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glass made of ideas



VisiLED Series

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1. Introduction/ System description

The VisiLED Series is an innovative illumination system using white LEDs. Specially developed for the fields of stereo microscopy and macroscopy, this system opens up many new possibilities for putting your specimen in the right light.

The excellent, electronic controllability of the LEDs affords the VisiLED Series contrasting methods, which far exceed the possibilities provided by conventional microscope illuminations. Intensive cold light is brought precisely to the specimen – heat-free and with the best-quality white (Color temperature -approx. 5600 K.)!

The illumination system operates completely soundlessly and without vibrating; the light produced does not ripple or flicker. The luminance remains stable irrespective of voltage fluctuations.

The VisiLED Series comprises the following components:

- MC 1500 controller* and MC 1100 for optimum contrasting as well as the MC 750 basic controller. When using the MC 1500 and MC 1100 all LED illuminations can be controlled in segments. The MC 750 controller is a cost effective alternative when less possibilities of contrasting are required.
- Three brightfield ringlights for intensive incident illumination (S80-25, S80-55, S80-65N)) and a ringlight with reduced outside diameter (S40-75).
- A particularly ringlight with exchangeable brightfield working distances and darkfield adapter (Slim-Ringlight).
- A darkfield ringlight for intensive illumination in incident darkfield (S40-10D).
- An adapter for connecting the darkfield ringlight to 66 mm and 70 mm Ø objectives.
- An adapter kit for combined use of brightfield ringlights with the incident darkfield ringlight.
- Two transmitted light stages for applications in the transmitted light bright field or in the transmitted light darkfield.
- Additional accessories: Foot switch RS232-USB1.1 converter, polarization filter, diffuser, protective glass.

The power supply for the system is provided by an electronic power supply with wide range input (100V -15% to 240V +10%). Power cords suitable for use in different countries are available as accessories.

* US patent application pending

The MC 1500 can control up to two illumination units (units A and B), including, e.g. the light intensity settings, a selection of five segment modes for each unit and also rotating or pulsating illumination.

Important properties of the VisiLED system with MC 1500 controller

In this way, the illumination system makes it possible to combine the light from two different LED illuminations on one single microscope (e.g. “incident light brightfield with incident light darkfield” or “incident light with transmitted light”). For example, a quarter circle illumination of an incident brightfield ringlight can be mixed with also a segmented or a full circle illumination of a transmitted light stage.

Through its synchronized control of the connected VisiLED illuminations the MC 1500 ensures that the characteristics of the set mixed light remain constant whether operating in rotation, strobe, trigger or flash mode:

- Rotation mode increases the impression of three dimensionality with structured specimens, also when viewed with a monitor.
- Strobe mode serves to produce “frozen images” of cyclically moving specimens, e.g. rotating fans.
- In trigger mode light pulses can be released using external control signals (trigger signals). In this way, e.g. the VisiLED illumination is only activated by an external Machine Vision system if an image of the specimen is meant to be recorded.
- In flash mode the set mixed light can be momentarily enhanced by an intensive single pulse so that the exposure times of connected photo equipment can be reduced – the mixed light “flashes”.

The MC 1500 LED controller possesses memory stations for saving the set mixed light and so makes it possible to switch between several mixed light conditions.

Every stored setting can be called up again quickly and reproducibly using the memory keys or the foot switch. The assignment of memory positions in the MC 1500 remains available – even after switching the controller off and on or after cutting the unit off from the power supply!

The MC 1500 also has an interface for connection to a computer. In this way commands for adjusting the LED illuminations can be transmitted from the computer to the control unit. By storing the setting files in the PC many user-defined configurations for mixed light can be permanently archived and when required downloaded to the MC 1500.

Important properties of the VisiLED system with MC 1100 controller

The MC 1100 controller can be used to control one VisiLED illumination unit.

The most important illumination parameters: light intensity setting, selection of five segment modes and rotating illumination in both directions, can be ergonomically and intuitively controlled using clearly arranged adjustment knobs.

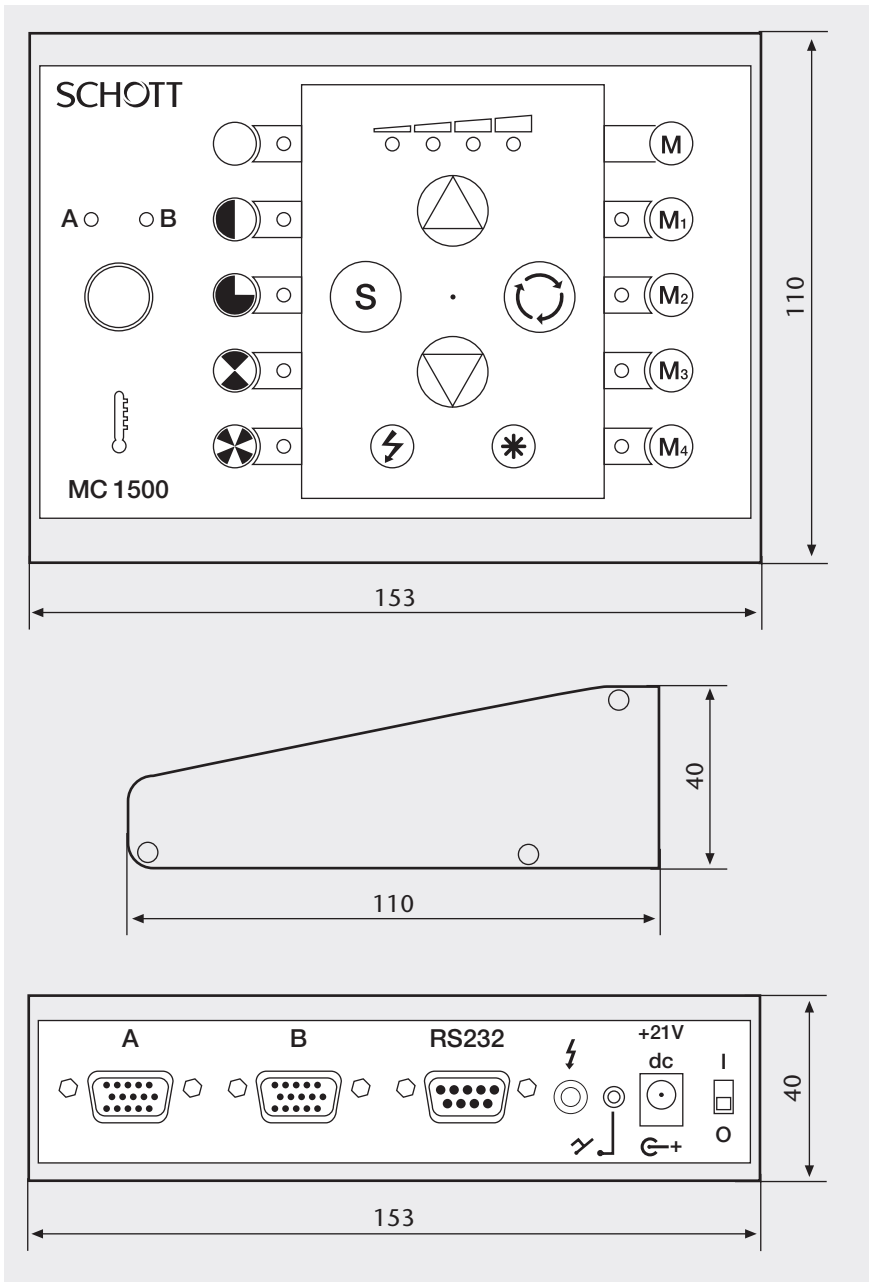
If required, the complete illumination system can be earthed via an ESD connector.

Important properties of the VisiLED system with MC 750 controller

The MC 750 controller can also be used to control one VisiLED illumination unit. Only the light intensity setting can be adjusted with the controller, meaning it is the ideal VisiLED control unit for more simple illumination applications.

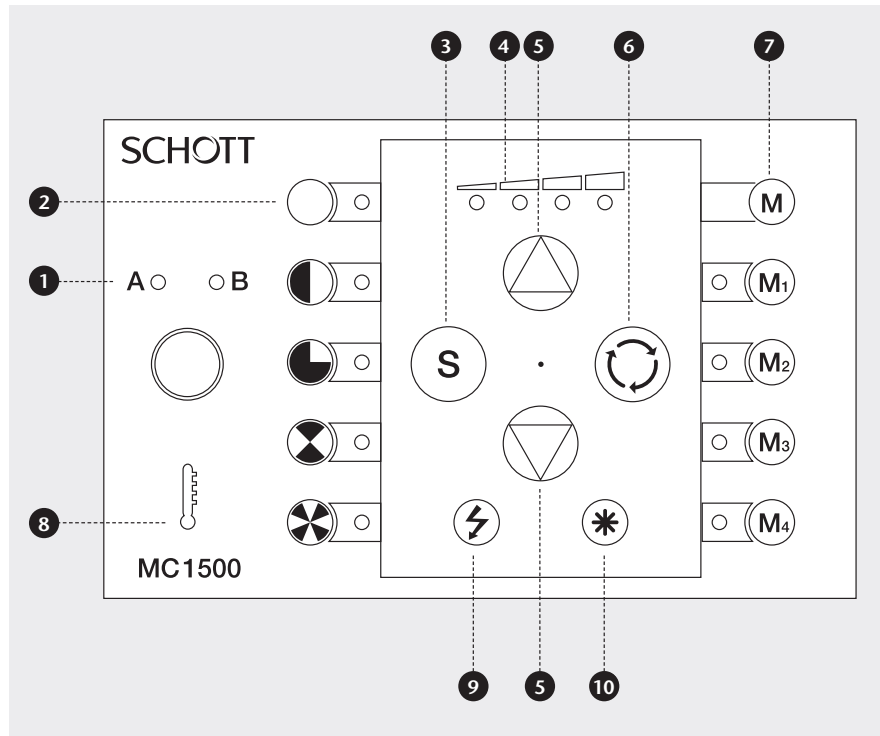
The VisiLED system is equipped with a thermo guard: the LED temperatures in each VisiLED illumination are continuously monitored by the controller. Should the permitted values be exceeded then following a pre-warning the affected LED unit is switched off. The thermo guard ensures a long lifetime for the LED illumination unit – even when set at the maximum brightness level.

2. Controller
2.1 MC 1500



in mm

Operating controls

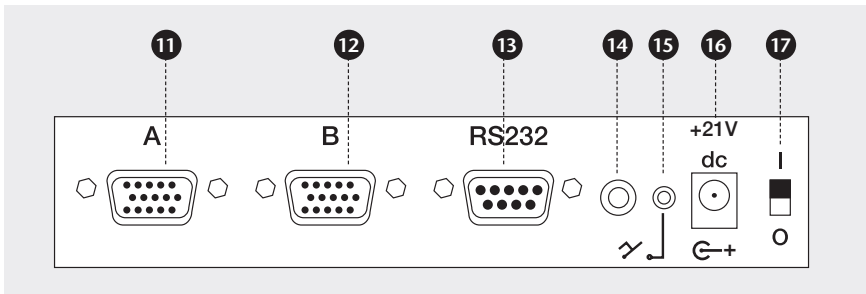


Several special functions like e.g. flash mode can only be adjusted via the PC

- 1 A/B unit selector key with LED display**
Only illumination parameters of the VisiLED unit (A or B) selected using (1) can be set by the key-board of the MC 1500! The LED indicators of the MC 1500 display the settings of the selected unit only. The illumination is not affected by solely pressing the selector key.
- 2 LED display for segment setting**
Shows the current segment mode of the selected illumination unit A/B.
- 3 Select key for segment setting**
Setting of segment mode for selected unit A/B.
- 4 LED display for light intensity adjustment**
Shows the relative brightness of the selected unit A/B.
- 5 Keys for brightness adjustment**
Keys for increasing/reducing the brightness of the selected unit A/B. When operating in activated -strobe or trigger mode the keys (5) have special functions (see Section 8.6).
- 6 Key for single step and continuous rotation**
Single step rotation of the selected unit A/B by pressing key (6). "On/off" continuous rotation of selected unit A/B by holding down key (6) for more than 2 seconds. "On/off" synchronized rotation of illumination units A and B by pressing or holding down key combination (10) + (6). Under synchro-nized rotation the set mixed light characteristics is retained.
- 7 Memory area**
Memory keys M1 to M4 for calling up stored illumination conditions. Key combination (M) + (M1) to (M) + (M4) for saving the currently set mixed light.
- 8 Thermo guard**
Red, blinking LED (8) warns of increased temperature of the illumination unit A or B. When the maximum permitted temperature is exceeded affected VisiLED unit is switched off and display (8) is permanently lit up.
- 9 „Strobe“ key**
Activation/deactivation of strobe mode for the -selected illumination unit A/B. Special functions when strobe mode activated: Key (5): Setting of strobe frequency; Key combination (10) + (5): Setting of strobe pulse duration.
- 10 „Star“ key**
Only functions when pressed in combination with other keys.
- 9 10 „Trigger mode“ key combination**
Activation/deactivation of trigger mode for the selected LED unit. Special functions when trigger mode activated: Key (5): Setting of duration between external trigger pulse and light pulse.

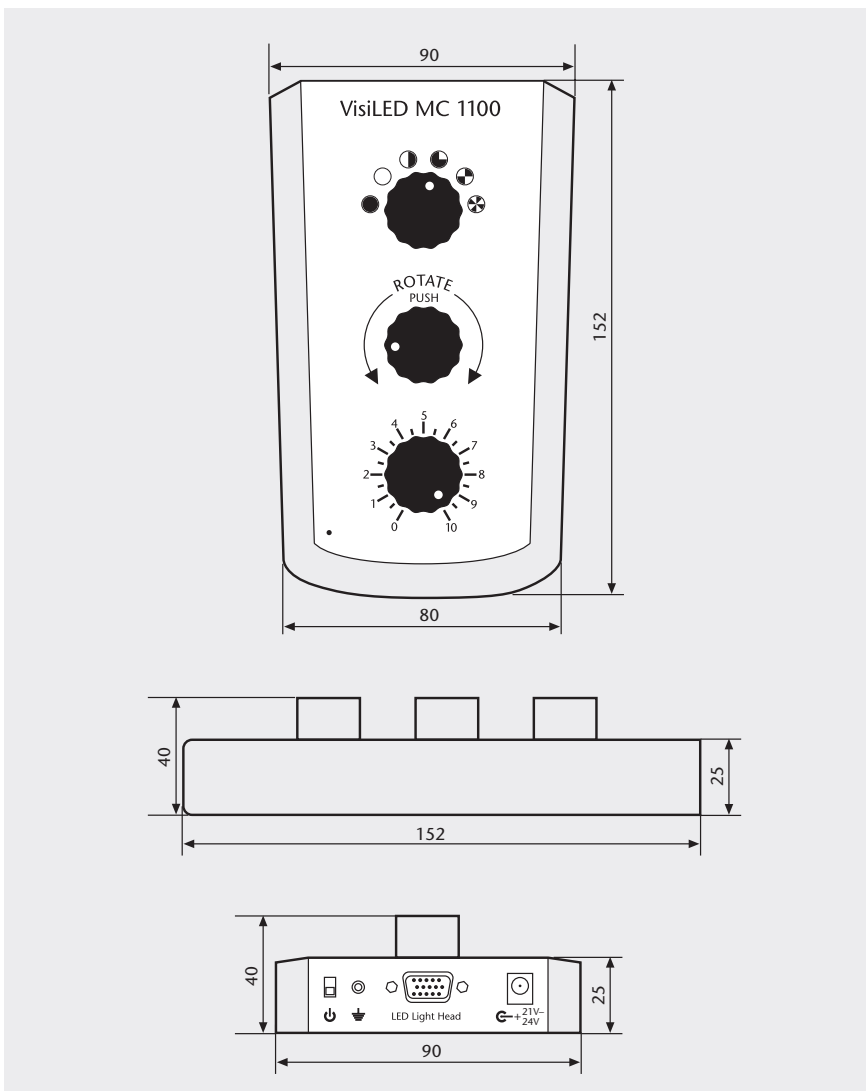
Subject to modifications and amendments

Connections on the rear panel of appliance



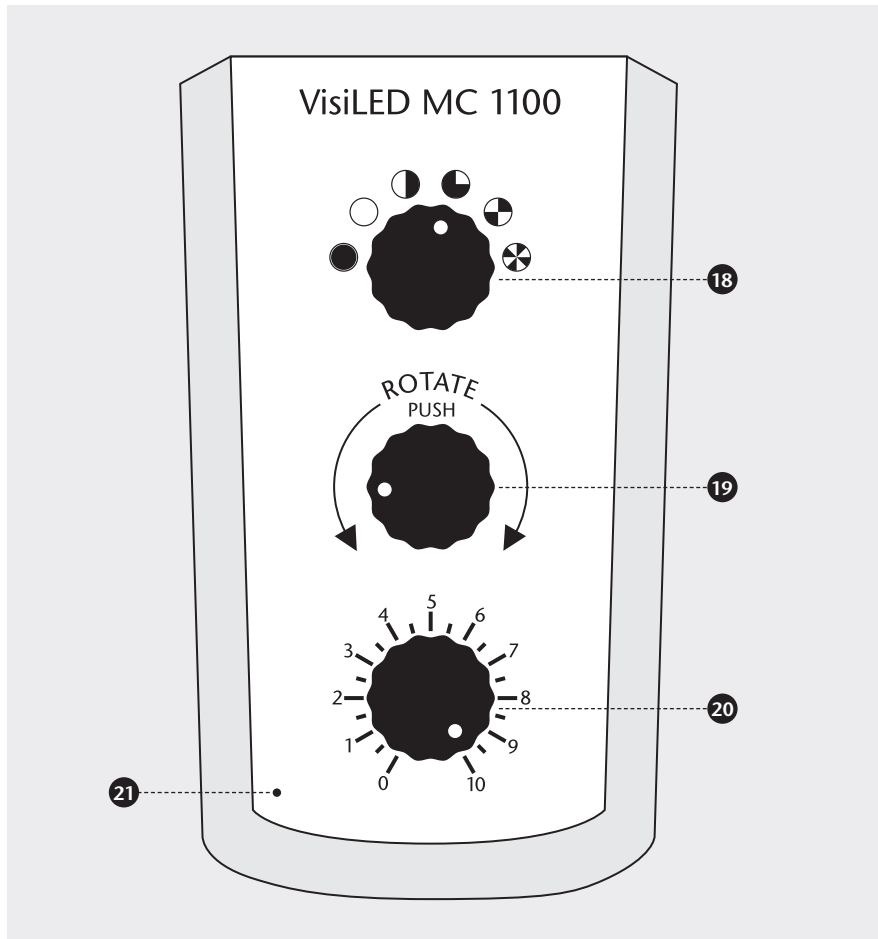
- ① Connection for illumination unit A
- ② Connection for illumination unit B
- ③ Connection for RS232 cable or RS232 to USB1.1 converter (accessory)
Facilitates control of MC 1500 via computer.
- ④ Facilitates control of MC 1500 via computer.
Facilitates trigger and flash mode.
- ⑤ Connection for foot switch (accessory)
Facilitates calling up of memory positions using foot switch.
- ⑥ Connection for electronic power supply
- ⑦ On/off switch

2.2 MC 1100



in mm

Operating controls



18 Adjusting knob for segment control

Adjusting knob for segment control of connected illumination unit.

19 Adjusting knob for rotation

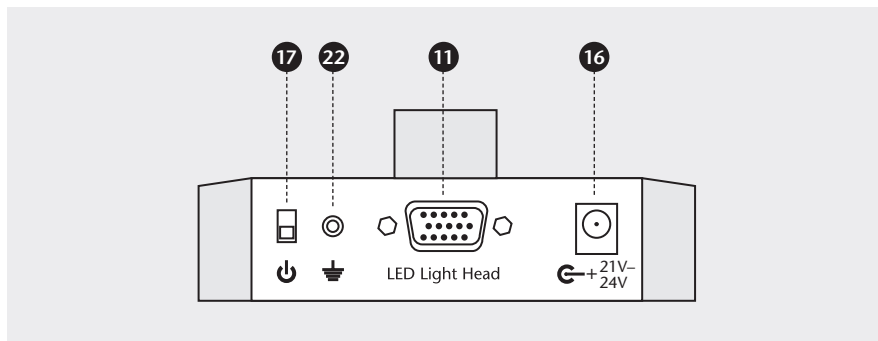
Adjusting knob for segment rotation in both directions, press for over 1 second for continuous rotation. To set rotation speed press for over 5 seconds.

20 Adjusting knob for light intensity setting

Adjusting knob for setting light intensity of connected illumination unit.

21 Operation display

Connections on the rear panel of appliance



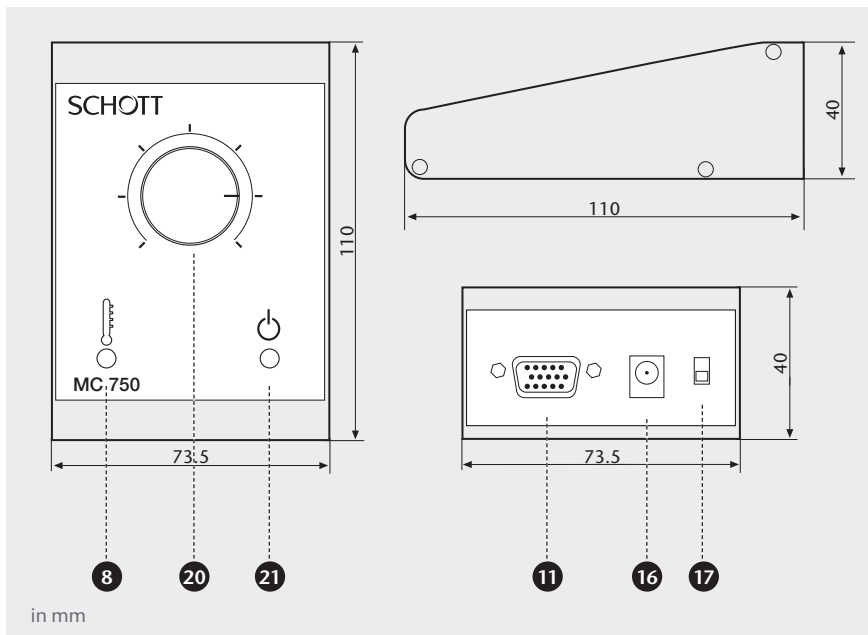
11 Connection for illumination unit

17 On/off switch

16 Connection for switching power supply

22 Earthing connection




2.3 MC 750



- 8 Thermo guard**
A red LED (8) blinks to warn of increased temperature in the connected illumination unit. If the maximum permitted temperature is exceeded the LED unit is switched off and the display (8) is permanently lit up.
- 11 Connection for illumination unit**
- 16 Connection for electronic power supply**
- 17 On/off switch**
- 20 Adjustment knob for light intensity setting**
Adjustment knob for continuous setting of the brightness of the connected illumination unit.
- 21 Operation display**

3. Intended use and important information

Symbols used

Symbol	Meaning
	Warns of a danger spot (caution, obey documentation)
	Off
	On

Intended use

The VisiLED series is an innovative illumination system using white LEDs, specially developed for the fields of stereo microscopy and macroscopy. The system is intended for industrial, laboratory and medical applications. For medical applications the system is designed to illuminate observation areas where there is no indirect or direct contact with patients.

Safety information



Please read and follow these instructions carefully. The VisiLED system's safety cannot be guaranteed if they are not obeyed.

- In accordance with the EN 62471 standard the LED illuminations of the VisiLED Series are classed as products under class 1.
- The VisiLED Series illumination system conforms with the following -European Directives:
2014/35/EU (Low Voltage Directive)
EMV Directive 2014/30/EU
2011/65/EU (RoHS)
The technical documentation and full compliance with the standards listed below proves the conformity with the essential requirements of the above-mentioned EC Directives:
EN 61010-1:2010
EN 62471:2008
EN 61326-1:1997 + A1:2013
- LEDs feature a very high luminance. Therefore, do not look directly into the LEDs when the illumination is switched on (Danger of ophthalmic injury.)!
- To avoid unnecessary stressing of your specimen by illumination with visible light, reduce the brightness and duration of illumination to the minimum required.

Important information

- Please take care that the VisiLED system is used with electronic power supplies and power cords specified by SCHOTT – only then is faultless operation and conformity with standards guaranteed!
 - Please ensure that the electronic power supply is only operated with the specified mains voltage. The power supply must only be plugged into sockets which are earthed. More details regarding the electronic power supply can be found in Section 12, Technical data.
 - In the event of insufficient cooling the integrated thermo guard switches off the illumination unit temporarily to protect the LEDs.
 - The illumination system has been developed for operation in dry rooms only.
 - The system must not be used in explosive areas.
 - Safe disconnection from the power supply takes place only by pulling out the mains plug.
 - Before changing the system configuration always switch off the controller and pull out the mains plug.
 - For reasons of energy saving we recommend to pull out the mains plug and so disconnect the electronic power supply from the mains voltage when the VisiLED system is not in use.
 - The electronic power supply or the VisiLED controllers or illumination units must not be opened or dismantled. Technical modifications to any parts of the VisiLED system are forbidden. Repairs must be carried out only by the manufacturer or by its authorized customer service agencies.
 - Please ensure that every user of the VisiLED system has quick access to these instructions.
 - The manufacturer is not liable for damage caused by failure to obey these instructions.
-
- The LED transmitted light brightfield stage has been developed for operation in a microscope stand or in another metallic heat sink.
 - If the transmitted light brightfield stage is operated without heat sink the metal housing can heat up to approx. 45°C. However, the diffuser disc and the specimen field do not heat up to the same level.
 - If the housing is accidentally touched the temperature may seem unpleasantly warm but it is technically safe. The operation of the illumination is not affected!

Information for operating the LED transmitted light brightfield stage

4. System set-up

The system should only be set up when the LED controller is switched off (on/off switch [17] in position **O**) and with mains plug disconnected.

Please take care that the VisiLED system is used with electronic power supplies and power cords specified by SCHOTT and that the power supply is only -operated with the specified mains voltage.

To operate the MC 750 and MC 1100 first attach the LED illumination unit to the controller connection (11). Please fix the connected plug using the two fastening screws. Then connect the electronic power supply with connector (16). Finally connect the power cord to the power socket (for permitted power voltage see Section 12, Technical data).

The MC 1500 memory controller allows the connection of up to two VisiLED illumination units. Please connect the unit(s) with connectors (11) or/and (12) of the controller. Fix the connected plug using the two fastening screws.

If connection to a PC is required please attach the RS232 cable provided or the USB 1.1-to-R232-converter (accessory) to the MC 1500 controller connection and fix with the fastening screws. Connect the other side of the RS232 cable or converter to a free RS232 or USB interface in accordance with the instructions for your computer.

To install the user software for the MC 1500 please follow the installation instructions on the supplied CD-ROM.

If required, connect the foot switch (accessory) to the MC 1500. Finally connect the electronic power supply with connection (16) of the MC 1500 and the 3-pin power cord with the input side of the electronic power supply.

When the system configuration has been set up connect the mains cable to the specified mains voltage (see Section 12, Technical data).

5. Start-up procedure

The system is switched on/off by operating the ON/OFF switch (17).

Position **O** : The VisiLED controller is switched off.

Position **I** : The VisiLED controller is switched on.

The output voltage of the electronic power supply is stabilized. This ensures stable light performance, irrespective of power fluctuations. The LED light -produced is ripple-free.

When the controller is switched on the operation display (21) is lit green.

The MC 750 makes it possible to adjust the brightness of the connected VisiLED illumination steplessly. To increase the brightness please turn the knob (20) clockwise.

To increase reproducibility the adjustment area between the two end positions at 0% and 100% light is additionally marked with 5 graduation marks.

When the controller is switched on the operating display (21) is lit green.

MC 1100 makes it possible to adjust the light intensity setting of the connected LED illumination unit steplessly. To increase the brightness turn the lower adjusting knob (20) clockwise.

For increased reproducibility the 0% to 100% adjustment area between the two end positions is additionally marked with 19 graduation marks, i.e. the scale ranges from 0 to 10, each with an additional mark.

All VisiLED illumination units can be controlled in segments using the MC 1100 controller.

By selecting the optimum segment mode for each specimen an object contrasting can be achieved which far exceeds the contrasts possible using a non-segmented illumination unit.

Repeated activation of the select key (18) changes the segment mode. VisiLED illumination units can be operated in full-circle, semi-circle, quarter-circle, 2-segment mode and 4-segment mode using the MC 1100.



6. MC 750 operation

6.1 Operation Display

6.2 Light intensity setting

7. MC 1100 operation

7.1 Operating display

7.2 Light intensity setting

7.3 Segment control

7.4 Single step and continuous rotation

The MC 1100 controller makes it possible to turn the segment setting of all VisiLED illumination units step by step or also to put them into power rotation mode.

The rotation mode increases the impression of three-dimensionality with structured objects, especially when viewed with a monitor.

By turning the middle rotation key (19) clockwise the segment setting of the connected illumination unit moves correspondingly clockwise in 1/8 circle steps. If the key (19) is turned anti-clockwise, then the set segments move correspondingly anti-clockwise.

By pressing (> 1 s) the rotation key (19) the segment setting begins to rotate clockwise in 1/8 circle steps. The rotation is deactivated by pressing the key (19) again.

If required the rotation speed can be adjusted by pressing the rotation key (19) in rotation mode (> 5 s) until the full-circle flashes. The rotation speed can be reduced by turning the rotation key (19) anti-clockwise and increased by turning clockwise. The adjusted speed is stored by pressing the rotation key (19) again.

The MC 1500 controller makes it possible to control up to two LED illuminations (A and B). In order to keep the control panel clearly arranged and compact separate operational controls for each unit A and B have been -dispensed with. A **changeover button** takes their place:

By pressing the unit selector key (1) the MC 1500 operating controls are routed to VisiLED unit A or B. The green LED indicators above key (1) display which of the two illumination units (A or B) has been selected.

- Only the selected VisiLED unit (A or B) can be set by the MC 1500 operation controls! This applies to the segment setting (3), the light intensity setting (5), the rotation setting (6) and the key (9) "Strobe on/off".
- The LED displays (2) and (4) on the MC 1500 control panel show the settings for the selected illumination unit only! The segment mode and the intensity setting of VisiLED unit A and B **cannot** be read off **concurrently**, but rather **successively** – by repeatedly pressing the key (1).
- The illumination is not changed by solely pressing the selector key (1). In particular the light of the VisiLED units is not switched on or off!

Synchronized rotation (see Section 8.4):

- "Rotation of mixed light" and setting of "rotation speed"

Memory area (see Section 8.5):

- "Storage of mixed light" and "Calling-up mixed light"
- If just the storage of light from one of the two LED illuminations (A or B) is required then the second LED unit should be dimmed down to intensity 0.

Strobe mode (see Section 8.6):

- Setting of "Strobe frequency" and "Strobe pulse duration"
- In this way "synchronized strobing" is guaranteed if both LED illuminations are in strobe mode! Individual activation/deactivation of the strobe mode using key (9) is possible for each LED illumination (see above).

Trigger mode (see Section 8.6):

- "Trigger mode on/off" and "Trigger delay time" (time between trigger pulse and light pulse)

8. MC 1500 operation

8.1 A/B unit selector key

Please note

All other MC 1500 settings affect both illumination units

8.2 Segment control

All VisiLED illuminations can be controlled in segments using the MC 1500.

By choosing the optimal segment mode for each specimen an object contrasting can be achieved which far exceeds the contrasts one gets using a non-segmented ringlight.

Repeated activation of the select key (3) changes the segment mode of the selected illumination unit (A or B):

„Full circle → Semi circle → Quarter circle → 2 segment mode → 4 segment mode → Full circle → ...“



The LED indicators of the segment control (2) display in which segment mode the selected unit is currently set.

To change or check the segment mode of the second VisiLED unit this must first be selected using the unit selector key (1).

If the MC 1500 is being controlled via a computer then all 8 individual segments of each illumination unit can be accessed. By combining the individual segments user-defined segment modes can be set.

8.3 Light intensity setting

The MC 1500 makes it possible to set the brightness of all VisiLED illuminations.

By pressing key (5) the brightness of the selected LED illumination unit (A or B) can be set. Short tapping increases or decreases the brightness in small steps. Continuous pressing of (5) increases (or decreases) the brightness steplessly.

The LED indicators of the brightness setting (4) display in which brightness range the selected illumination unit currently is:

Range	LED indicator display (4)	Light intensity of selected LED illumination		
1	no LED lit	0 %	to	1 %
2	one green LED	2 %	to	32 %
3	two green LEDs	33 %	to	59 %
4	two green and one yellow LED	60 %	to	82 %
5 – „Overdrive“	two green, one yellow and one red LED	83 %	to	100 %

To change or check the light intensity setting of the second LED unit this must first be selected using the unit selector key (1).

If the MC 1500 is being controlled via a computer then the intensity of each individual LED unit can be specified to the exact percentage.

In brightness range 5 the selected LED unit is in overdrive mode: maximum light intensity of LEDs is reached!

The MC 1500 makes it possible to turn the segment setting of all VisiLED illuminations step by step or also to put them into permanent rotation. If two VisiLED units are connected to a MC 1500 then it is possible to synchronously rotate both illuminations: the mixed light characteristics remains constant when rotating around the specimen under observation.

The rotation mode increases the impression of three-dimensionality with structured microscope objects, especially when viewed with a monitor.

Short tapping of the rotation key (6) turns the segment setting of the selected illumination unit (A or B) step by step by a 1/8 circle. If the key is pressed for longer (> 2 seconds) the permanent rotation of the actual segment mode for this LED unit is activated/deactivated.

To be able to turn or rotate the light of the second VisiLED unit this must first be selected using the unit selector key (1).

The synchronized turning of the illumination of **both** units (A and B) is achieved by pressing down key (10) at the same time as key (6). If this key combination is held down for longer than 2 seconds the permanent synchronized rotation of the mixed light is activated or deactivated.

When the MC 1500 is controlled via the computer it is also possible to specify the direction and exact speed of the rotation.

8.4 Single step and continuous rotation

8.5 Memory functions

The MC 1500 controller possesses memory stations for saving the set mixed light and makes it possible to switch between several mixed light conditions.

In this way it is possible e.g. to observe the specimen under different defined illumination conditions without requiring time-consuming re-setting of the light.

In addition it is possible to archive the configurations as setting files in the PC and when required download to the MC 1500.

Storage of mixed light

The current set illumination condition can be stored by pressing down the memory key (M) and selecting a memory key (M1) to (M4). In doing so previous settings in this memory station are overwritten.

Calling up mixed light

A stored illumination condition can be called up again by pressing the appropriate memory key M1 to M4. After calling up a stored condition the green LED display belonging to the memory station lights up.

Please note

- The settings stored in the memory positions of the MC 1500 remain available – even after switching the controller off and on or after cutting the unit off from the power supply temporarily. They can only be deleted by being overwritten.
- Always the settings of **both** units are saved. If only the light from one of the two VisiLED illuminations (A or B) is supposed to be saved then the **second** LED unit should be dimmed down to **intensity 0**.
- The delay time (trigger mode) can only be stored with limitations (see Section 8.6).

When the MC 1500 is controlled via the computer there is also the possibility of uploading the memory settings of the controller to the computer. These sets consisting of five different illumination conditions (four memory stations and the currently set light) can be archived in setting files.

If required, the archived setting files can be called up again via the user software and also downloaded from the PC into the memory of a MC 1500.

The special functions detailed below are primarily significant for the application of the VisiLED system in the field of industrial image processing or “Machine Vision”.

8.6 Special functions (strobe mode, trigger mode, flash mode)

Strobe mode serves to produce “frozen images” of cyclically moving specimens, e.g. rotating fans or balance-wheels of a clock.

Strobe mode

By pressing the function key (9) the selected illumination unit (A or B) is put into strobe mode: the light of this LED unit pulsates. Repeated pressing of key (9) deactivates the strobe mode of the unit again.

The strobe mode makes it possible to “freeze” the movement of cyclically moving specimens – but only if the strobe frequency is synchronized exactly with the oscillation or rotation frequency of the moving specimen:

- Pressing the up/down keys (5) when the strobe mode is activated sets the strobe frequency: the “up” key increases the frequency, “down” decreases it.
- The strobe frequency can be set roughly by holding down (5) for more than 2 seconds.
- The frequency can be fine-tuned by quickly pressing (5).

In addition the pulse duration of the individual strobe pulse can be changed. The shorter the duration of the individual pulse, the sharper the “frozen” image will be. The brightness of the strobe light is, however, reduced when the pulse duration is decreased. For this reason the pulse duration should be optimized for each moving specimen.

- Pressing down key (10) together with the up/down key (5) when the strobe mode is activated sets the strobe pulse duration. The key combination (10) + (5 “up”) increases the pulse duration, (10) + (5 “down”) decreases it.
 - The strobe pulse duration can be set roughly by holding down the key combination (10) + (5) for more than two seconds.
 - The pulse duration can be fine-tuned by holding down key (10) and pressing (5) quickly.
- When strobe frequency or strobe pulse duration are changed, this automatically affects both VisiLED units (A and B). This guarantees the synchronized strobing of both illuminations – a fundamental “must” for generating frozen images when strobing with mixed light.
 - The intensity of the strobe pulses cannot be changed by the MC 1500. When the strobe is active it is automatically set at maximum brightness for this mode. However, when the computer is controlling the MC 1500 the strobe intensity for both units (A/B) can be individually adjusted.

Please note

In order to activate/deactivate the strobe mode of the second LED unit this must first be selected using the unit selector key (1).

When the computer is controlling the MC 1500 the strobe cycle duration ($1/\text{strobe frequency}$) and the strobe pulse duration can be set to the exact μs and the strobe intensity can be adjusted by the exact percentage for each VisiLED unit. If certain ancillary conditions are observed (pulse duration $< 10\text{ ms}$, cycle duration $> 10 \times$ pulse duration) an overdrive of the strobe intensity up to 300% of the continuous light is possible! Otherwise the maximum intensity is 100%.

Trigger mode

In trigger mode both VisiLED illuminations are initially switched off, but the VisiLED system always emits a light pulse after receiving an external control signal (trigger signal).

In this way, for example, an individual pulse is always released from an external Machine Vision system whenever an image of a specimen has to be recorded.

The trigger mode is activated when the strobe key (9) is pressed while key (10) is held down. The LED display (4) rolls up and down to indicate trigger mode has been activated. The trigger mode is deactivated by pressing the key combination (10) + (9) again.

The light pulse can be emitted with a defined time delay after receiving the trigger signal. This time delay can be set using the keys (5) when trigger mode is active. The "up" key increases the time delay; the "down" decreases it.

The initial setting of the MC 1500 is selected so that the delay can be set at 1 second and reduced to 0. The delay can be increased to up to 16 seconds by computer.

Please note

- The activation/deactivation of the trigger mode and the delay time setting automatically affect both LED illuminations (A/B).
- The intensity and pulse duration of the emitted light pulse cannot be changed using the controller. However, when the computer is controlling the MC 1500 there is the possibility of individually adjusting both values.
- After the trigger signal has been received no additional trigger signal can be accepted until the light pulse has been emitted.
- After the light pulse has been emitted, until an octuple pulse duration has elapsed, no further light pulse can be emitted. This protects the LEDs.
- The light pulse is triggered by bypassing both contacts of the flash connection (14) on the back of the controller (3.5 mm jack socket). The tip of the connector is positive.
- The trigger signal should last more than 5 μs .

- Whenever a new delay time is sent from the PC to the controller automatically the accuracy of setting the delay by MC 1500 is adjusted. It amounts always to 0,5% of the set delay time. For this reason it is not possible to store different delay times from PC correctly in the different memory stations of the MC 1500. We recommend to use in trigger mode one memory station only. Alternatively identical delay times could be stored in all used memory stations.

When the computer is controlling the MC 1500 the pulse duration of the individual pulse can be set to the exact μs . In addition the pulse intensity can be adjusted by the exact percentage for each LED unit. When the pulse duration is less than 10 ms an overdrive of the pulse intensity up to 300% of the continuous light is possible. Otherwise the maximum intensity is 100%.

In flash mode the set mixed light can be momentarily intensified by an intensive single pulse so that the exposure times of connected photo equipment can be reduced – the mixed light “flashes”.

Flash mode

The MC 1500 controller possesses a connection for a flash cable (14). A corresponding cable can be connected to cameras or micro-photographic equipment via an S contact.

When recording an image the LED illumination system emits a photoflash in addition to the set continuous light. In this way the intensity of each unit is momentarily increased by a factor of 4. So the set mixed light characteristics remain constant during flashing!

To avoid the illumination heads being overloaded the flash is only emitted if both illumination units are in the 0 to 3 brightness range. In addition the -strobe and trigger mode must be deactivated for both LED illuminations.

- A maximum of two green LEDs of the display (4) must be lit up for each VisiLED unit. Please also check the second unit by pressing (1).
- The flash intensity automatically results from the light intensity setting of the continuous light. The highest intensity of the flash pulse is 236% when the affected LED unit is set to 59% brightness.
- The flash pulse is triggered by bypassing the contacts of the flash connection (14) on the back of the controller (3.5 mm jack socket).

Please note

When the computer is controlling the MC 1500 the flash duration can be set to the exact μs .

The flash is always emitted simultaneously for both illuminations. If only the flashing of one of the VisiLED units is required then the second LED unit should be dimmed down to 0 brightness

8.7 PC control

The MC 1500 controller can receive control commands from a PC. Computers with operating systems XP/Vista/Win7 can be used.

The computer is connected to the connection (13) of the controller using a RS232 cable. The MC 1500 can also be connected to a PC's USB interface using a USB 1.1-to-RS232 converter (accessory) – with full USB functionality.

The CD-ROM supplied contains demonstration software for controlling the MC 1500, a DDL file for integrating the controller steering into user-own software and information on controlling the MC 1500 via a hyper terminal. The demo software allows to comfortably control all functions of the MC 1500.

The MC 1500 can in principle also be controlled via a palm top unit if the palm is equipped with a terminal software.

Please note

- A detailed manual on the current version of the software in pdf format can be found on your CD.
- The user program supplied has the status of demonstration software because no software support going beyond the accompanying documentation can be given!
- In general, customer-specific changes to the operating software cannot be undertaken. However, the user is provided with all information required to integrate the MC 1500 into his own operating program with full functionality.

Fundamental software properties

- Access to individual segments, generation of user-defined segment modes.
- Intensity of each illumination unit can be set to the exact percentage.
- Exact setting of rotation speed and rotation direction.
- Exact setting of strobe mode (intensity, frequency and pulse duration).
- Exact setting of trigger mode (intensity, pulse duration and delay time).
- Setting of flash mode (pulse duration).
- Saving of 4 illumination settings in the PC. Downloading of each setting to the corresponding controller memory station.
- Generation of setting files comprising sets of five illumination settings (contents of four memory stations plus current MC 1500 setting). User-defined archiving of numerous setting files on the hard drive or storage medium.
- Uploading of five MC 1500 settings (see above) to the PC for archiving them as setting files.
- Downloading of setting files to the MC 1500 memory stations for calling up the archived settings.
- It is not possible to set different delay times (trigger mode) per PC and store them to the different memory stations of the MC 1500. See Section 8.6.

The foot switch can be connected to the MC 1500 connection (15). When repeatedly pressed down it calls up the M1 to M4 memory stations and makes it possible to quickly switch over the stored illumination conditions without having to press a memory key.

(M1 → M2 → M3 → M4 → M1 → ...)

The brightfield-darkfield adapter kit makes it possible to connect one of the LED brightfield ringlights (S80-25, S80-55) with the darkfield ringlight (S40-10D) to a stereo microscope.

If the ringlights combined on the microscope are then connected to the MC 1500 one gets an incident light illumination that makes it possible to quickly switch between brightfield and darkfield. In addition this facilitates to comfortably generate mixed light. When the adapter kit was developed great care was taken to minimize the occurrence of scatter light and ambient light on the specimen.

The brightfield-darkfield adapter kit is made up of three components: the connection adapter, and two distance rings.

To set up the adapter kit first please screw the connection adapter into the thread of the S40-10D darkfield ringlight. Then fix the connection adapter to a VisiLED brightfield ringlight by sliding the adapter over the ringlight and fixing with three screws.

The brightfield-darkfield illumination is assembled on the microscope by sliding the brightfield ringlight over the microscope objective and screwing tight. The acceptance diameter of the ringlights is 66 mm. To fix onto microscope objectives with other diameters please use intermediate rings (accessory).

If the darkfield ringlight is not situated in the recommended 5 mm to 15 mm working distance above the microscope specimen, please carry out the assembling of the adapter kit as follows:

First screw one or two of the supplied distance rings into the VisiLED brightfield ringlight. Then slide the connection adapter with the darkfield ringlight over the distance ring(s) on the brightfield ringlight and fix with the three screws.

9. Accessories: foot switch and brightfield-darkfield adapter kit

Foot switch

Brightfield-darkfield adapter kit

10. Maintenance

The VisiLED MC series is maintenance-free.

There is no provision necessary for disinfecting the MC 750, MC 1100 or MC 1500 controller as well as the VisiLED illumination units when using them in the medical field.

To clean the outside of the controller or the illumination components please use a soft dry cloth or commercially available plastic cleaning cloths.

The use of cleaning agents, alcohol or any other chemicals is not permitted.

11. Troubleshooting

MC 750

Fault	Possible causes and remedial action
1. No light, operation display (21) not lit up	<ul style="list-style-type: none"> • Is electronic power supply correctly connected to LED controller and power cord? (16) • Is correct supply voltage available? • Is controller switched on? (17)
2. No light, operation display (21) lit up	<ul style="list-style-type: none"> • Is LED illumination connected correctly? (11) • Is brightness setting too low? If necessary, increase by turning knob (20)
3. No light, red LED-display (8) permanently lit up	<ul style="list-style-type: none"> • LED unit heated up excessively. Reduce brightness (20), until the red LED goes out.
4. Light available, red LED display (8) blinking	<ul style="list-style-type: none"> • Warning that the LED illumination is approaching the permitted temperature limit.

MC 1100

Fault	Possible causes and remedial action
1. No light, operation display (21) not lit up	<ul style="list-style-type: none"> • Is switching power supply correctly connected to controller and power cord? (16) • Is correct supply voltage available? • Is controller switched on? (17)
2. No light, operating display (21) lit up	<ul style="list-style-type: none"> • Is LED illumination unit correctly connected? (11) • Is the light intensity setting too low? (if necessary, increase by turning knob [20])
3. Low intensity	<ul style="list-style-type: none"> • LED unit excessively heated. Reduce brightness (20) or switch off appliance for a while (17).

In case of a static discharge the controller can switch itself off. After briefly switching off and on again (17) the appliance is ready for operation again.

Fault	Possible causes and remedial action
1. No light, A/B LED display (1) no lit up	<ul style="list-style-type: none"> • Is electronic power supply correctly connected to LED controller and power cord? (16) • Is correct supply voltage available? • Is controller switched on? (17)
2. No light, A/B LED display (1) lit up	<ul style="list-style-type: none"> • VisiLED illumination(s) connected correctly? (11), (12) • VisiLED illumination(s) dimmed down to brightness 0? Select each illumination unit with unit selector key (1) and increase brightness (5).
3. No light, LED display A/B (1) lit up LED display (4) rolling	<ul style="list-style-type: none"> • LED illuminations in trigger mode. Deactivate trigger mode by pressing key combination (10) + (9) or increase intensity and if necessary pulse duration of individual light (see Section 8.6)
4. No light, A/B LED display (1) lit up, three LEDs of display (4) lit up	<ul style="list-style-type: none"> • Is selected VisiLED unit in strobe mode? Increase strobe intensity and possibly strobe pulse duration or deactivate strobe with (9) (see Section 8.6)
5. No light, redLED display (8) permanently lit up	<ul style="list-style-type: none"> • LED illumination(s) heated up excessively. Reduce brightness slightly (5) until the red LED goes out, if necessary for both LED units.
6. Light available, red LED display (8) blinking	<ul style="list-style-type: none"> • Warning that the LED illumination is approaching the permitted temperature limit.
7. Not possible to set brightness by pressing key (5)	<ul style="list-style-type: none"> • Is the VisiLED unit to be set already selected? If necessary activate switch (1). • Deactivate strobe with (9) or increase strobe intensity and if necessary strobe pulse duration (see Section 8.6). • Is selected VisiLED unit in trigger mode? Deactivate mode using (10) + (9) or increase intensity and if necessary pulse duration of individual pulse (see Section 8.6).

MC 1500

MC 1500

Fault	Possible causes and remedial action
8. Segment setting or rotation mode not functioning	<ul style="list-style-type: none"> • Has the LED unit to be set already been selected? If necessary select using switch (1) (also see Section 8.2 or 8.4)
9. Light does not change when (M1) to (M4) memory keys activated	<ul style="list-style-type: none"> • Have the memory keys already been programmed? If necessary save different illumination conditions by pressing down the M key together with one of (M1) to (M4) keys
10. The programmed settings are deleted when the MC 1500 is switched off	<ul style="list-style-type: none"> • Default values are set when the MC 1500 is switched on. Please save individual settings in memory stations before switching off controller.
11. Strobe mode: Illumination not pulsating	<ul style="list-style-type: none"> • Is strobe activated? Select required illumination unit using (1) and activate strobe mode (9). • Is strobe frequency too high, strobe intensity too low or strobe pulse duration too long? Optimize variables. If necessary set strobe intensity individually for both LED units (see Section 8.6).
12. Strobe mode: no stationary image	<ul style="list-style-type: none"> • Is movement of the specimen periodic with a constant frequency? Only then are stationary images possible. • Optimize strobe frequency (see Section 8.6).
13. Strobe mode: Stationary image is blurred or pale	<ul style="list-style-type: none"> • Please decrease strobe pulse duration. If necessary increase strobe intensity individually for each unit (see Section 8.6). • Preferably activate strobe mode for both VisiLED units. If that is not desirable reduce the brightness of unit that shall not strobe to required minimum. • If necessary reduce ambient light.
14. Trigger mode: No light pulse or light pulse too weak	<ul style="list-style-type: none"> • Is intensity or duration of light pulse too low? If necessary increase values using PC control (also see Section 8.6).

Fault	Possible causes and remedial action
15. Trigger mode: Light pulse mistimed	<ul style="list-style-type: none"> • Optimize time delay between trigger pulse and light pulse (also see Section 8.6). • Were different delay times stored in the memory stations of the MC 1500? Correct recall of all delay times is not possible then. Please use in trigger mode one memory station only or store identical delay times in all used memory stations.
16. Trigger mode: not all trigger signals recognized	<ul style="list-style-type: none"> • Does trigger pulse occur too soon after light pulse? Reduce duration of light pulse! • Is trigger signal too short? Please increase time of the trigger pulse (see also Section 8.6).
17. Flash mode: Flashing via synchronous flash cable not functioning	<ul style="list-style-type: none"> • Is flash cable connected correctly? (14) • Are both LED illuminations in the 0 to 3 brightness range? Two green LEDs maximum (4) should be lit up. If necessary turn down the brightness of both units appropriately using (5) (see Section 8.6). • Is flash pulse duration too short? If necessary increase via PC control. • Are strobe mode and trigger mode deactivated? If necessary deactivate for both LED units (see Section 8.6).
18. Flash mode: Flash not bright enough	<ul style="list-style-type: none"> • Is flash pulse duration too short? If necessary increase via PC control. • For maximum flash intensity increase the brightness of both units until the third LED of display (4) "just doesn't" light up.

MC 1500

If you are unable to rectify the fault by the actions mentioned above, please contact your specialist dealer or the nearest SCHOTT agency. More extensive repairs must be carried out by the authorized customer service depot.

12. Technical data

(Data sheet information in accordance with DIN 58143-5)

General information

Properties	Values	Tested in accordance with
Type description	<ul style="list-style-type: none"> • VisiLED MC 750, MC 1100 and MC 1500 Controller* • VisiLED electronic power supply 	
Dimensions (W x D x H)	mm See enclosed drawings	
Mass of LED Controller	kg MC 750 approx. 0.25 kg MC 1100 approx. 0.17 kg MC 1500 approx. 0.65 kg	
Cooling	Convection	
Ambient temperature	°C +5 ... +40	EN 60601
Relative air humidity	% <ul style="list-style-type: none"> • Up to 31°C ambient temperature: 85% • Up to 40°C ambient temperature: decreasing linearly to 75% 	EN 60601/ EN 61010-1
Air pressure	hPa 800 ... 1060	
Contamination level	2	EN 61010-1
IP Protection Type	IP 40	DIN 40050
VisiLED system mark of conformity	CE	EN61010-1 EN61326-1 EN62471

* US patent application pending

Electrical information

	Properties	Values	Tested in accordance with
Power supply unit	Operating voltage, frequency	100–240 V ~ 50–60 Hz	
	Power consumption max.	VA max. 40	
	Protection class	II	
	Oversvoltage category	II	
MC 750 Controller	Supply Voltage	21–24 V DC	
	Current	0,48 A	
MC 1100 Controller	Supply Voltage	21–24 V DC	
	Current	0,6 A	
MC 1500 Controller	Supply Voltage	21–24 V DC	
	Current	1,1 A	
	Mark of conformity or compliance for electronic powersupply	CE cUL	EN 60950, EN 55022-B UL-60950-1

Please note: faultless operation and full standard compliance can only be guaranteed if the VisiLED system is operated with the electronic power supply specified by SCHOTT.

Parameter setting for MC 1500

Properties	Values	Tested in accordance with
Light intensity setting brightness ranges MC 1500: 1 = No LED lit up 2 = One green LED 3 = Two green LEDs 4 = Two green and one yellow LED 5 = Two green, one yellow and one red LED	% 0–100 0–1 2–32 33–59 60–82 83–100	Base setting 32%
Rotation mode Angle of single rotation step illumination time of each step* → Rotation speed*	45° ms 2–500 → 0.25–62.5 rps	125 ms → 1 rps
Strobe mode Strobe cycle duration → Strobe frequency Strobe pulse duration Strobe intensity*	μs 100–65 000, (full intensity from on 500 μs) → Strobe frequency 15–2000 Hz (10 000 Hz) μs 80–65 000 % 0–100 without overdrive 0–300, if overdrive conditions fulfilled (see Section 8.6)	deaktiviert 40 000 → 20 Hz 2500 300
Trigger mode Light pulse duration Light pulse intensity* Delay time*	μs 80–65 000 0–100 without overdrive 0v300, if „pulse duration < 10 000 μs“ ms 0–16 000 (only limited settings possible via controller keypad)	deaktiviert 2500 300 1000
Flash mode Flash duration	μs 80–65 000	2500

Precise setting of the parameters only by computer control of the MC 1500. The MC 1500 controller's keypad only allows rough visible adjustment.

* The values indicated with * can only be changed via computer.

→ The values indicated with → are derivative values that cannot be directly set.

MC 1500 Connections

Properties	Values
RS232 connection cable or RS232-to-USB1.1 converter (13)	<ul style="list-style-type: none"> • Sub-D, 9 pin, "female" • Pin 2 = Data out from MC 1500 • Pin 3 = Data into MC 1500 • Pin 5 = Ground
Connection for flash cable and trigger mode (14)	<ul style="list-style-type: none"> • 3.5 mm mono jack socket • tip positive tied to +5 V with 10 kΩ resistor • TTL, CMOS, Volt free contact or NPN open collector compatible, triggered by a falling edge (contact closure)
Connection for foot switch (15)	<ul style="list-style-type: none"> • 3.5 mm power socket • tip positive tied to +5 V with 10 kΩ resistor • TTL, CMOS, Volt free contact or NPN open collector compatible, triggered by a falling edge (contact closure)
Voltage input (16)	<ul style="list-style-type: none"> • 2,1 mm Kleinspannungsbuchse • tip positive, 21–24 V DC • Max. current drain 1,1 A

General properties of VisiLED illumination units

Properties	Values
LED operating hours (until drop-off to 50% brightness)	approx. 30 000 hrs
Lamp change in VisiLED illuminations	All LEDs in the ringlights must be exchanged in one go. The replacement must be carried out by the manufacturer or an authorized customer service depot.
Color temperature	approx. 5600 K
Heat protection measure	<ul style="list-style-type: none"> • Convection cooling • Integrated thermo guard

Optical properties of VisiLED illumination units

Component	Working distance array [mm]	Maximum illuminance [klx] (at working distance [mm])
Brightfield ringlight S40-75	55-145	110 klx (85 mm)
Brightfield ringlight S80-25	25-50	360 klx (30 mm)
Brightfield ringlight S80-55	50-135	200 klx (75 mm)
Brightfield ringlight S80-65N	35-100	130 klx (55 mm)
Darkfield ringlight S40-10D	5-15	130 klx (10 mm)
Slim Ringlight (darkfield)	20-40 40-90 5-20	45 klx (25 mm) 65 klx (50 mm) 40 klx (10 mm)
Transmitted light darkfield stage	-	100 klx (illuminance towards bottom side of the specimen)
		Bright spot Ø [mm] Luminance [cd/m²]
Transmitted light brightfield stage	-	50 20000
Brightfield-darkfield adapter kit	Suitable for microscope objectives with a 40-100 mm working distance	

Subject to modifications
and amendments

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