

Accessories

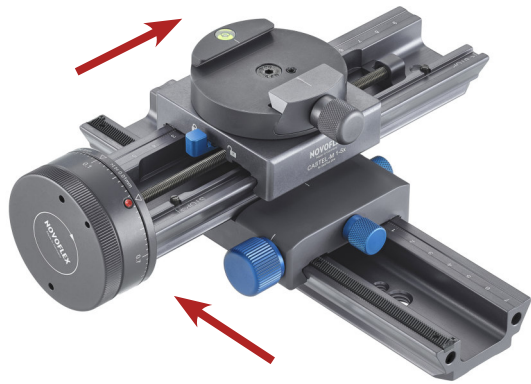
NOVOFLEX offers a wide range of accessories for macro photography, including bellows, focusing racks and reverse adapters.

Our MagicStudio light tables and backgrounds are particularly suitable for professionally illuminating your subject. Our STASET rod set, which also includes a mini clamp and plant holder is a perfect choice for holding small and delicate things.

The PLATTE-M is specially designed for the CASTEL-M and is used to increase the position of the Q=Mount quick release unit on the sliding block by 23mm, e.g. when using a camera with a battery pack.



In order to set up a cross slide that is used for reproducing a two-dimensional camera movement at extremely close range. A second focusing rack situated below the CASTEL-M is recommended for this particular setup. We recommend the CASTEL-Q, CASTEL-XQ II or a second CASTEL-M.



Information

For more information, advice and tips about our products contact your photo dealer or the distributor of NOVOFLEX products in your country (have a look at the "Where to buy" section of our website to find your distributor) or visit our website www.novoflex.com.

For personal advice about possible accessories which are suitable for your NOVOFLEX product please contact the following phone number or send us an E-mail.

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Focusing Rack CASTEL-M



MANUAL

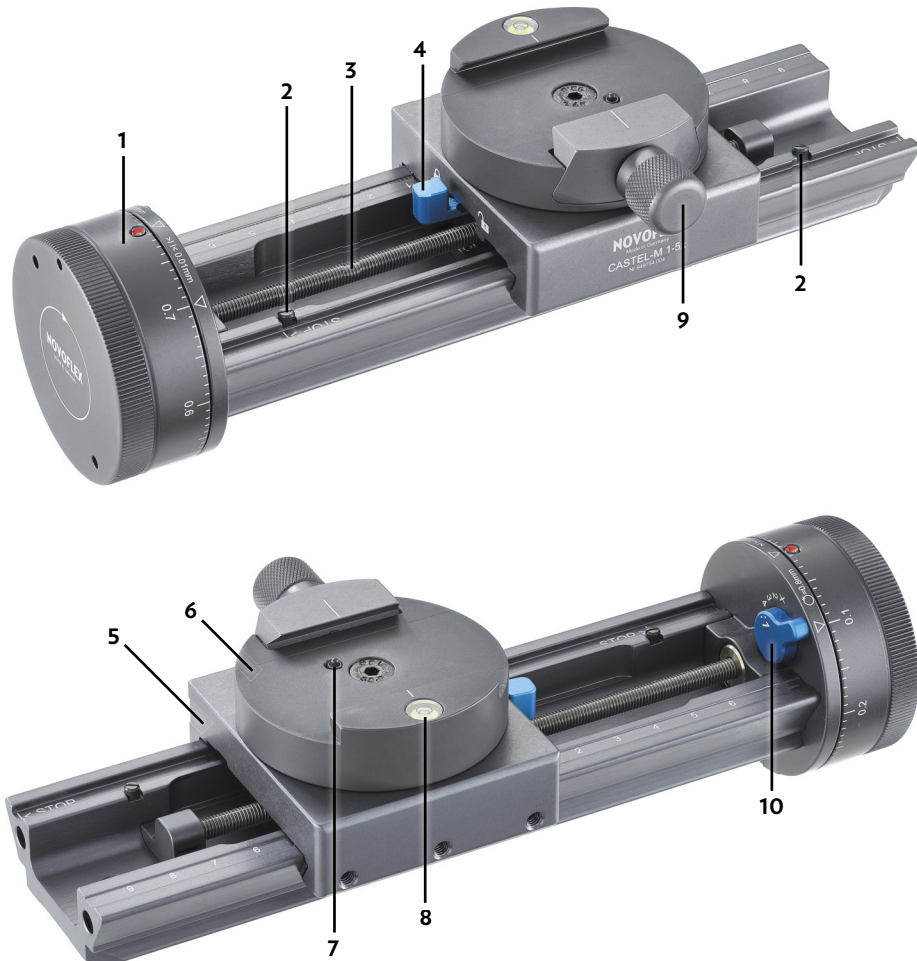


Application Example: Illustration shows optional accessories

Congratulations on your purchase of the CASTEL-M manual focusing rack, which has been optimized for higher magnifications and focus stacking. Whilst you should have no difficulty in using your focusing rack, you may find the following explanations useful.

Nomenclature

1	Focus wheel with length scaling	8	Spirit level
2	Stop screws 3x	9	Clamping screw Q=Mount
3	Spindle	10	Increment selector lever (5 settings)
4	Locking lever spindle	11	Milling cutout for safety pin
5	Sliding block	12	Tripod mount 1/4"-20
6	Quick release unit Q=Mount type ARCA	13	Tripod mount 3/8"-16
7	Safety pin on quick release unit	14	Dovetail guide type ARCA



Example: For an APS-C sized sensor with a permissible circle of confusion diameter of 0.0178mm, f-stop setting 4 and a magnification of 2:1, the depth of field is $2 \times 0.0178\text{mm} \times 4 \times (1 + 2) / 22 = 0.1068\text{mm}$. Divide this value by 2 to determine a suitable increment. This gives you 0.0534 mm. According to the table on page 9, the 4:1 setting on the blue increment lever is ideal. Alternatively, you can also work with a smaller increment, in this case with the setting 5:1.

Taking the series of photos and further processing

Focus by moving the sliding block to the point where you want the area of sharpness to begin in your subject. Set the blue increment selector lever to the desired magnification number and commence shooting. After each shot advance the focus wheel to the next click-stop. The sliding block is moved forward (i.e.) when the focus wheel is rotated in a clockwise direction. The shooting process ends when you have completely covered the range within the subject you want to be in focus.

The collection of images can be processed using suitable focus stacking software, for example, Helicon Focus or Affinity-Photo etc.



Technical Data CASTEL-M

Dimension	204 x 80 x 57mm / 8.03 x 3.15 x 2.24"
Weight	682 g / 1.50 lbs
Maximum travel	100mm / 3.93"
Increments	0,067mm, 0,038mm, 0,024mm, 0,018mm and step-less
Tripod connection	1/4"-20, 3/8"-16 and Q-Profil (ARCA compatible)
Camera connection	Q-Profil (ARCA-compatible)

Tip: When you are working with a rather low magnification, e.g. 1:1, use the largest click-stop increment (setting 2:1) and take the pictures not at every click-stop, but at every second, third, or fourth click-stop. For even larger increments, switch to operation without click-stops (setting X) and count the engraved markings on the focus wheel or revolutions, e.g. use the scale to take pictures every 0.1mm or after each full revolution (0.8mm).

Increment selection by calculation

$$\Delta_d = 2 Z k \frac{1 + \beta}{\beta^2}$$

Δ_d = Depth of field

Z = Permissible circle of confusion

k = F-stop

β = Magnification

In order to determine a suitable increment with an alternative and more scientific method. Calculate the depth of field which is dependant on magnification, the f-stop setting used and the permissible circle of confusion of your camera's sensor. Use the formula on the left side, or a table which has been calculated using it.

Strictly speaking, this formula applies only to approximately symmetrical lenses with a pupil scale of approximately 1: 1, which is true for most macro lenses.

• Permissible circle of confusion Z

The still permissible circle of confusion diameter is usually estimated at 1/1500 of the film- or sensor diagonal of the camera. For the 35mm format with the diagonal of 43.2mm, this results in a permissible circle diameter of 0.0288mm. Smaller values can be used if the result is to be greatly increased. However, this requires a high-resolution camera.

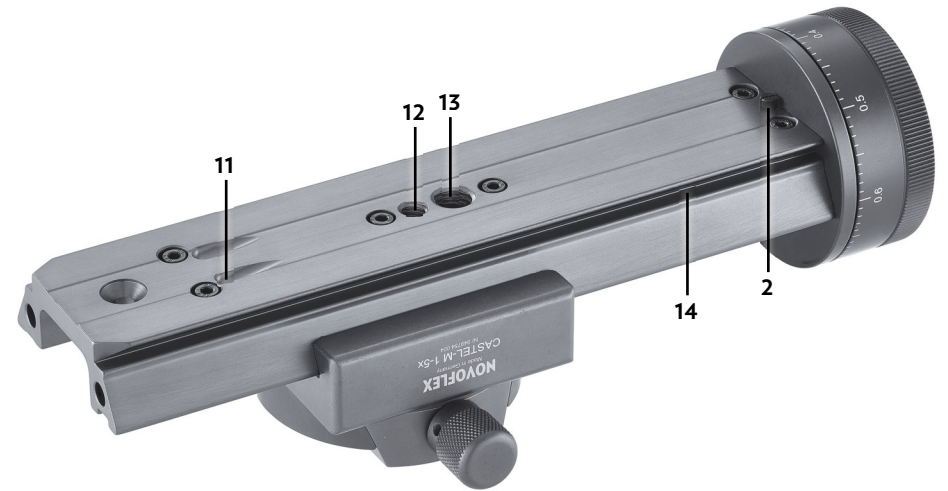
• F-stop k

The f-stop is set on your camera or directly on the lens. Excessive apertures (high f-stops above 11) should be avoided because of the diffraction blurring that occurs with it.

• Magnification β

The magnification is the ration between the image size and the actual object size. To determine it, you must know the sensor size of your camera (the image size).

In order to get enough overlap between the individual planes of sharpness, use only a fraction of the depth of field determined in this way for the increment setting. So divide the result for the depth of field e.g. by 2 or 3.



Product description

The CASTEL-M differs from our classic, mechanical focusing racks by the implementation of a high-precision spindle (3) that drives the sliding block (5) using the rear focus wheel (1). Thanks to the spindle's low thread pitch, extremely small distances can be set reproducibly. That's why the CASTEL-M is particularly well suited for large magnifications and for focus stacking.

The focus wheel can be moved completely freely when the blue increment selector lever (10) is set to X. With the help of the scale on the focus wheel, distances can be set precisely and reproducibly. One full clockwise rotation moves the sliding block 0.8mm forward. One engraved division mark on the focus wheel scale corresponds to 0.01mm movement of the sliding block.

For focus stacking with magnification greater than 1:1, the movement can be interrupted by click-stops, i.e. the focus wheel always locks into place after a preset distance when turning. The individual shots are then taken at each click stop. For focus stacking with magnifications of 2:1, 3:1, 4:1 and 5:1 suitable increments are available, which are set using the increment selector lever (10) on the inside of the focus wheel. The distances have been optimized for cameras with a 35mm full-frame sensor (permissible circle of confusion diameter 0.025mm) and a depth of field with an aperture of F4 on the lens. The large aperture was chosen to avoid the onset of diffraction blur as much as possible. In addition, an overlapping of the individual shots, which is necessary for the stacking process, was included.

For cross focusing, the CASTEL-M can either be placed on a second focusing rack, or the sliding block (5) can be disengaged from the spindle using the locking lever (4) on the back and moved by hand.

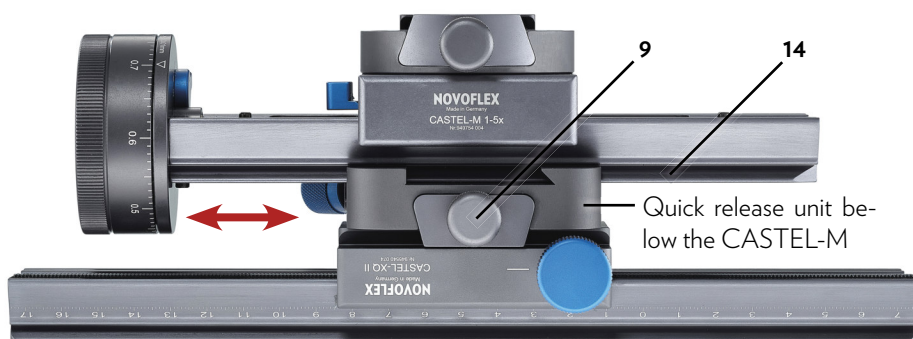
With the help of the spirit level (8) and a leveling unit below the focusing rack, the system can be aligned exactly horizontally, e.g. for reproductions.

Mounting

Attaching the CASTEL-M to a quick release or tripod head

The advantage of using a NOVOFLEX Q=System quick release unit below the focusing rack is that you can roughly preset the focusing distance by moving the rack forwards and backwards.

For mounting, the rail of the CASTEL-M has an ARCA-compatible dovetail guide (14) on the underside. The safety pin of a NOVOFLEX quick-release unit engages into the rail's milling cut-out (11) and prevents unintentional slipping out of the rack if the corresponding clamping screw was accidentally not fully tightened. (illustration on page 3).



For assembly, open the clamping screw (9) of the lower quick-release unit and slide the focusing rack into the coupling. Then close the clamping screw again and check the secure hold of the focusing rack on the coupling.

Alternatively, the 1/4"-20 or 3/8"-16 threaded holes (12) or (13) can be used for attachment to a tripod or tripod head (illustration on page 3).

Attaching the camera or bellows to the CASTEL-M

For mounting the camera on your focusing rack CASTEL-M, a variety of replaceable clamping plates of the type Q=PLATE can be used. These are available in different sizes, with different thread screws and with and without anti-twist pins. Details can be found on our website www.novoflex.com or at your photo dealer.

As an universal clamping plate for macro and stereo photography, we recommend the 84 mm long NOVOFLEX QPL2, image on the right.



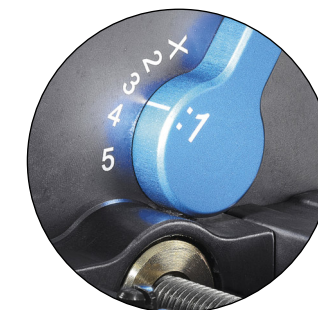
- An ingenious solution to this problem is the focus stacking technique, which works with medium aperture or the so-called optimal aperture. Here, a larger number of shots are taken at different distances from the subject and at different focus points. The short focus area thus moves from shot to shot through the image. A software then calculates the individual images of shallow depth of field to form an overall image with a large depth of field.

Focus Stacking

For focus stacking, the movement can be interrupted by click-stops, i.e. the focus wheel always locks into place after a preset distance when turning. The individual shots are then taken at each click stop. Four preset increments of 0.067mm, 0.038mm, 0.024mm and 0.018mm are available. These are set on the blue increment lever (10) on the inside of the focus wheel. In the X position, the movement is done without click-stops.

Increment settings on the CASTEL-M

Setting	Steps per revolution	Increment	Depth of field at f4*
2:1	12	0,067mm	0,142mm
3:1	21	0,038mm	0,080mm
4:1	33	0,024mm	0,053mm
5:1	45	0,018mm	0,037mm



* on a 35mm full-frame camera with a circle of confusion of 0.025mm

Recommended camera and lens settings

A prerequisite for successful stacking is a stable setup, a static subject, uniform lighting conditions and exposure, i.e. manual mode on your camera with a constant shutter speed, f-stop and ISO setting. It is also recommended to use a fixed colour temperature value rather than Auto White Balance which can vary during the stacking process.

For the best image quality use a medium aperture or commonly referred to as the optimal aperture such as f/4 or f/5.6.

Choice of increment by trial and error

The distance between two shots should be about half the depth of field or less.

A suitable increment setting can easily be determined by trial and error. With the lens stopped down, look through the camera's viewfinder and try all 4 increment settings. To do this, turn the focus wheel from click-stop to click-stop. If a point in the subject appears sharply at a minimum of two click-stop, you have moved within the depth of field. If the same point is slightly blurred at the next (third) click-stop, you have found a suitable increment setting.

Attention: The sliding block must not be turned further with force at both end positions of the rail, otherwise the spindle may be damaged. A corresponding note is given by the two STOP markings and stop screws (2). There is another stop screw on the underside that protects the focus wheel from damage. Never remove these screws!

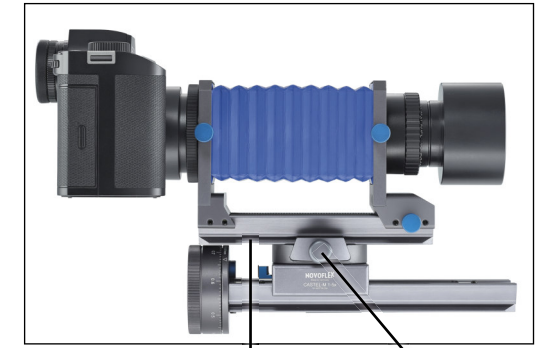


Practical tips

- The **depth of field** depends only on the magnification and the f-stop setting used. For close-up and macro shots, the depth of field is almost always shallow. As a rule of thumb: At f-stop 8 and image ratio 1: 1, depth of field extends for about 1mm. Stopping down by 2 stops doubles the depth of field; opening by 2 stops halves the depth of field.
- The **magnification** setting can be read directly from the focus ring on many macro lenses. However, this also depends on the sensor size. To determine the magnification individually for your system, proceed as follows: Photograph a ruler vertically and determine the width of the image in mm. Then divide the sensor width of your camera by the value determined in this way. With a medium format camera (44mm sensor width) and 22mm image, for example, you have a magnification of 2:1 (44:22=2:1).
- With increasing magnification in the close-up and macro range, one encounters the problem of decreasing depth of field. Objects are therefore only sharply displayed in a small area, while the foreground and background appear blurred. Very strong stopping down, which extends the depth of field, leads to **diffraction blur** and significantly affects the quality of the picture. The gain in depth of field is often not large enough.



Clamping plate with Q=STOP TC



Dovetail guide, type ARCA 9

Mount the clamping plate below the camera or tripod collar using the camera screw provided (included in the scope of delivery of the clamping plate).

To mount NOVOFLEX bellows from the BALPRO and BAL-F series, use the ARCA type dovetail guide on its underside.

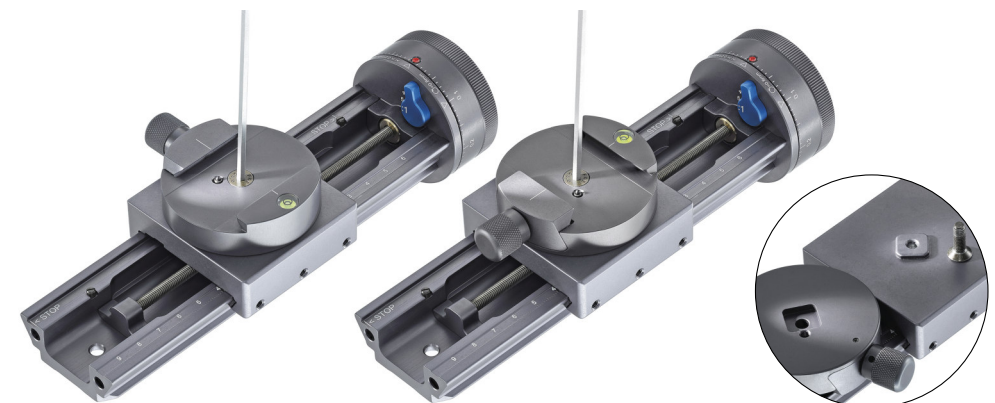
Open the clamping screw (9) of the quick release unit and slide the clamping plate into the coupling. Then close the clamping screw again and check that the mounted device is securely held on the focusing rack.

To disconnect the mounted device, proceed in reverse order.

Rotated assembly of the quick release unit on the sliding block

If necessary, e.g. for setting up a cross-focusing rack, you can mount the quick release unit (6) rotated by 90°, 180° or 270° on the sliding block (5). The position of the clamping screw (9) is then at the front, on the other side or at the back.

Using a size 3 Allen key, remove the screw in the center of the coupling, lift the quick release unit, turn it to the desired angle and reinstall the screw. A cut-out on the underside ensures exact alignment parallel or transverse to the direction of movement of the sliding block.



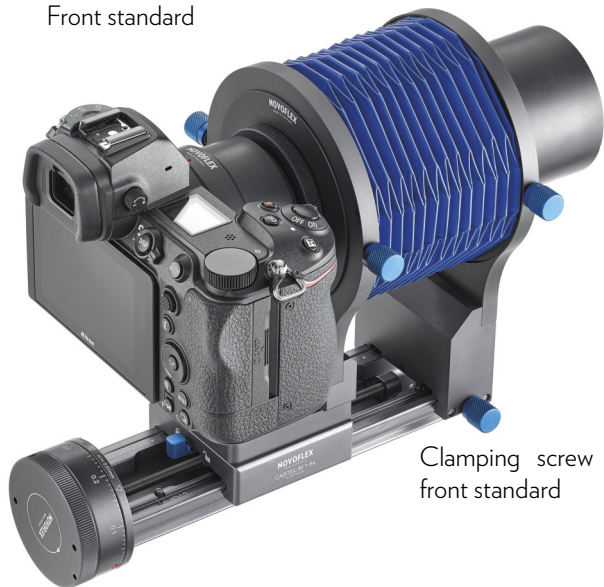
Installation of the CASTBAL-PRO bellows attachment

Instead of a camera, lens or bellows, the CASTBAL-PRO bellows attachment can also be mounted directly on the sliding block (5) of the CASTEL-M. Combined with appropriate lenses, this bellows attachment is suitable both for focus stacking in macro photography and for ambitious product photography, where absolute sharpness and maximum depth of field are important. For this we particularly recommend the Schneider Kreuznach Pyrite 4.5/90.



Camera standard

Front standard



Clamping screw front standard

The stacking steps are usually done by moving the camera standard. This has the advantage that the position of the lens does not change in relation to the subject, which can be important for controlling the reflections when taking pictures of jewelry, for example.

In product photography, larger objects can also be stacked in this way without any problems, since only the focus is adjusted and, in contrast to the usual stacking methods, the entire distance does not have to be covered.

For assembly, first remove the Q=Mount quick release unit (6) of the CASTEL-M by unscrewing the central fastening screw. Now place the front standard on the sliding block and tighten the central fastening screw again. Then mount the front standard on the dovetail guide of the rail using the corresponding clamping screw of the bellows attachment.

Operation

Turn off auto focus

Switch off the auto focus of your camera or your lens, as this overdrives in most cases. Focusing in the macro range is usually done by changing the shooting distance, ideally with the help of the focusing rack.

Specify the magnification / image section

When taking close-up and macro shots, the magnification (image section) is determined by focusing with the lens and, in the case of bellows, by the length of the extension. Adjust the desired image section so that your subject appears in the viewfinder in the full screen.



Coarse focus by hand

For coarse focusing, set the blue locking lever (4) to the open lock symbol and move the sliding block forwards or backwards by hand. Make sure that you still have enough distance to the stop markings. This distance is needed later for fine focusing. Alternatively, use a second focusing rack or quick release unit below the CASTEL-M for rough adjustment.

Fine focus with the focus wheel (1)

For fine focusing, then set the blue locking lever to the closed lock symbol and turn the rear focus wheel in both directions. One full clockwise rotation moves the sliding block 0.8mm forward. One division mark on the engraved focus wheel scale corresponds to 0.01mm movement of the sliding block.

