

2-AXIS LASER BEAM DEFLECTION UNITS

# TURBOSCAN



## XY-Deflection Units for Industrial Applications

- Speed combined with accuracy and reliability
- Robust and dust proof (CE) for industrial conditions
- Easy integration and multi-head applications
- Customized solutions
- Outstanding price/performance ratio

# 2-AXIS LASER BEAM DEFLECTION UNITS

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## ● DESIGN

The TURBOSCAN XY-deflection units set standards for speed, long-term stability, and low drift values. The compact and robust design (CE) and the reduced weight are further advantages.

RAYLASE products combine fine tolerance mechanics, optimized mirror design, high-quality electronics, and outstanding galvanometer scanners.

## ● QUALITY

Maintaining high product quality standards is a priority at RAYLASE. Deflection units are shipped to customers only after passing extensive tests.

## ● MIRRORS AND OBJECTIVES

Mirrors and objectives are available for all typical laser types and working field sizes.

## ● INTERFACES

The deflection units are electrically and mechanically compatible to the XY2-100 standard. They can be controlled via high-speed data link, with a suitable control card, or by using an analog current or voltage interface.

## ● TYPICAL APPLICATIONS

Marking; material processing such as engraving, ablation, drilling, cutting, welding; electronic production such as structuring, trimming; processing on the fly; stereolithography; rapid tooling; 3D-applications.

## ● GENERAL SPECIFICATIONS

|                     |         |  |
|---------------------|---------|--|
| Power Supply        | Voltage | ±15 to ±18 V                           |
|                     | Current | 3 A, RMS, max. 10 A                    |
|                     | Ripple  | ≤ 200 mV                               |
|                     | Noise   | ≤ 0.5 % DC to 30 MHz                   |
| Interface Signals   | Analog  | ±5 V, ±10 V, 0-10 V<br>±20 mA, 0-40 mA |
|                     | Digital | XY2-100 Protocol                       |
| Ambient Temperature |         | +15 to +35 °C                          |

|   |                       |
|---|-----------------------|
| Storage Temperature                           | -10 to +60 °C         |
| Humidity                                      | ≤ 80 % non-condensing |
| Typical Deflection                            | ±0.393 rad            |
| Resolution                                    | 12 μrad               |
| Repeatability                                 | 20 μrad               |
| Max. Gaindrift <sup>(1)</sup>                 | 0.007 %/K             |
| Max. Offsetdrift <sup>(1)</sup>               | 35 μrad/K             |
| Long-term Drift over 8 hours <sup>(1,2)</sup> | < 400 μrad            |

(1) Drift per axis. (2) After warming-up, variations of ambient temperature < 1 K. Specifications for F-Theta objective f=160 mm / for field size 110 mm x 110 mm.

## ● APERTURE DEPENDENT SPECIFICATIONS

| Deflection Unit   | TURBOSCAN-10 | TURBOSCAN-12 | TURBOSCAN-14 | TURBOSCAN-15 | TURBOSCAN-30 |
|---|--------------|--------------|--------------|--------------|--------------|
| <b>Mechanical Data:</b>                                 |              |              |              |              |              |
| Input Aperture (mm)                                     | 10.0         | 12.0         | 14.0         | 15.0         | 30.0         |
| Beam Displacement (mm)                                  | 12.4         | 14.0         | 15.6         | 16.4         | 35.7         |
| Max. Immersion Depth for Objectives (mm) <sup>(1)</sup> | 20.7         | 19.9         | 18.9         | 17.5         | 17.0         |
| Weight (kg) (without objective)                         | approx. 2.8  | approx. 2.8  | approx. 2.9  | approx. 2.9  | approx. 5.0  |
| <b>Dynamic Data:</b>                                    |              |              |              |              |              |
| Writing Speed (cps) <sup>(2,3)</sup>                    | > 600        | > 500        | > 400        | > 400        | -            |
| Positioning Speed (m/s) <sup>(2)</sup>                  | > 8          | > 7          | > 6          | > 6          | > 4          |

(1) From bearing surface of objective ring, incl. 1 mm safety clearance. (2) With F-Theta objective f=160 / field size 110 mm x 110 mm. (3) Single-stroke font with 1 mm height.

## ● MIRROR SPECIFICATIONS

| Laser   | Nd-YAG                         | Nd-YAG doubled               | Nd-YAG tripled               | Broadband                          | Diode                            | CO <sub>2</sub>                     |                                     |
|---|--------------------------------|------------------------------|------------------------------|------------------------------------|----------------------------------|-------------------------------------|-------------------------------------|
| Wavelength (nm)   | 1,064                          | 532                          | 355                          | 400-1,064                          | 800-980                          | 10,600                              | 10,600                              |
| Coating   | dielectric                     | dielectric                   | dielectric                   | Silver IP                          | dielectric                       | dielectric                          | Gold IP                             |
| Min. Reflectivity @ Wavelength (nm)                             | 99.5 % @ 1,064<br>80.0 % @ 633 | 99.5 % @ 532<br>50.0 % @ 633 | 99.0 % @ 355<br>80.0 % @ 633 | 97.0 % @ 400-1,064<br>97.0 % @ 633 | 99.0 % @ 808-980<br>50.0 % @ 633 | 99.9 % @ 10,600<br>80.0 % @ 450-650 | 99.0 % @ 10,600<br>80.0 % @ 450-650 |
| Flatness @ 633 nm   | λ/4                            | λ/4                          | λ/4                          | λ/4                                | λ/4                              | λ/4                                 | λ/4                                 |
| Max. Laser Power, cw (W/cm <sup>2</sup> )                       | 500                            | 500                          | 100                          | 70                                 | 500                              | 500                                 | 80                                  |
| Max. Max. Laser Power, 100 ns Pulse Width (MW/cm <sup>2</sup> ) | 100                            | 100 (10 ns)                  | 20 (10 ns)                   | N/A                                | N/A                              | 400                                 | 400                                 |
| Surface Quality (Scratch/Dig)                                   | 40/20                          | 40/20                        | 40/20                        | 40/20                              | 40/20                            | 40/20                               | 40/20                               |

Mirrors for other wavelengths available on request.

## ● OBJECTIVE INFORMATION

| Laser                                | Nd-YAG    |           |           | Nd-YAG doubled | Nd-YAG tripled | CO <sub>2</sub> |             |             |
|--------------------------------------|-----------|-----------|-----------|----------------|----------------|-----------------|-------------|-------------|
| Wavelength (nm)                      | 1,064     | 1,064     | 1,064     | 532            | 355            | 10,600          | 10,600      | 10,600      |
| Objective (f in mm)                  | f = 100   | f = 160   | f = 254   | f = 160        | f = 160        | f = 100         | f = 200     | f = 300     |
| Typical Field Size (mm x mm)         | 60x60     | 110x110   | 180x180   | 110x110        | 110x110        | 70x70           | 140x140     | 210x210     |
| Spot Diameter TEM00 (μm)             |           |           |           |                |                |                 |             |             |
| Aperture 10 mm / 12 mm               | ~23 / ~20 | ~31 / ~27 | ~50 / ~44 | ~15 / ~13      | ~12 / -        | ~230 / ~210     | ~380 / ~345 | ~570 / ~520 |
| Aperture 14 mm / 15 mm               | ~17 / ~16 | ~23 / ~22 | ~35 / ~33 | ~12 / ~11      | - / -          | ~190 / ~180     | ~300 / ~270 | ~400 / ~375 |
| Aperture 30 mm                       | -         | -         | -         | -              | -              | -               | -           | -           |
| Working Distance (mm) <sup>(1)</sup> |           |           |           |                |                |                 |             |             |
| Aperture 10 mm / 12 mm               | 126 / 127 | 203 / 205 | 356 / 356 | 203 / 205      | 222 / -        | 88 / 90         | 190 / 191   | 288 / 290   |
| Aperture 14 mm / 15 mm               | 129 / 130 | 208 / 209 | 356 / 356 | 207 / 208      | - / 227        | 91 / 91         | 193 / 193   | 291 / 292   |
| Aperture 30 mm                       | -         | -         | -         | -              | -              | -               | -           | -           |

(1) Distance between edge of deflection unit and working surface. This distance is dependent on the objective model and will vary with laser divergence and objective tolerance.

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