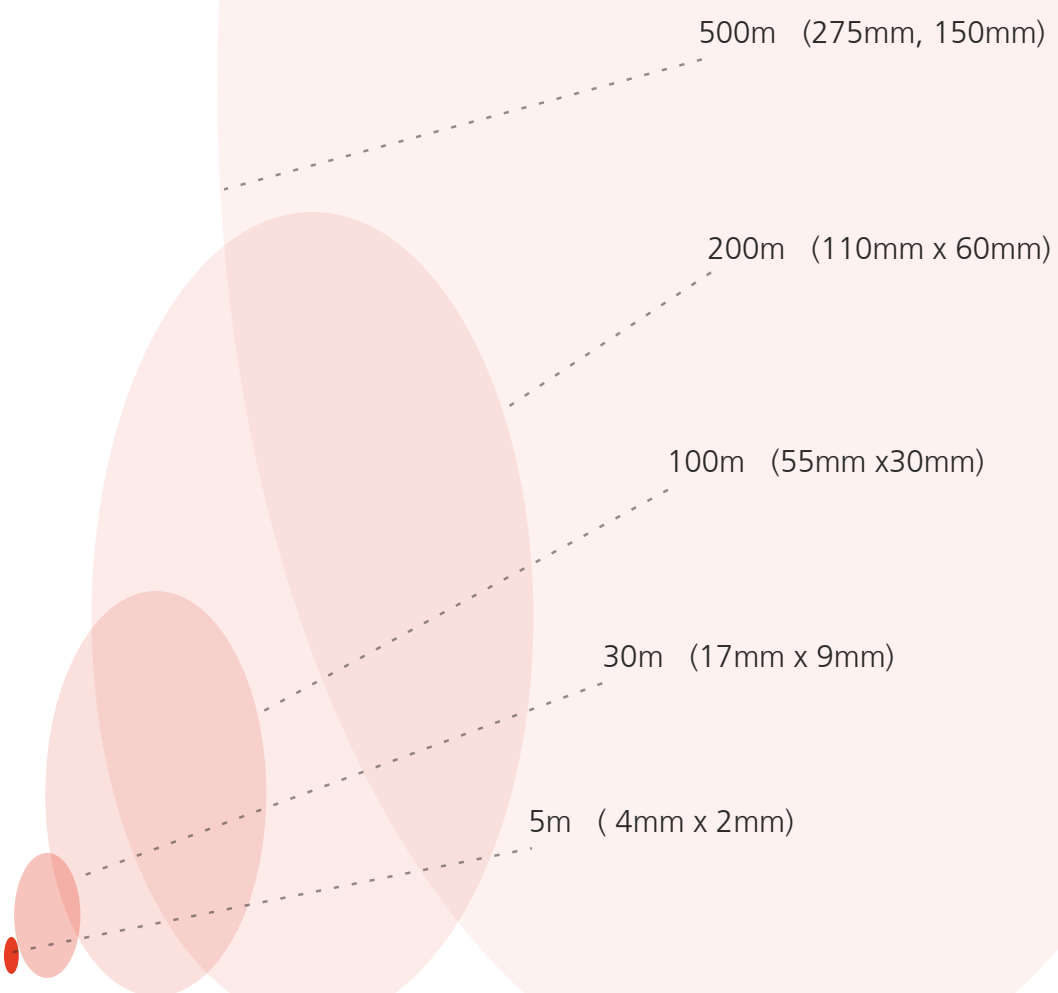
TechPart 5 – Optics & Measurement challenges

1 Target size

- The background picture shows how the typical **size of the laser spot increases with the distance**.
- The size of the **target** must always be **bigger then** the size of the **laser spot**.
- It is never possible to align the sensor absolutely exact, so the target should generally be generously oversized.
- If you have the choice mount the sensor on a fixed position and make the target movable. Especially on shaking system this makes the alignment of the sensor more reliable.

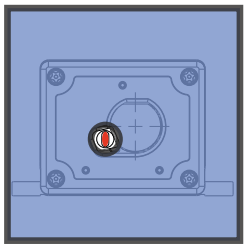


2 Optical path, keep out area

- Often the way between the sensor and the target is narrowed by obstacles like case openings, or gaps between pieces of equipment.
- Due to there limited size, glass windows or mirrors are also narrow spots in the optical path.
- The **laser beam must** completely **pass throw** the **narrow spot** without grazing its side.
- Beside this the **reflected laser light must** also be able to **pass** the **narrow spot** and reach the receiver lens.
- **Narrow spots near** to the **sensor** (as shown in the illustration below) should at least be **35mm** in diameter.

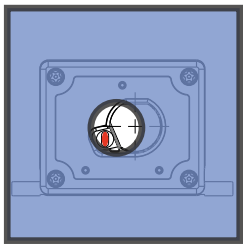
Dose not work at all

- Laser passes throw opening
- But receiver lens is completely covered



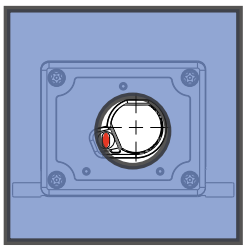
Bad

- Receiver lens is partly covered
- Reduced accuracy and/ or measurement speed



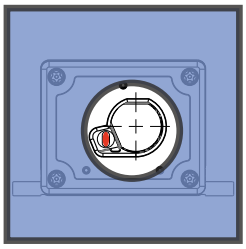
On the edge

- Theoretically OK.
- Practically still to narrow. Sooner or later there will be problems.



Very good

- Laser passes.
- Receiver lens not covered
- Generously oversize opening avoids problems



- Narrow spots at an **arbitrary position** should theoretically be at least the size of the laser spot at this position plus 35mm (Narrow spot @ 100m: 55mm + 35mm = 90mm). In practice you need to generously oversize to avoid problems.

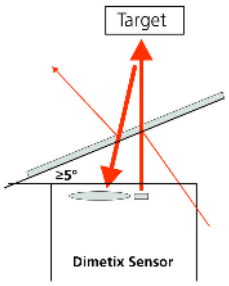
3 Measuring through glass

Dimetix recommends to **avoid measuring through glass:**

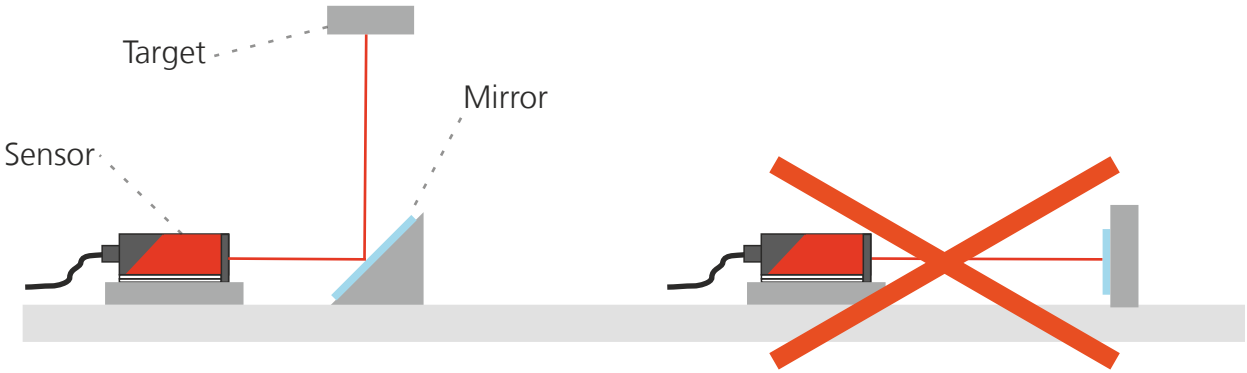
- Loss of signal amplitude
- Reflections can interfere with the measurement
- Contamination of the glass can make make measuring impossible

If measuring throw glass can not be avoided Dimetix recommends the following measures:

- **Tilt the glass by at least 5°** so that reflections are lead away from the receiver lens
- Use a **glass** with a reflective coating **intended for optical devices**. Avoid general purpose window glass.
- Chose a big enough glass (see optical path)
- Clean glass in regular intervals
- During operation **check measurement results for plausibility**. Error if measuring distance ≤ glass distance. For this the sensors digital output can be configured. The measurement result could also be monitored on the overall system level. The second must of coarse be implementation by the system integrator.



4 Measuring via a mirror



Dimetix recommends to **avoid measuring via a mirror**:

- Loss of signal amplitude
- Contamination of the mirror can make measuring impossible.

If measuring via a mirror can not be avoided Dimetix recommends the following measures:

- Use a **mirror intended for optical devices**. Do not use general purpose mirrors.
- Chose a big enough mirror (see optical path)
- During operation check measurement results for plausibility
- **Avoid measuring strait into the mirror**
- Clean mirror in regular intervals

5 Measuring on shiny metallic targets

Measuring on shiny surfaces can be challenging. To much light is reflected and the sensor will over amplify:

- A sensor which is able measuring on the orange Dimetix reflective target plate can solve this problem
- If possible increase the distance between the sensor and the target
- Never measure on highly polished mirror like surfaces

6 Measuring on porous materials like wood or plastic

- When measuring on porous or semi translucent surfaces, the laser light can penetrate some millimeters into the target
- The sensor will deliver **measurement results** which are a bit **to long**