

# PRECEYES Surgical System

The first market-cleared robot for retina surgery

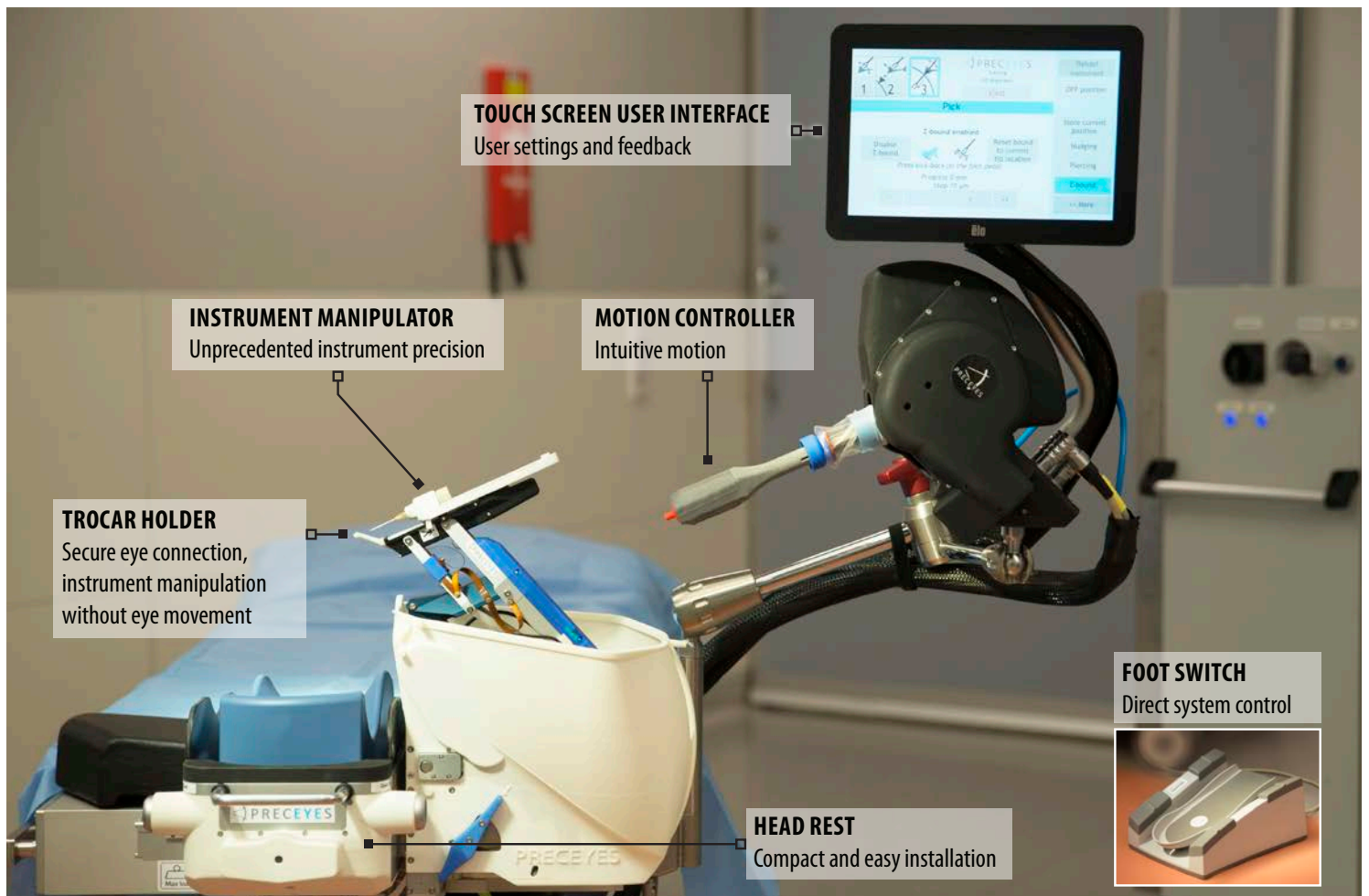
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 PRECEYES  
a ZEISS company

# PRECEYES Surgical System

The PRECEYES Surgical System is a robotic assistant for vitreoretinal surgery. It supports surgeons in inserting and manipulating instruments inside the eye. The system is guided by positioning commands that the surgeon provides through an intuitive motion controller. The dedicated head rest facilitates easy installation onto existing OR tables.

The system provides surgeons with a precision better than 20  $\mu\text{m}$  to position and hold instruments steady for an extended period of time. The high surgical precision aims to improve treatment outcomes. The system empowers surgeons to establish new innovative surgical techniques and to deliver advanced therapeutics.



## Precision

Scaling and filtering of hand tremors yield unprecedented steadiness and precision of the instrument position. The standby function freezes any motion and allows to relax and reposition for optimal hand position.

## Safety

A hybrid manual/assisted setup allows the surgeon to maintain patient contact. Residual eye movements are minimized by holding the trocar and safety boundaries are employed to limit instrument movements.

## Workflow optimization

During highly demanding surgical steps, the robot is easily engaged to assist in specific tasks. Instruments are easily exchanged and their movements recorded for post-surgical evaluation and training purposes.

# For retina surgery

The PRECEYES Surgical System is compatible with a wide range of 23G, 25G and 27G instruments. Third-party instrument tips are connected via a proprietary system interface. The PRECEYES Surgical System can be used in patients under either local or general anesthesia in a standard surgical setting.



## Instrumentation interfaces

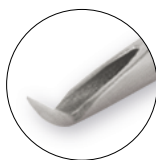
Luer



Optico C-range



Specials, dedicated interfaces



## Surgical Task

## Compatible third-party instrumentation

Tissue manipulation

Micro pick, knife, soft tipped cannula, extendable spatula, sweeper, side port needle, forceps

Subretinal injection

41G (extendable) injection needle, injection system with viscous fluid interface

Fluid, gas & oil exchange

Dual bore injection needle, backflush needle

Venous & artery cannulation

Cannulation needle

Illumination

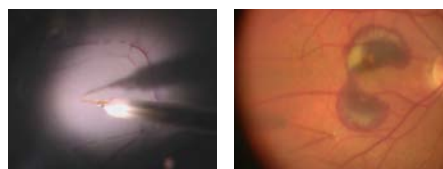
Illumination probe

Endo-diathermy

Diathermy probe

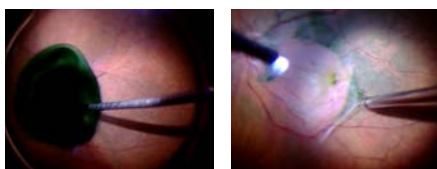
# Clinically validated

The PRECEYES System has been successfully validated in clinical investigations and preclinical research. The PRECEYES Surgical System R1.1 has a CE mark and is commercially available for use in vitreoretinal surgical interventions in Europe.



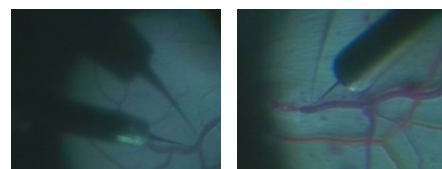
## Subretinal injections

[Nature Biomed Eng, 2018; 2:649-656]



## Staining and ERM Peeling

[Floretina Congr; 2019]



## Vein cannulation

[Br J Opth, 2016; 100:1742-1746]

# TECHNICAL DATA

## PRECEYES Surgical System R1.1

### Robotic System


Instrument positioning	Four degrees of freedom, controllable motionless point at the sclerotomy, movement reach 80° × 80° × 40 mm, instrument rotation 720°
Precision <sup>1</sup>	<20 µm
Safety	Balanced manipulator design, quick eject response time <0.5 s, manually removable instrument and manipulator, trocar connection for eye stabilization
Instrument manipulator positioning	Three degrees of freedom, motorized, movement reach 50 × 40 × 60 mm
Motion controller	Four degrees of freedom, motorized, movement reach 70° × 70° × 55 mm, stylus rotation 300°
Instrument actuation	Six bar nominal pressure, seven bar maximum pressure, purity class [7:4:4] ISO 8573-1:2010
Electronics cabinet	High precision motion control, monitoring system integrity, spoken feedback on system status and input verification
System controls	Touch screen user interface, 6-function foot pedal
Anaesthetic	Compatible with LA and GA
Power supply	220 - 240 VAC, 50 Hz (EU version) 114 - 126 VAC, 60 Hz (US version)

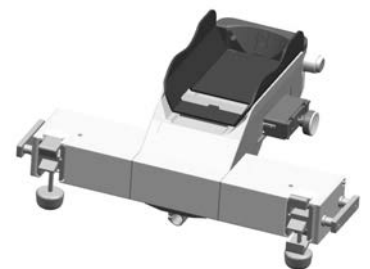
<sup>1</sup>Precision down to 3 µm was reported in [Acta Ophth. 2018; 14003]

### Accessories

Draping	Three disposable polyurethane drapes forming a reliable sterile barrier
Instrument interface	Easily installed disposable interface between the instrument manipulator and the instrument
Trocar holder	Disposable interface between the instrument manipulator and the trocar
Head strap	Sleeve with microvelcro, to fixate the patient's head

### Regulatory

Conformity	 Council Directive 93/42/EEC on Medical Devices (MDD)
Classification	Class IIa, rule 2, 6 and 9
Standards	EN ISO 15223-1:2016, EN 1041:2008/A1:2013, EN ISO 14971:2012, EN 60601-1:2012/A1:2013, EN 60601-1-2:2015, EN 60601-1-6:2010 + A1:2015, EN-IEC 62366-1:2015/C11:2016, EN 62304:2006/A1:2015, EN ISO 14155:2011/AC:2011



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