BLACKBIRD




**3D scan system laser welding**

# intelli*WELD* II PR

## The high-tech scanner

- Optimized for ‚vision' applications (e.g. OCT)
- Compatible with single mode lasers
- Ideal for processing large workpieces
- Process overview through real-time status monitoring

# Smart welding with the intelli*WELD* II PR

The intelli*WELD* 3D scan systems have been developed for a wide range of different welding applications. They are able to cover a three-dimensional space in which parts can be processed. The scan system is designed for the on-the-fly operation, in which a handling device moves it in a simply programmed path over the component to be welded and the welding task is carried out simultaneously.

The intelli*WELD* II PR deflects the laser beam quickly, precisely and with high repeatability. The fast movements of the deflection mirrors increase the process speed and reduce the positioning time from weld seam to weld seam (jump time) to a few milliseconds. This increases productivity significantly. The optional superimposition of a welding figure with oscillation geometries enables the welding result to be optimized even with complex tasks.

The compactness of the intelli*WELD* II PR enables it to be used and installed in a wide variety of industrial environments, whether with robots, linear axis systems or compact production systems. The optics are optimized for fiber-coupled disk or fiber lasers with powers of up to 8 kW.

The pre-focus optics of the intelli*WELD* II PR enable obtaining a high beam quality. ‚Vision'-based applications can achieve particularly good results due to the low transmission loss and the highest imaging quality. These advantages come into their own in fillet welding with precise edge tracking.

## Optimized for ‚vision' applications

- High transmission for ‚vision' / NIR wavelengths; therefore ideal for coaxial sensors, lighting and observation
- No deviations between observation and processing point (no lateral color error)
- Standard monitoring channel (without tracking)
- Optional: Tracking C-Mount connection for the entire working volume

## Compatible with single-mode lasers

- Particularly high imaging quality thanks to pre-focusing optics
- Various collimation focal lengths available for single-mode lasers

## Ideal for the processing of larger workpieces

- Large z-stroke, large field of view can be covered
- Short process times and high throughput with 3D on-the-fly operation

## Smart surveillance

- Monitoring of the most important measured values by intelligent sensors in real time
- Early warning in the event of increased stress or incorrect setting
- Integral safety concept with numerous options for laser and process control

## Optical specifications intelli*WELD* II PR

| **Version** | intelli*WELD* II PR | | | | intelli*WELD* II PR Single Mode | | | |
|---|---|---|---|---|---|---|---|---|
| **Focal length collimator in mm** | 110 | | 135 | | 165 | | 250 | |
| **Focal length focussing optics in mm** | 470 | 660 | 470 | 660 | 470 | 660 | 470 | 660 |
| **Fiber adapter** | QBH / QD (LLK-D) | | | | | | | |
| **Wave length in nm** | 1030 - 1085 + NIR (quarz) | | | | 1025 - 1085 + NIR (quarz) | | | |
| **Limiting NA (half angle) @ 86 % in rad** | 0.087 | 0.087 | 0.073 | 0.073 | 0.057 | 0.057 | 0.037 | 0.037 |
| **Limiting NA (half angle) @ 98.x % in rad** | 0.130 | 0.130 | 0.110 | 0.110 | 0.086 | 0.086 | 0.056 | 0.056 |
| **Optical magnification** | 1 : 4.3 | 1 : 6.0 | 1 : 3.5 | 1 : 4.9 | 1 : 2.8 | 1 : 4 | 1 : 1.18 | 1 : 2.64 |
| **Design for OCT option** | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| **Image field size @ z = 0 (elliptical) in mm** | 330 × 300 (for 470 foc.) / 480 × 450 (for 660 foc.) | | | | | | | |
| **Image field size @ z = 0 (rectangular) in mm** | 270 × 270 (for 470 foc.) / 470 × 450 (for 660 foc.) | | | | | | | |
| **Focus stroke in z-direction - / + in mm** | 50 | 100 | 50 | 100 | + / - 50 | 100 (in -z)* | + / - 50 | 100 (in -z)* |
| **Maximum laser power in kW** | 8 (Multi Mode) | | | | 3 (Multi Mode & Single Mode) | | | |
| **Working distance (lower edge scanner) in mm** | 300 | 472 | 300 | 472 | 300 | 472 | 300 | 472 |

**Back reflections*

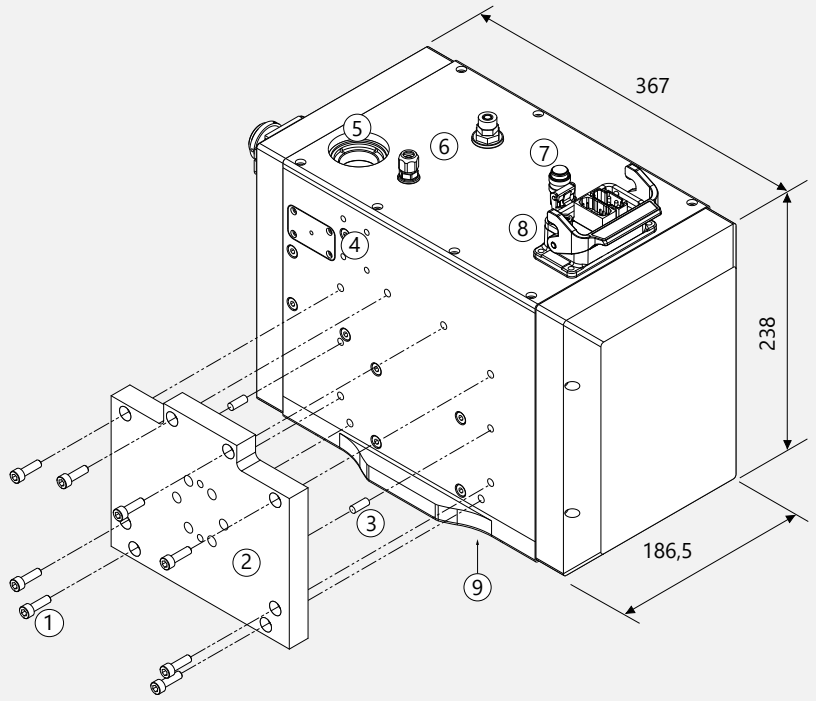
## Options and extensions

**On-the-fly welding**
On-the-fly (OTF) welding allows the scanner or the component to be moved during the welding process. This reduces the processing time to the shortest possible and increases the efficiency of the system. The Blackbird controller can perform OTF welding in conjunction with robots (e.g. KUKA, ABB or Yaskawa) or with one or two linear axes.

**Optical coherence tomography**
The addition of an OCT scan system to the intelli*WELD* II PR can add quantifiable value to the process. This ranges from finding the edge and tracking the weld seam to detecting the weld depth. The final check of the welded seam makes the OCT the universal genius of measuring systems.

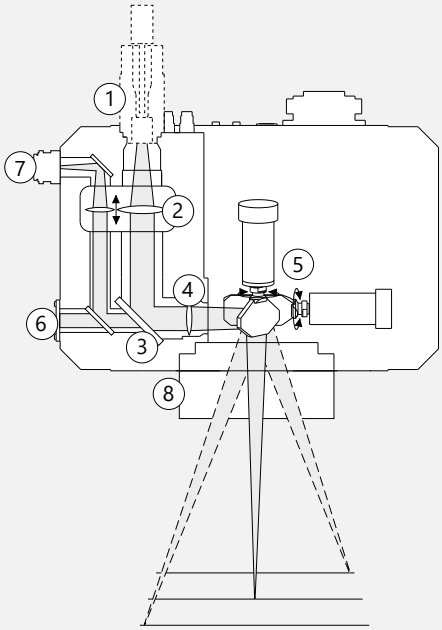
**Air management**
With the proven interaction of Crossjet, process nozzles, fume protection module and supplied purge air, the deposition of smoke and particles on optical components is prevented and the service life of the scan system is maximized.

**Protective cover**
Designed for a particularly demanding processing environment, the protective cover of the intelli*WELD* II PR offers additional protection against contamination from process by-products.




**Key**

1 Bolts*
2 Flange (robot adapter plate)*
3 Alignment pins*
4 Mounting option for strain relief (fiber)
5 Mounting option for fiber adapter
6 Connectors for cooling fluid
7 Compressed air connection
8 Interfaces (data, interlock, power in)
9 Mounting hole for objective holder and crossjet




**Key**

1 Fiber adapter
2 Variable collimator
3 Beam splitter
4 Pre-focus optic
5 Galvanometer scanner
6 Process monitoring port
7 Tracked camera port
8 Fume protection module

*All dimensions in mm*

**Not included in the delivery*

# Technical data

| | |
|---|---|
| **Weight (without attachments)** | 27 kg |
| **Operating temperature** | 25 °C ± 10 °C |
| **Supply voltage (supplied by the Blackbird control system)** | 30 V DC (29-33 V), respective max. 8 A |
| **Water cooling specification** | 2 l/min at 20 °C and Δp < 0.1 bar; p < 4 bar |
| **Filter unit purge air specification** | ISO 8573 - 1 : 2010, class 5.4.4 |
| **Supplementary set for cooling water connection** | Optional |
| **Repeatablity (RMS)** | < 2 µrad |
| **Long term drift over 8 h (at operating temperature)** | < 0.15 mrad |
| **Tracked camera port observation channel 2 (top)** | C-Mount (optional) |
| **Double cover slide (beam exit)** | Yes |
| **Purge Air between inner & outer cover slide** | Yes |
| **Cover slide sensor (beam exit)** | Yes |
| **Cover slide collimator** | Yes, interchangeable |
| **Flow sensor (cooling water)** | Yes |
| **Teach support** | Yes |
| **IP protection class** | IP54 |



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