

# TWAP 1-11L

## Wide Angle image Projector

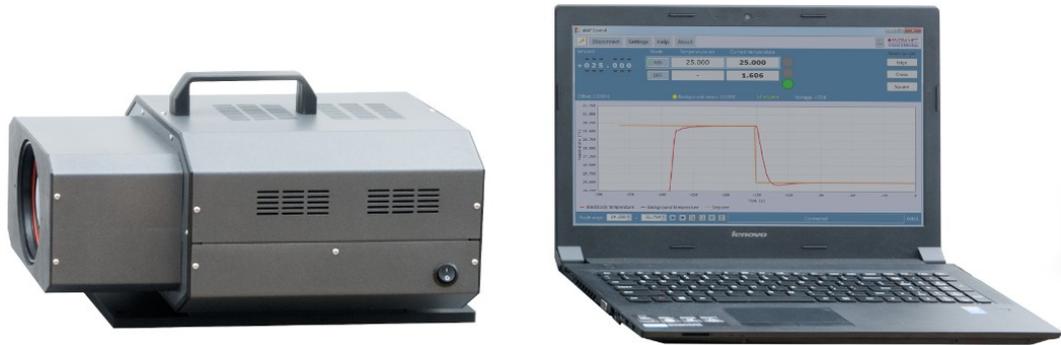


Fig. 1. Photo of TWAP 1-11L projector

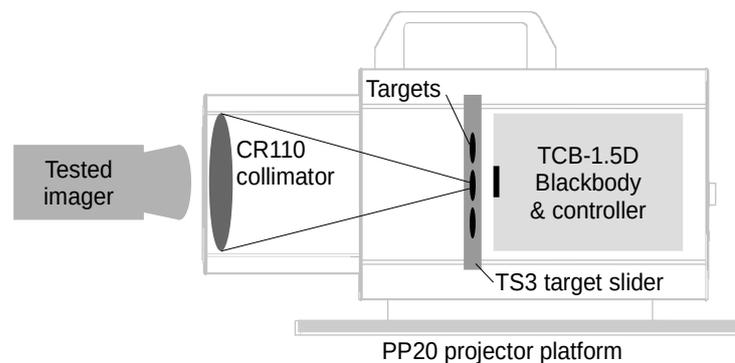


Fig. 2. Block diagram of TWAP 1-11L projector

### 1. BASIC INFORMATION:

Most of Inframet test systems are image projectors that use collimators to project images of reference targets located at collimator focal plane. Reflective collimators due to their wide flat spectral range are almost exclusively used in systems for testing thermal imagers. However, reflective collimators are also characterized to relatively small FOV typically not bigger than about  $2.5^\circ$  and relatively big size and mass. It practically means that that such collimator can project image of test target in angle not bigger than this value. Image projection of targets of angular size  $1-3^\circ$  into direction of tested imager is typically enough measure most of important parameters of tested thermal imagers. However, there are some applications when projections of bigger test targets is required or image projector must be smaller.

TWAP 1-11L is a wide angle image projector built using a refractive collimator of wide field of view optimized for LWIR band. The projector is characterized

by relatively wide projection angle (at least  $11^\circ$ ), compact design and small mass. These features make TWAP 1-11L an ideal choice for testing small thermal imagers of wide FOV or any application when compact LWIR image projectors are needed.

Small size and wide projection angle has been achieved by accepting decrease of collimator resolution comparing to resolution of reflective collimators. Therefore TWAP 1-11L projector should rather be used for testing wide FOV collimators of Nyquist frequency not higher than about  $1.5-2$  lp/mrad. Testing imagers of medium or narrow FOV is not recommended.

Typical version is optimized for work at laboratory conditions. However, special athermal version capable to work at extreme temperatures can be delivered, too.

TWAP 1-11L belong to a family of wide angle image projectors based on different refractive collimators that can be delivered by Inframet.

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### 1. HOW TWAP 1-11L PROJECTOR IS BUILT?

The TWAP 1-11L projector is built from a set of seven blocks (see Figs 2-3): CR110 refractive collimator, TS3 target slider, set of 3 targets, TCB-1.5D blackbody, PP20 projector platform, laptop, and TWAP Control computer program. The targets are located on a TS3 target slider located at collimator focal plane. Only one of the targets can be in active positions. Image of the active target is projected into direction of tested thermal imager. Thermal contrast of projected image can be regulated by regulation of temperature of TCB-1.5D blackbody located behind the active target. Both TS3 target slider and TCB-1.5D blackbody can be controlled remotely from a laptop using TWAP Control computer program.

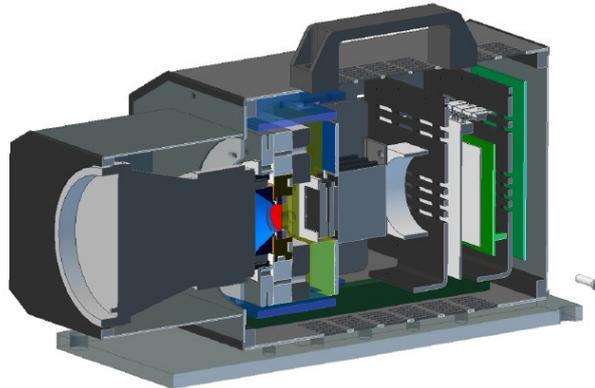


Fig. 3. Cross view of TWAP 1-11L projector

### 2. TARGETS

Three targets of angular size equal to  $10^\circ$  can be inserted into TS3 target slider. Patterns of different shape can be used to design the targets depending on customer requirements. Exemplary targets are shown in Fig. 4.

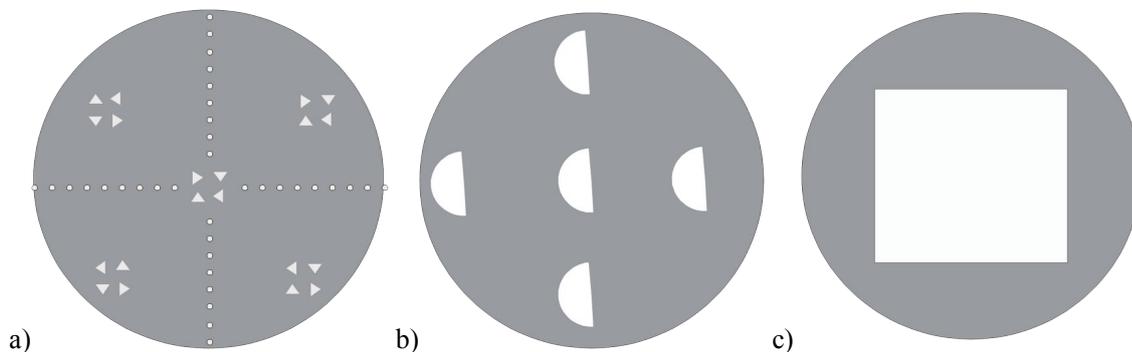
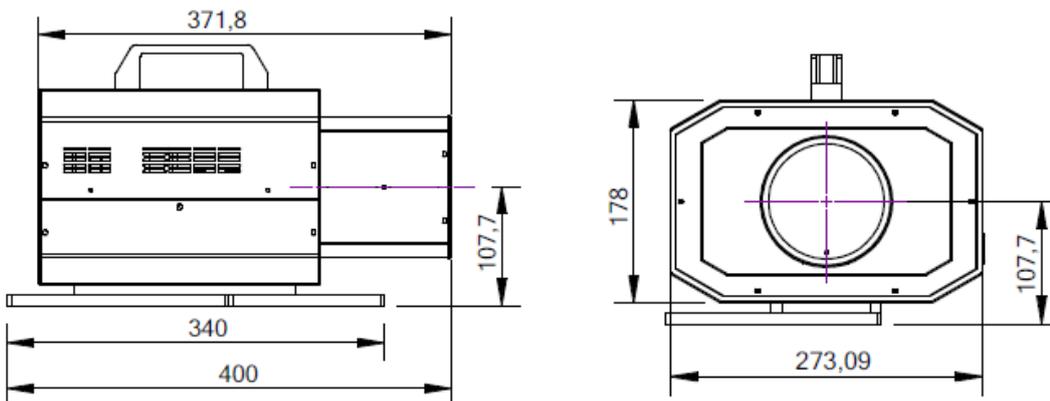


Fig. 4. Standard targets of TWAP : a) resolution/FOV target, b) multiply edge target, c) square target

### 3. DIMENSIONS

Precision dimensions of TWAP 1-11L projectors are shown at figures below.



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### 4. TECHNICAL PARAMETERS

|    | <b>Parameter</b>                                       | <b>Value</b>  |
|----|--|---|
| 1  | FOV  | 11° (circular shape)  |
| 2  | Spectral band  | 8-12µm  |
| 3  | Type of collimator                                     | Refractive, aspheric triplet  |
| 4  | Collimator aperture                                    | 100mm (or 66 mm in athermal version)                                      |
| 5  | Collimator focal length                                | 100 mm  |
| 6  | Resolution   | Not worse than 5 lp/mrad (center)   |
| 7  | Blackbody temperature range                            | 0-100°C   |
| 8  | Regulation resolution                                  | 0.001°C   |
| 9  | Targets  | 3 targets of 11° angular size (shapes according to customer requirements) |
| 10 | Target slider  | Motorized   |
| 11 | Acceptable distance imager optics to collimator optics | Up to 150mm at restricted FOV but recommended distance is below 30 mm     |
| 12 | Working temperature range                              | 15°C to 30°C (10°C to 40°C – option)                                      |
| 13 | Dimensions   | As in section 3   |
| 14 | Mass   | About 12 kg (excluding laptop)  |

*\*specifications are subject to change without prior notice*

*Version 1.5*

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