Telescopi Italiani s.r.l. Web: www.italiantelescopes.net
Email: info@italiantelescopes.net
Phone: +39 3428012938 Fax: +39 0503869316

Telescope Model: TI-35 f/3,5

Overall description:

The TI 35 represents the state of the art in terms of aperture ratio, transportability, optical performances and technology. It comes directly from the TI45 design and it is born as its small brother. It uses the same construction approach and the same high-end solutions and quality goals.

The TI 35 performs an awesome f/3,5 aperture ratio and thanks to the proprietary Modified Harmer-Wynne optical design, it still has an extremely wide diffraction limited corrected field.

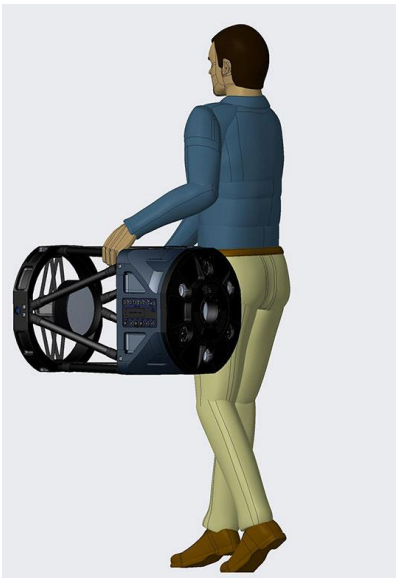
The TI 35 astrograph is built with wide use of carbon fiber sandwich parts delivering the best stiffness/weight and thermal stability performances. It includes an articulated electronic system with a lot of innovative features useful to simplify the operations and especially designed, thinking to facilitate both remote application and travelling astrophotographers.

Figure 1 – TI35 f/3,5

Dimensions and weight:
Overall length: 750 mm
Overall diameter: 430 x 430 mm
Expected weight: less than 18 kg
Back Focus from rear flange (mm): 125 mm

Optical Characteristics:

- *Primary mirror:*
  Overall diameter: 355 mm
  Clear aperture: 450 mm
  Shape: Parabolic
  Material: Borosilicate glass
  Fused Silica (Quartz) on request
  Coatings: Aluminium enhanced >94%
- *Secondary mirror:*
  Overall diameter: 190 mm
  Clear Aperture: 187 mm
  Thichkness: 20 mm - Shape: Spherical
  Material: Borosilicate
  Coatings: Aluminium enhanced >94%

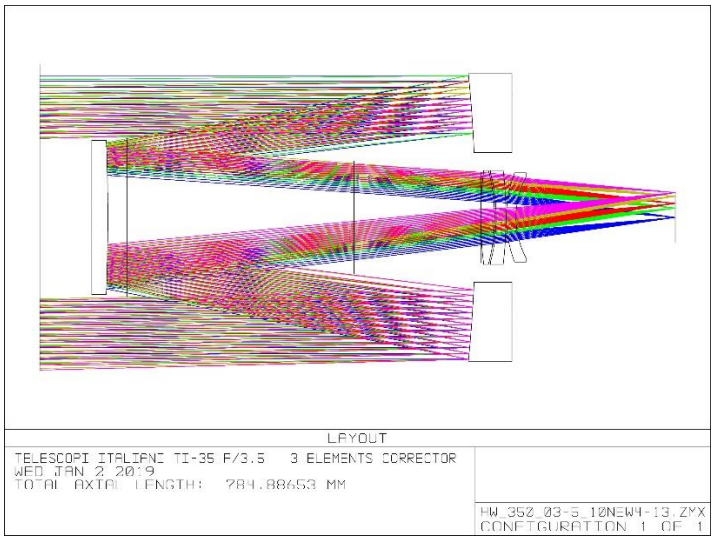


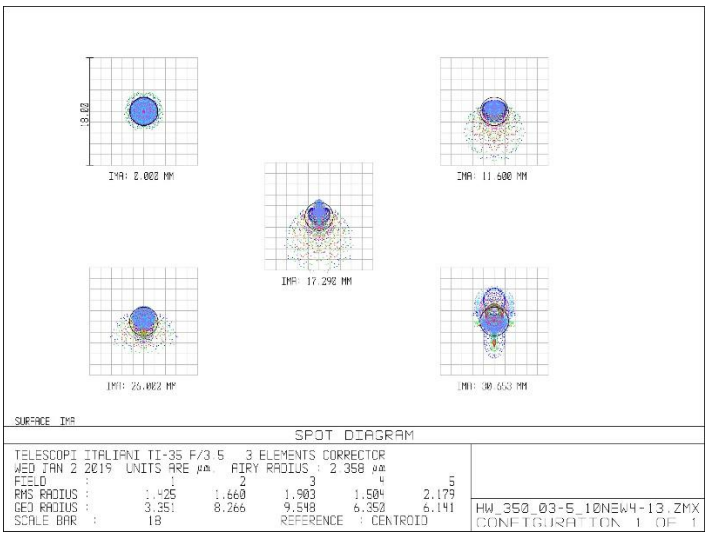
Telescopi Italiani s.r.l. Web: www.italiantelescopes.net
Email: info@italiantelescopes.net
Phone: +39 3428012938 Fax: +39 0503869316

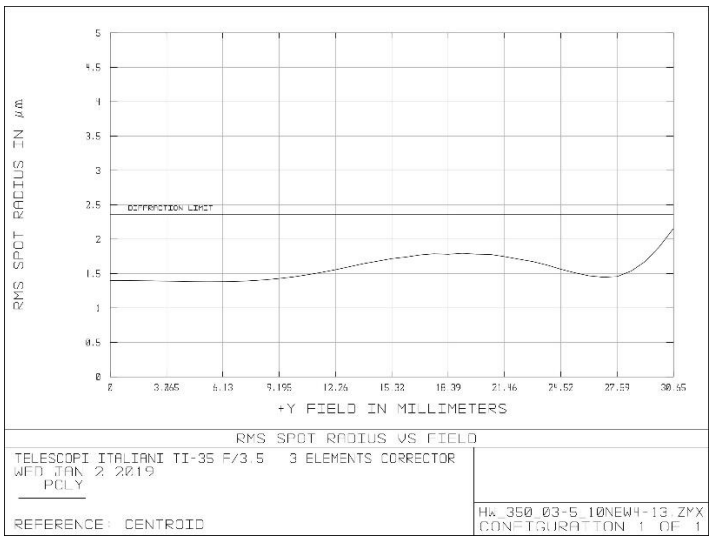
- *f/3.5 Group Lenses (Corrector):*
  Lens number: 3 – **ED element**
  Lens diameter: 116 mm
  Coatings: Multylayers 400-900 nm

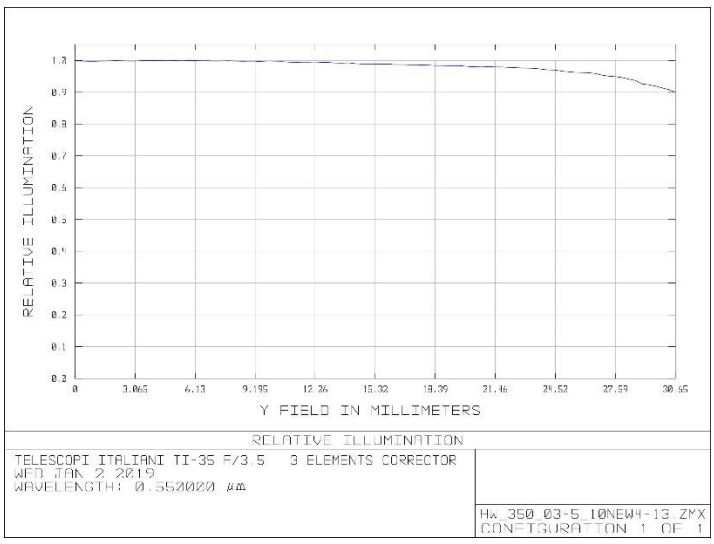
f/3.5 Optical Performances:

- Real Diffraction Limited field diameter (mm) (considering Polychromatic 400/700 nm): 62 mm
- Spot Diagram RMS Diameter @ 26 mm from axis - Poly 400-700 nm (micron): 3.00μm
- Spot Diagram RMS Diameter @ 30 mm from axis - Poly 400-700 nm (micron): 4.36 μm
- Total Effective Obstruction: 56 %
- Light incoming (% of aperture area): 68.4 %
- Loss of light (vignetting) @ 26 mm from axis (%): 4.5 %
- Loss of light (vignetting) @ 30 mm from axis (%): 10.0 %

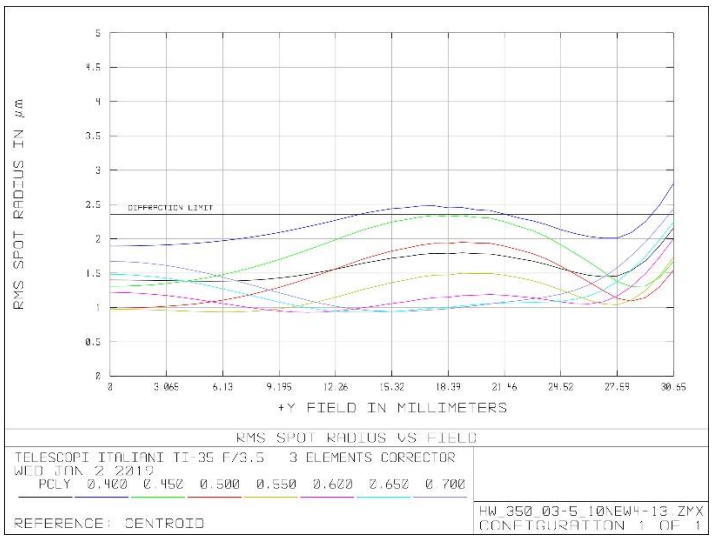


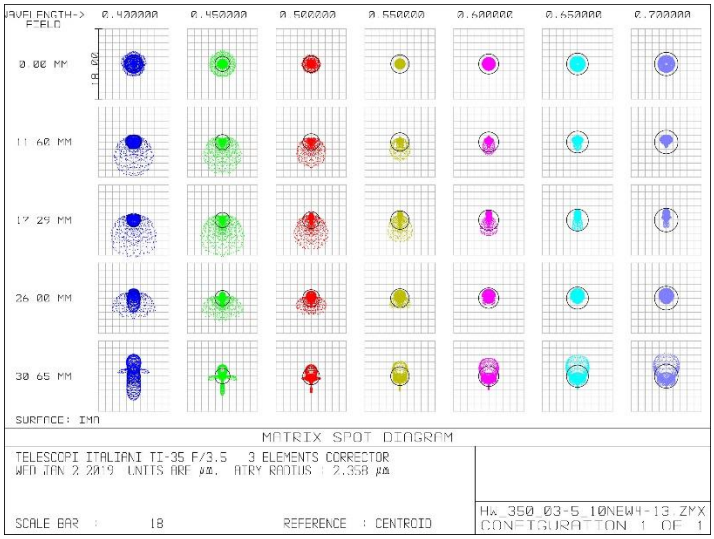






Telescopi Italiani s.r.l. Web: www.italiantelescopes.net
Email: info@italiantelescopes.net
Phone: +39 3428012938 Fax: +39 0503869316





Mechanical characteristics:

- *Overall structure:* Full carbon truss structure – The best structure stiffness, light weight and thermal stability
  - rear body: carbon sandwich
  - front ring: carbon sandwich - integrated 6068-T6 aluminium alloy inserts for truss structure.

- *Primary mirror cell:* Lightweighted FEM optimized Aluminium alloy cell, proprietary design central hub holder for lightweight conical mirror

- *Secondary mirror cells:* 2011-S Aluminium alloy, external surface excavated with conical surfaces in order to minimize reflected light. Adjustment system: two precision adjustable screws (100 TPI by Thorlabs) for a real x-y mirror collimating movements. This system allows to avoid axial movement of the mirror during tilt adjustment, thanks to the spherical joint near the backplate of the mirror. This solution allows also to not have tilt movement when axial adjustment is performed. So we have movement not reciprocally influenced like conventional three screws system has. The primary-secondary mirror distance is (must be) a fixed parameter optimized in each optical design and we do not think it should be varied neither for focusing, neither during collimation.
- *Secondary mirror cell vane: pre-loaded* double vane spider (AISI 3014 stainless steel 0.8 mm thick) for the best stiffness and low diffraction effects
- *Primary mirror baffle:* carbon tube with internal circular baffling

- *Secondary mirror baffling:* **suspended conical carbon baffling**. This shape allows best baffling without adding obstruction

OPTION: TI-110 Field Rotator

110 mm clear aperture rotator (4,33”), it can be integrated into the back plate, 160 mm warm wheel with a precision stepper motor drives high precision preloaded steel cross roller bearing for a stiff and precision rotation (0.64”/step) and extremely Low axial/radial run-out error (less than 7 micron measured). It carries tens of kg payload, with no effect. Simply installation, removing the rear flange, install the Field Rotator and plug the connector.

INCLUDED:

- ***Electronic Secondary Focuser System:*** integrated into central spider hub, it deliveries extremely accurate focusing by moving axially the secondary cell. The optical configuration allows a camera to rear flange distance tolerance of +/- 1,5 mm with respect the nominal distance to remain within the diffraction limit and a +/- 2.5 mm in the "real" condition with no detectable effect on the image. Moreover, this system allow to good compensate primary mirror axial offset with respect the nominal position by +/- 4 mm with no effect on the image. Nominal resolution: 51 nm/micro-step. Travel: +/- 5 mm.

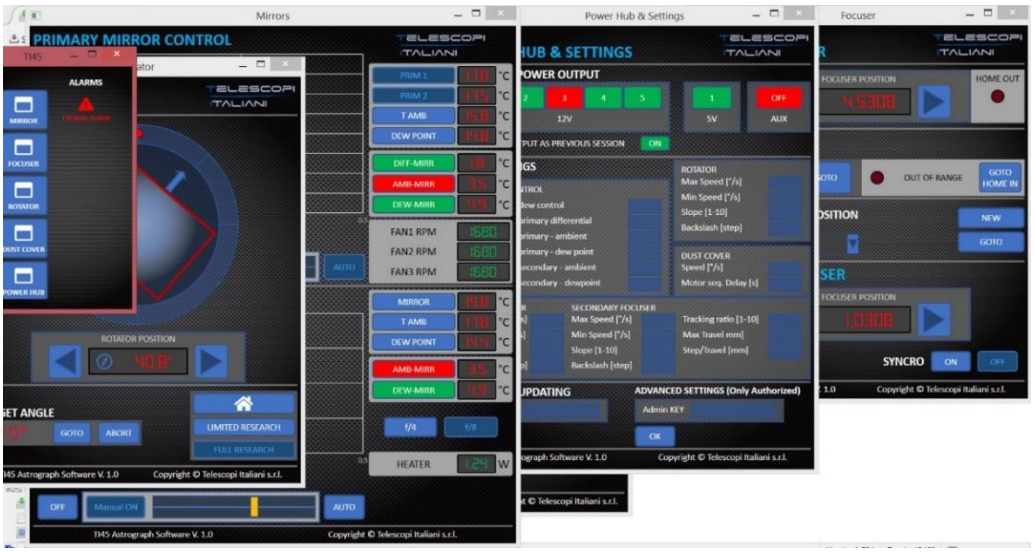
Electronics, control and software:

All our Astrographs have a built in high-end electronic system and a a complete software Suite based of the new standard ASCOM Alpaca. The **full control of the telescope is via WIFI**, so wireless.

- ***Electronic boards****:*
  Our Astrographs have a built in high-end electronic board. It is integrated into the rear body thickness and full accessible for check and dismounting.
- ***Active temperature control****:* Three high quality fans PWM controlled will keeps the primary mirror temperature controlled avoiding both high temperature difference between air temperature and high temperature gradient within the mirror itself (thanks the two sensors installed close to the cooler area ant the other near the warmer area). A special air flow path allow the main parts of air to flow out from back without damaging the quiet air above the mirror. A full customized silicon secondary mirror heater with extremely low power density and PWM driven, will maintain the secondary mirror just above the dewpoint if needed.
- ***Sensors installed****:*
  - Primary mirror: two temperature sensors
  - Secondary mirror: temperature sensor
  - Air temperature sensor
  - Air relative humidity sensor
- ***Electronic panels****:* in the lateral sides of the rear body two control panels will allow to simplify all cable connections between OTA and PC and same useful action. Here the characteristics:
  - *Five USB input with IP 65 screwed connection*
  - *Four 12V Output IP 65 3.5 mm jacks – with red led to detect if jack is powered*
  - *One 5V Output – IP 65 3.5 mm jacks– with red led to detect if jack is powered*
  - One Aux Output – IP65 *3.5 mm jacks – it allow to power instrument with a specific tension.*
  - One Aux Input – IP65 *3.5 mm jacks – where you have to arrive with your specific tension.*
  - *Two buttons to open/close manually the primary dust covers (IP 65) - Optional*
  - *One connector to power the OTA (12 and 5 V powered with our external power supply) (IP 65)*
  - *One USB connector to connect to PC (IP 65)*
- One connector to an external focuser (IP 65) – This output can drive a stepper motor for aux focuser system. It is used on our off-axis guider with a stepper helical focuser built-in or on a secondary focuser.
- ***Hardware Safety****:* all the onboard electronics are protected by over current thanks the use of two fuse. All the external hardware powered by our power hub has inside its own fuse that can be installed with the right current limitation in according to the hardware current rating.

- ***Wireless connection**:* the on-board electronic has its wireless connection to allow actions from your smartphone or ipad. We think the features for example to allow focuser and rotator command when the operator need to stay close to the telescope.

- ***Software Suite**:* the package includes a software able to control all the functions and to connect it via ASCOM driver to MaxIm and other commercial software. The software will have:
  - *Window 1:* **Temperature controls**
    Where you ca see themperature graphs, fan speed, heater power, decide if manually or auto comand the fan and the heater
  - *Window 2:* **Focuser controls**
    Where you ca see the focuser absolute position, move in/out focuser, see if reach the limits, load/store/rename focuser position, go to a target focuser position, go to home position, save temperature/focuser point for compensation curve, switch on/off temperature compensation, see secondary focuser position, move in/out secondary focuser, goto home for secondary focuser, syncro on/off secondary focuser to the main focuser.
  - *Window 3:* **Field Rotator controls - OPTIONAL**
    Where you can see the absolute rotator position, goto target angle, research home (limited – full options)
  - *Window 4:* **Dust cover - OPTIONAL**
    Where you can open/close the dust cover, stop the procedure
  - *Window 5:* **Power Hub and Settings**
    Where you can switch on/off power relé on each power output (n. 4 12V, n. 1 5V, n. 1 Aux Volt), select to set power outputs as previous session, modify user setting parameters, make the firmware updating, access to the advanced setting (only authorized)



We emphasize that from OTA toward the PC only two cables are connected: power 12 / 5V (possibly to our optional TI power supply) and USB signal, while all other cables are internal to the structure or connect the electronic board to the external instrumentation: CCD camera, filter wheel or a guide camera. Since external cables are very short and screwed over IP65 sockets, the system is free from entanglement problems or crushing during the movement of the mount, as well as disconnections or bad contacts. This solution is very important and useful for remote observatory use and as simple for travelling astroimagers who can leave the instruments connected to the OTA.