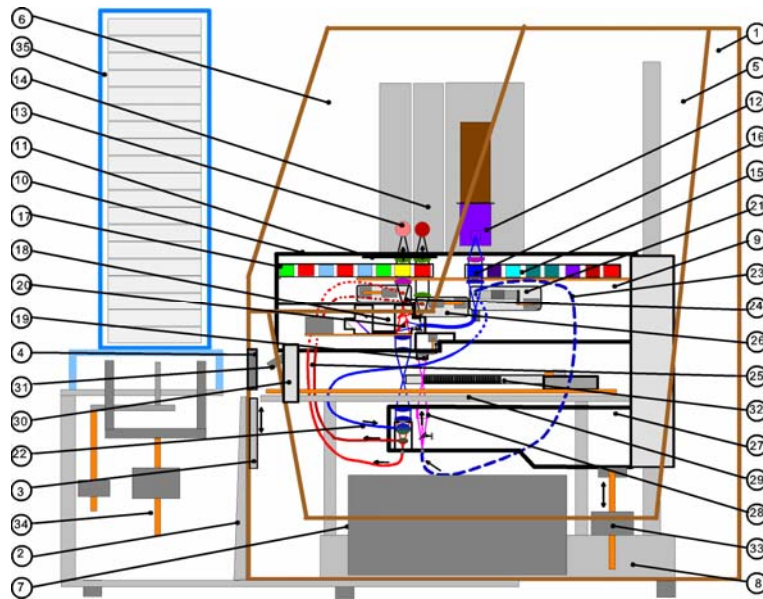


Figure 3. Layout of modules in EnVision (side view)

- | | |
|-----------------------------|---|
| 1. Case frame | 19. Photometric detector |
| 2. Front panel | 20. Mirror module |
| 3. Loading door | 21. Light director assembly |
| 4. Height sensor | 22. Bottom excitation cable |
| 5. Case | 23. Photometric cable |
| 6. Lid | 24. Emission light selector |
| 7. Power supply | 25. Emission cable |
| 8. Basic frame | 26. Second detector emission light selector |
| 9. Top measuring head body | 27. Bottom measuring head body |
| 10. Cover plate | 28. Photometric optics |
| 11. Light shutter | 29. X-Y conveyor |
| 12. High effic.light source | 30. Barcode reader holder |
| 13. Detector | 31. Barcode reader |
| 14. Second detector | 32. Plate carrier |
| 15. Excitation filter frame | 33. Z-movement module |
| 16. Filter module | 34. Lifting module (stacker) |
| 17. Emission filter frame | 35. Magazine for 20 plates |
| 18. Mirror module changer | |

Note! With Ultra Sensitive Luminescence there is an additional detector for this measurement. This is located next to the other detector(s). The detector used for Ultra Sensitive Luminescence is also used for HTS AlphaScreen if that is installed.

Note! With AlphaScreen and HTS AlphaScreen there is an additional laser for excitation. The light travels by means of a light guide to a special mirror module and via that to the measurement position. A light shutter protects the detector during the time the laser is exciting the sample. With HTS AlphaScreen there is an additional detector to enable high throughput AlphaScreen measurements. This is located next to the other detector(s). It is the same detector as used for Ultra Sensitive Luminescence.

Note! The optional dispenser unit is bolted on to the side of main instrument and connections made through an opening in the instrument case

Temperature control

The temperature control option consists of heating elements. These are located above and below the measurement position.

Plate types

All types of microtitration plate may be measured. Petri dishes, slides, filters and Terasaki plates are all suitable.

Plate height sensor

A height sensor ensures that every time a plate is loaded the height is detected.

Alternative plate loading modes

The possible plate loading modes are:

- Manual loading (one plate at time)
- Stacker loading (up to either 20 or 50 plates per load) - requires the stacker module
- Robotic loading - uses an external robotic system to load plates in the plate carrier of the basic instrument. The magazine table of the stacker is used without magazines. Rods come up from the table and the plate is loaded onto them.

Flexible stacker

The stacker provides a semi-automated plate loading option. Each stacker carries up to 20 or 50 plates at a time. The plate stacker includes robust magazines, which are easy to lift into place and remove. With an easy one-hand operation you place and remove the loaded magazine. Measurement is started with a single mouse-click or by pressing the START button, depending on the barcode mode.

You can select whether plates are taken into the instrument from the right or the left magazine. Plates can also be moved from one magazine to the other.

Robotic loading

In a typical automated HTS laboratory there are many different instruments such as stackers, different kinds of readers and counters, washers and dispensers, all of which can be accessed by a robot enabling continuous loading and unloading. The robot moves microplates from instrument to instrument in a sequential order according to the assay protocol used. The robot acts as the master system and all the other instruments are subsystems

of the robot. The robot software communicates with the subsystem software. Different kinds of robots can be used as the main system in an automated HTS laboratory.

When used with a robot, EnVision is usually linked through COM interfaces. These provide the basis for seamless integration and instrument control. The robot and the counter work as a unit.

Optical system

The unique measurement performance of EnVision is a consequence of the instrument's special optical design. The emission optical system features Direct Double Optics. This means a full lens system without any light guides or fiber bundles for measurements from above and a stray light aperture between the two lenses. The latter configuration ensures optimized use of a high quality interference filter and pure collection of emission light from the excited sample volume.

The excitation optical system also employs two lenses. They are coupled with a short length of quartz fiber bundle. The use of the fiber bundle allows the optimal location of filter slides so that you can access them easily. Another important advantage of using the fiber bundle is to ensure delivery of a confined and stable circular spot into the sample volume.

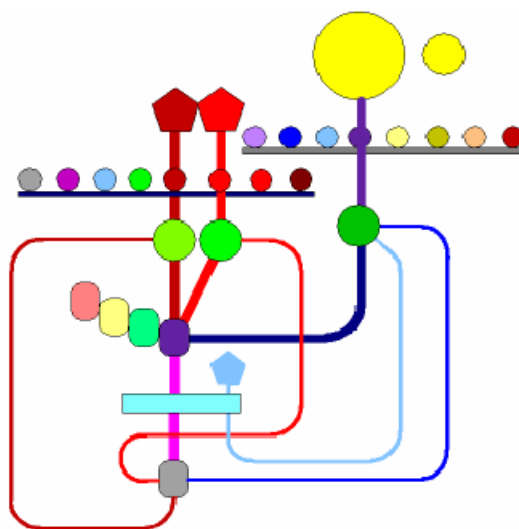


Figure 4. Overall view of the optical components

In the pictures of the optical components, the two circles at the top represent two light sources, the first light source (the larger circle) and the second light source (the smaller circle), medium circles are path selectors, small circles on top of slides represent filters. Rounded rectangles represent mirror modules and pentagons are light detectors (PMTs and diode). All straight lines represent direct optical paths using lens optics and all curved lines represent optical paths using quartz light guides.

Note! With Ultra Sensitive Luminescence there is an additional detector, a highly sensitive PMT. This is also used for HTS AlphaScreen.

Note! With AlphaScreen a special dichroic mirror module is used to direct the excitation laser light into the sample well. The emission path and detection is similar to that for fluorescence intensity.

Luminescence mode

When a luminescence sample is measured, no excitation components are used. It is often useful to use an infrared cut-off filter (2100-212) in the emission path due to the very long decay photoluminescence from the plate itself.

The sample is measured as follows: emission light coming from the sample is collected by the sample optics and directed through the aperture of the luminescence mirror module (2100-404). This aperture effectively decreases the crosstalk from adjacent wells. The filter optics guides the light from the aperture into the photocathode of the side window photomultiplier tube. The single photon counting system counts the number of photons for a pre-selected time period and the counter is then read by the microprocessor.

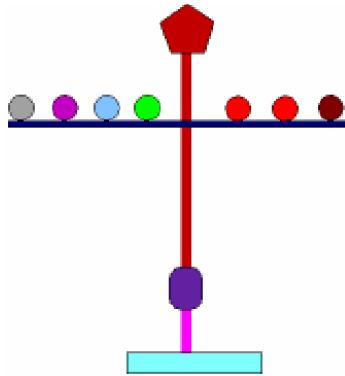


Figure 5. Luminescence measurement

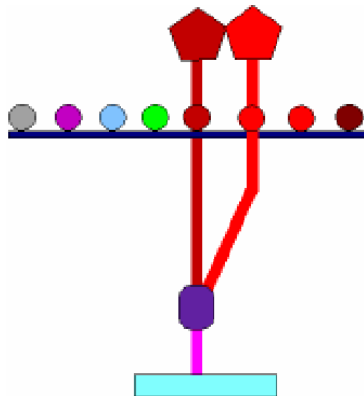


Figure 6. Dual wavelength luminescence measurement

In some luminescence applications there is a need to measure two wavelengths at the same time. This can be done if you have the high speed dual detector option with the dual luminescence mirror module (2100-454) with the 50/50 beamsplitter in the emission light path.

Ultra Sensitive luminescence mode



Figure 7. Ultra Sensitive luminescence measurement

Ultra Sensitive luminescence uses a very high sensitivity luminescence PMT as the detector. It has extremely low background, high dynamic range and spectral response from 300 nm up to 650 nm. The detector has no optical components and the emission light is collected directly from the well.

The detector can be lowered so that it is just above the plate, thus reducing the crosstalk between wells. The detector has an aperture to define the area of the plate it can view. Currently there are three different aperture sizes: for 96, 384 and 1536-well plates. They are optimized to give the highest possible signal and minimize crosstalk between wells. This aperture can be changed by hand.

There is a sensor to identify the presence of the aperture. Another sensor allows precise plate height determination to allow the aperture to come very close to the plate without hitting it.

Fluorescence Intensity

In fluorescence intensity measurements the sample is excited by the flashlamp and generated fluorescence is read by a photomultiplier tube in gated analog mode. In analog detection mode the high voltage of the photomultiplier i.e. the gain, is a parameter that can be set by the user. Changing the parameter value from 1 to 1024 changes the gain from 50000 to about 10 million i.e. over two orders of magnitude.

The basic measurement needs only one flash, but for higher accuracy it could be useful to use more flashes. The integrated analog signal from the photomultiplier and the reference photodiode are always read after every flash. For one measurement (one or more flashes) these readings are summed (not averaged). The reference signal is then compared to the original reference value with the label and the results are corrected for the same excitation energy.

All FI-measurements are done in epi-mode (top or inverted) i.e. excitation from above and reading from above or excitation from below and reading from below. The general mirror module with the 50/50 beamsplitter mirror can be used for all labels independent of the excitation and emission wavelengths. For dual detection the dual general mirror module is needed. For reading from below, the same mirror module can be installed into the bottom head but now the mirror module information has to be given through the user interface and the instrument has no means to check the correctness of this information. For optimized FITC or similar labels a special mirror module is available with a dichroic mirror. The emission signal with the

dichroic mirror is about three times higher than with a general mirror module.

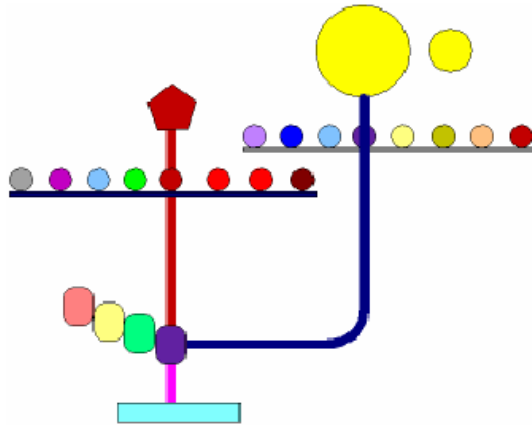


Figure 8. Excitation from above/Reading from above

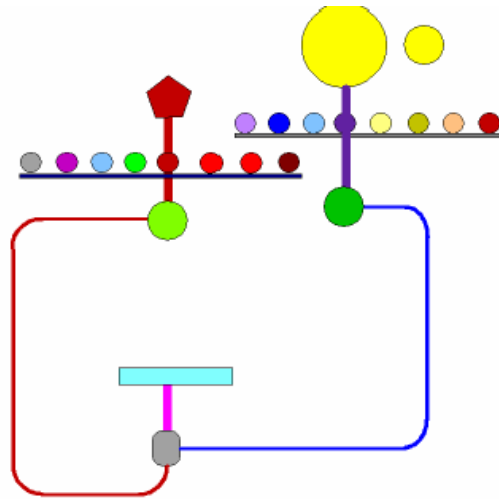


Figure 9. Excitation from below/Reading from below

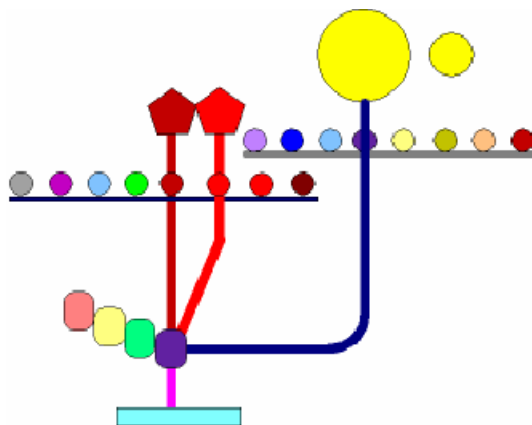


Figure 10. Excitation from above/Dual reading from above

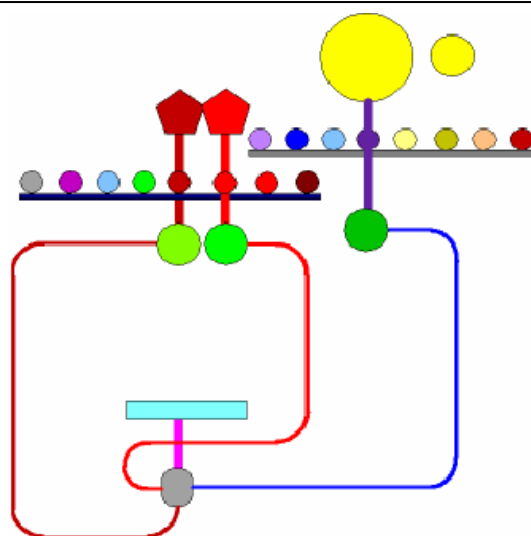


Figure 11. Excitation from below/Dual reading from below

Using the quad monochromator option, excitation light from the lamp is directed through the excitation double monochromator into the sample. The emission light is then directed through the emission double monochromator to the detector.

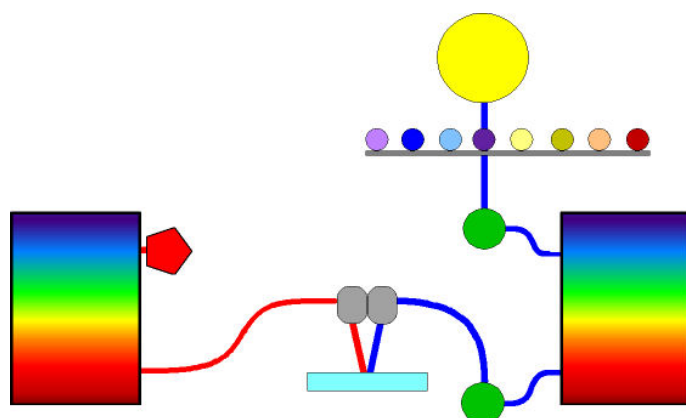


Figure 12. FI measurement using the EnVision™ monochromator option

Monochromator function relies on the direction of a beam of polychromatic light onto a diffraction grating. The grating separates the incident polychromatic beam into its constituent wavelength components, sending each wavelength into a different direction so that a narrow band of wavelengths can be collected. Double monochromators contain two diffraction gratings. The use of monochromators provides the benefit that wavelength can be selected steplessly through the workstation software.

Although monochromators relieve you of the need to have filters for every label, a broad waveband cut-off filter is still required in order to block harmonic multiple orders of the wavelength chosen. A total of three cut-off filters covers the entire range of wavelengths supported by the instrument.

TR-fluorescence mode

In time-resolved fluorescence measurements the sample are excited by the flash lamp and the generated fluorescence is read by the photomultiplier tube in single photon counting mode. The basic measurement needs only one flash, but more flashes (i.e. 100) ensure higher accuracy. The integrated photon counts from the photomultiplier and the integrated analog signal from the reference photodiode are always read after every flash. For one measurement (one or more flashes) these readings are summed (not averaged). The reference signal is then compared with the original reference value obtained with the same label and the results are corrected so that they each come from the same excitation energy.

Most TRF-measurements are done in epi-mode i.e. excitation from above and reading from above or excitation from below and reading from below, or in through mode. The general mirror module (2100-4010) with 50/50 beamsplitter mirror can be used for all labels independent of the excitation and emission wavelengths. For dual detection the dual general mirror module (2100-4050) is needed. For better detection limits the UV mirror module (2100-4170) should be used. The dichroic mirror of this mirror module is optimized for excitation of different chelates. The dual mirror module (2100-4160), for instance for dual label DELFIA (Eu/Sm), is equipped with a secondary dichroic mirror with a cut-off wavelength of 630 nm. With this mirror module different epi-measurements can be performed.

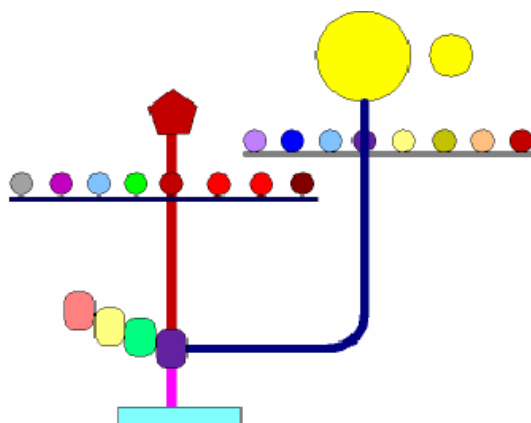


Figure 13. Excitation from above/Reading from above

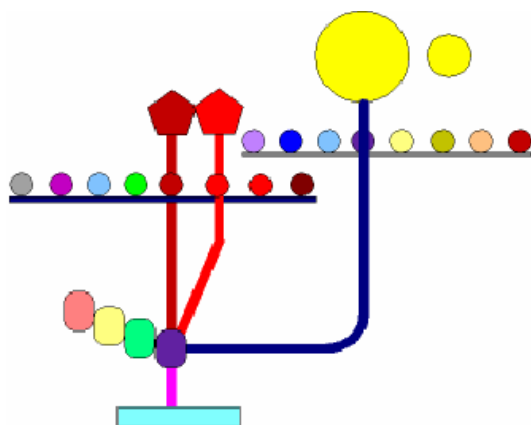


Figure 14. Excitation from above/Dual reading from above

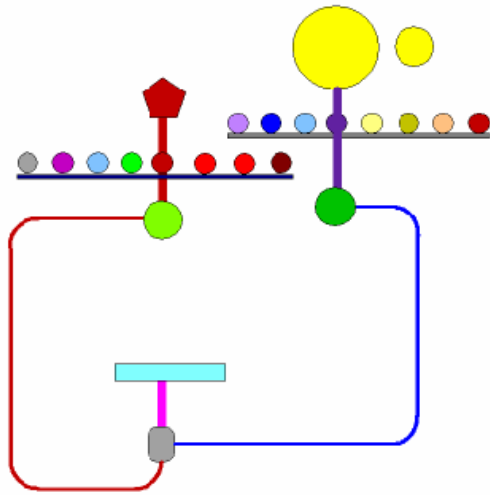


Figure 15. Excitation from below/Reading from below

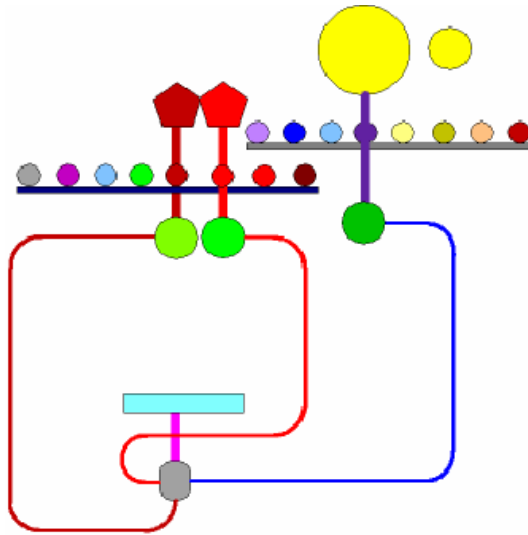


Figure 16. Excitation from below/Dual reading from below

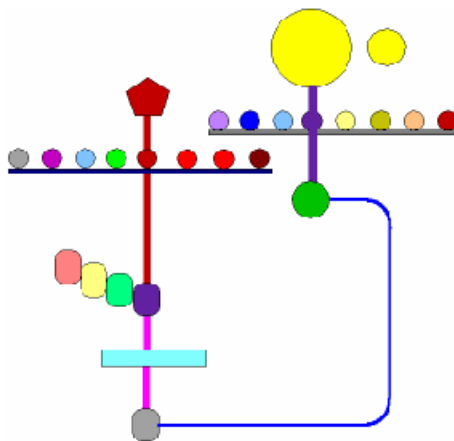


Figure 17. Excitation from below/Reading from above

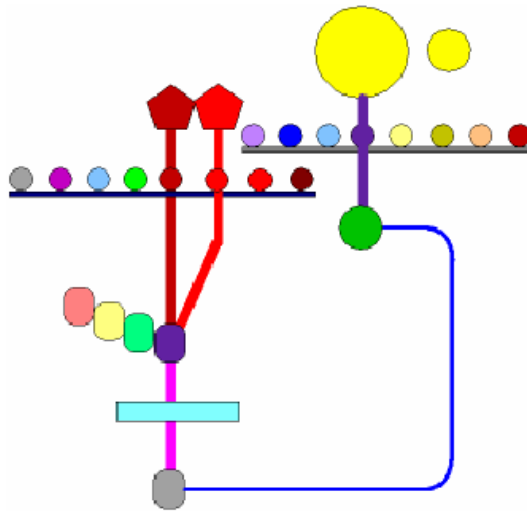


Figure 18. Excitation from below/Dual reading from above

Note! A dual mirror is needed whenever the second detector is used even if the reading is done from opposite sides of the plate. The mirror in the light path to the second detector is the one that must be dual as noted in the figures.

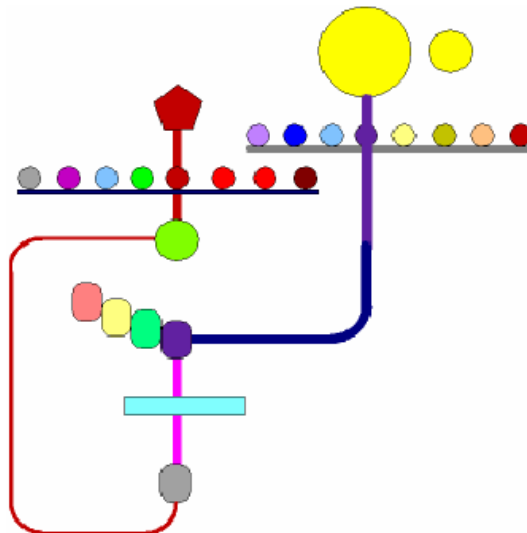


Figure 19. Excitation from above/Reading from below

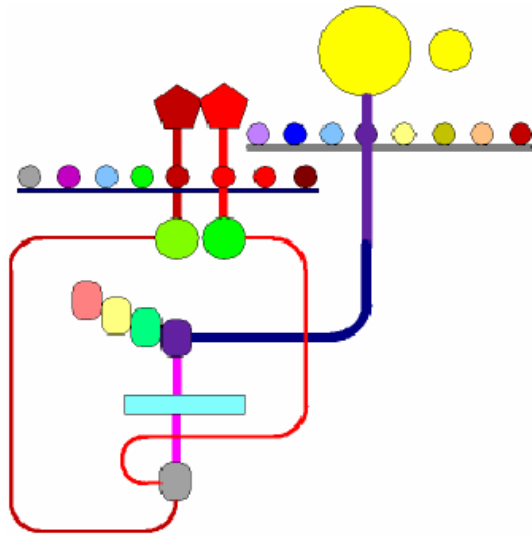


Figure 20. Excitation from above/Dual reading from below

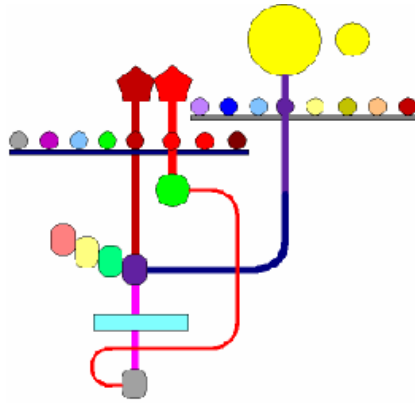


Figure 21. Excitation from above/Reading from above and reading from below (second detector). Bottom mirror must be dual

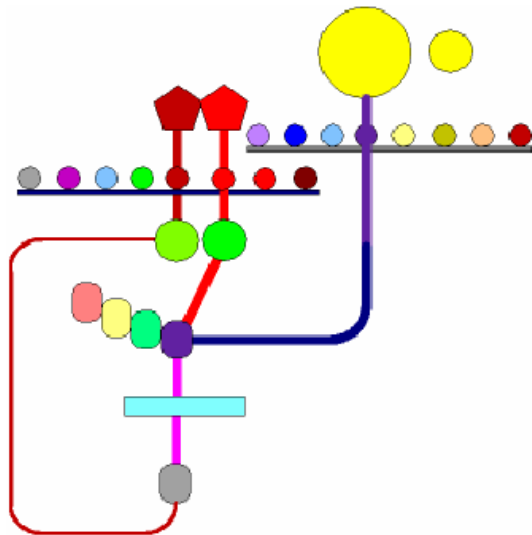


Figure 22. Excitation from above/Reading from above (second detector) and reading from below. Top mirror must be dual

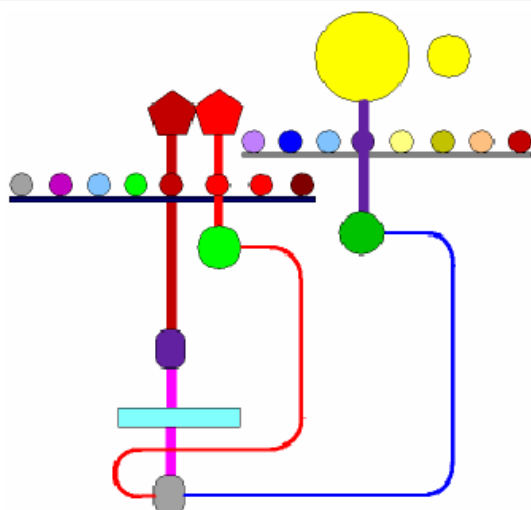


Figure 23. Excitation from below/Reading from above and reading from below (second detector). Bottom mirror must be dual

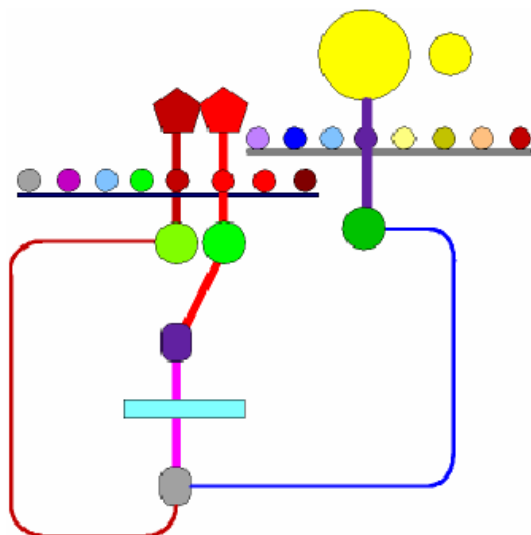


Figure 24. Excitation from below/Reading from above (second detector) and reading from below. Top mirror must be dual

Fluorescence polarization mode

The excitation light is produced in the same light source as for FI and TRF measurements. The light is guided via an excitation filter through the light guide into the optical module. The excitation light is polarized by a polarizing filter in the optical module. The filter polarizes the light in the S-plane. The integrated photon counts from the photomultiplier and the integrated analog signal from the reference photodiode are always read after every flash. For one measurement (one or more flashes) these readings are summed (not averaged). The reference signal is then compared with the original reference value obtained with the same label and the results are corrected so that they each come from the same excitation energy.

The excitation light is then directed onto the sample by the excitation beamsplitter in the optical module.

The polarized emission light passes through the excitation beamsplitter in the optical module. If the instrument has two detectors enabling dual emission measurements, the mirror module has a second emission beamsplitter which directs a portion of the emission light to the second detector. This second beamsplitter separates light according to its plane of polarization.

The emission light then passes through the emission filters in the emission filter slide. These filters are equipped with polarization filters to ensure that the right plane of polarization is being measured. Hence there are separate filters for S and P polarized emission light. If the system does not support dual emission measurements the two planes will be measured sequentially by changing the emission filter.

The final result is calculated by combining these measurements using the formula

$$\text{Polarization (mP)} = 1000 * (S - G*P)/(S + G*P)$$

where S and P are the measured results with the S and P emission filters respectively. G is a factor to correct for the effect of emission filter transmission variations, differences in the emission light paths and sample viscosity. In instruments with two detectors the G factor can be set to 1 and the polarization value can be adjusted by changing the separate gain of the detectors.

In EnVision, a background correction can be done before calculating the final results. It is done by subtracting measured S and P results obtained from a buffer sample from the actual measured S and P results respectively.

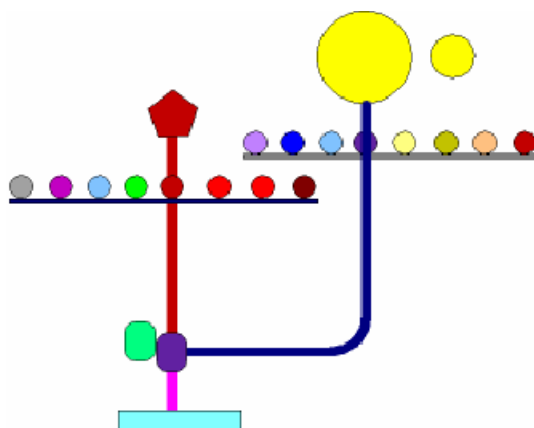


Figure 25. Excitation from above/Reading from above (two readings necessary, one with the S polarizer and one with the P polarizer)

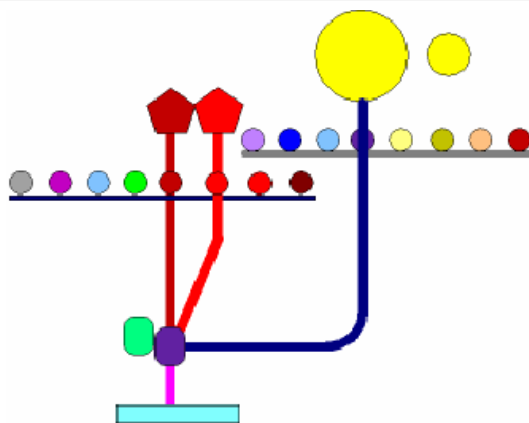


Figure 26. Excitation from above/Dual reading from above (using the S and P polarizers)

Absorbance mode

For absorbance measurements the same excitation light source is used as for FI, TRF and FP measurements. The wavelength of the light is selected by an optical filter placed in the excitation filter slide and it can be in the range 230-950 nm. A 405 nm absorbance filter is supplied with the instrument.

In absorbance measurements, light is directed through a light guide to the bottom measuring head where the intensity of the light is measured using a reference photodiode. The light is then directed through the bottom of the plate and focused into the sample. The focal plane is the same as for FI, TRF and FP measurements.

The intensity of the light is first measured without any sample and then the samples in one plate are measured.

The light intensity is measured by a photodiode placed at an optimal position directly above the plate. The light path for absorbance measurements is thus different than for FI, TRF, FP and luminescence measurements.

The absorbance value is calculated by the equation

$$A = -\log(I/I_0)$$

where I_0 is the light intensity without any sample and I is the intensity after an absorbing or reflecting medium.

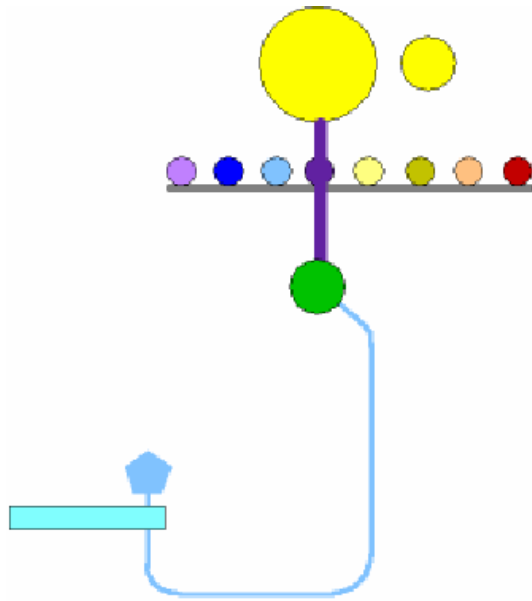


Figure 27. Light directed through the sample from below and detected above with a photo-diode

Using the quad monochromator option, light passing into the sample comes from the “excitation” double monochromator. For users who do not wish to perform fluorescence intensity measurements, the single monochromator option may be chosen rather than the quad monochromator.

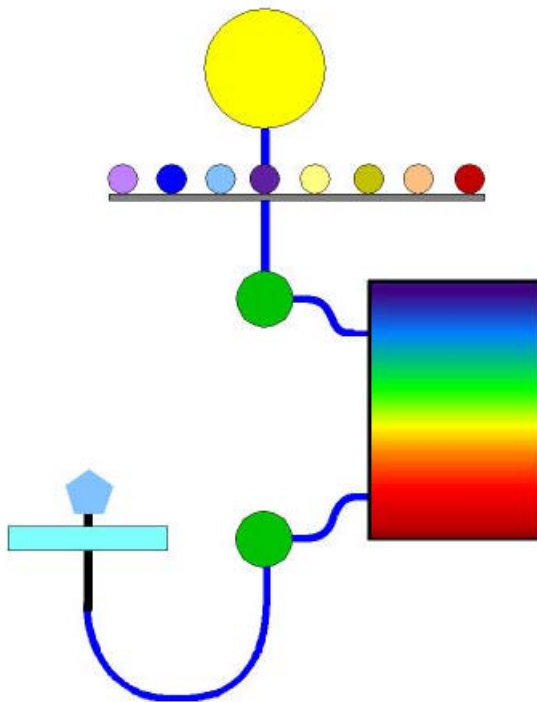


Figure 28. Absorbance measurement using either the quad or single monochromator option

AlphaScreen / HTS AlphaScreen mode

Unlike the other modes, AlphaScreen uses a laser to excite the sample. A special dichroic mirror module is used to direct the excitation laser light into the sample well. In the case of standard AlphaScreen a light guide is used to direct the light to this mirror module. In the case of HTS AlphaScreen the light is directed straight to the sample from the laser. The excitation wavelength is 680 nm. AlphaScreen donor beads are excited by the laser beam. A photosensitizer in the donor bead converts ambient oxygen to a more excited singlet state. These oxygen molecules diffuse to the bound acceptor bead where they react with a thioxene derivative generating chemiluminescence at 370 nm. This activates fluorophores in the bead which emit fluorescence light in the range 520 to 620 nm. The long half-life of the signal permits the measurement to be time-resolved to reduce the contribution of background fluorescence. The fact that the excitation wavelength is longer than the emission, further reduces the background, as does the fact that wavelength itself is long.

In the case of AlphaScreen the emission light pathway involves the fluorescence light passing back through the mirror module and then through the filter into the photomultiplier tube. There is also a shutter in this pathway which is open during the emission phase but closed during excitation to protect the detector from the laser light.

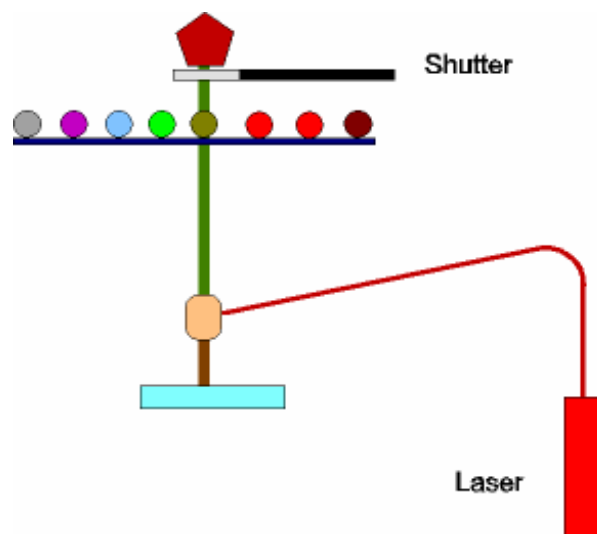


Figure 29. Laser excitation from above/reading from above. Mirror module must be the special AlphaScreen dichroic

In the case of HTS AlphaScreen, the detector is directly above the plate and reads the well adjacent to the one excited by the laser. Light passes through an aperture and into the detector.

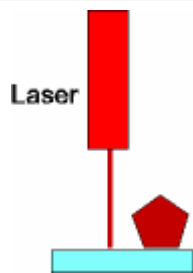


Figure 30. Laser excitation from above to adjacent well/reading from above.

Both excitation and emission occur from the top of the sample. Bottom reading is not possible with AlphaScreen in EnVision.

Only one measurement per well is recommended because the sample is partially bleached by the excitation light.

Crosstalk is a factor that must also be taken into account. There are three components: bleaching caused by the excitation of adjacent samples, afterglow from a previously excited adjacent sample and glow from an adjacent well at the time of measurement. A crosstalk correction wizard allows the amount of the crosstalk to be measured and the software uses this as a correction factor in the calculation of the final result.

TRF laser mode

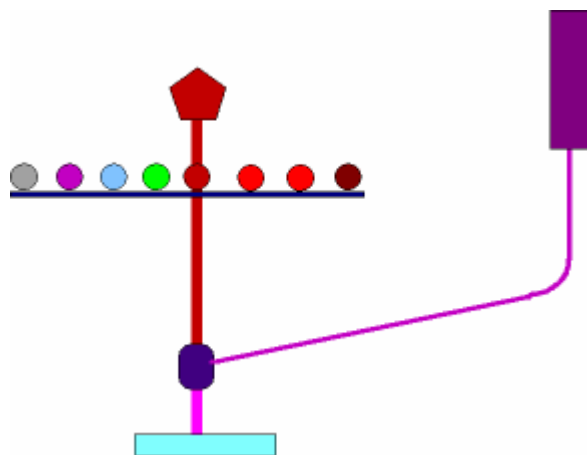


Figure 31. Laser excitation (second light source) from above/reading from above. Bias mirror module with a single mirror is used.

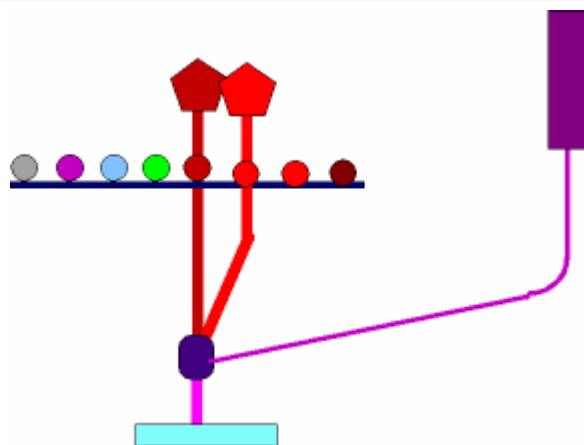


Figure 32. Laser excitation (second light source) from above/dual reading from above. Bias mirror module with two mirrors is used.

The TRF laser (second light source) is a compact nitrogen laser that does not require any additional nitrogen source. The laser produces a very narrow (3 nm) excitation pulse at a wavelength of 337 nm. This enables short 20 μ s delay times to be used, improving the signal to background ratio. The excitation pulse is also very strong making on-the-fly TRF assays feasible.

Light sources

EnVision employs a high stability, short-arc flash lamp as a common light source (first light source) in measurements. The high-efficiency light source has a high repetition rate for high throughput applications and it allows you to perform faster multi-flash measurements such as time-resolved fluorescence and fluorescence polarization. For every measurement type you can select the number of flashes used. To ensure both the long-term and short-term stability of measurements, the excitation energy is monitored after every flash via a beamsplitter and reference photodiode.

In the case of AlphaScreen a laser emitting light at wavelength of 680 nm is used.

In the case of enhanced TRF measurements, a nitrogen laser option (second light source) emitting light at a wavelength of 337 nm may be used. This is fixed to the back of EnVision and the light is directed to the well by means of a light fiber and the bias mirror module.

There is no danger to the user from these lasers unless the instrument is broken into.

Warning! Only personnel specially trained and authorized by PerkinElmer may open the covers that require a tool.

Optical filters

A wide range of filters covers the wavelengths used in fluorometric and photometric applications. Additional filters are available upon request.

All interference filters are pre-installed into the barcoded filter block which is easily installed onto a ladder-type filter slide. The structure of the block ensures that any polarizing filters used are aligned in the right direction.

Focus point adjustment

The focus point is adjustable. The measuring height is a parameter that can be defined in your protocol. The focus point can be located at the very bottom or at the very top of the well or anywhere between. This is very beneficial when measuring filters plates, cell layers, membranes etc. It also enables you to reduce sample volumes efficiently.

Application specific mirror modules

User interchangeable application specific mirror modules form a crucial part of the optical system. The mirror modules include all application critical components:

- a main excitation dichroic beamsplitter
- 50/50 broadband beamsplitter
- a reference beamsplitter for measurement stabilization
- an emission dichroic beamsplitter
- broadband beamsplitter for dual measurement
- a stray light aperture located between relay optics
- a special dichroic beamsplitter for AlphaScreen
- a bias mirror module for use with the second light source

All application specific mirror modules are barcoded.

For reading from above, the multiple mirror module can hold up to four mirror modules. Any of the mirror modules can also be in the head for reading from below but the barcode is not then read automatically.

The mirror modules used for dual channel measurements differ from those used for single channel measurements. Dual mirror modules include a third reflecting component - an emission beamsplitter and a stray light aperture.

Detectors

The photoluminescence detectors are red-sensitive temperature-stabilized side-window photomultiplier tubes. For chemiluminescence and time-resolved fluorescence measurements the detectors are used in single photon counting mode with factory-set high-voltage and discriminator setting. For fluorescence intensity and fluorescence polarization measurements the detectors are used in gated analog mode with user adjustable gain (high voltage) setting values.

Optionally a second detector can be installed behind the first one. Two detectors increase speed of measurement which is highly advantageous in all dual label measurements in both fluorescence polarization assays and time-resolved fluorescence DELFIA and LANCE assays.

Measurements can also be made from below if the appropriate modules are included.

In Ultra Sensitive Luminescence and HTS AlphaScreen the detector is a very high sensitivity PMT.

Apertures

In Ultra Sensitive luminescence and HTS AlphaScreen measurement, an aperture is used to guide light from the sample into the detector. This reduces signal loss due to light spreading out from the sample. It also minimizes crosstalk from adjacent samples.

There are different sizes of aperture: for 1536, 384 and 96-well plates respectively. Apertures also differ depending on if they are for HTS AlphaScreen or one of the luminescence modes. You can use an aperture smaller than the sample well e.g. a 1536-well plate aperture for a 384-well plate. This will minimize the crosstalk although there will be some signal loss because the aperture size is not optimum.

The system checks that the selected aperture is in place and gives a warning message if it is not. You can still continue despite this warning if you choose to.

A shutter is available to protect the additional detector from dust when it is not being used e.g. for several days or longer. This shutter must be used instead of an aperture when standard AlphaScreen measurements are made because the other apertures prevent the detector and plate cooler from coming close enough to the plate to make successful standard AlphaScreen measurements.

Test plate

A test plate is supplied with every instrument. This includes multilabel solid samples covering all technologies and commonly used labels.

Measurement features

Your instrument has the following measurement features:

Fast dual TRF

Homogeneous TRF-assays can be measured extremely rapidly and with high sensitivity.

Multiple window TRF

The multiple window TRF option opens up the possibility to record the signal in separate windows within one flash cycle. The need to follow a change in the emission profile of a lanthanide chelate is of practical

importance in energy transfer applications especially when the actual energy transfer might be affected.

Dual ratio measurements

Certain labels require dual excitation or emission readings. In Wallac EnVision protocols you can define many different labels. The instrument will carry out the measurement quickly without any worries about any internal calibrations of serial PMTs.

Simultaneous dual emission measurement with two emission detectors allows you to obtain the fastest possible results.

Fast FP

Extremely fast measurement is based on a two-detector system, which means that both polarization planes can be measured at the same time.

AlphaScreen

AlphaScreen enables very high sensitivity measurements with very low background and very high signal to background ratio. A laser and AlphaScreen coated-bead technology are used.

Large wavelength regions

Large wavelength ranges are needed in DNA and protein qualification assays. EnVision supports wavelengths from 240 nm to 850 nm.

Luminescence mode

When a luminescence sample is measured, no excitation components are used.

Minimized crosstalk in luminescence measurements

The Ultra Sensitive Luminescence feature permits the detector to be lowered so that it is just above the plate thus reducing the crosstalk between wells.

Crosstalk correction for Ultra Sensitive luminescence

Ultra Sensitive luminescence allows the instrument to be optimized for glow-type crosstalk. A special crosstalk measurement is setup and run using a crosstalk correction wizard. The software then applies the crosstalk correction to actual sample measurements. This correction further improves the signal to background ratio for these measurements.

Crosstalk correction for AlphaScreen or HTS AlphaScreen

A crosstalk correction wizard allows the setup and measurement of the contribution to the signal from a sample well due to the glow and afterglow of adjacent samples and the effect of bleaching. The software then corrects for these effects in the calculation of the final results.

Reading from above and below

Fluorescence intensity and time-resolved fluorescence readings can be taken from above or below. Reading from above is the most efficient way when no lid is used because no plastic surface has to be penetrated. For adherent cells and lidded plates, reading from below provides superior efficiency. It is a true epimode, in the sense that both excitation and emission are from below.

Switching between reading from above to reading from below and vice versa is purely a software issue and for the same run both above and below can be used.

Shaking

The shaker accommodates the wide range of plates and applications for which EnVision is suited. Three modes are available; linear, orbital and double orbital. The duration, speed and amplitude of shaking can all be defined by the user.

Scanning

Cell applications, require several reading points in one well. Due to the heterogeneous spread of cells in a well it is important to scan the complete area of the cell culture. This can be done with EnVision by specifying the shape of the scan area and the number of points to be scanned. The scanning function is also suitable for the reading of small membranes, chips and slides.

Kinetics

In both slow and fast kinetic assays, EnVision allows faithful reproduction of physical conditions. Delays and repeats can be specified by plates or wells. Specific operation sequences can be defined by well or by well group.

Dispensing

A dispenser unit can be installed in EnVision. This enables dispensing to microplates and is needed for applications requiring real time reading after activation, such as cellular ion-channel and flash luminescence assays. Real time measurements with dispensing can be done with the "Real time" tip in a tip mount. The well is directly below the measuring head when dispensing takes place so there is no delay between dispensing and measurement.

Simultaneous dual dispensing can be done when immediate measurement is not required.

In cases where maximizing the signal intensity is important, dispensing can be done with a tip which is not between the well and the measuring head.

The unit contains two pumps, one of which can be used in real-time kinetics measurements.

Each pump comprises a motor, syringe, valve and tubing. The aspiration tube is used to aspirate liquid from the liquid reservoir or to retrieve liquid back to the reservoir. The output tube is connected to a tip which is part of a tip mount. The actual position of a tip is determined by the tip mount. In the case of a dual pump unit the tip mount has two tips, each of which is connected to one of the pumps.

Each tip mount is identified by a barcode which is read automatically by the system.

A tip mount has three tip positions of which two can be used at a time. These positions are named (from left to right) “Post”, “Real time and “Pre”. The “Real time” position is the measurement position. “Post” is the position the well moves to after the measurement position. “Pre” is the position it is in before moving to the measurement position. Pump connections are as shown in the table.

| Tip configuration | Pump1 | Pump2 |
|--------------------------|--------------|--------------|
| Real time | Real time | Not used |
| Pre | Pre | Not used |
| Real time and Pre | Real time | Pre |
| Pre and Post | Pre | Post |

The offset of the “Pre” and “Post” positions depends on the plate type, 384-well or 96-well. There is a separate tip mounts for each of these plate types.

Dispensing can be done in two ways:

- first filling the syringe and then dispensing aliquots the size of the required volume
- aspirating the required volume and dispensing it.

The second option gives better results when small volumes (< 10 µl) are dispensed.

There are two modes of operation:

Dispense measurement – dispensing from one or both tips is followed by measurement.

Dispense – only dispensing takes place but no measurement. In this case parallel dispensing is used when there is a dual tip mount.

There is a waste container in the instrument. This is used when operations such as rinse occur. A separate aspiration tip connected to a waste pump is used to empty this waste container when necessary. This operation occurs automatically.

The liquid reservoir is placed on a hot plate which also includes the possibility to operate a magnetic stirrer. Both the temperature of the hot plate and the speed of the magnetic stirrer can be controlled by settings in the software.

Maintenance operations can be performed with:

- the instrument lid closed when the tip mount is in its place
- the instrument lid opened when the tip mount is outside the instrument

Barcodes

Your instrument uses the following barcodes:

Filter/mirror barcodes

All filter and mirror modules are barcoded, this makes their use much easier.

Plate barcodes

The barcode reader allows you to load barcode labeled plates, which are identified by the barcode reader. Codabar, Code39, Interleaved 2 of 5 and Code 128 barcodes can be read.

Tip mount barcodes

Each tip mount is barcoded so that the system knows that the correct tip mount is in the instrument for the dispensing required.

PC and printer

Your instrument has the following requirements for PC and printer:

PC configurations

The workstation software is run under Windows XP on a Pentium® computer (1.7 GHz), minimum 512 MB memory, with 30 GB available hard disk space or Windows Vista on a Intel Core 2 Duo E4300 (1.8 GHz, 800 MHz, 2MB), minimum 1GB memory, with 80 GB available hard disk space. The computer is equipped with a CD-ROM, an Ethernet card and a 24-bit color display with minimum resolution of 1024 x 768 pixels.

Printer

All Windows compatible printers are suitable.

Software

PerkinElmer Life and Analytical Sciences has built a wealth of strong features into its robust EnVision software. Running under Windows XP or Windows Vista it is easy to learn to use and provides clear viewing of all of the information you need on screen. For reliability and convenience, protocols and results are stored in a database.

There is a protocol explorer for quick access and editing of protocols. Example protocols are included as a starting point for users to make their own application specific protocols.

EnVision is designed for easy connectivity to your existing automation. True two-way communication with other instruments is easy to achieve due to the COM interface and the Windows environment.

Relation to other systems

EnVision can be used independently as a stand-alone manually loaded system. EnVision can be used as a robot-controlled subsystem in an automated HTS laboratory. The data generated by EnVision can be transferred via the Windows operating system and a computer network to other systems. Different kinds of robots can be used as the main system in an automated HTS laboratory.

An automated system consists of a local area network (LAN) which interconnects several workstations, servers, robots and instruments. A typical example of the function of the network is to transfer results data to a centralized data management and computing unit.

The workstation can interact with the following external systems:

- Network and network servers.
- Data capture and conversion software.
- Robot control software.
- Human operators.

Chapter 3

Information about user instructions and warnings

Information about user instructions and warnings

There are several forms of user instructions:

Installation instructions

These are not needed by the regular user because installation is only to be performed by personnel trained and authorized by PerkinElmer Life and Analytical Sciences. They are included for reference purposes.

User manual

This is a separate manual from this instrument manual. It gives information necessary for basic operation of the instrument using mainly default parameter settings. It tells how to run the instrument and view results.

Reference manual

This is a separate manual from this instrument manual. It describes the features of the user interface in detail. With this information you can do more advanced setup than described in the User manual.

Administrator manual

This is a separate manual from this instrument manual. It describes the Enhanced Security software. It is intended for users with Administrator rights.

Quick start guide

This is a plasticized card that gives an overview of the steps involved in operating EnVision.

On-line help

This is supplied with the software and can be accessed by clicking **Help** or F1 in any EnVision window. This help gives detailed information about all features of the operation which concern the normal user (service information is not provided). There is a table of contents giving an overview of the Help, a topic index in alphabetical order, as well as a search facility enabling keywords in the help to be located. Topics are connected, where relevant, by hypertext links so that you can easily find all the information on a particular subject.

Routine maintenance

This is maintenance intended to be performed by the user and is described in a separate chapter of this instrument manual. Any other maintenance than what is described there should be performed by a service person trained and authorized by PerkinElmer Life and Analytical Sciences.

Warnings

Regarding connection of the instrument to the mains:

Note! The instrument must be connected to a mains supply having a protective earth.

On the side of the instrument:

Warning! Disconnect supply before servicing

On the back of the instrument:

Warning! CLASS 1 LASER PRODUCT EN 60825-1 + A1:2002 + A2:2001

Inside the instrument:

Caution! To avoid the risk of electric shock or exposure to ultraviolet light do not unscrew any parts.

Note! See also the additional warnings associated with the optional TRF LASER as shown on the following pages.

Safety symbols used



Power ON



Power OFF

Report on laser safety: EnVision with the TRF laser option

General:

EnVision with the TRF laser option includes a nitrogen laser MNL-100 manufactured by LTB. This laser is classified to class 3B and therefore the safety aspects are made according to 3B-class laser.

Concerning class 3B lasers, the International Standard IEC 60825-1 on the safety of laser products states the following:

“Class 3B: Lasers that are normally hazardous when direct intrabeam exposure occurs (i.e. within the NOHD). Viewing diffuse reflections is normally safe.”

Regarding laser safety, it is extremely important to prevent the user from being exposed to laser beam, either directly or through reflection from a mirror surface.

Although the laser used in EnVision is a 3B-class laser, the EnVision instrument is a class 1 laser product. This is possible, because EnVision has adequate laser shielding which prevents the user being exposed to the laser radiation.

Outer covers and openings of EnVision

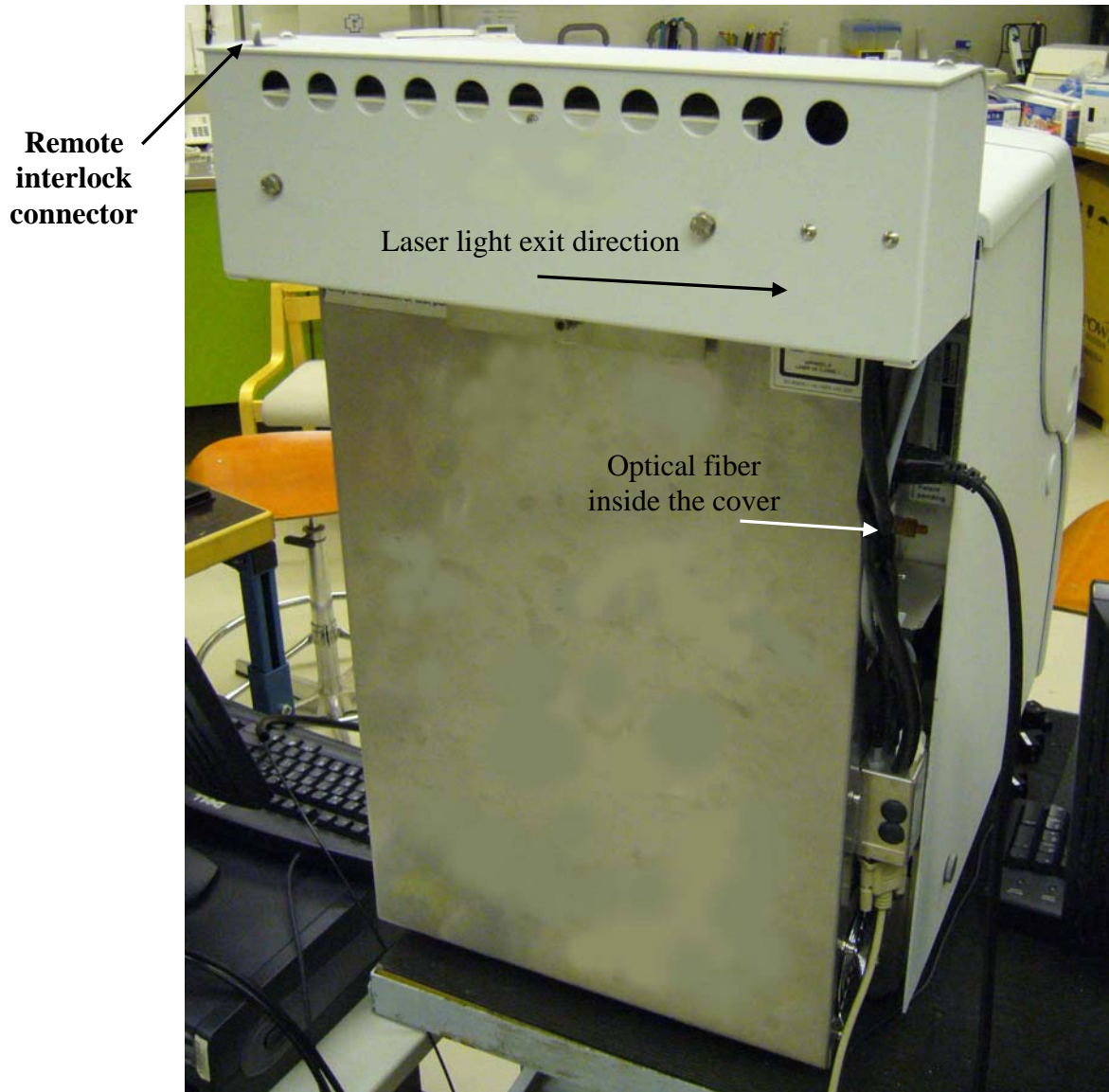
The case assembly, lid, loading door and side hatch of the instrument form a light-tight system. Light-tightness is essential not only for laser safety, but also for the functional performance of the instrument. The laser itself has been placed on top of the instrument under a protective casing, and the laser beam is led by an optical fiber via the electronics compartment to the light-tight instrument compartment. Because of air circulation, the protective casing of the laser and the electronics compartment cannot be built to be light-tight. However, the protective casing of the laser and the electronics compartment can be locked with screws.

EnVision has three openings through which visual contact with the light-tight measurement compartment can occur. These openings are the lid, loading door and side hatch (see Figure 1).



Picture 1. EnVision and its openings.

Picture 2 shows the structure of the protective casing of the laser. This is assembled with screws, and a laser warning label is affixed onto the casing. The arrow in the picture shows the exit direction of the laser beam. If, for some reason, the optical fiber of the laser was disconnected, the laser beam would not come out directly from the protective casing, as it would hit the end wall of the casing. The tip of the arrow shows the approximate spot where the laser beam would hit because of this kind of error. Furthermore, the diffuse reflection from the inner surface of the protective casing does not cause immediate danger to the user according to class 3B, not even if the user looks straight at the illuminated spot. Picture 2 also shows the optical fiber of the laser that leads from the electronics compartment to the instrument compartment. In addition, the optical fiber of the laser is inside a cover that protects the optical fiber from damage.

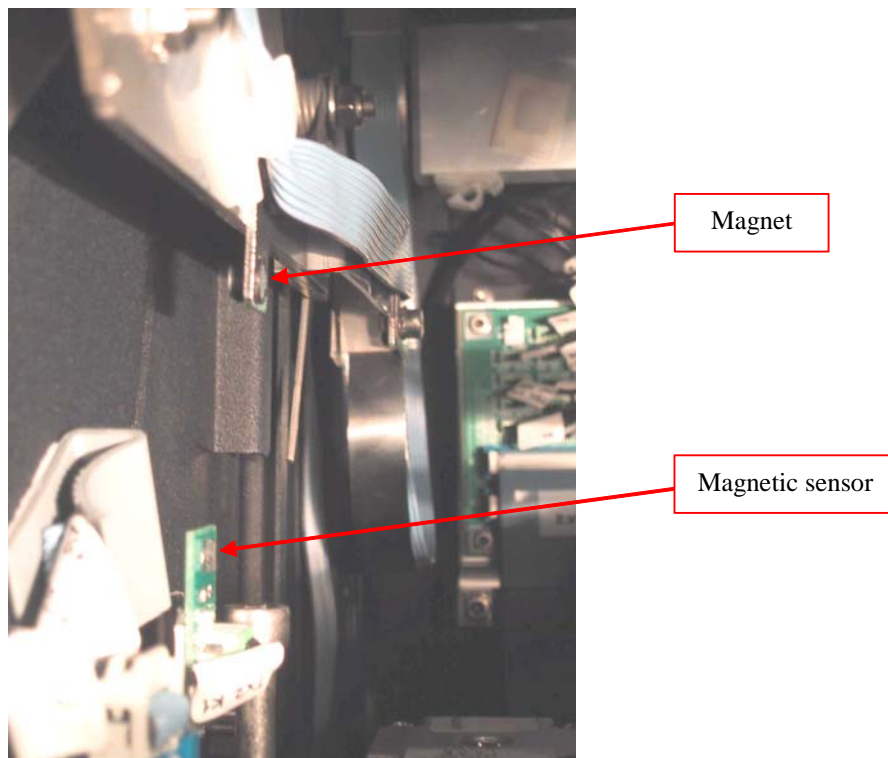


Picture 2. The protective casing of the laser and the exit direction of the optical fiber.

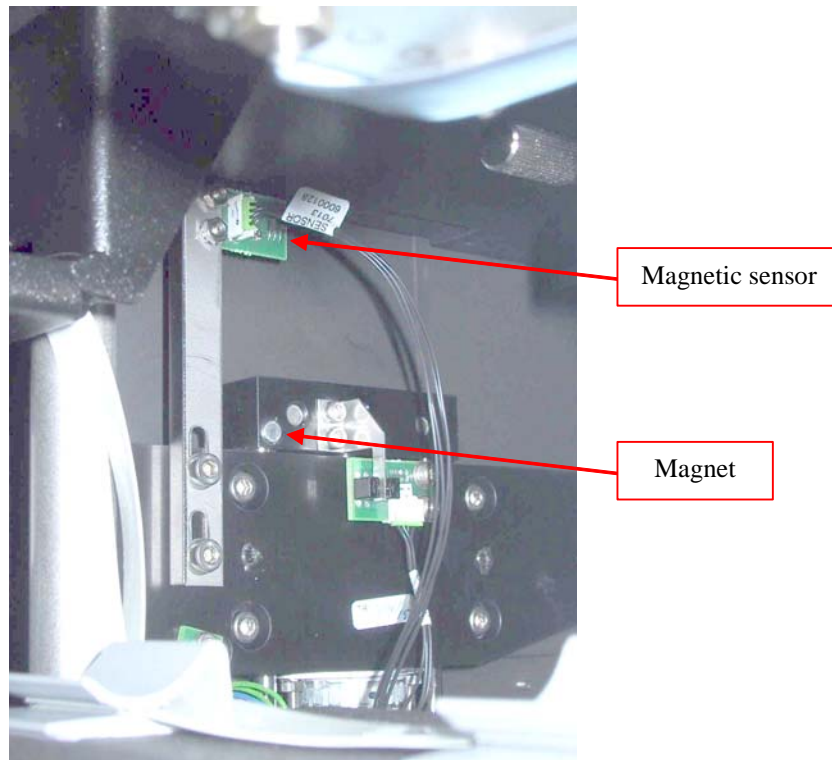
Safety switches and lid locking

The lid has a locking mechanism to ensure that it cannot be opened during measurements. The mechanism is designed so that two solenoids will lock the lid before the measurement is started. However, there is no specific control to ensure that the locking mechanism functions properly. Therefore, besides the locking mechanism, additional protection is needed. The purpose of the locking mechanism is mainly to prevent the user from opening the lid during measurement and destroying the measuring results.

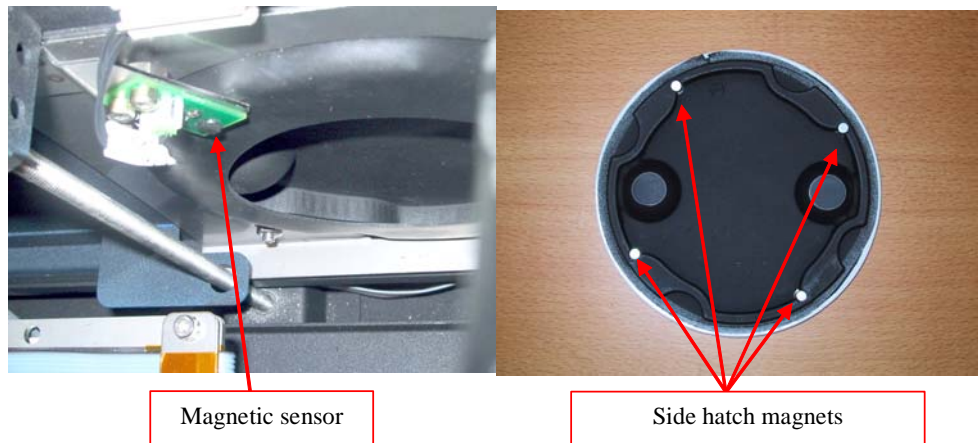
To ensure laser safety, all three openings are equipped with a magnetic switch. This kind of Hall sensor operates by detecting a magnetic field caused by a magnet affixed to the opening. When one of the openings is opened, the magnet affixed to the opening moves away from the magnetic sensor and the magnetic field weakens. In such a case the laser operation is stopped and the laser beam shutter is closed. Thus, it is possible to use the laser only when the magnetic switch detects that all openings are closed. The longest possible distance for the magnetic switches to work is approximately 5 mm and the moving distance of the openings before actual opening is much longer than this. Hence even the slightest gap in the door is impossible during laser operation. The mechanical structure of the switches is presented in the following pictures.



Picture 3. Magnetic switch on the lid.



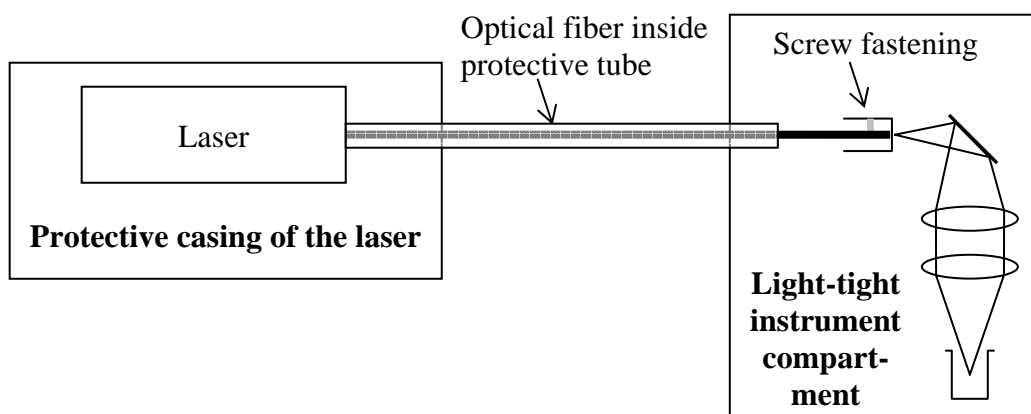
Picture 4. Magnetic switch on the loading door.



Picture 5. Magnetic switch on the side hatch.

Laser beam path

The path of the laser beam from the laser to the sample well is described in the following picture:



Picture 6. Path of the laser beam.

The laser has been placed on top of the instrument under a protective casing as shown in Picture 1, and the optical fiber connected to the laser is led via the electronics compartment to the light-tight instrument compartment. In the instrument compartment, the light produced by the laser is directed to the sample with the help of a mirror and lenses. Therefore, when the optical fiber is connected, it is impossible that the user would be exposed to laser beam unintentionally.

Detaching the optical fiber

The optical fiber of the laser is connected to the laser with a SMA-905 connector. The other end of the optical fiber is locked by tightening the locking screw at the side as shown in Picture 6. The casing protecting the laser and optical fiber as well as the cover plate of the electronics compartment are fastened with screws. Therefore, it is impossible to reach the laser or its fiber connectors without tools.

Additional safety features of the instrument

To ensure laser safety, the device contains two special features. These are the automatic closing of the beam shutter and the measuring of laser pulse light before the next laser pulse.

The laser is equipped with a built-in beam shutter, which remains closed except when measuring. When the measuring is started, the beam shutter opens and, after measuring, it closes automatically. Thus, no laser beam is emitted except during measuring, even if the laser is turned on by mistake. The other safety feature, i.e. measuring of laser pulse light, is intended for the measuring phase. As mentioned above, laser beam is led by an optical fiber to the light-tight instrument compartment. Before entering a sample, part of the laser pulse light is led into a photodiode for a reference

measurement. The objective of the reference measurement is to correct the variation of measurement results caused by energy variation of the laser pulses. In this case the reference measurement is also monitored in such a way that the laser pulse is activated only when the energy of the previous laser pulse has been within the specified limits. With this procedure, it is possible to ensure that the optical fiber has not been damaged or that the connectors have not been disconnected. If this kind of damage occurs, the laser operation is stopped right after the first pulse and an error message is displayed.

Laser warning labels

According to standard IEC 60825-1, a class 3B laser must contain a warning label with the following text:

LASER RADIATION

AVOID EXPOSURE TO BEAM

CLASS 3B LASER PRODUCT

Standard IEC 60825-1 also states that all couplings and protective structures must contain a warning label, if there is a risk of being exposed to class 3B laser radiation when opened. The warning symbol must include the following text:

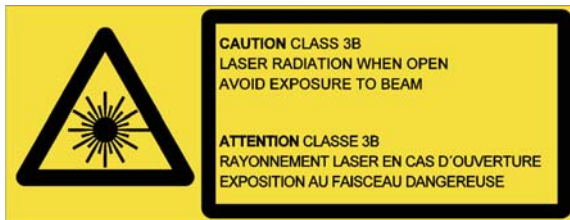
CAUTION – CLASS 3B LASER RADIATION WHEN OPEN

AVOID EXPOSURE TO THE BEAM

EnVision has four laser warning labels. They are fastened on the laser and on the cover plates, and you have to detach the labels before you can reach the laser or the fiber connectors.



Picture 7. Warning label of the laser.



Picture 8. Warning label affixed on the protective casing of the laser.



Picture 9. Laser class label on the cover of the electronics compartment.



Picture 10. *Laser warning label inside the instrument.*

Contact addresses

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Manufacturer

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Chapter 4

Routine maintenance

Routine maintenance

All maintenance, other than that described here, must be performed by service personnel authorized by PerkinElmer Life and Analytical Sciences.

Cleaning the instrument

The plate carrier should be kept clean to avoid dust and dirt entering into the optics at the measuring position.

You can remove dust by the use of very clean and dry compressed air or special canned air for optics cleaning.

The plate carrier should be cleaned at least once a week using a soft cloth or tissue paper soaked in a mild detergent solution or alcohol.

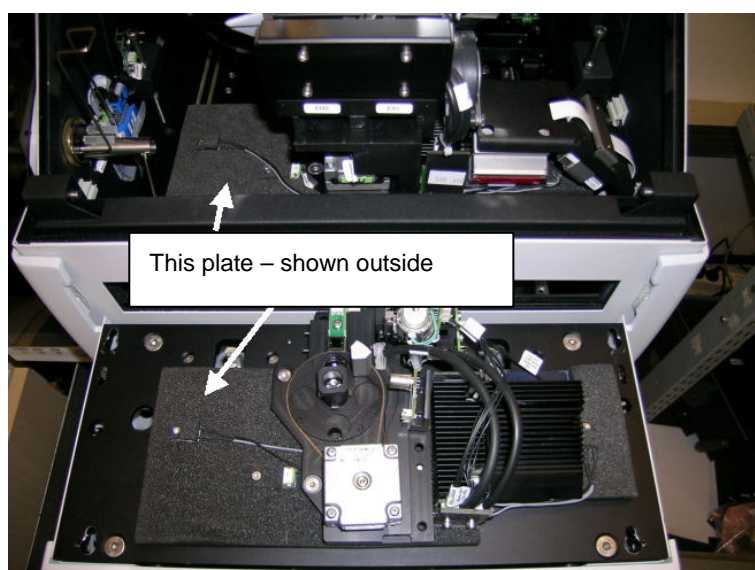
In case of spillage of a sample containing any signal generation component, clean the area where the spillage occurred in a similar way to that described above, except that you first use Enhancement Solution to remove e.g. the europium, then a mild detergent or alcohol and finally distilled water. Let the area dry before starting to use the instrument.

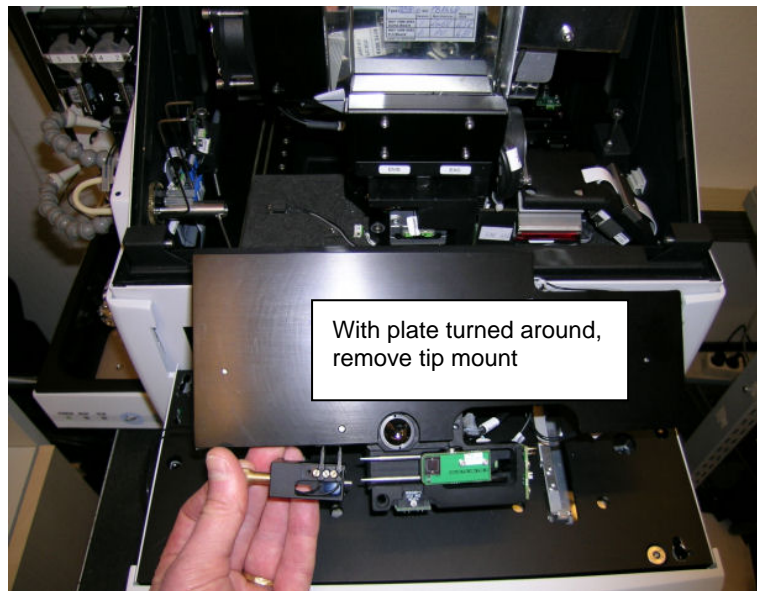
Filters should be free of finger prints. Fingerprints on filters should be removed with 99.8 vol. % Alcohol (Ethanol Aa) on microfiber cloth.

Cleaning of the lens when using the dispenser

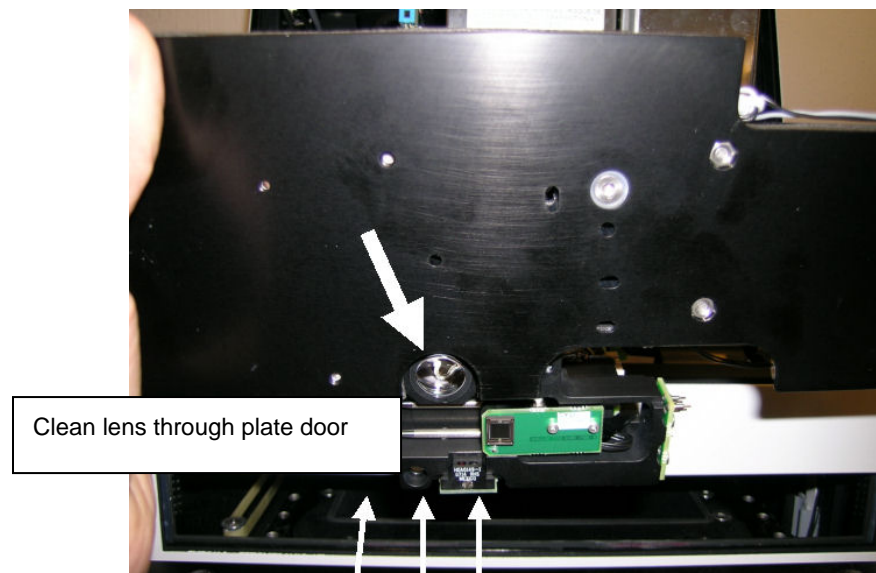
When using the dispenser there is always a risk that there might be some splashes onto the lens on the mirror module. A dirty lens will decrease the counting efficiency and sensitivity of the instrument. By cleaning the lens regularly this can be prevented.

1. Switch off the instrument when the plate door is open





2. Push the plate carrier gently inside the instrument into the right upper corner of the xy track
3. Remove the tip mount if installed
4. Wet a microfiber cloth (or some soft non-dust tissue) with pure ethanol.
5. Put your hand into the instrument through the plate door of the instrument and clean the lens (see picture below, in which the horizontal head is shown vertically). The lens is not directly visible but can be cleaned from the outside. With a small mirror it is possible to check that the lens look clean.



Removing the magazine table

If you want to load plates manually you need to remove the magazines and upper part of the stacker - the magazine table.

1. Lift off the magazines.



2. Pull forward the magazine table.



3. Lift off the magazine table



Note! If the rods of the stacker are up, click the **Reset stacker** button in **Reader settings/Stacker** to get the magazine table out.

Reverse the procedure to reinstall the magazine table and magazines.

Changing filter slides

1. Lift the instrument lid.



2. You will see the ends of the excitation and emission filter slides directly in front of you. Pull out the slide you want to get access to.



3. Add, remove or exchange filter modules as needed.



4. The filter module snaps into place in the filter slide.



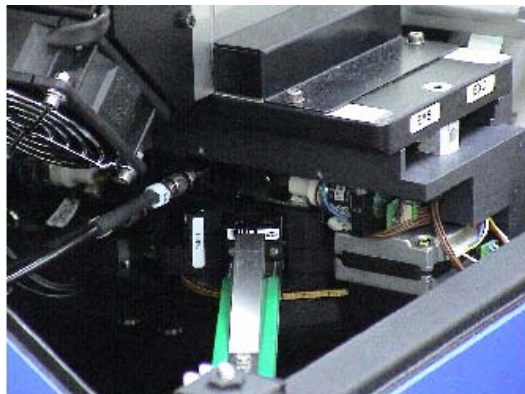
5. Put back the slide.

Note! You could also put in another slide with a different set of filters instead.

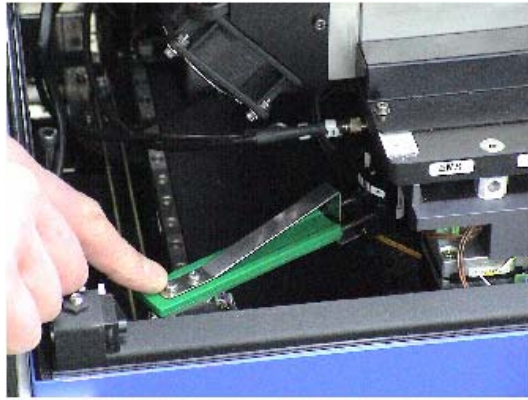
6. Close the instrument lid when you have finished.
7. The instrument will read the barcodes on the filter modules and update the list of filters in the software.

Changing a mirror module

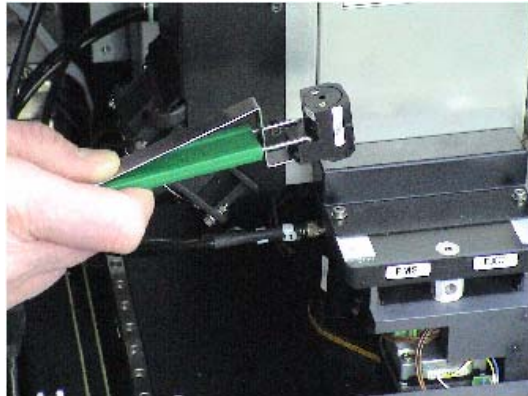
1. When the lid is lifted you can see a mirror module just to the left of the top measuring head body (where the filter slides are also located). Up to four mirror modules are mounted on a rotatable mirror module changer. You can turn this to get access to the mirror module you want. There is a metal wedge after which comes mirror modules 1, 2, 3 and 4 in clockwise order.



2. Use the special tool to remove the mirror module. The sprung metal piece in the center of the tool must be pressed down when you engage the hooks of the tool with the mirror module. Release the sprung metal piece again to hold the mirror module firmly.
3. Press down the end of the tool to release the mirror module.



4. Lift off the mirror module.



5. In a similar way replace it with the mirror module you want. When the mirror module is in place, press down on the sprung metal piece to release the mirror module so that you can unhook the tool.
6. Close the lid when you have finished.
7. The instrument will read the barcodes on the mirror modules and update the list of mirrors in the software.

Changing the bottom mirror

Note! This operation has to be performed by touch and not by sight so the pictures do not show the components when they are actually installed inside the instrument.

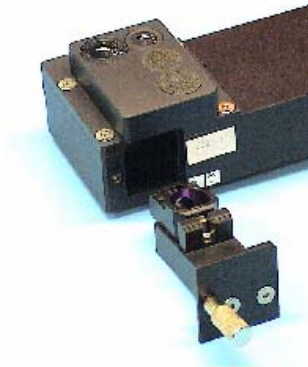
1. Release the white cover on the right side of the instrument by twisting it. Remove it.



2. Put your hand through the hole into the instrument and locate the bottom mirror module holder.



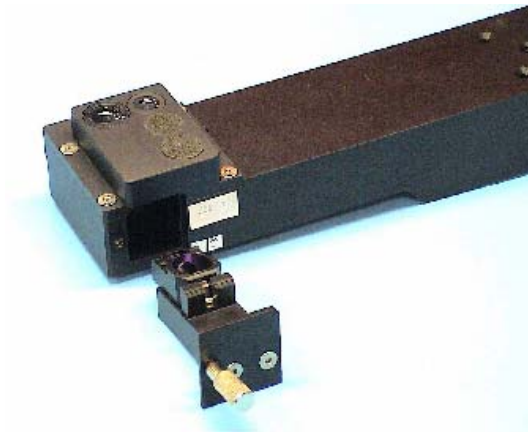
3. It is fixed in place by a finger-tightened screw. The figure shows the screw in the bottom mirror module holder. You need to find this screw with your fingers and turn it anti-clockwise to release it.



4. Carefully withdraw the bottom mirror module holder from its position inside the bottom measuring head body. Then holding it in your hand, bring your hand out through the hole in the side of the instrument.



5. You can then exchange the bottom mirror module. The picture shows a holder with the bottom mirror module removed.



6. Reverse this procedure to install a bottom mirror module.
7. Make sure that when you have returned the bottom mirror module holder to its position in the bottom measuring head body, you tighten the screw to fix it in place. Also replace the cover on the hole in the instrument. Twist it to lock it in place.

Note! The instrument does not identify the bottom mirror installed. You must give this information in the software. When you replace the cover a series of prompts appear on the user interface telling you to give this information. This is described in the Reference manual in the Mirrors chapter.

Changing the aperture

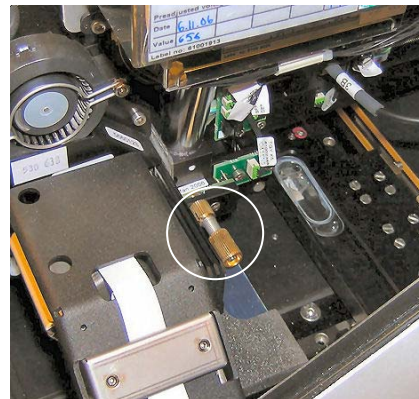
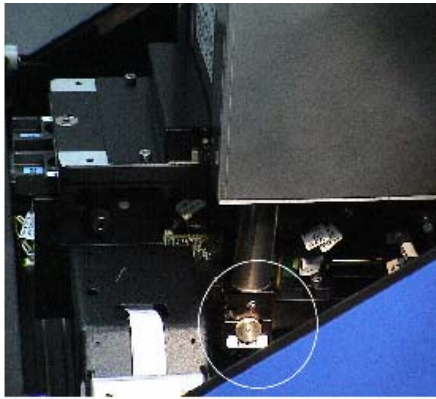
If you are going to make measurements using one of the options: Ultra Sensitive Luminescence or HTS AlphaScreen, you must use the correct aperture for the plate type you are using. There are three sizes of aperture, one for each of 96-well, 384-well and 1536-well plates.

Note! In the case of instruments that do not have the Enhanced height sensor option, the instrument does not check which aperture is installed. You must do this manually.

1. To access the aperture you must first raise the instrument lid.



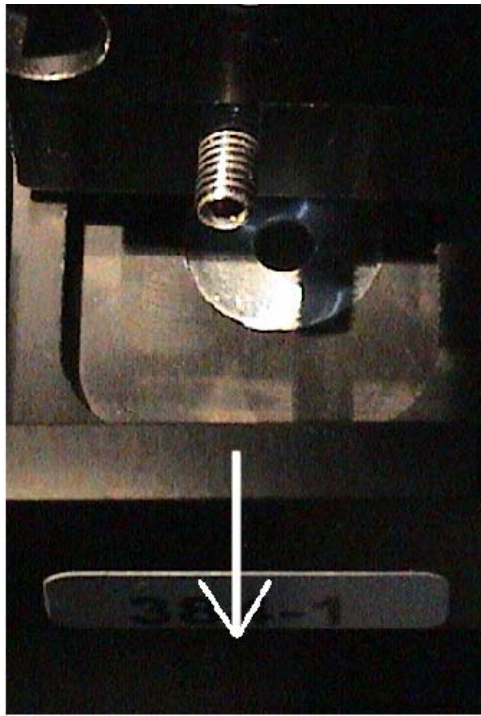
2. EnVision instruments will have one of the following types of head to secure the aperture slide.



3. Unscrew and remove the screw head (left pictures) or twist anti-clockwise and pull (right). Use your fingers, no tool is necessary.



4. Pull out the aperture.



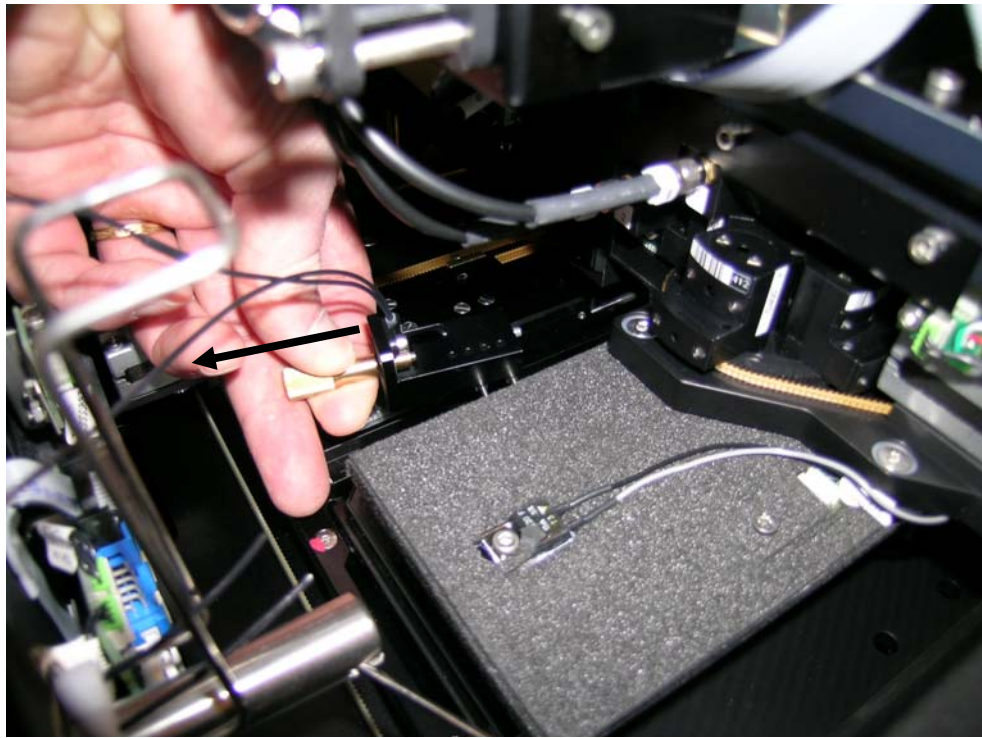
5. Replace it with the aperture you require.
6. Slide the aperture back into position.
7. Replace and tighten the screw head. Use your fingers to do this, not any tool.
8. Close the instrument lid.

Note! If errors occur with the aperture, you should check that the aperture is correctly installed. There is a possibility that the aperture block did not go far enough into its place when the screw was tightened.

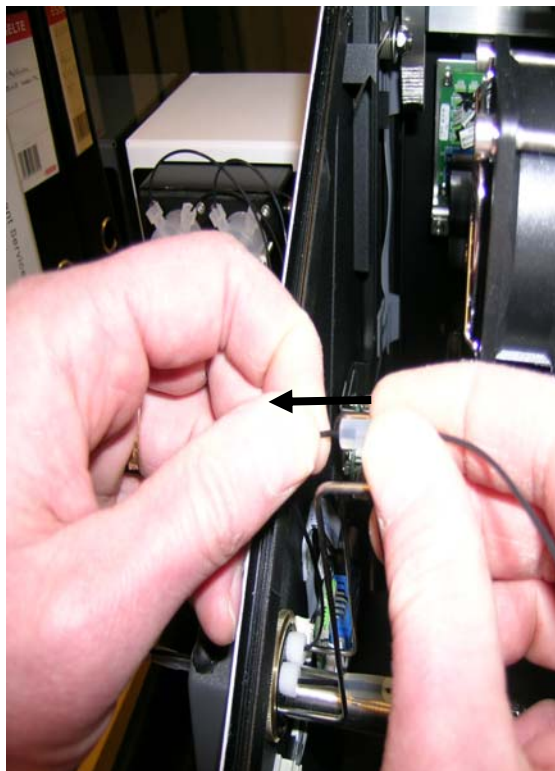
Changing a tip mount

Open the instrument lid and the dispenser unit lid..

To remove the existing tip mount, first loosen the brass screw and then pull out the tip mount.



Pull out the tubes from the silicone connectors.



Lift the tip mount away from the instrument.

Take the new tip mount. Make sure it has the tip configuration you want.

Carefully push each tube from the dispenser into the silicone connectors at the end of the tubes coming from the tip mount.



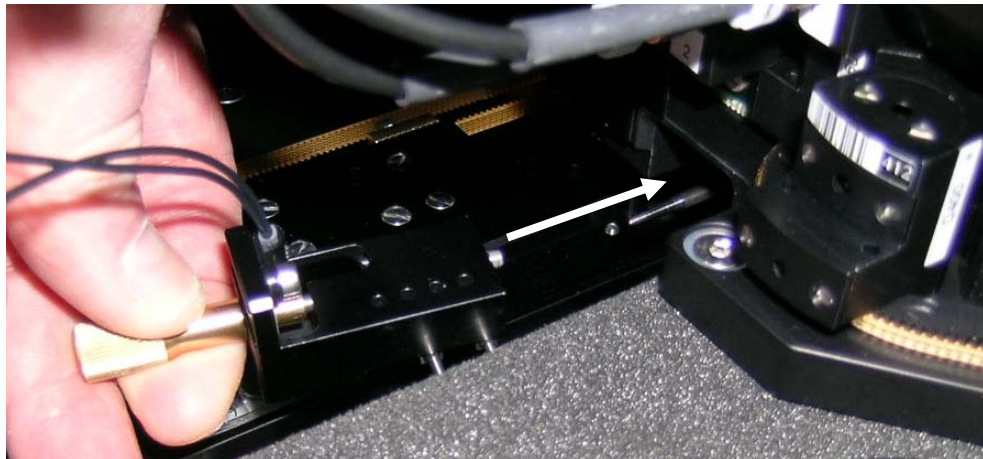
Note! Hold the tube near its end to avoid it kinking when you push it in!

Note! Don't leave a gap between the ends of the two tubes inside the silicone connector because this affects the output tube volume.

Note! The tube from Tip 1, which is to be connected to the tube from Pump 1, has a "sock" shrunk onto it to help you distinguish it from the tube from Tip 2. Connections should be as in the table:

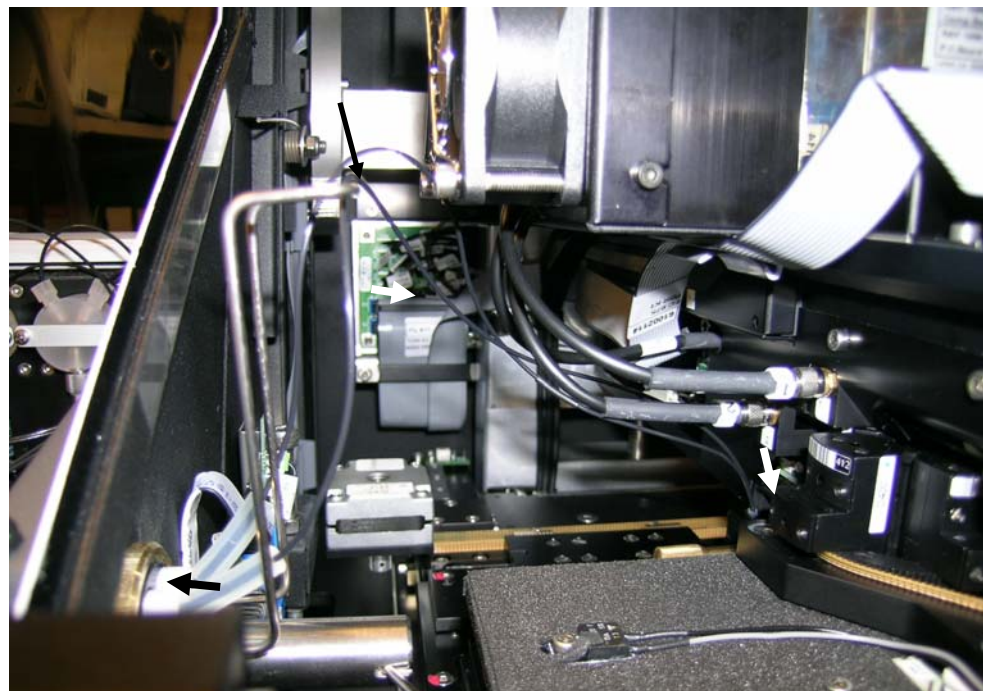
| Tip configuration | Pump1 | Pump2 |
|--------------------------|--------------|--------------|
| Real time | Real time | Not used |
| Pre | Pre | Not used |
| Real time and Pre | Real time | Pre |
| Pre and Post | Pre | Post |

Install the tip mount into the instrument mirror module changer by fitting it onto the two guide pins. Tighten the brass screw.



Gently pull out each tube through the dispenser connection piece in the direction of the dispenser so the silicone connector is pulled as close as possible to the dispenser connection piece.

Arrange the tubing so that it rests on top of the support piece. This prevents the tubing getting in the way of the mirror module changer.



Close the instrument lid.

Make sure that the correct liquid reservoir and liquid are installed for each pump and that the aspiration tubes go to the correct reservoirs.

Close the dispenser lid.

Use the ***Tip Mounts*** function in the user interface to prepare and use the tip mount. See the Tip Mounts chapter in the Reference manual for more information about selecting the correct tip mount.

See the Dispenser Control chapter in the User manual for dispenser operations.

Chapter 5

Specifications

Specifications

This section contains information about the safety standards and provides the EnVision technical information.

Safety standards

Certification:

- IEC-CB, CE and NRTL-TUV Rheinland of North America

The instrument fulfills the requirements of:

- IEC 61010-1:1990 + A1(1992) + A2(1995)
- CAN/CSA-C22.2 No. 1010.1 – 92 + A2:97
- UL 61010A-1: 2002 R4.02

Class 1 Laser product

Caution! Use of this instrument other than specified in the user instructions may result in exposure to hazardous laser radiation.

The laser is classified according to standard EN 60825-1 + A1.2002 + A2:2001 (IEC 60825-1 Ed. 1.2, 2001-08)

The safety specifications are met also under the following environmental conditions in addition or in excess to those stated in the operating conditions:

Altitude: up to 2000 m

Temperature: +5°C to +40°C

Relative humidity: Maximum 80% at 31°C decreasing linearly to 50% at 40°C

Mains supply fluctuations: ±10%

Installation category (overvoltage category): II according to IEC 664-1 (Note 1)

Pollution degree: 2 according to IEC 664-1 (Note 2)

Note! Installation category (overvoltage category) defines the level of transient overvoltage which the instrument is designed to withstand safely. It depends on the nature of the electricity supply and its overvoltage protection means. For example in CAT II which is the category used for instruments in installations supplied from supply comparable to public mains such as hospital and research laboratories and most industrial laboratories the expected transient overvoltage is 2500 V for a 230 V supply and 1500 V for a 120 V supply.

Note! Pollution degree describes the amount of conductive pollution present in the operating environment. Pollution degree 2 assumes that normally only non-conductive pollution such as dust occurs with the exception of occasional conductivity caused by condensation.

Both of these affect the dimensioning of the electrical insulation within the instrument.

Conformance to EU directives

| | |
|--|--|
| <p>The CE mark conforms to the following EU directives</p> | <ul style="list-style-type: none"> • 89/336/EEC (as amended by 92/31/EEC and 93/68/EEC) relating to Electromagnetic Compatibility) • 73/23/EEC (as amended by 93/68/EEC) Low Voltage Directive |
| <p>Performance specifications used to verify conformance to the Directives above</p> | <ul style="list-style-type: none"> • EN 61326 class B Requirements • IEC 61010-1:1990 + A1(1992) + A2(1995) |

Environmental conditions

Operating conditions: +15°C to +35°C, Relative humidity 80% maximum at 31°C decreasing linearly to 65% at 35°C (indoor use)

Operating conditions for AlphaScreen: +20°C to +25°C, Relative humidity 80%.

Transportation conditions: -20°C to +50°C, Relative humidity 5 to 90%, IEC 68-2-56 as guidelines packed in transportation package

Storage conditions: -20°C to +50°C, Relative humidity 5 to 90%, IEC 68-2-56 as guidelines packed in transportation package

Power requirements

Power consumption: 300 VA

Mains voltage: 110 - 240 V, 50/60 Hz

Physical dimensions

Reader

Height: 567 mm (with 50 plate stacker magazines 945 mm) (with TRF Laser 650 mm)

Width: 411 mm (with dispenser unit 566 mm)

Depth: 570 mm (with stacker 748 mm) (with TRF laser 630 mm)

Weight: 50 kg (with stacker 62 kg) (with dispenser 57 kg) (with both 69 kg) (with TRF laser 55 kg)

Dispenser Unit

Height: 345 mm

Width: 155 mm

Depth: 365 mm

Weight: 7.0 kg

Input / Output connections

PC: Connected directly or indirectly (LAN) to Control Unit, Ethernet connector (RJ-45 10/100 Mb/s).

Printers: Connected to PC, parallel port

PC

The workstation software is run under Windows XP on a Pentium® computer (1.7 GHz), minimum 512 MB memory, with 30 GB available hard disk space or Windows Vista on a Intel Core 2 Duo E4300 (1.8 GHz, 800 MHz, 2MB), minimum 1GB memory, with 80 GB available hard disk space. The computer is equipped with a CD-ROM, an Ethernet card and a 24-bit color display with minimum resolution of 1024 x 768 pixels.

Plates

1 to 1536-well plates are compatible with the instrument. The user can define non-standard plate configurations. The maximum outer dimensions are 86.0 x 128.2 x 29.0 mm. Both opaque and clear plates are suitable (for photometric measurement a clear bottom is required).

Stacker

A semi-automated plate loading option, including load and unload magazines. The magazines can take 20 or 50 plates at a time. The stacker is

bi-directional and designed to take plates that fulfill the following requirements:

Length: 127.2 - 128.2 mm

Width: 84.5 - 86.0 mm

Height: 7.5 - 29.0 mm

Maximum load: 5.2 kg

Above the plate ledge: the ledge width > 2.8 mm

Below the plate: the ledge width relative to a plate stacked below it:
> 0.7 mm

Gap between the top of a ledge and the bottom of a plate stacked above it:
> 3.5 mm

These last three requirements are because of the holders that support the stack of plates in the magazine. There must be adequate space between a ledge and the plate stacked above it for the holders to fit in. There must also be an adequate amount of ledge sticking out for the holders to get underneath so that they can support the plate and the rest of the plates stacked above it.

Note! A plate locking mechanism ensures that a plate can be removed from a stack even if there is a tendency for plates to stick together due to e.g. tape on top of a plate.

Note! Plates with heights below 10 mm cannot be used in the same run as larger heights.

Plate barcode specifications

Barcode length: max. 60 mm

Barcode height: min. 5 mm

Empty space at the ends of barcode label: min. 10 mm

Minimum bar width min. 0.25 mm

Bar-space ratio 1/3

Non-fluorescent label material

Code types (variable number of digits, no check digit):

- CODE39
- INTERLEAVED 2/5
- CODABAR
- CODE128

Light sources

The flash light source used for measurements is a UV xenon flash tube, spectral range 230 - 1100 nm. In AlphaScreen a 680 nm diode laser is used. For homogeneous TRF-assays a 337 nm nitrogen laser is available.

Detection units

Absorbance: Photo diode, range 230-950 nm

Luminescence, Fluorescence and TR-Fluorescence: Photomultiplier tube, range 230 - 850 nm

Ultra Sensitive Luminescence and HTS AlphaScreen: very high sensitivity, PMT range 300 nm - 650 nm.

Mirrors

- Multiple mirror module changer provided with 4 mirror positions.
- Barcoded mirrors.

Filters

- Changeable excitation filter slide, provided with 8 filter positions (Ø15.0 mm)
- Changeable emission filter slide, provided with 8 filter positions (Ø15.0 mm)
- Barcoded filters.

Apertures

Three apertures are available: for 1536, 384 and 96-well plates respectively. These are for Ultra Sensitive luminescence or HTS AlphaScreen measurements.

A shutter is available to protect the Ultra Sensitive luminescence detector when such measurements are not being made.

Dispenser

- Dispensing up to 384-well plates
- Volumes 2µl - 475µl
- Adjustable dispensing speed 100µl/s – 500µl/s
- Precision for 10µl volume <10%
- Dead volume below 500µl
- Simultaneous dispensing with two pumps for maximum throughput
- In real-time kinetics the dispensing can be set to occur on any selected repeat

Measurement modes

- Fluorescence intensity from top
- Fluorescence intensity from top and bottom
- Time-resolved fluorescence from top
- Time-resolved fluorescence from top and bottom
- Multiple window TRF
- Homogenous TRF (LANCE, HTRF, LanthaScreen)
- Fluorescence polarization
- Absorbance
- Luminescence
- Ultra Sensitive Luminescence
- Dual emission
- AlphaScreen or HTS AlphaScreen
- Adjustable measurement height
- Dispensing

Plate shaking

Three plate shaking modes are available: linear, orbital and double orbital. Three speed levels can be selected and the amplitude of the movement is adjustable.

Scanning

Scanning of wells (several measuring points within a well) are available for all technologies.

Kinetics

Repeated measurements or operations can be defined by plate or well.

Monochromator option

Two double monochromators are located inside the instrument casing. Light fibers are used to guide the light to and from them. The excitation light from the lamp is directed through the excitation double monochromator into the sample. The emission light from the sample is directed through the emission double monochromator to the detector.

Applications supported

- Photometric application range 230 – 1000 nm
- Photometric spectrum scan 230 – 1000 nm
- Fluorescence intensity application range 230 - 850 nm
- Fluorescence intensity excitation & emission spectrum scan measurement 230 - 850 nm

- Verification of spectral properties of a fluorescence label prior to measurement with fixed excitation and emission wavelengths

Photometric performance with monochromator

- Wavelength range: 230-1000 nm
- Wavelength selection: monochromator, tunable in 0.1 nm increments
- Photometric resolution: 0.001 OD

Fluorescence intensity performance with monochromators

- Wavelength selection: monochromators, tunable in 0.1 nm increments

Other optional modules

- Stacker
- Barcode Readers
- 2nd Detector
- Ultra Sensitive Luminescence and HTS AlphaScreen Detector
- AlphaScreen or HTS AlphaScreen - laser light source and plate cooler unit
- TRF laser (337 nm nitrogen laser)
- Control unit
- Temperature control
- Dispenser

Measurement time and performance

Measurement times

| Technology | Number of flashes | Time for 96 wells | Time for 384 wells | Time for 1536 wells |
|----------------------|-------------------|-------------------|--------------------|---------------------|
| Fi/Abs | 1 (on-the-fly) | 22 s | 27 s | 36 s |
| Fi/Abs | 10 | 32 s | 1 m 3 s | 2 m 56 s |
| Fluor.pol. | 30 | 37 s | 1 m 22 s | 4 m 15 s |
| TRF LANCE | 30 | 37 s | 1 m 22 s | 4 m 15 s |
| TRF LANCE with Laser | 1 (on-the-fly) | 4 s | 11 s | 35 s |
| TRF LANCE with Laser | 10 | 35 s | 2 m 08 s | 8 m 11 s |

| | | | | |
|--------------------|-----|---------|----------|-----------|
| TRF DELFI A | 100 | 55 s | 2 m 32 s | 8 m 52 s |
| AlphaScreen Std | - | 1 m 32s | 4 m 54 s | 19 m 28 s |
| AlphaScreen HTS | - | 51 s | 1 m 52 s | 9 m 23 s |

Measurement Performance

| Technology | Feature | Performance |
|---------------------------------------|---|---|
| Fluorescence intensity, filters | Detection limit (96-plate, 200 μ L) | < 4 pM, <0.8 fmol/well, fluorescein, 100 flashes from top |
| Fluorescence intensity, filters | Detection limit (384-plate, 50 μ L) | < 4 pM, <0.2 fmol/well, fluorescein, 100 flashes from top |
| Fluorescence intensity, filters | Detection limit (1536-plate, 7.5 μ L) | < 20 pM, <0.15 fmol/well, Fluorescein, 100 flashes from top |
| Fluorescence intensity, monochromator | Detection limit (96-plate, 200 μ L) | < 10 pM, <2 fmol/well, Fluorescein, 100 flashes from top |
| Fluorescence intensity, monochromator | Detection limit (384-plate, 50 μ L) | < 80 pM, <4 fmol/well, Fluorescein, 100 flashes from top |
| Fluorescence intensity, monochromator | Bandwidth (Excitation / Emission) | < 8nm |
| Fluorescence polarization | Detection limit (96-plate, 200 μ L) | < 3 mP, 1nM Fluorescein, 100 flashes |
| Fluorescence polarization | Precision (384-plate, 50 μ L) | < 3 mP, 1nM Fluorescein, 100 flashes |
| Fluorescence polarization | Precision (1536-plate, 7.5 μ L) | < 7 mP, 1nM Fluorescein, 100 flashes |
| Time-resolved fluorescence | Detection limit (96-plate, 200 μ L) | < 55 fM, Eu, <11 amol/well, 100 flashes from top |
| Time-resolved fluorescence | Detection limit (384-plate, 50 μ L) | < 55 fM, Eu, < 2.8 amol/well, 100 flashes from top |

| Technology | Feature | Performance |
|---|--|---|
| Time-resolved fluorescence | Detection limit (1536-plate, 7.5 μ L) | < 150 fM, Eu, < 1 amol/well, 100 flashes from top |
| | Linearity | 4.5 decades, Eu |
| Absorbance Filter / Monochromator | Measurement range (96-plate, 200 μ L) | 0-4 OD @ 405 nm |
| Absorbance Filter / Monochromator | Measurement range (384-plate, 50 μ L) | 0-4 OD @ 405 nm |
| | Accuracy @ 2 OD | < 2% @ 405 nm |
| | Precision @ 2 OD | < 0.1 % @ 405 nm |
| Absorbance Filter / Monochromator | Measurement range (1536-plate, 7.5 μ L) | 0-3 OD @ 405 nm |
| Absorbance Monochromator | Bandwidth | <8 nm |
| Absorbance Monochromator | Wavelength accuracy | \pm 2.0 nm |
| Absorbance Monochromator | Wavelength precision | \pm 0.2 nm |
| Luminescence | Lower limit of detection (96-plate, 200 μ L) | < 75 pM, ATP, 1 second |
| Ultra Sensitive Luminescence | Lower limit of detection (384-plate, 50 μ L) | < 10 pM, ATP, 1 second |
| AlphaScreen (Std and HTS) | Detection limit (384-plate, 50 μ L) (25 μ L, phosphorylated bio-peptide, kinase assay) | < 100 amol |

Chapter 6

Quality information



DECLARATION OF CONFORMITY FOR CE-MARKING
INSTRUMENTS

We

Supplier's name

WALLAC OY

Address

PL 10, 20101 TURKU, FINLAND

declare under our sole responsibility that the product

Name, type or model, lot, batch or serial number, possibly sources and numbers of items

2104 EnVision MULTILABEL READER Valid from serial number 1040001

to which this declaration relates is in conformity with the following standard(s) or other normative document(s)

Title and/or number and date of issue of the standard(s) or other normative document(s)

EN 61326:1998

EN 61010-1 :2001

(if applicable) following the provisions of the following directives

Electromagnetic compatibility (EMC), 89/336/EEC

Low voltage (LV), 72/23/EEC

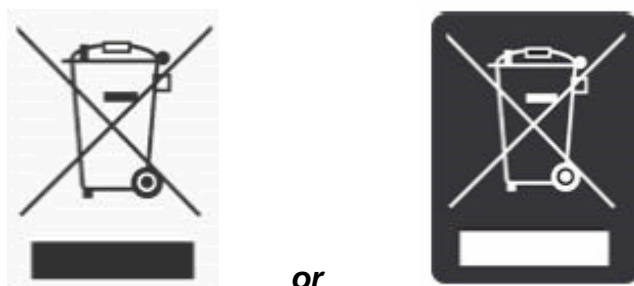
Date and place of issue

5 December 2007 TURKU, FINLAND

Name and signature or equivalent marking of authorized person

Pekka Mäkinen, Quality Manager, Instruments

WEEE Instructions for PerkinElmer Products



A label with a crossed-out wheeled bin symbol and a rectangular bar indicates that the product is covered by the Waste Electrical and Electronic Equipment (WEEE) Directive and is not to be disposed of as unsorted municipal waste. Any products marked with this symbol must be collected separately, according to the regulatory guidelines in your area.

The objectives of this program are to preserve, protect and improve the quality of the environment, protect human health, and utilize natural resources prudently and rationally. Specific treatment of WEEE is indispensable in order to avoid the dispersion of pollutants into the recycled material or waste stream. Such treatment is the most effective means of protecting the customer's environment.

Requirements for waste collection, reuse, recycling, and recovery programs vary by regulatory authority at your location. Contact your local responsible body (e.g., your laboratory manager) or authorized representative for information regarding applicable disposal regulations. Contact PerkinElmer at the web site listed below for information specific to PerkinElmer products.

Web address:

<http://las.perkinelmer.com/OneSource/Environmental-directives.htm>

| | | |
|----------------|-------------------|-------------------|
| Customer Care: | 1-800-762-4000 | (inside the USA) |
| | (+1) 203-925-4602 | (outside the USA) |
| | 0800 40 858 | (Brussels) |
| | 0800 90 66 42 | (Monza) |

Products from other manufacturers may also form a part of your PerkinElmer system. These other producers are directly responsible for the collection and processing of their own waste products under the terms of the WEEE Directive. Please contact these producers directly before discarding any of their products.

Consult the PerkinElmer web site (above) for producer names and web addresses.



Chapter 7

Glossary

Glossary

| | |
|--------------------------------------|---|
| 2nd detector | <p>PMT that intensifies and measures the signal from the rear emission channel</p> <p><i>Note!</i> the detector has a normal side window PMT used for both photon calculation and analog mode. The 2nd detector is needed in dual label measurements (e.g. Eu/Sm) or in fast FP measurements, where both polarization directions are measured simultaneously.</p> |
| 2nd detector emission light selector | mirror slide to select whether the 2nd detector module handles emission light excited from above the sample or the bottom measuring emission light from the emission cable |
| alphascreen | this term is used to cover both the standard AlphaScreen and HTS AlphaScreen options when referring to features that are common to both |
| alphascreen option | <p>separate option including a laser, light guide, mirror module, filter and plate cooler for AlphaScreen measurements</p> <p><i>Note!</i> AlphaScreen is a measurement technology based on the use of coated beads. Donor beads are excited by laser light. Energy is transferred to bound acceptor beads which then emit light</p> |
| aperture | <p>hole through which radiation may pass</p> <p><i>Note!</i> There are three apertures: for 1536, 384 and 96-well plates respectively. These are for <i>Ultra Sensitive luminescence</i>. See also <i>shutter</i></p> |
| aspiration tip | used to empty the <i>waste container</i> . Part of the <i>dispenser</i> |
| aspiration tube | tube between the <i>liquid reservoir</i> and the syringe in the <i>dispenser</i> . Used to aspirate liquid from the reservoir or retrieve liquid to it |

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| barcode reader | component that scans the ID barcode mounted on the sample plate <i>Note!</i> The barcode reader position depends on whether the ID barcode is placed on the long or the short side of the plate. |
| barcode reader holder | support onto which the barcode readers are mounted |
| barcode reader module | module assembly consisting of the barcode reader holder and 1-2 barcode readers |
| basic frame | rigid steel-bar case on which the instrument is assembled |
| beamsplitter | optical device to split the beam into two or more separate rays. Optical device for dividing a beam into two or more separate beams. |
| bias mirror module | the <i>mirror module</i> is used with the <i>second light source (TRF-laser)</i> . It has the <i>aperture</i> offset from the center position (biased excitation aperture) whereas <i>mirror modules</i> used with <i>light source 1</i> have the aperture in the center. This bias mirror module comes in a single mirror module version and a dual mirror module version |
| bottom excitation cable | optical fiber to guide the excitation light from the <i>light director assembly</i> into the inlet aperture of the mirror in the <i>bottom measuring head</i> |
| bottom measuring head | measuring head positioned below the <i>x-y conveyor</i> |
| bottom measuring head body | body section of the <i>bottom measuring head</i> ; it embodies dedicated positions for different modules |
| bottom mirror module holder | holder of one manually replaceable mirror for the <i>bottom measuring head</i> |
| CAN interface card | PCI-bus based add-on card for PCs, which is used for Controller Area Network (CAN) protocol data communication |
| case assembly | detachable outer cover of the <i>instrument case</i> |

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| case frame assembly | lower part of the <i>instrument case</i> , not replaceable and fitted with external connector and ventilator |
| control panel | plate equipped with three LED-fitted press buttons that are used to control the instrument's operation |
| control unit | device through which the instrument's operation is managed |
| cover plate | lid of the <i>top measuring head body</i> covering the <i>filter slides</i> in their light-tight channel. It contains all lenses placed above the filter slides and supports the <i>light sources</i> , and <i>detectors</i> . |
| detector | PMT that intensifies and measures the signal from the emission channel <i>Note!</i> The detector has a normal side window PMT used for both photon calculation and analogue mode. |
| dichroic mirror | beamsplitter that permeates/reflects light of a certain wavelength range mirror used to selectively transmit light according to its wavelength |
| diffraction grating | a device for dispersing light, used as the basis for a monochromator |
| dispenser unit | device for dispensing to a microtitration plate in EnVision one or two <i>pumps</i> can be installed. A <i>tip mount</i> is used to position the tip(s) |
| dual mirror module | assembly to guide excitation light onto the sample and emission light to the <i>detector</i> which also divides emission light between the detector and the <i>2nd detector</i> |
| emission cable | optical cable that guides emission light from the <i>bottom measuring head</i> to the <i>emission light selector</i> |
| emission light mirror holder | part that guides the emission light from top of the sample into the <i>2nd detector</i> module in models without the <i>bottom measuring option</i> |

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| emission light selector | mirror slide to select whether the <i>detector</i> handles emission light excited from above the sample or the bottom measurement emission light from the <i>emission cable</i> |
| enhanced plate height sensor | a sensor that enables the <i>Ultra Sensitive luminescence</i> aperture to be positioned very close to the plate |
| excitation light director assembly | in photometry or <i>bottom measuring</i> ; assembly to guide the emission light from the light source through deflection mirrors to the <i>light guides</i> |
| flash counter | software which counts the number of times the <i>light source</i> has flashed |
| filter (optical) | component letting only a certain bandwidth range of light pass through |
| filter frame | support onto which the filter block is mounted |
| filter module | assembly consisting of the <i>filter frame</i> , the filter, a barcode, a polarizer, and a possible aperture plate |
| filter slide | assembly consisting of the filter holder and the filter blocks, enabling automatic filter switching <i>Note!</i> The maximum number of filter blocks on the filter slide is 8. The instrument has two kinds of filter slides: an excitation filter slide for excitation light and an emission filter slide for emission light. |
| glow luminescence | luminescence that persists for at least some seconds |
| height sensor | probe right behind (inside) the <i>loading door</i> to check the plate level and ensure that the plate is properly placed on the <i>plate carrier</i> |

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| high throughput light source | flash lamp that is more efficient than the light source, exciting wide-spectrum light; used to shorten the time spent on measurements <i>Note!</i> The max. frequency band of the high efficiency light source is 1000Hz. One light impulse has the same optical energy as the light source, but since the lamp contains an internal reflector, the average input power is approx. 35W. If 100 impulses are needed in a measurement, measuring takes only 0.1 s / sample using this light source. |
| hts alphascreen option | high throughput version of <i>AlphaScreen</i> which uses the same <i>very high sensitivity detector</i> as <i>ultra sensitive luminescence</i> and an <i>aperture</i> and there are no optics in the emission light path |
| instrument case | assembly outer cover protecting the instrument |
| laser | a laser emitting light at a wavelength of 680 nm and used to excite samples in <i>AlphaScreen</i> and <i>HTS AlphaScreen</i> measurements |
| lens assembly | component that contains one plano-convex lens and a lens holder with locking rings <i>Note!</i> The instrument has four different lens assemblies with different lens features and at different locations. |
| lid | opening in the upper instrument case providing access to <i>filter slides</i> and <i>mirror modules</i> |
| lid lock | mechanism to keep the lid locked during measurement |
| lid sensor | sensors in the instrument case to ensure that the lid and the door on the right side are properly closed |
| lifting unit | mechanism for lifting and lowering plates in the <i>stacker</i> |
| light guide | optical fiber to guide excitation light into the inlet aperture of the <i>mirror module</i> |
| light guide holder | mechanical part onto which the <i>light guide</i> is mounted |

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| light shutter | <p>movable metal plate used to protect a normal detector from light. It is removed automatically from the light path during a measurement</p> <p><i>Note!</i> this is different from the <i>Ultra Sensitive luminescence shutter</i></p> |
| light source | <p>flash lamp producing wide-spectral excitation light</p> <p><i>Note!</i> The light source excites impulses at a typical frequency of 100 Hz and uses an average input power of 5W. The light source enables measuring all measurement types, but the ones necessitating several light impulses for a single measurement (TRF, FP) take more time. A measurement with the high efficiency light source is much quicker than measurement with a normal light source.</p> |
| loading door | <p>light-tight sliding door and the related mechanism</p> <p><i>Note!</i> The approx. dimensions (height and width) of the door are 35mm*320mm.</p> |
| luminescence aperture slide | <p>user-changeable plate-specific slide with suitable aperture to mask luminescence emission</p> |
| magazine | <p>detachable part of the <i>stacker</i> to hold the sample plates</p> |
| measurement height changer | <p>module to adjust the height of the measuring heads from the point of measuring</p> |
| mirror module | <p>assembly to guide excitation light onto the sample and emission light to the detector</p> <p><i>Note!</i> The mirror module contains different types of <i>beamsplitters</i>, polarizers and <i>aperture</i> plates to optimize the volume of the sample to be excited/measured. The mirror module also contains a reference detector for excitation light and sample optics is mounted in the assembly.</p> |
| mirror module changer | <p>module that contains a place for four mirror modules replaceable by the user</p> |

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| monochromator | device for separation of a narrow band of light wavelengths from a broader range of wavelengths |
| multilabel reader | entity that enables measuring different applications |
| multilabel test plate | a special microplate for the user to test the operation of the instrument. It has samples suitable for testing the operation of optical components for various labels |
| output tube | tube between the syringe and a tip in the <i>tip mount</i> . Part of the <i>dispenser</i> . Liquid is dispensed through this tube |
| photodiode height changer | a movement motor to ensure that the photodiode's position is optimal with regard to the plate in photometric measurements |
| photometric cable | optical fiber to guide the light from the <i>light director assembly</i> directly to the <i>photometric optics</i> |
| photometric detector | part located above the sample; for signal measurement it contains a photodiode and a movement motor to ensure that the photodiode's position is optimal from the plate in photometric measurements <i>Note!</i> The photometric detector is mounted in the <i>mirror module</i> . |
| photometric optics | assembly to reconstruct the emission light from the light cable into a beam that passes through the sample well bottom <i>Note!</i> The photometric optics is embedded in the bottom measuring head body and it also contains a 2nd feed mirror and reference photodiodes |
| plate carrier | mechanical part on which the sample is conveyed in the instrument |
| plate cooler | device employing Peltier elements to maintain the temperature of a plate in the instrument at the temperature it had when loaded. Used in the <i>AlphaScreen option</i> . Also called Cold plate unit |

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| pump | device comprising a motor, valve and syringe part of the <i>dispenser unit</i> |
| radioluminescence | luminescence excited by radioactivity |
| second light source | the external <i>TRF-laser</i> used with EnVision for TRF measurements |
| semitransparent mirror | beamsplitter that permeates/reflects half of the light hitting it <i>Note!</i> This beamsplitter is independent of the wavelength of light |
| shutter | metal piece used to protect the <i>Ultra Sensitive luminescence detector</i> when it is not being used. It is inserted and removed manually |
| stacker | device to enable automatic transfer of sample plates to/from the instrument |
| temperature control | heating elements positioned above and below the measuring position to maintain the temperature of assay plates with samples requiring above ambient temperature |
| tip mount | comprises one or two tips and their mounting. Part of the <i>dispenser</i> there are three tip positions any two of which can be used |
| top measuring head | measuring head positioned above the <i>x-y conveyor</i> |
| top measuring head body | body section of the top measuring head on which most modules and units are mounted <i>Note!</i> the top measuring head body embodies e.g. the motors and belts of the <i>filter slides, lens assemblies, etc.</i> |
| TRF laser option | a nitrogen laser emitting pulsed light of 337 nm which is connected to the back of EnVision and used for time-resolved fluorescence measurements. This is referred to as the <i>second light source</i> in the EnVision software. It requires the <i>Bias mirror module</i> to be used |

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| ultra sensitive luminescence option | a very sensitive luminescence measurement technology making use of a very <i>high sensitivity detector</i> , which is also used for <i>HTS AlphaScreen</i> |
| very high sensitivity detector | a separate special detector used for ultra <i>sensitive luminescence</i> and <i>HTS AlphaScreen</i> measurements |
| waste container | small container in EnVision for dispensed waste liquid. This is automatically emptied by a waste pump using the <i>aspiration tip</i> |
| x-y conveyor | mechanism that moves the <i>plate carrier</i> in the horizontal plane between different functional positions including from either the <i>stacker</i> or the manual loading position to the position in the instrument where measurement occurs |

Chapter 8

Installation

Installation

Environment

Normal clean laboratory conditions usually provide a satisfactory operational environment but the following points should be taken into consideration.

- Ventilation should be adequate for all conditions of use
- The temperature should be reasonably constant at about 22 °C
- Relative humidity should not be excessive
- Direct sunlight should not be able to reach the instrument
- If possible, there should be a separate power line for the instrument itself with an isolation switch and fuse box.
- If excessive fluctuations in the mains voltage are anticipated, a mains stabilizer may be necessary.

Note! Make sure that when the instrument is at its place of operation it is exactly level. This is important to ensure proper function of the stacker.

1. Unpacking instructions

Follow the instructions on the document attached on the instrument!

2. Installation of options

If the instrument has been ordered with stacker, dispenser or TRF LASER, follow the instructions in the service manual or in the support folder on the software CD!

If the Enhanced Security option is installed see Administrator Manual Enhanced Security (supplied with the instrument) for User Name and Password!

3. PC

Each instrument is supplied with a PC which has the CAN card, as well as the needed software installed.

Note! The computer cannot be set to go automatically to a standby state.

4. Set up the system

- Set up the computer
- Install the printer according to the instructions accompanying the printer.
- Connect the CAN cable between the PC and the instrument (or to the dispenser if installed)

Note! Do not connect the cable to the RS232 port of the PC!

- Connect the instrument and computer to the mains
- Switch the computer on and log in to the EnVision user. See documentation with the computer for User Name and password.
- Start the service program and run the performance test (see the Service support folder for detailed information).

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