Instruction Manual

Roundshot 28-220

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1. System Overview

1.1 Camera system Roundshot 28-220

Camera head

Engine with control unit

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8	Tripod mount (3/8'')
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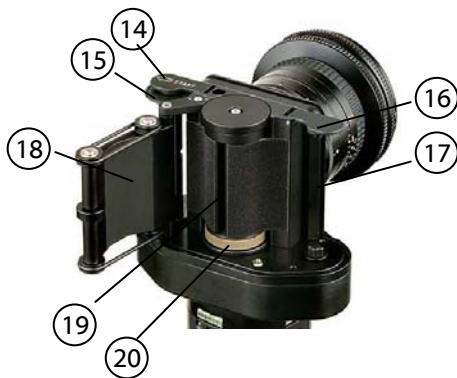
14	Spool holder for non-exposed film
15	Spool for non-exposed film
16	Spool holder for exposed film
17	Spool for exposed film
18	Film pressure plate
19	Exposure slit
20	Film plane and drum for film transport

1.2 Accessories

	Set-up	Application
	Viewfinder In socket for viewfinder (1)	Allows exact control of the image field and the positioning of the camera. Can be turned 360° and can be adjusted for shift lenses
	Quick Adaptor Between tripod (3/8'') and 28-220	1. Quick adaptor for rapid changing of the camera off the tripod 2. Perfect positioning of the camera in its starting position through smooth turning of the upper part of the adapter 3. Built-in water bubble indicator allows perfect calibration when the camera is held over the head 4. Optional security strap for hand-held shots
	Cable for external release (1.6m) In connection for external release (9)	Easy release of the camera if camera is in higher or inaccessible position. 3 possible functions: 1. Activate camera from "stand-by" 2. Start camera 3. Stop camera
	Waterproof case (Peli-Case)	Ideal accessory for secure storage and transport of your equipment

1.3 Functioning of the camera

The camera consists of two parts: a camera head with lens and an engine with integrated control unit. The camera head rotates during exposure around its axis, while the engine and control unit remains fixed. Within the camera head the film transport system is located. When starting the shot, the release opens a small vertical exposure slit (19). The light that enters through the lens is projected on the cylindrical film plane (20). At the same time, the film transport system is activated. This device moves the film smoothly from the spool holder for non-exposed film (14) to the one for exposed film (16). The selected shutter speed defines the rotating speed of the camera.

1.4 Lenses

1.4.1 Lens mount

The camera has been conceived as a compact medium format camera and has been designed for a focal length of 28mm. The parameters for nodal point, length of film and exposure are defined exactly for a focal length of 28mm.

Important: Use only lenses with a focal length of 28mm!

Other focal lengths would require other parameters and would yield, with this camera, distorted and unsharp images.

Important: Normal (AF) lenses have a smaller image circle and lose sharpness at the upper and lower edges. The best results are achieved with shift PC lenses.

Possible lens mounts:

Nikon 28mm
To remove proctecting lid: press lens button (3) in. At the same time move protecting lid counter-clockwise until its mark aligns with the button.
To mount lens: position lens on the bayonet mount and move counter-clockwise until the lens locks
To remove lens: press lens button (3) in while at the same time moving the lens clockwise.
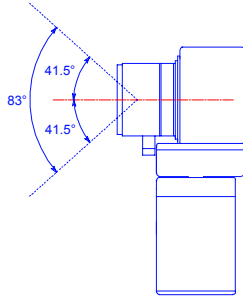
Leica R and Contax 28mm
To mount lens: position lens on the bayonet mount and move counter-clockwise until the lens locks
To remove lens: press lens button (3) in while at the same time moving the lens clockwise.
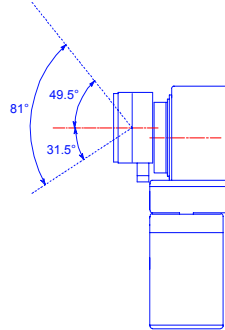(Contax: press from above inwards)

1.4.2 Vertical height of image

Normal lenses

41.5°
83°
41.5°

Height of image: 83°

Shift lenses

81°
49.5°
31.5°

Height of image: 81°

For example: Nikon PC Shift: +/- 8mm

The same applies when the lens is shifted downwards
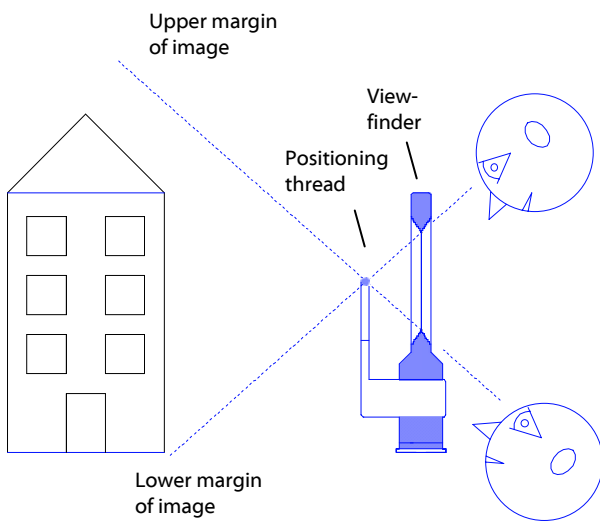
1.5 Viewfinder

1.5.1 Insert viewfinder
The viewfinder can be fitted easily in the socket (1). For this the trimming on the viewfinder needs to point forward. Slide viewfinder in until it clicks to lock. The viewfinder can be rotated by 360°.

Important: do not turn the camera head. This can transport film when the mechanical-electrical lock (5) is off.

1.5.2 Determine image field with the viewfinder
Turn the smaller part of the viewfinder with the positioning thread towards the object.
The vertical image field can be determined as follows:

Upper margin of image

View-finder

Positioning thread

Lower margin of image

Look through viewfinder from above until the upper limit of the viewfinder aligns with the positioning thread. The corresponding point in space is the lower margin of the image.

Look through viewfinder from below until the lower limit of the viewfinder aligns with the positioning thread. The corresponding point in space is the upper margin of the image.

When using a shift lens the viewfinder can be shifted upwards and downwards by 8mm. To do this, slide the L-shaped part (with the positioning thread) up or down.

1.5.3 Remove the viewfinder
Turn viewfinder until you can see a small indent. Then slide viewfinder from socket (1).
Removing the viewfinder is advisable especially for fast shutter speeds and for transport.

2. Control and Functions

2.1 Main switch

The mechanical-electrical lock (5) serves as the main switch for the camera. In the upper position of the lock, the camera head is locked and the camera system turned off. To activate the camera press lock (5) down and press start/stop button (10) once. The camera goes into standby mode 2 minutes after the last selection is done.

We recommend locking the camera after taking images. To do this press mechanical-electrical lock (5) upwards and move camera head clockwise until it locks. This activates the transport lock and prevents unintended rotations of the camera.

2.2 Start/stop button

The start/stop button (10) wakes the camera from standby mode. It releases a shot and stops it if the button is pressed before the image is complete. It also serves to activate or stop the 10 second timer.

2.3 Control unit

The camera display has the following icons and symbols:

T	Shutter speed
360°	Degree of panorama
34	Film counter
(timer icon)	Timer
End	Spooling film to end
New	Insert new film
(battery icon)	Battery status

2.3.1 Shutter speed

The camera operates in 2 speed modes: SLOW and FAST. Beneath the lens a small switch is located:
Position out (left): Shutter speeds of 1/60 to 8 sec.
Position in (right): Shutter speeds of 1/500 to 1 sec. (green LED of camera flashes)

The SLOW mode deactivates the day filter, which allows to let in 3 x more light at the same rotating speed. This is advantageous for shots with little light (for instance at night).

Shutter speed, seconds	Rotation time for 360° panorama, seconds	
	FAST mode	SLOW mode
1/500	0,7	
1/250	1,5	
1/125	3	
1/60	6	0,7
1/30	11	1,5
1/15	21	3
1/8	40	6
1/4	75	11
1/2	150	21
1	300	40
2		75
4		150
8		300

To select the shutter speed press mode button (11) until the icon „T" blinks. Then select the shutter time using selection buttons up (12) or down (13).

2.3.2 Degree of panorama

To select the degree of the panorama press mode button (11) until the icon „degree of panorama" blinks. Then select the degree using selection buttons up (12) or down (13). The angle can be determined from 0° to 999° (entire length of film) in 45° increments.

2.3.3 Film counter

The film counter displays the remaining single shots, counting in 1/8 rotations (i.e. 45°).
120 film: 35 x 45°
220 film: 70 x 45°
The end of film is indicated as soon as the counter reaches the value "0".

2.3.4 Timer

To select the timer press mode button (11) until the icon „timer" blinks. By pressing the start/stop button (10) the 10 second count-down of the timer is activated and the green LED blinks once per second. 3 seconds prior to the shot the frequency of the LED is doubled.

2.3.5 Spooling film to end

To select the spooling function press mode button (11) until the icon „film end" of the display blinks. By pressing the start/stop button (10) the remaining film and paper edge is spooled onto the spool for exposed film (16).

This function can also be selected when the film is not entirely exposed. The icon „spooling film to end" appears automatically at the end of film.

2.3.6 Insert new film

The icon „insert new film" appears automatically after completing „spooling film to end".

Open cover release (2) and lift off cover. Swing film pressure plate (18) backwards. Open spool holder for exposed film (16) and remove exposed film (17). Remove empty film spool (15) and place in spool holder for exposed film (16). Insert new film in spool holder (14), pull paper edge of film between camera and film pressure plate (18) with black surface towards exposure slit (19). Attach film to empty spool (16).

Release mechanical-electrical lock (5) and move film counter-clockwise until „Start" mark of non-exposed film (15) aligns with start mark of spool holder (14). Then swing back film pressure plate (18) until securely fastened.

Put on cover and close cover release (2). If camera in standby mode press start/stop button (10).

To select the film type press mode button (11) until the icon „Film new" blinks (if not displayed automatically). Then select film type (120 or 220) with selection buttons up (12) or down (13). If the correct film is selected press start/stop button (10). The camera transports the non-exposed film forward to the exposure slit (19).

The camera is now ready for exposure.

2.3.7 Battery status

The symbol indicates the status of the battery. With a complete power load up to 100 films can be exposed, depending on speed of operation and temperature. To load the battery connect the camera to a power source with the universal speed charger unit. The maximum loading time is 4 hours, which is indicated by the blinking of the green LED of the universal speed charger.

2.4 Calibration with water bubble indicators

If you want to portray the horizon as a straight line it is important to hold the camera steady. To do this, the camera is calibrated with 2 water bubble indicators that are positioned at the upper end of the engine body. Holding the camera at a significant angle results in a wave-like horizon.

2.5. Light metering

The reading of the exact aperture and shutter time can be done with an external light meter. For optimum results the section of the panorama with most relevance should be taken as a reference. During daylight the section with bright sunlight should not be taken as the primary reading as this may lead to under-exposure of the panorama. The obtained light reading can be set on the lens (aperture) and using the shutter speed function. Some lenses, such as the Nikon AF 28mm, reach optimum image circle only after aperture 11. When selecting lower apertures with this lens a reduction in light and sharpness on the upper or lower margins may occur.

2.6 Distance setting on the lens

The camera system requires exact setting of the lens. The system is optimised for an average distance of 7 metres, i.e., at this distance optimum sharpness can be reached, normally 3 to 5mm after the infinity setting of the lens. Thanks to the slit-scan technology very high depth of field can be reached.

Depending on lens brand and type small differences in focal length and distance markings can occur. That is why we recommend to test the lens in use under different distance settings.

To do this, place the camera on a tripod placed 7 metres away from an object with smaller and larger letters. Ideally leave the aperture open, optionally reduce by one „f-stop" and correct shutter speed accordingly. Take different shots of the object, varying the distance setting slightly each time from infinity to 5 metres. Plot shutter speeds, apertures and distance parameters on a notepad or on a display table.

After film development choose optimum distance setting and mark this value on the lens.

3. Tips and Resources

3.1 Film spools

Always use identical film spools for non-exposed and exposed film, as different brands have different spool dimensions.

3.2 Panorama images

In FAST mode at shutter speeds 1/500 to 1/60 hand-held shots are possible. To do this, hold the engine and control unit firmly in your hands above your head as to avoid to be in the picture.

For shots on a tripod place the camera on the 3/8'' mount on the tripod. To avoid to be in the picture choose slow shutter speeds or use the 10 second timer.

3.3 Length of film and number of panoramas per film

The number of possible shots with the 28-220 camera are displayed in the following table. We recommend using a larger degree of the panorama than actually necessary (for instance 405° for a 360° shot). This allows to choose the best section of the image later.

Length of film used

Film length (mm) =   Focal length x 2 x π / 360 x degree of shot

Focal length	Degree of shot								
	90	135	180	225	270	315	360	405	450
28	44.8	67.1	89.5	111.9	134.3	156.6	179.0	201.4	223.8

Available film length (mm)

120 medium format	780
220 medium format	1,560

Number of panoramas per film
Example 28-220 (28mm lens)

Film	Degree of shot								
	90	135	180	225	270	315	360	405	450
120	17.4	11.6	8.7	7.0	5.8	5.0	4.4	3.9	3.5
220	34.9	23.2	17.4	13.9	11.6	10.0	8.7	7.7	7.0

Example 28-220:   Film for a 360° shot with 28-220 camera (28mm lens) is 17.9 cm long
(28mm lens)   Number of shots per 120 film (780mm long): 3 x 405° und 1 x 360°
   Number of shots 220 film (780mm long): 6 x 405° und 2 x 360°

3.4 Maintenance

The exposure slit (19) of the camera must be kept clean at all times. Remove dust particles with sticky scotch tape to prevent horizontal stripes on the film. The lower, brown rubber ring (film transport) may not be oily or lubricated. If necessary clean rubber ring with spirit or similar liquid.

More tips and resources are available on our website www.roundshot.ch

3.5 Return of equipment / recycling

Your Roundshot product and the accessories are produced from highest quality materials and parts and will provide you continued pleasure. Should you nevertheless want to dispose of your Roundshot equipment one day, it should not be placed in normal waste. The correct disposal of your old equipment is a contribution to preventing possible negative causes for the environment.

For optimum recycling we kindly ask you to return us your camera (with accessories) to the following address:

Seitz Phototechnik AG
Environment & Recycling Department
Hauptstr. 14
8512 Lustdorf / Switzerland

This return shipment to the manufacturer is **free of charge**.
The service is available **worldwide**.

Please contact us to arrange the return shipment and prepare the materials for the delivery. Your camera and accessories will be picked up by our courier service and will be recycled in our factory.

We wish you continued success and fun with your Roundshot 28-220!

4. Technical Data

Filmformat	120/220 medium format
Lens	28mm
Lens mount	Bayonet für 28mm
Lens brands	Nikkor 2.0, 2.8; PC Nikkor 3.5; AF Nikkor 1.4, 2.8; Leica Elmarit R 2.8, Contax Distagon T 2.8; more on demand
Shift	+/- 8mm with PC Shift
Maximum height of image	84° (vertical); 50mm
Length of image at 360°	180mm
360° shots per film	8 x mit 220 Film, 4 x mit 120 Film
Viewfinder	Telrad viewfinder
Distance setting	Optimum at 7m, depending on lens
Slit	2.0 mm
Light meter	-
Fastest scan for 360°	0.7 seconds
Exposure variation (bracketing)	manual
Dimensions (L x W x H)	67 x 116 x 220 mm
Weight	1.5 kg
Control	With selection buttons and LCD
Display	LCD (shutter speed, degree of panorama, shot counter, battery status, timer, film selection, winding functions)
Shutter speeds	1/500 to 8 seconds
Degree of panorama	Selectable in increments of 45° to infinity
Density exposure	-
Timer	10 seconds with bright LED
Power supply	NiMh Akku 4.8V 3.5A
Film transport	Automatic
Power charger	Universal speed charger 100-240V
Calibration	2 water bubble indicators
Film transport lock	Mechanical-electrical
Standard accessories	Power charger, NiMh battery
Possible further accessories	Telrad viewfinder, quick adaptor, cable for external release, waterproof case