The Vision Monitor is equipped with a near infra-red illumination and a high resolution near infra-red image sensor which allow measurements of both eyes simultaneously, even under complete darkness.

The different versions of the Vision Monitor realize a precise control of the visual stimulation parameters:

- Background luminance
- Full field flashes with programmable color, luminance and duration.

Pupil size measurement

The image of the eyes is processed by computer to perform accurate measurements of the pupil sizes (accuracy = 0.1 mm).

The pupil contour is outlined on the image to allow the control of measurement accuracy.

Static pupillometry

This exam performs measurements of pupil size under several levels of controlled illumination:

- high photopic (100 cd/m2)
- low photopic (10 cd/m2)
- high mesopic (1 cd/m2)
- low mesopic (0.1 cd/m2)

The acquired images can be printed and saved in the patient's data base.

Application in refractive surgery

American Academy of Ophthalmology: "In refractive surgery, the most relevant information is the pupil size at the mesopic and scotopic levels of illumination because of potential problems with glare, halos, and other visual phenomena in some patients under scotopic lower lighting conditions." (AMBROSIO & al, 2002).

ASCRS: "Measurement of pupil size in dim and room light. Pupil size is an important factor in counselling a candidate about night vision and planning the appropriate laser vision correction strategy." (STEINERT & al, 2003).

Application in neuro-ophthalmology

Pupil size measurements are also important in neuro-ophthalmology because the pupil is affected by lesions of the afferent pupillary pathway (retina, optic nerve), lesions of the midbrain and lesions of the efferent pupillary pathways (ALEXANDRIDIS, 1985, LOEWENFELD, 1993).

Example of Adie's tonic Pupil

Under photopic illumination: only the left pupil constricts (top).
After instillation of pilocarpine: the right pupil constricts too (bottom).
(Source: Dr Zanlonghi, Nantes).
Dynamic pupillometry

The images of both eyes are acquired and processed in real time: 30 images per second (200 with fast camera option).

The program also performs an analysis of the temporal response and of the averaged response of successive visual stimuli (light flashes).

Analysis of the temporal response

Automated quantification of the following parameters:
- maximum diameter,
- minimum diameter,
- amplitude of constriction.

Analysis of the average response

Automated quantification of the following parameters:
- resting diameter, amplitude of constriction,
- velocities of constriction and dilation,
- latency of constriction

Summary of specifications

<table>
<thead>
<tr>
<th></th>
<th>MonCV3</th>
<th>MonPack One</th>
<th>MonColor</th>
<th>MonCV One</th>
</tr>
</thead>
<tbody>
<tr>
<td>Binocular recording</td>
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<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
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<tr>
<td>950 nm near infrared illumination</td>
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<tr>
<td>0.1 mm accuracy of measurements</td>
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<tr>
<td>Sampling frequency 30Hz (200 Hz as option)</td>
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<tr>
<td>Simultaneous video recording (option)</td>
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<td>✔️</td>
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<tr>
<td>Stimulus color(s)</td>
<td>1 source (White)</td>
<td>3 sources and their combination (619, 525, 465 nm)</td>
<td>5 sources and their combination (660, 619, 525, 465, 414 nm)</td>
<td>3 sources and their combination (619, 525, 465 nm)</td>
</tr>
<tr>
<td>Stimulus duration</td>
<td>17 ms and up with steps of 17 ms</td>
<td>2 ms and up with steps of 1 ms</td>
<td>2 ms and up with steps of 1 ms</td>
<td>2 ms and up with steps of 1 ms</td>
</tr>
<tr>
<td>Stimulus luminance</td>
<td>0.1 up to 100 cd/m²</td>
<td>Scotopic up to 300 cd/m²</td>
<td>Scotopic up to 1000 cd/m²</td>
<td>Scotopic up to 600 cd/m²</td>
</tr>
</tbody>
</table>

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