

Collimator N II

Instructions for Use

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Legend

- ✓ Prerequisites
- ◆ Instructions
- Text lists
- ➔ Cross reference

⚠ CAUTION

Cause

⚠ WARNING

Possible consequences

- ◆ Precautions or remedies



X-Ray radiation

Warning of ionizing radiation.

General Note

BEFORE USING THIS COMPONENT

This component should be used only by employees adequately trained in the use of this equipment.

Before using this component, the operator should be thoroughly acquainted with the instructions for use and safety recommendations provided in this manual.

Failure to follow the instructions for use and safety recommendations provided in this manual can cause serious injury to the patient, the operator or other persons.

This component has been manufactured and developed in agreement with the Council Directive RoHS 2011/65/EU with 2015/863 on the restriction of the use of certain hazardous substances in electrical and electronical equipment, following the requirement of standard EN IEC 63000:2018.

Spare and repair

Spare and Repair parts may contain non RoHS compliant material, according to the exemption definition in the Council Directive 2011/65/EU.

Disclaimer

The contents of this document may be published under a system integrator's/manufacture's label, but it is the sole responsibility of the system integrator of the finished medical device that content and safety measures described within this document are maintained and clear to the end user.

The system integrator is responsible for translations of this document and to provide the language versions that might be required under country specific regulations.

These components and configurations are not finished medical devices. The system integrator is responsible for complying with all laws and regulations that are applicable to finished medical devices with respect to marketing, sales and installation.

Electromagnetic compatibility (EMC)



The Collimator N II is intended for use by professional healthcare facility environment.

The Collimator N II is intended for use in a professional healthcare facility environment.

The EMISSIONS characteristics of this equipment make it suitable for use in industrial areas and hospitals (CISPR 11 class A). If it is used in a residential environment (for which CISPR 11 class B is normally required) this equipment might not offer adequate protection to radio-frequency communication services. The user might need to take mitigation measures, such as relocating or re-orienting the equipment.

Original language

This Dokument is originally written in English.

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1 Introduction/Overview

1.1 Introduction

1.1.1 Intended Use

Intended purpose:

This collimator is a standard, diagnostic X-ray beam-limiting and shaping device which is intended to be integrated in a diagnostic X-ray system. An X-ray collimator is used to limit the effects of scattered radiation on image quality, and to provide patient protection by eliminating exposure to non-target body areas.

The collimator is equipped with a motorized shutter/length adjustment mechanism in order to match the size of the x-ray beam to the size of the detector system in use/the region of interest. The motors are controlled by the X-ray system, in which the collimator is integrated.

Some collimators are additionally equipped with rails for accessories, in order to insert e.g. filters for beam hardening (Aluminum or Copper). Some collimators include a light field indicator and/or a laser centering device for supporting the positioning of the radiation field.

Indications for Use:

Indication for use of the collimator is every clinical indication which requires a diagnostic X-ray procedure using a diagnostic X-ray system. The specific indications, parts of the body and the duration of the exposure for which the collimator can be used (once or repeated) are defined by the diagnostic X-ray system in which the collimator is integrated.

Contra-Indications:

For collimators no other contra-indications besides the ones for general radiologic procedures are currently known. Specific contra-indications might need to be defined by the system integrator of the diagnostic X-ray system in which the collimator is integrated.

Patient target group(s):

The collimator may be used for each patient who is admitted for an X-ray examination, from newborn to geriatric. The patient population might need to be restricted on system level as result of the integration of the collimator into a diagnostic X-ray system by the system integrator.

Intended users:

Collimators are intended to be integrated into diagnostic X-ray systems by a system integrator, for whom it is required to have specific technical and medical knowledge and skills, including but not limited to radiation protection, electrical and mechanical safety and clinical procedures for which the finalized system is released.

Integrated into the diagnostic X-ray system, collimators are intended to be operated by adequately trained clinical users. Instructions for use of these devices address exclusively the system integrator and are not intended being handed over to the clinical operators.

All information and advices for the clinical operator are to be included in the instruction for use and accompanying documents of the finished diagnostic X-ray system in which the collimator is integrated.

(Negative) Side-effects:

Since a Collimator which is not integrated in a system has no clinical effect, it consequently has no side-effects either. Clinical effects and also side-effects are depending on the design and intended use of the diagnostic X-ray system in which the Collimator is integrated and need to be determined on the system level.

1.1.2 Models

The following models of the Collimator N II are available.

Model	Description	Article code	GTIN
Collimator AL03 II eL	Automatic Collimator N with LED light, without prefiltration	10092610	04056869033747
Collimator ML01 II	Manual Collimator N with LED light, manual prefiltration	10092611	04056869011554
Collimator AL01 II	Automatic Collimator N with halogen light, manual prefiltration	10092602	04056869011479
Collimator AL01 II eL	Automatic Collimator N with LED light, manual prefiltration	10092612	04056869011561
Collimator AL02 II	Automatic Collimator N with halogen light, motorized prefiltration	10092604	04056869011493
Collimator AL01 C II		10092624	04056869011615
Collimator AL02 II eL	Automatic Collimator N with LED light, motorized prefiltration	10092614	04056869011578
Collimator AL01 C II eL		10092634	04056869032252
Collimator AL02 II -D	Automatic Collimator N with LED light, motorized prefiltration, without display, with digital SID (Source Image Distance) tape measure	10092609	04056869011547
Collimator AL04 II -D	Automatic Collimator N with LED light, motorized prefiltration, without display	10092619	04056869054803
Collimator AL04 II eL		10092629	04056869180557
Collimator AFL01 II	Automatic Collimator N with halogen light, motorized prefiltration, with iris collimation for image intensifier	10092608	04056869011530
Collimator AFL01 II eL	Automatic Collimator N with LED light, motorized prefiltration, with iris collimation for image intensifier	10092618	04056869011592
Collimator AFL DSA01 II	Automatic Collimator N with halogen light, motorized prefiltration, with iris collimation for image intensifier, wedge filters for DSA	10092605	04056869011509
Collimator AFL DSA01 II eL	Automatic Collimator N with LED light, motorized prefiltration, with iris collimation for image intensifier, wedge filters for DSA	10092615	04056869011585
Collimator A01 II	Automatic Collimator N, motorized prefiltration	10092606	04056869011516
Collimator AF01 II	Automatic Collimator N, motorized prefiltration with iris collimation for image intensifier	10092603	04056869011486
Collimator AF01 A II		10092623	04056869011608

Type	Description	Article code	GTIN
Collimator AF DSA01 II	Automatic Collimator N, motorized prefiltration with iris collimation for image intensifier, wedge filters for DSA	10092607	04056869011523
Collimator AF DSA01 II		10092627	04056869011622

1.1.3 Configurations

Collimator functions

Model

	Collimator AL03 II eL	Collimator ML01 II	Collimator AL01 II	Collimator AL01 II eL	Collimator AL02 II	Collimator AL01 C II	Collimator AL02 II eL	Collimator AL01 C II eL	Collimator AL04 II eL	Collimator AL04 II -D	Collimator AL02 II -D	Collimator AFL01 II	Collimator AFL01 II eL	Collimator AFL DSA01 II	Collimator AFL DSA01 II eL	Collimator A01 II	Collimator AF01 II	Collimator AF01 A II	Collimator AF DSA01 II
Rectangular collimation	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
User Interface (front panel, halogen light localizer, laser and measuring tape)	—	—	x	—	x	—	—	—	—	—	—	x	—	x	—	—	—	—	—
User interface (front panel, LED light localizer, laser and measuring tape)	x	x	—	x	—	x	x	x	x	x	x	—	x	—	x	—	—	—	—
LCD display	x	—	x	x	x	x	x	—	—	—	—	x	x	x	x	—	—	—	—
Digital measuring tape	—	—	—	—	—	—	—	—	—	x	—	—	—	—	—	—	—	—	—
Motorized prefilter	—	—	—	—	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Manual prefilter	—	x	x	x	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Iris diaphragm	—	—	—	—	—	—	—	—	—	—	—	x	x	x	x	—	x	x	x
DSA (wedge filter) module	—	—	—	—	—	—	—	—	—	—	—	—	—	x	x	—	—	—	x
Integrated DAP chamber possible	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Off focal blades	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Manual rotary flange	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	—	—	—	—
Accessory rails	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	—	—	—	—
Camera option	—	—	—	—	—	—	—	x	—	—	—	—	—	—	—	—	—	—	—

1.1.4 Features and Benefits

- Simple mounting on the tube flange
- Rectangular shaped collimation
- CAN Bus data interface (except Collimator ML01 II)
- Automatic SID (Source Image Distance) tracking (except Collimator ML01 II / Collimator AL02 II-D / A01 II)
- Off focal blades to shield off extrafocal radiation

Only for Collimator AL03 II eL, Collimator ML01 II, Collimator

AL01 II, Collimator AL01 II eL, Collimator AL02 II, Collimator

AL01 C II, Collimator AL02 II eL, Collimator AL01 C II eL,

Collimator AL02 II -D, Collimator AFL01 II, Collimator AFL01 II eL,

Collimator AFL DSA01 II, Collimator AFL DSA01 II eL

Collimator AL04 II eL and Collimator AL04 II -D:

- Laser line localizer guarantees a sharp line for all SIDs (optional: laser line localizer with crosshairs).
- Simple rotation of the collimator ($\pm 45^\circ$) at the tube by the rotation flange with a detent in 0° position and optional detent detection.
- User friendly source image distance control by means of a measuring tape.
- On model Collimator AL02 II -D the value of the SID measuring tape is also available via CAN telegram.
- LCD display of the current SID and field size either in cm or inch (except model Collimator AL02 II -D / Collimator AL04 II -D / Collimator AL04 II eL).
- Manual operation via integrated control panel.
- Two foam protected accessory rails.

1.1.5 Compliance to Standards

The following standards for component development apply:

- IEC 60601-1:2012+C1:2012; eq EU: EN 60601-1:2006 +AC:2010+A1:2013+AC:2014
- IEC 1.15-2: 2014; eq EU: EN 60601-1-2: 2015
- IEC 60601-1-6: 2010 + A1: 2013; eq EN 60601-1-6: 2020 + A1: 2015
- IEC 60601-1-3: 2008 +A1:2013; eq EU: EN 60601-1-3:208+AC:2010+A1:2013+A11: 2016+A1/AC:2014
- IEC 60601-1-6: 2013; eq EU: EN 60601-1-6:201+A1:2015
- IEC 60601-2-54:2015; eq EU: EN 60601-2-54:2009 +A1:2015
- IEC 60825-1:2014; eq EU: EN 60825-1:2014
- 21 CFR chapter I subchapter J
- IEC 62304:2015; eq EU: EN 62304:2006+AC:2008+A1:2015
- IEC 62366-1:2015+Cor1:2016; eq EU: EN 62366-1:2015+AC:2015
- IEC 62471:2006; eq EU: EN 62471:2008
- ISO 14971: 2007; eq EN ISO 14971:2012
- IEC 63000:2016 eq. EU: EN IEC 63000:2018 (RoHS)

1.1.6 Laws and Regulation

The statutory regulations of the respective country must be followed.

1.1.6.1 Regulations in the EU

This component has been manufactured and developed in agreement with the applicable requirements according to the following laws, directives and design regulations:

- Council Directive RoHS 2011/65/EU with 2015/863 on the restriction of the use of certain hazardous substances in electrical and electronic equipment, following the requirements of standard EN IEC 63000:2018
- WEEE Directive 2012/19/EU on waste electrical and electronic equipment
- Council Regulation 1907/2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH).

The system integrator, integrating this ceiling stand in a diagnostic X-ray system is responsible for fulfilling the respective country laws and regulations.

1.1.7 Acronyms and Abbreviations

ACSS	Automated Collimation Size Sensing
CAN	Controller Area Network
COM	Component Object Model
CSA	Canadian Standards Association
DAP	Dose Area Component
DIN	German Institute for Standardization (= Deutsches Institut für Normung e.V.)
DIP	Dual In-line Package
DHHS	Department of Health and Human Services
DSA	Digital Subtraction Angiography
EMC	Electromagnetic Compatibility
EPRC	Electronic Component Radiation Control
GTIN	Global Trade Item Number
IEC	International Electrotechnical Commission
LCD	Liquid Crystal Display
LED	Light Emitting Diode
OEM	Original Equipment Manufacturer
OT	Over Table
PC	Personal Computer
PCB	Printed Circuit Board
PBL	Positive Beam Limitation device
PE	Protected Earth
RHA	Rotation about Horizontal Axis
RAD	Radiography
SID	Source Image Distance
SW	Software
UT	Under Table
VDE	Association for Electrical, Electronic & Information Technologies (= Verband der Elektrotechnik Elektronik Informationstechnik e.V.)

1.2 Safety

1.2.1 Information about this Manual

To ensure proper installation, maintenance, or repair of the component, carefully read and understand the instructions in this manual. In addition, comply with country specific regulations and keep this instruction for future reference.



1.2.1.1 General Information

Scope of applicability	This manual describes all component features.
Note	<p>The complete component is described with all options and accessories that have been released. Possible options have not been specially marked.</p> <p>Particular options or accessories may not be available for specific components.</p> <p>The quotation text of your order is the sole reference for the functional scope of your component.</p> <ul style="list-style-type: none">◆ Particular options or components may not be available for specific components.◆ If a specific feature is missing in your component, please contact your local sales representative.
Installed components	When reading this Instructions for Use please remember that some components described herein may not be installed in your configuration.
Conditions	<ul style="list-style-type: none">■ Patient target group (s): see 1.1.1■ Idended Users: see 1.1.1■ Manual and precautions: Read and understand all the instructions in the manual before using the component■ The collimator does not contain any functions/function chains that comply with essential performances according to IEC 60601-1 <p>Keep the manual with the equipment at all times and periodically review the procedures and safety precautions.</p> <p>Failure to follow the operating instructions and safety precautions could result in serious injury to the patient, others or yourself.</p>
Safety	<p>Always pay attention to the relevant safety information.</p> <p>Disregarding the information on safety is considered abnormal use.</p>
Statutory regulations	If legally binding regulations govern the installation and/or operation of the component, it is the responsibility of the installer and/or the operator to observe these regulations.

1.2.1.2 Text Layout

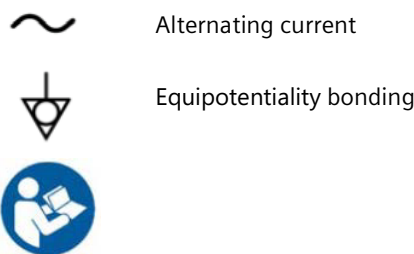
Note	Example for Note
	A note emphasizes important information without there being direct danger and helps you to operate the component properly and to avoid errors. It also provides additional useful explanations about a subject.
!	Example Refers to information that is important for the safe operation of the system without presence of any hazard to health or life.

1.2.1.3 Structure of Safety Information

	Warning/Caution
	Cause/Source of danger
	Possible consequences
	Precautions or remedies
	<p>Warning indicates a hazardous situation which, if not avoided, could result in death or serious injury.</p> <p>Caution indicates a hazardous situation which, if not avoided, may result in minor or moderate injury or property damage.</p>

1.2.1.4 Pictograms

The following are pictograms and their meanings as they may apply to your component (IEC standard).



Illustrations	<p>All illustrations of the equipment and of the user interface in this manual are <i>examples</i> only.</p> <p>Differences in detail may occur in your component due to the installed options configuration and constant development of the component.</p> <p>Reproduction of images can cause loss of detail. Pictures in this manual do not therefore provide any indication of image quality.</p> <p>All names of patients in images or illustrations are purely fictional. Any similarities with existing persons are entirely coincidental.</p>
Value statements	<p>All technical data are typical values unless specific tolerances are stated.</p> <p>Values in pictures of the software user interface have no clinical meaning.</p> <ul style="list-style-type: none">◆ Only set the values preset in the exam sets provided or the values recommended by experienced application specialists.

1.2.1.5 Warning Signs

Special danger points are marked on the unit with a warning sign:

General Danger	<p>Caution, always observe the manual!</p> <p>This warning notice indicates that special instructions can be found in the manual.</p> <p>Please read the manual.</p>
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1.2.2 Proper Usage of the Component

1.2.2.1 Safety Precautions

X-ray collimators are supplied with housing and are used under X-ray radiation. Collimators should be handled with care by engineers having sufficient technical knowledge and training.

- Handle the collimator with care at all times. Always use the original packaging with correct installation of the transportation safeguards and the cover for the off focal blades.
- Do not scratch the output window.
- Only apply a power supply on the collimator according to the technical description.
- When power is connected to the unit, do not open the collimator and do not touch any connectors in the collimator.
- Before touching connectors switch the power supply OFF.
- Do not drill any additional holes in the collimator to ensure intactness of the radiation protection.
- Always seek advice from the manufacturer when operation or handling is assumed to be hazardous.
- Also refer to the sections on installation, operation and maintenance for additional safety precautions.

1.2.2.2 Improper Use



Improper installation, service operation and usage can lead to hazardous situations for the patient, operator or service engineer. Do not carry out any installation, maintenance work or adjustment procedure other than described in this manual.

The manufacturer will not be held responsible for the safety features, reliability, and performance of the component if

- the component is used in a manner other than specified in the operating manual
- components affecting component safety are not replaced with original **manufacturers** spare parts,
- electrical wiring in the operating room does not meet the specifications of the VDE or local regulations.

1.2.2.3 Staff Qualification

Operating Staff	<p>Using this component in accordance with regulations is only possible if the operating staff has the required specialized knowledge and is familiar with the operating instructions. These must be studied thoroughly before startup.</p> <p>The operating staff should have practical training in the correct operation. The training should be repeated at appropriate intervals of time. It is recommended that emergencies are simulated and corresponding measures are trained.</p>
Installation, Maintenance and Repair Staff	<p>Only persons having expert knowledge of electrical systems and radiation protection are allowed to install, maintain and adjust the collimator and the implemented laser device, e.g. electrical engineers or technicians.</p>

1.2.2.4 Radiation Protection

The shielding of the collimator is designed for tube potentials up to 150 kV. Do not use this collimator with a higher tube potential.

The X-Ray cone from the tube has to be reduced to an angle of 28° before it enters the collimator.

1.2.3 Protective Measures

1.2.3.1 Protection against Electric Shock

Power supply	<p>For all components that are operated within an diagnostic X-ray system, the power supply has to be set up with a contactor or other multipole circuit breaker installed on-site.</p> <p>The room installation must comply with DIN VDE 0100-710 or the corresponding national regulations.</p>
Covers	<p>If socket covers (especially of the operating modules) are damaged, they must be replaced.</p> <p>In the event of defects, for example, if a covering cap has broken off:</p> <ul style="list-style-type: none">◆ Call the manufacturer's customer service.
Protection class	<p>The component conforms to the requirements of the IEC 60601-1.</p> <p>The protection against ingress of water is IPx0.</p>
Equipotential bonding	<p>Components for which equipotential bonding is recommended must only be operated in medical facilities where supplemental equipotential bonding has been installed and tested according to the specifications in IEC 60364-7-710/ VDE 0100-710 or the relevant local and federal regulations.</p>
Opening the units	<p>Only authorized service personnel are permitted to open the units.</p>

1.2.3.2 Precaution for EMC

Medical electrical equipment needs special precautions regarding EMC. EMC information provided in the accompanying documents must be followed where appropriate.

Portable and mobile RF communications equipment can affect medical electrical equipment.

The use of accessories, transducers and cables other than those specified, with the exception of transducers and cables sold by the manufacturer of the component as replacement parts for internal components, may result in increased emission or decreased immunity of the component.

!

This equipment/system is intended for use by professional healthcare facility environment.

This equipment/system may cause electromagnetic disturbances or could be influenced by radiated/conducted signals.

The EMISSIONS characteristics of this equipment make it suitable for use industrial areas and hospitals (CISPR 11 class A). If it is used in a residential environment (for which CISPR 11 class B is normally required) this equipment might not offer adequate protection to radiofrequency communication services. The user might need to take mitigation measures, such as relocating or reorienting the equipment.

1.2.3.3 Combination with other Components

To find out about the current state of the equipment and the combinations and upgrades currently approved:

- ◆ Please contact your authorized local sales representative.

Interfaces

Accessory equipment connected to the analog or digital interfaces must be certified according to the respective IEC standards (for example, IEC 950 for data processing equipment and IEC 60601-1 for medical equipment).

Furthermore all configurations shall comply with the valid version of the component standard IEC 60601-1.

Everybody who connects additional equipment to the signal input part configures a medical component, and is therefore responsible for ensuring that the component complies with the requirements of the valid version of the component standard IEC 60601-1.

- ◆ If in doubt consult your technical service department or local representative.

To ensure component safety use only accessories with the following specifications:

Maximum weight:		7 kg
Mounting dimensions:	width	177.5 ^{-0.5} mm
	depth	177.5 ^{-0.5} mm
Maximum torque from accessories:		15 Nm

Always slide the accessories into the rails until the lock spring prevents the accessory from falling out.

1.2.4 General Hazards

1.2.4.1 X-ray Radiation Hazard

CAUTION

G_X012_F5G4U1M1

Incorrect collimation.
Risk of increased radiation dose for the patient.
◆ Select the filter carefully.



Improper replacement of parts can cause a malfunction or mechanical damage.
◆ Replace damaged or worn parts only with original parts.

1.2.4.2 Hazards due to Heat Dissipation

CAUTION

G_X012_F3G2U1M2

If the halogen lamp of the light localizer burns for a long time, the lamp housing can heat up.
Danger of burns.
◆ Avoid contact with lamp housing to prevent burns.
◆ The maximum permissible operation time duty cycle is 50% (90 seconds on to 90 seconds off).
◆ The permanent on time of the light must not exceed 10 minutes.

CAUTION

G_X012_F3G2U1M2

If the LED of the light localizer burns for a long time the heatsink can heat up.
Danger of burns.
◆ Avoid contact with the heatsink to avoid burns. free.

1.2.4.3 Hazard due to Light Beams

⚠ CAUTION

G_X012_F3G3U1M2

Laser light.

Eye injury.

- ◆ Do not look into the beam!
- ◆ Take care that neither you nor any other person looks directly into the light beam.
- ◆ Close the Laser radiation exit of the laser light localizer with the sliding cover to protect the eyes of the patient or any other person.

⚠ CAUTION

G_X012_F3G4U1M2

Photobiological effect of ultraviolet radiation.

Eye injury.

- ◆ Do not look into the light beam for longer than 15 seconds.
- ◆ Always keep enough distance to the collimator.

1.2.4.4 Mechanical Hazards

⚠ CAUTION

G_X012_F1G1U1M3

Screws fastening the collimator to the tube assembly come loose.

Risk of injury due to falling collimator.

- ◆ Follow the fastening instructions for the collimator and mount the collimator backlash-free.

⚠ CAUTION

G_X012_F1G1U1M2

Screws fastening the collimator to the tube assembly come loose.

Risk of injury due to falling collimator.

- ◆ Maximum torque to fasten the screws: 5 Nm.

⚠ CAUTION

G_X012_F3G1U1M2

Lamp breaks.

Patient and/or user injured by glass splinters.

- ◆ Use only Siemens spare parts.

1.2.4.5 Hazard due to Liquids

⚠ CAUTION

G_X012_F8G8U1M1

Use of harsh cleaning agents, liquids or sprays.

When cleaning the collimator, liquids can seep into the openings of the system and cause electric shock, short circuits, or corrosion of Electrical parts.

Risk of electrical hazard or damage to the system.

- ◆ Use only substances for cleaning and disinfection, which are recommended, but no sprays.
- ◆ Do not let cleaning liquids seep into the openings of the system (e.g. air openings, gaps between covers).
- ◆ Observe the following cleaning and disinfection instructions. (see chapter “Cleaning and Disinfection”)

1.2.5 Compliance with Regulations and Standards

Local Regulations The installer and operator are responsible for complying with all local regulations regarding installation and operation of this collimator.

National Regulations In all countries, the legally established regulations are to be observed.

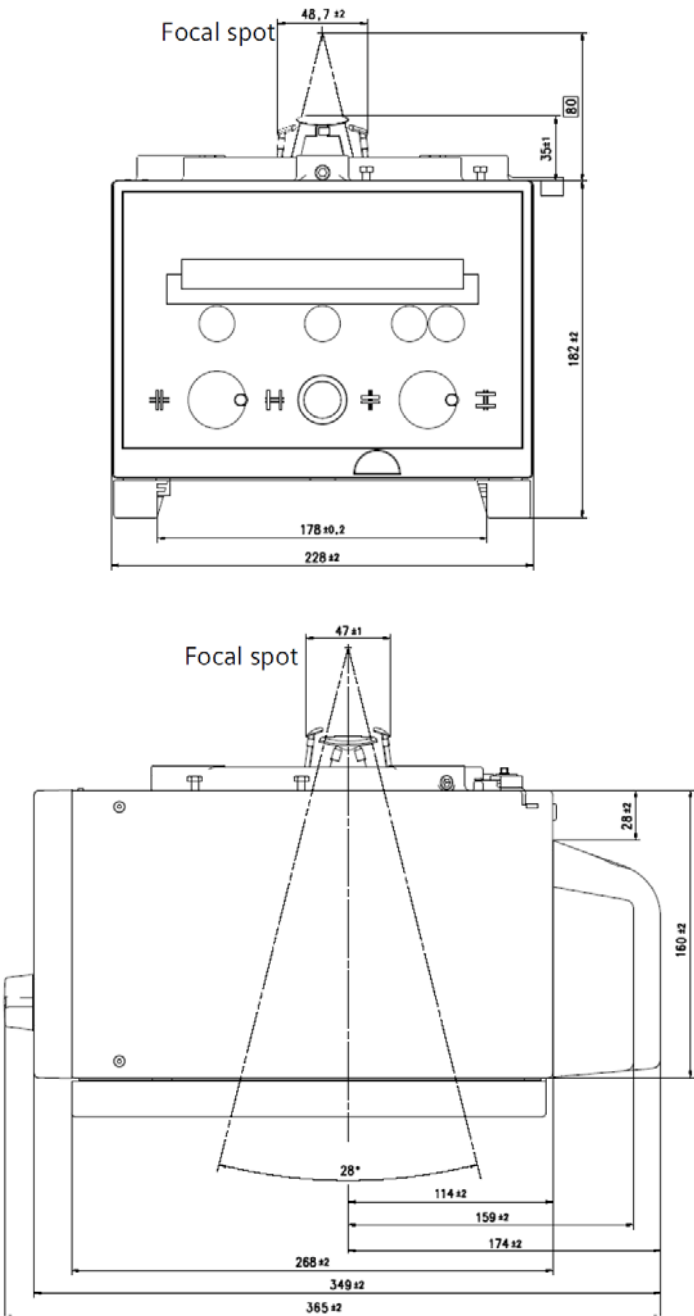
Legally Required Tests All legally required tests must be performed at the prescribed time intervals, e.g. constancy test according to the X-ray ordinance (§16 RöV) in the Federal Republic of Germany, e.g. tests based on requirements regarding Electronic Component Radiation Control (EPRC).

1.3 Technical Specifications

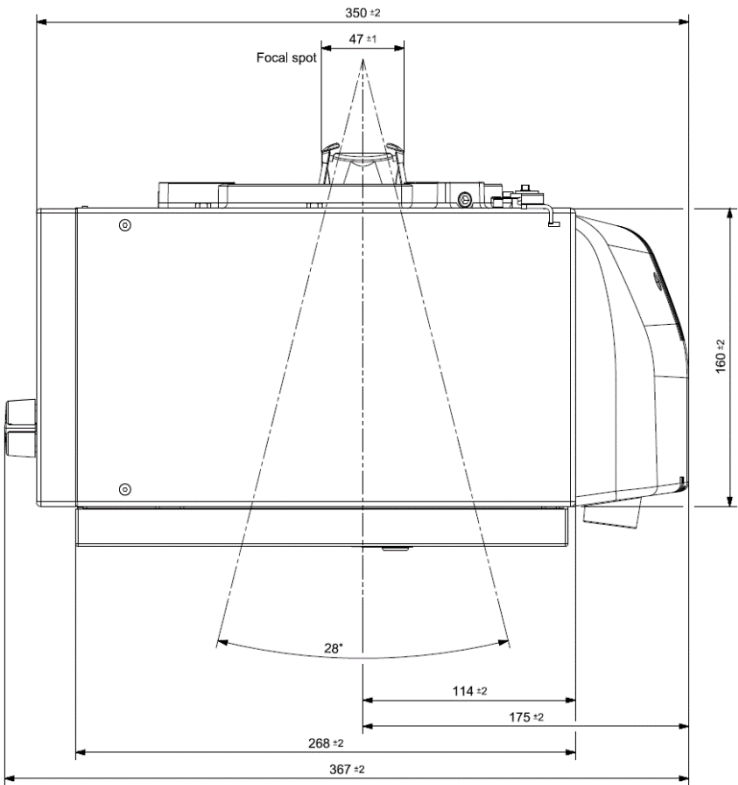
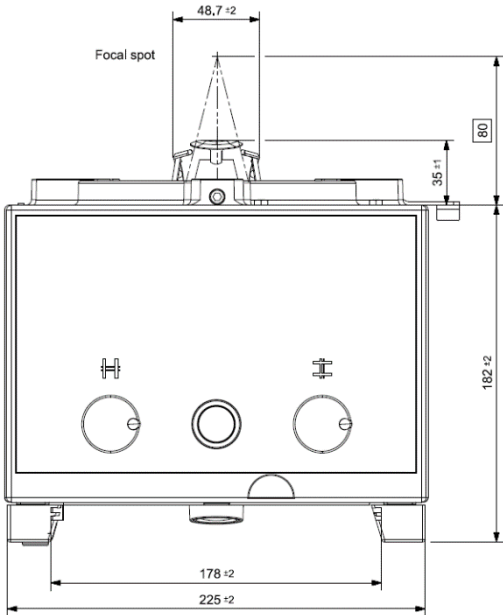
1.3.1 Dimensional Drawings

All dimensions in mm.

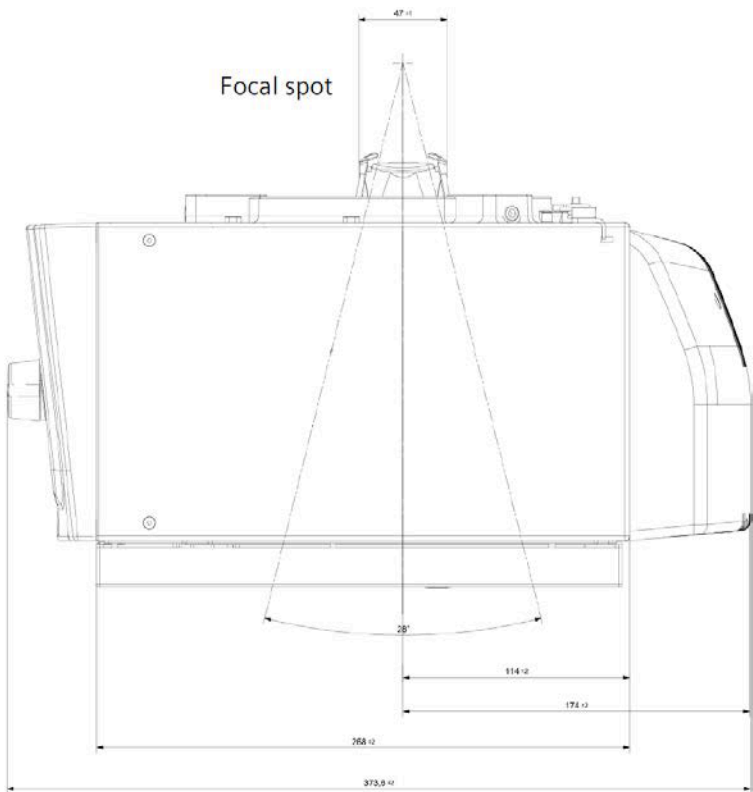
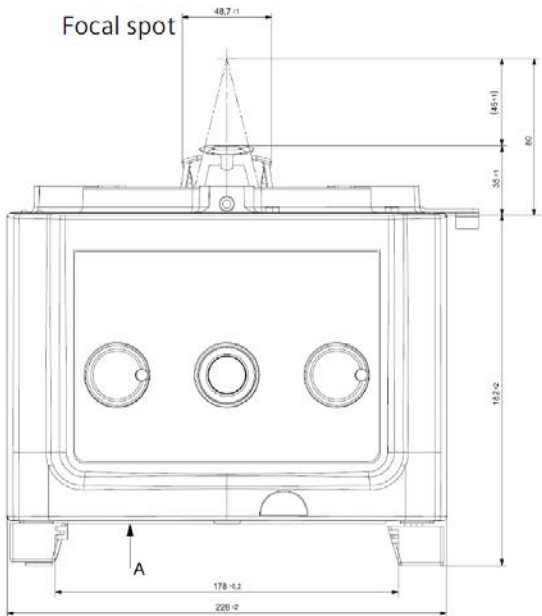
Dimensions of Collimator AL03 II eL, Collimator AL01 II, Collimator AL01 II eL, Collimator AL02 II, Collimator AL01 C II, Collimator AL02 II eL, Collimator AL01 C II eL, Collimator AFL01 II and Collimator AFL01 II eL



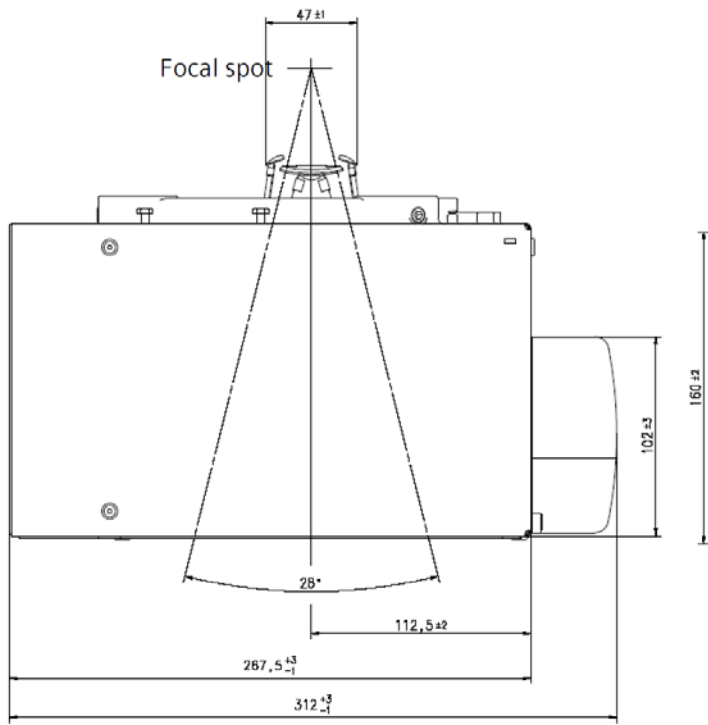
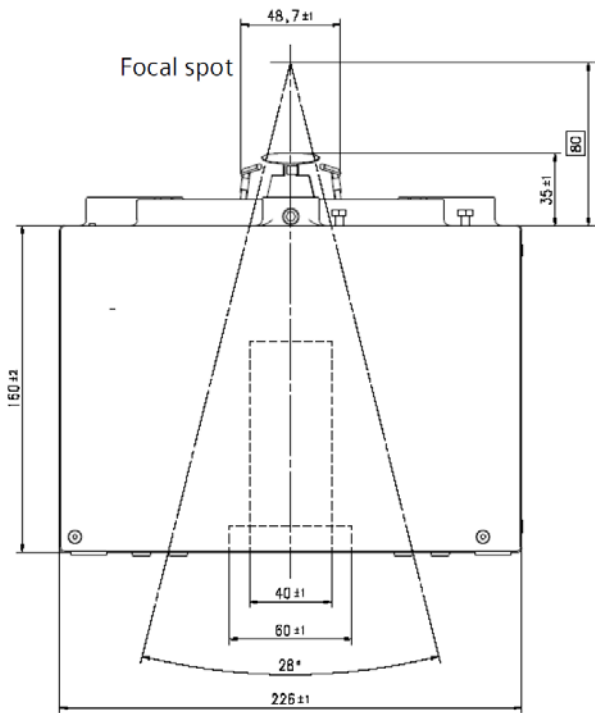
Dimensions of Collimator AL04 II eL and Collimator AL04 II-D



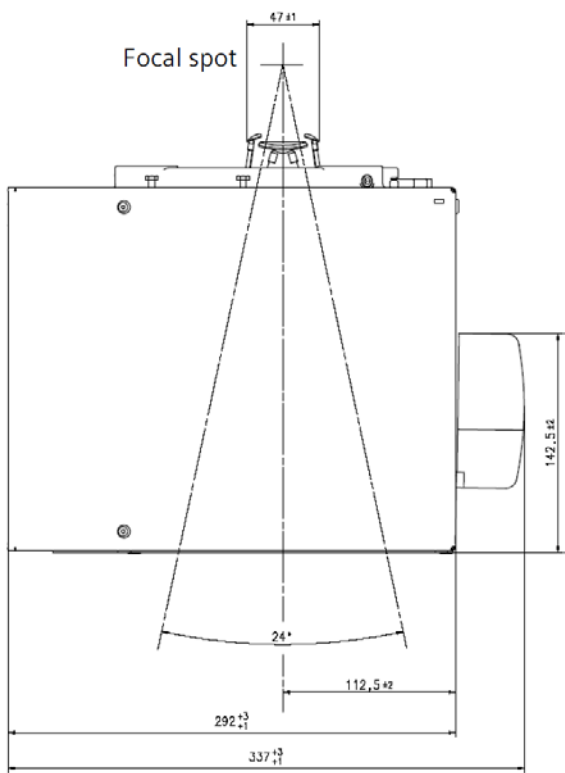
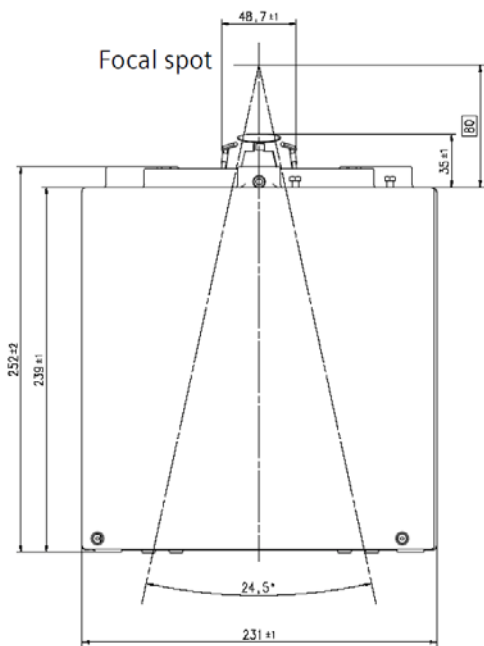
Dimensions of Collimator AL02 II -D



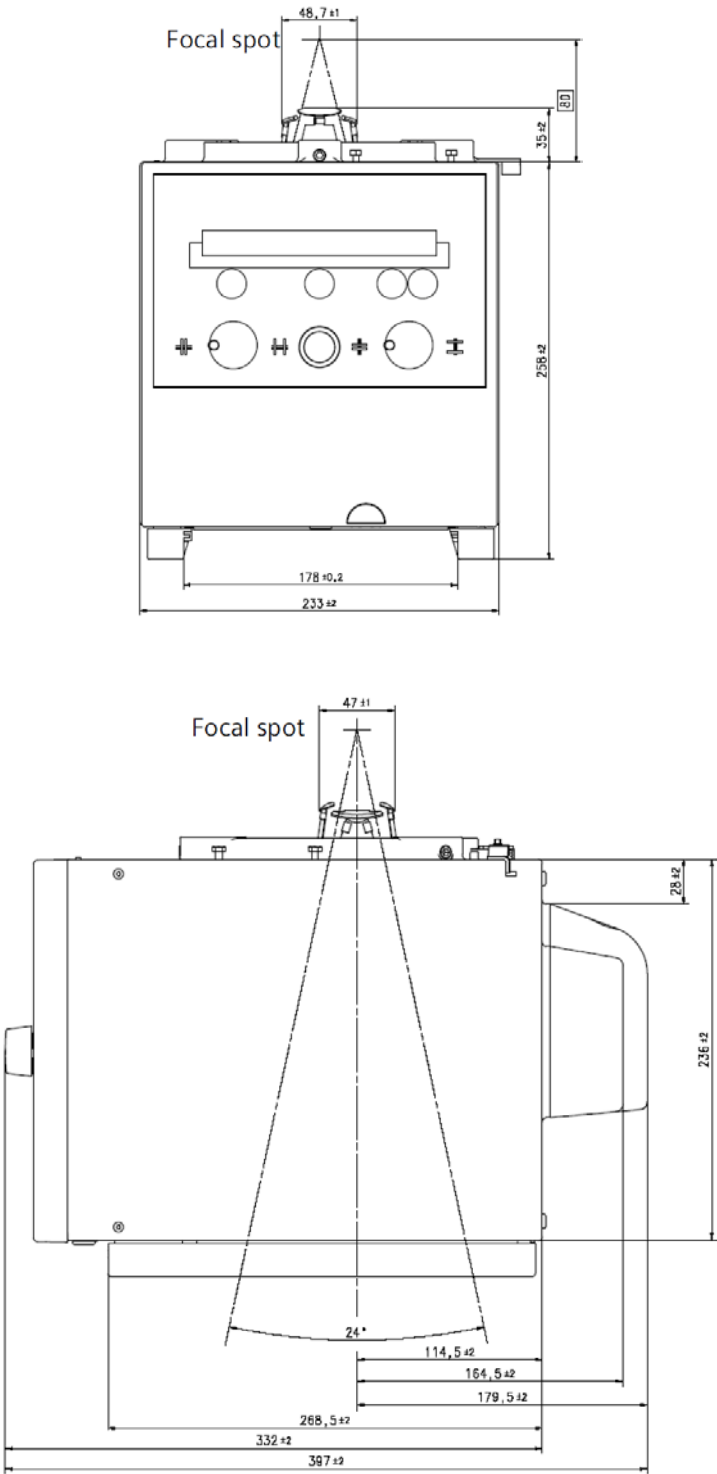
Dimensions of Collimator A01 II, Collimator AF01 II and Collimator AF01 A II



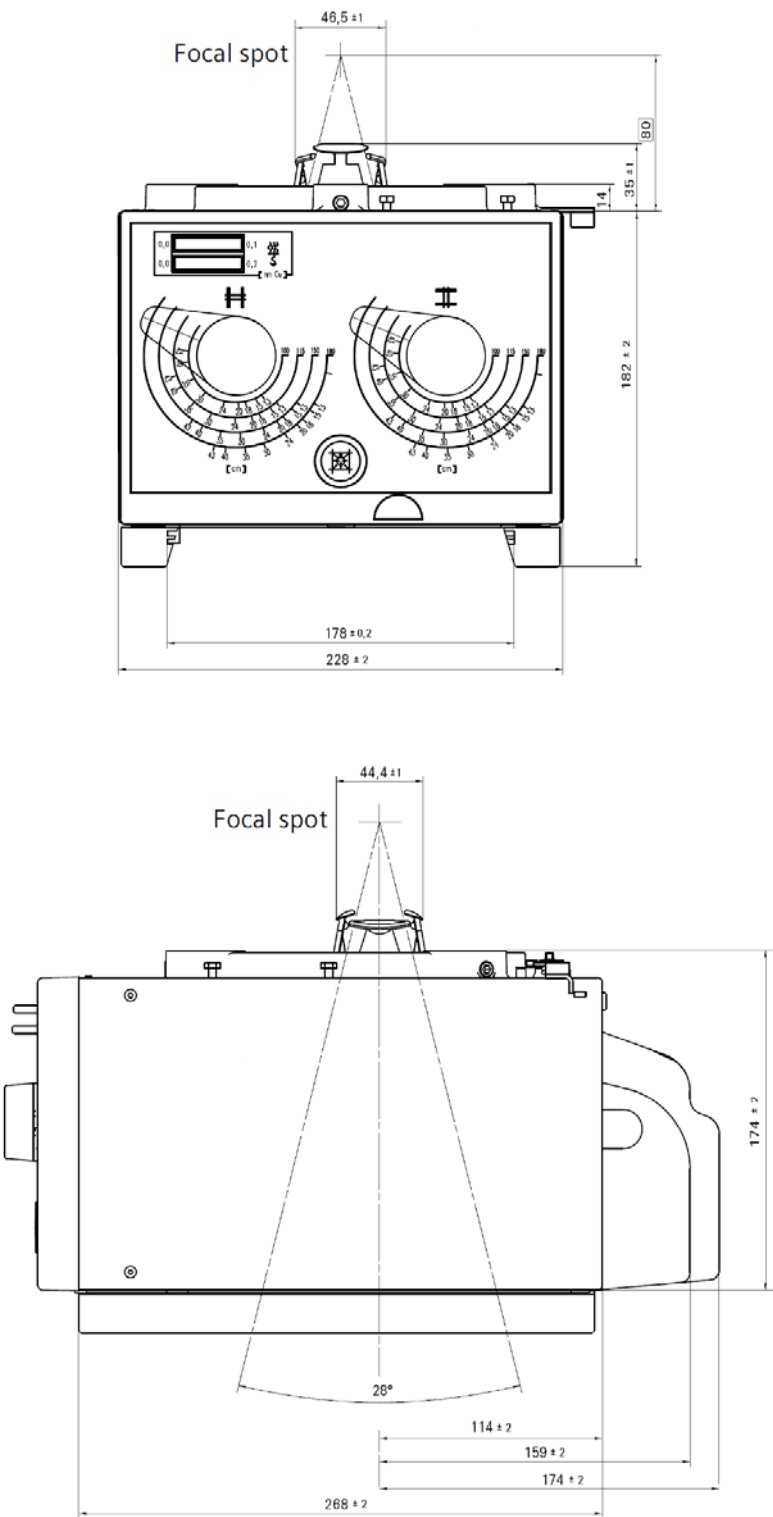
Dimensions of Collimator AF DSA01 II



Dimensions of Collimator AFL DSA01 II and Collimator AF DSA01 II eL



Dimensions of Collimator ML01 II



1.3.2 General & Electrical Data

Models Collimator AL01 II, Collimator AL02 II, Collimator AL01 C II and Collimator AFL01 II

Standard	Description	Specification
	Dimensions (L x W x H) [mm] (typical values)	(365.5 x 228 x 182) ± 2
	Weight of unit [kg]	≤ 10.5
	Collimator AL01 C II	10 ± 0.5
	Collimator AFL01 II	≤11.5
	Aperture angle [°]	28 / 28
	Angle of rotation around central beam axis [°]	± 45
	Maximum field size [cm] with SID = 90cm	43 x 43
	Minimum field size [cm] with SID = 100cm	3 x 3
	Power supply:	
	DC input voltage [V]	24 ± 10%
	Max. DC input current [A]	2.0
	DC input voltage lamp [V]	28 ... 40
	Max. AC input current [A]	10
	DC input voltage CAN bus [V]	12 ... 27
	Max. DC input current [mA] at nominal voltage (15V) for the CAN interface	150
	Halogen lamp	24V _{AC} / 150W / part no.: 8375545 Only OEM Siemens parts may be used as replacement parts!
IEC 60601-1-3	Inherent filtration Collimator AL01 C II	1.0 mm Al at 70 kV 2.0 mm Al at 70 kV
IEC 60601-1-3	Leakage radiation	< 0.5 mGy / h
IEC 60601-1	Protection class	Class I
IEC 60825-1	Laser component	Laser Class 2

Models Collimator AL03 II eL, Collimator AL01 II eL, Collimator AL02 II eL, Collimator AL01 C II eL, Collimator AFL01 eL and Collimator AL02 II -D

Standard	Description	Specification
	Dimensions (L x W x H) [mm] (typical values)	(365.5 x 228 x 182) ± 2
	Collimator AL02 II -D	(373 x228 x 182) ± 2
	Weight of unit [kg]	≤ 10.5
	Collimator AL01 C II eL	10 ± 0.5
	Collimator AFL01 eL	≤ 11.5
	Collimator AL02 II -D	≤ 12.0
	Aperture angle [°]	28 / 28
	Angle of rotation around central beam axis [°]	± 45
	Maximum field size [cm] with SID = 90cm	43 x 43
	Minimum field size [cm] with SID = 100cm	3 x 3
	Power supply: DC input voltage [V]	24 ± 10%
	Max. DC input current [A]	2.0
	DC input voltage CAN bus [V]	12 ... 27
	Max. DC input current [mA] at nominal voltage (15 V) for the CAN interface	150
IEC 60601-1-3	Inherent filtration Collimator AL01 C II eL	1.0 mm Al at 70 kV 2.0 mm Al at 70 kV
IEC 60601-1-3	Leakage radiation	< 0.5 mGy / h
IEC 60601-1	Protection class	Class I
IEC 60825-1	Laser component	Laser Class 2

Models Collimator AL04 II eL and Collimator AL04 II -D

Standard	Description	Specification
	Dimensions (L x W x H) [mm] (typical values)	(365.5 x 228 x 182) ± 2
	Weight of unit [kg]	≤ 12.0
	Aperture angle [°]	24.2 / 24.2
	Angle of rotation around central beam axis [°]	± 45
	Maximum field size [cm] with SID = 100cm	43 x 43
	Minimum field size [cm] with SID = 100cm	3 x 3
	Power supply: DC input voltage [V]	24 ± 10%
	Max. DC input current [A]	2.0
	DC input voltage CAN bus [V]	12 ... 27
	Max. DC input current [mA] at nominal voltage (15 V) for the CAN interface	150
IEC 60601-1-3	Inherent filtration	1.0 mm Al at 70 kV
IEC 60601-1-3	Leakage radiation	< 0.5 mGy / h
IEC 60601-1	Protection class	Class I
IEC 60825-1	Laser component	Laser Class 2

Model Collimator AFL DSA01 II

Standard	Description	Specification
	Dimensions (L x W x H) [mm] (typical values)	(397 x 233 x 258) ± 2
	Weight of unit [kg]	≤ 16.5
	Aperture angle [°]	24 / 24
	Angle of rotation around central beam axis [°]	± 45
	Maximum field size [cm] with SID = 90cm	38 x 38
	Minimum field size [cm] with SID = 100cm	3 x 3
	Power supply:	
	DC input voltage [V]	24 ± 10%
	Max. DC input current [A]	3.0
	AC input voltage (lamp) [V]	28 ... 40
	Max. AC input current [A]	10
	DC input voltage CAN bus [V]	12 ... 27
	Max. DC input current [mA] at nominal voltage (15 V) for the CAN interface	150
	Halogen lamp	24V _{AC} / 150W / part no.: 8375545G2107 Only OEM Siemens parts may be used as replacement parts!
IEC 60601-1-3	Inherent filtration	1.0 mm Al at 70 kV
IEC 60601-1-3	Leakage radiation	< 0.5 mGy / h
IEC 60601-1	Protection class	Class I
IEC 60601-1	Laser component	Laser Class 2

Model Collimator AFL DSA01 II eL

Standard	Description	Specification
	Dimensions (L x W x H) [mm] (typical values)	(397 x 233 x 258) ± 2
	Weight of unit [kg]	≤ 16.5
	Aperture angle [°]	24 / 24
	Angle of rotation around central beam axis [°]	± 45
	Maximum field size [cm] with SID = 90cm	38 x 38
	Minimum field size [cm] with SID = 100cm	3 x 3
	Power supply:	
	DC input voltage [V]	24 ± 10%
	Max. DC input current [A]	3.0
	AC input voltage (lamp) [V]	12 ... 27
	Max. DC input current [mA] at nominal voltage (15 V) for the CAN interface	150
IEC 60601-1-3	Inherent filtration	1.0 mm Al at 70 kV
IEC 60601-1-3	Leakage radiation	< 0.5 mGy / h
IEC 60601-1	Protection class	Class I
IEC 60601-1	Laser component	Laser Class 2

Models Collimator A01 II, Collimator AF01 II and Collimator AF01 A II

Standard	Description	Specification
	Dimensions (L x W x H) [mm] (typical values)	(313 x 226 x 160) ± 2
	Weight of unit [kg]	≤ 9.5
	Collimator AF01 A II	8.8 ± 0.5
	Aperture angle [°]	28 / 28
	Maximum field size [cm] with SID = 90cm	43 x 43
	Minimum field size [cm] with SID = 100cm	3 x 3
	Power supply: DC input voltage [V]	24 ± 10%
	Max. DC input current [A]	2.0
	DC input voltage CAN bus [V]	12 ... 27
	Max. DC input current [mA] at nominal voltage (15 V) for the CAN interface	150
IEC 60601-1-3	Inherent filtration	0.5 mm Al at 70 kV
	Collimator AF01 A II	1.5 mm Al at 70 kV
IEC 60601-1-3	Leakage radiation	< 0.5 mGy / h
IEC 60601-1	Protection class	Class I

Model Collimator AF DSA01 II

Standard	Description	Specification
	Dimensions (L x W x H) [mm] (typical values)	(338 x 231 x 239) ± 2
	Weight of unit [kg]	≤ 14.5
	Collimator AF DSA01 II (10092627)	13.4 ± 0.5
	Aperture angle [°]	24 / 24
	Maximum field size [cm] with SID = 90cm	38 x 38
	Minimum field size [cm] with SID = 100cm	3 x 3
	Power supply: DC input voltage [V]	24 ± 10%
	Max. DC input current [A]	3.0
	DC input voltage CAN bus [V]	12 ... 27
	Max. DC input current [mA] at nominal voltage (15 V) for the CAN interface	150
IEC 60601-1-3	Inherent filtration	0.5 mm Al at 70 kV
	Collimator AF DSA01 II (10092627)	0.1 mm Al at 70 kV
IEC 60601-1-3	Leakage radiation	< 0.5 mGy / h
IEC 60601-1	Protection class	Class I

Model Collimator ML01 II

Standard	Description	Specification
	Dimensions (L x W x H) [mm] (typical values)	(268 x 228 x 182) ± 2
	Weight of unit [kg]	≤ 10.5
	Aperture angle [°]	28 / 28
	Angle of rotation around central beam axis [°]	± 45
	Maximum field size [cm] with SID = 90cm	43 x 43
	Minimum field size [cm] with SID = 100cm	3 x 3
	Power supply: DC input voltage LED [V] Max. DC input current [A]	24 ± 10% 3.0
IEC 60601-1-3	Inherent filtration	1.0 mm Al at 70 kV
IEC 60601-1-3	Leakage radiation	< 0.5 mGy / h
IEC 60601-1	Protection class	Class I
IEC 60825-1	Laser component	Laser Class 2

1.3.3 Laser Performance Data

Standard	Description	Specification
	Class 2	
	Wavelength	650nm (continous wave)
	Beam divergence	0.5 mrad
	Fan angle	85° +/- 5°
	Optical output power:	3 mW -0.6 mW/+1mW
	Accessible emission	<= 1 mW (accessible emission)

There are no contros and procedures available to increase accessible emission levels of radiation.

1.3.4 Climatic Conditions

	Transportation and Storage	Operation
Admissible ambient temperature [°C]	-40 to +70	+10 to 35
Admissible relative humidity not condensing	10 to 95 %	20 to 75
Admissible barometric pressure [kPa]	50 to 106	70 to 106
Degree of protection	IPX0 acc. to EN60529	

!

The collimator should not be subjected to extreme and fast temperature changes (both in cold and hot environments), excessive dust or high humidity. For further precautions during transportation, please refer to the sections on installation, operation and maintenance in this manual.

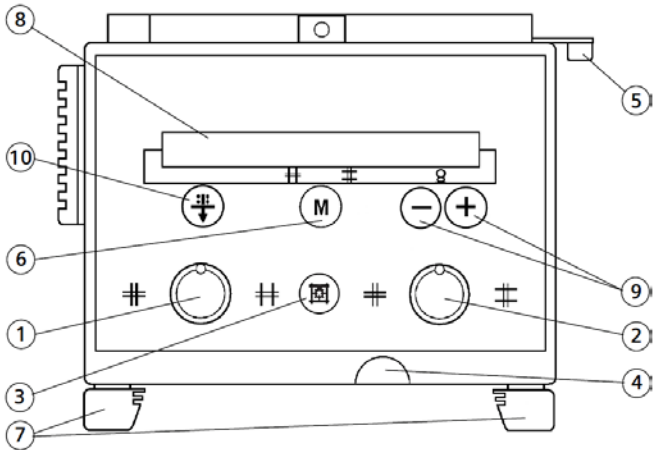
1.3.5 Materials Used

Part	Material
Off focal blades	Pb 2 mm
Input window	
Fixed Al filter plate (optional)	Al 1.0 mm
Prefiltration	
Manual prefiltration	Cu 0.1 mm and Cu 0.2 mm (combined Cu 0.3 mm)
Motorized prefiltration	1x Cu 0.1 mm and 1x Cu 0.2 mm (combined 0.3 mm Cu) 1x Cu 0.1 mm and 1x Cu 0.2 mm (combined 0.3 mm Cu)
Reflector	Al equivalent 1.0 mm / 70kV
Collimation	Pb 3 mm
Output window	
Models with radiation field localizer	Lexan, Al equivalent 0.1 mm / 70kV
Models without radiation field localizer	Al 0.5 mm

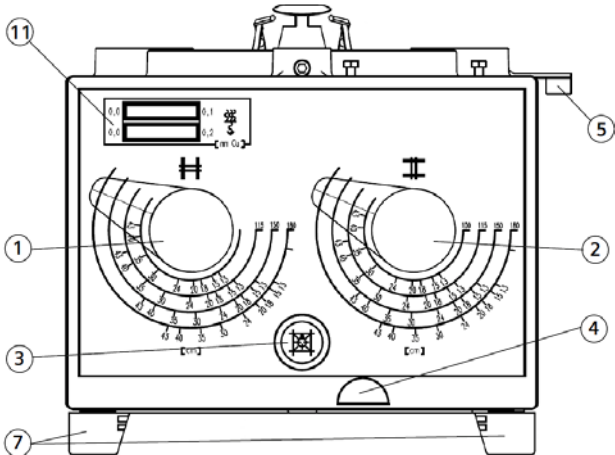
1.4 Overview

1.4.1 Parts of the Collimator

1.4.1.1 Front Operating Panel



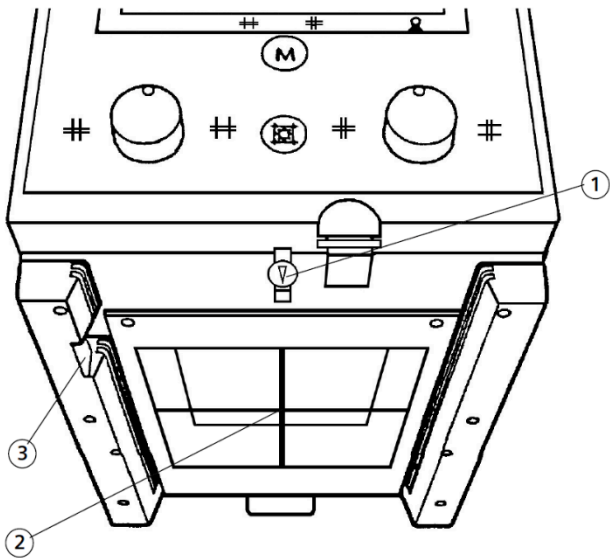
1.4.1.2 Front Panel of the Manual Collimator



1.4.1.3 Table of Functions and Displays

No.	Description
(1)	Adjusting knob for format height collimation. Turning counterclockwise closes the collimator, turning clockwise opens the collimator (the rotation direction is configurable on collimators with CANopen interface only).
(2)	Adjusting knob for format width collimation. Turning counterclockwise closes the collimator, turning clockwise opens the collimator (the rotation direction is configurable on collimators with CANopen interface only).
(3)	Button for light localizer and laser line light localizer. Switches off automatically (the operating time can be set stepwise; see chapter "Operation" > "Getting Started" > "Lamp Timer").
(4)	Grip of the measuring tape for SID measurement. Read the measuring tape at bottom edge of the collimator (the measuring tape has both a cm and an inch graduation).
(5)	Detent lever for rotation of the collimator about the central beam axis. (rotation $\pm 45^\circ$; the collimator only stops in the 0° position).
(6)	MEMORY button to call up the most recent format settings (not available on models Collimator AL02 II -D, Collimator AL04 II -D, Collimator AL04 II eL and Collimator ML01 II). When a button is pressed, the collimator sends a CAN message to the system. This signal can be used e.g. to recall the last stored collimation.
(7)	Accessory rails for attachment parts.
(8)	Function display field (not available on models Collimator AL02 II -D, Collimator AL04 II -D, Collimator AL04 II eL and Collimator ML01 II).
(9)	Button for manually setting the SID. (Pressing the button sends a signal to the system (not available on models Collimator AL02 II -D, Collimator AL04 II -D, Collimator AL04 II eL and Collimator ML01 II).
(10)	Button for selecting the internal Cu prefiltration of the collimator (not available on models Collimator AL02 II-D, Collimator AL04 II -D, Collimator AL04 II eL, Collimator AL01 II, Collimator AL01 II eL and Collimator ML01 II).
(11)	Switch lever for manual selection of the internal Cu prefiltration (operating elements of model Collimator ML01 II are shown as an example).

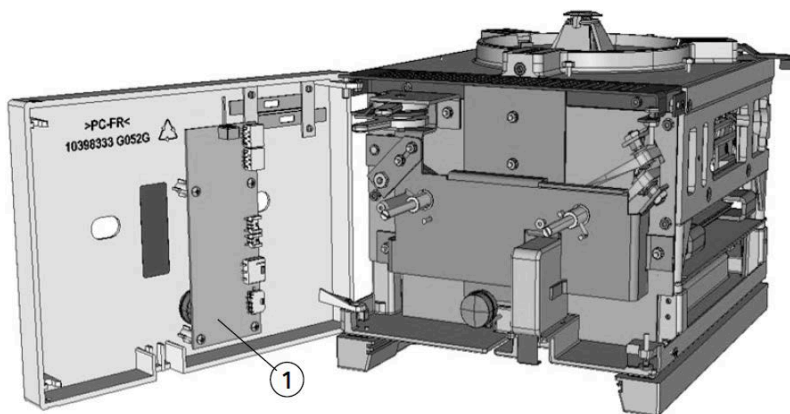
1.4.1.4 Operating Elements below the Collimator



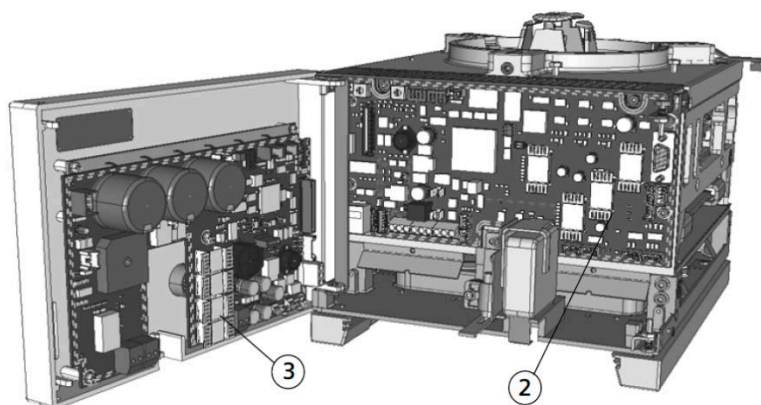
No.	Description
(1)	Laser light localizer with slider to cover the outlet opening.
(2)	Crosshairs in the light localizer window.
(3)	Locking spring for accessories.

1.4.1.5 PCBs of the Collimators

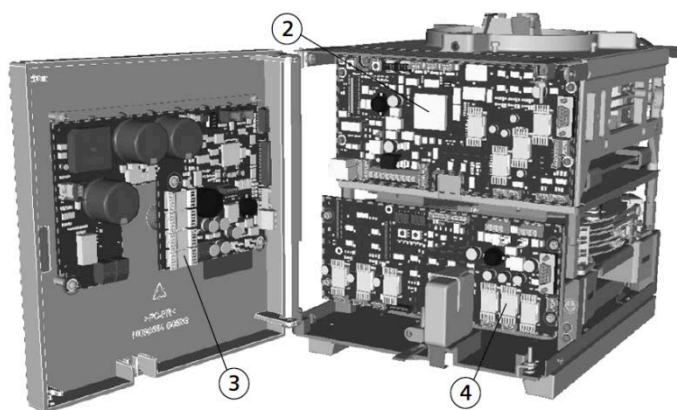
1.4.1.5.1 PCB of Model Collimator ML01 II



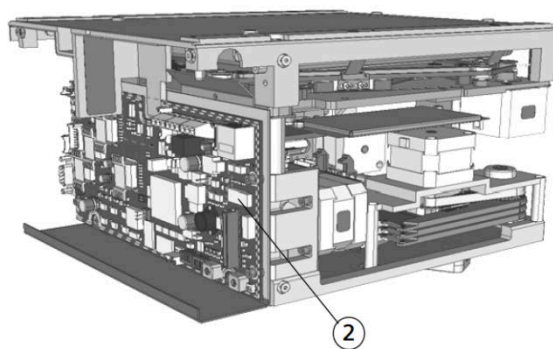
1.4.1.5.2 PCBs of Models Collimator AL03 II eL, Collimator AL01 II, Collimator AL01 II eL, Collimator AL02 II, Collimator AL01 C II, Collimator AL02 II eL, Collimator AL01 C II eL, Collimator AFL01 II, Collimator AFL01 II eL and Collimator AL02 II -D



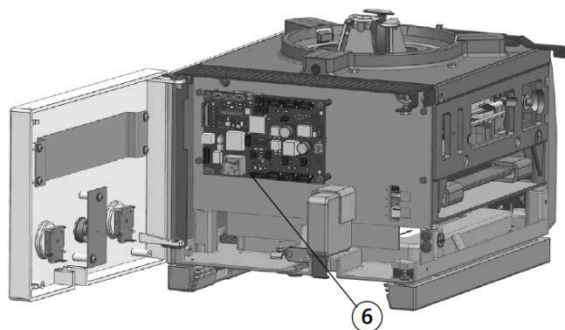
1.4.1.5.3 PCBs of Models Collimator AFL DSA01 II and Collimator AF DSA01 II eL



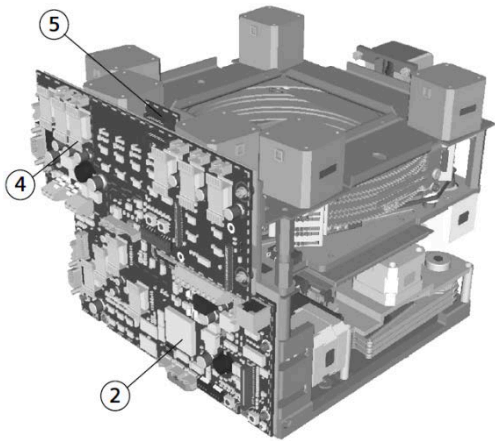
1.4.1.5.4 PCB of Models Collimator A01 II, Collimator AF 01 II and Collimator AF01 A II



1.4.1.5.5 PCB of Models Collimator AL04 II eL and Collimator AL04 II -D



1.4.1.5.6 PCBs of Model Collimator AF DSA01 II



1.4.1.6 Description of the PCBs

No.	Description
(1)	PCB D20
(2)	PCB D21
(3)	PCB D22 resp. D23 eL
(4)	PCB D204
(5)	PCB D203 (behind PCB D204)
(6)	PCB D77

2 Getting Started

2.1 Installation

2.1.1 Safety Information



Only qualified staff is permitted to unpack, install and operate the collimator unit. Only the chapters “Operation” and “Maintenance” of the following instructions are intended as information for the end user. All other instructions are intended for installation and service personnel only.

2.1.1.1 Setup Hazards



Drilling holes into the collimator housing can damage the shielding of the radiation protection and electrical components on the inside.

- ◆ Do not drill additional holes in the cover of the collimator.

2.1.2 Delivery Content

Standard documentation:

- Factory test certificate
- Component status list
- Adjustment gauge

2.1.3 Required Tools and Measurement Devices

- Set of Allen keys
- Slot screwdriver
- Hexagon wrench 5.5
- Ground wire test meter
- Digital multimeter
- Torque wrench, 5 Nm

2.1.4 Transportation to the Installation Site

!

To protect the collimator against damage, transport it in its packaging as supplied by the manufacturer. Transportation is recommended with the exit window of the collimator facing down. Be careful not to damage or displace the focal blades at the inlet aperture.

!

Assure, that during transport the transportation safeguards are always attached correctly as described on the caution label (see below).

2.1.5 Unpacking

- Remove all additional papers which are attached to the packaging and keep them with the system documents.
- Remove the transportation safeguard:



Remove all 3 transport safety screws (marked red), see illustration X and Y, before power on the collimator. Before transportation tighten the transport safety screws X fully (they have to screw in easily). Therefore the smallest x-ray field has to be set. For manual setting of collimator blades replace the left cover and adjust an opening of the collimator blades of approx. 4.5 mm. Turn off voltage before fitting or removing the cover. Mind installation instructions and ESD regulations.

- Remove the protective cover before installation and check the adjustment of the focal blades.
- Use the adjustment gauge (part no.: 0468769 G052G or part no.: 7736791 for off focal blades in two directions) supplied with the collimator.



- The off focal blades should have a distance of 0.0 mm up to 1.0 mm to the pin of the adjustment gauge, when the rectangular blades are straightened into the closed end position by hand.
- If, due to deviations of the focus within the tube unit, the off focal blades should extend into the path of rays, the particular leaf has to be bent outwards carefully.

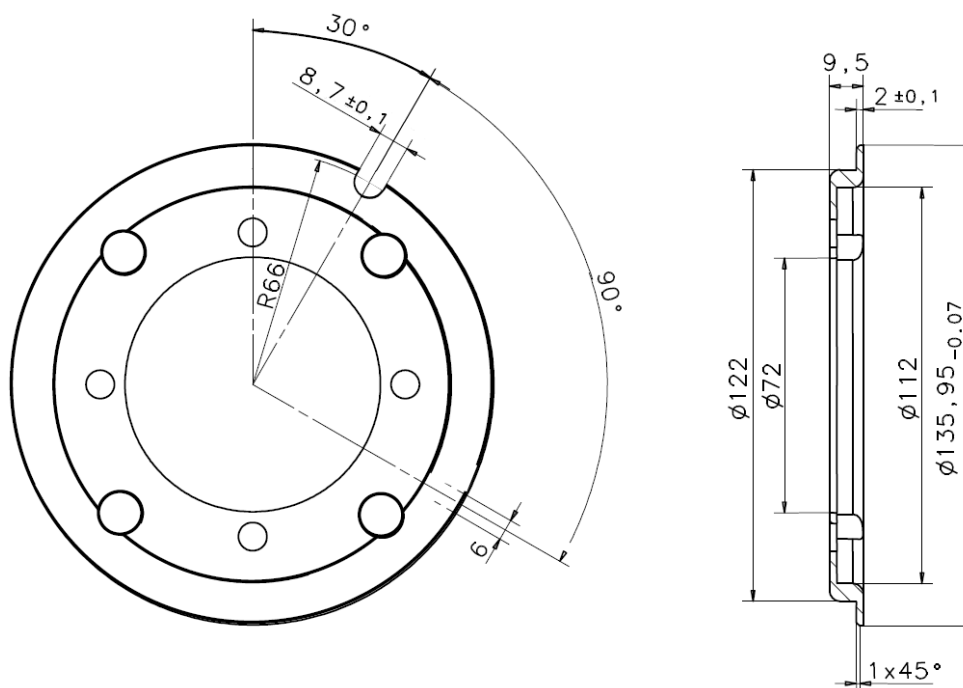


Keep the cover on the input window until the final installation of the collimator on the tube to protect the focal blades against damage.

2.1.5.1 Installing the Collimator

Note

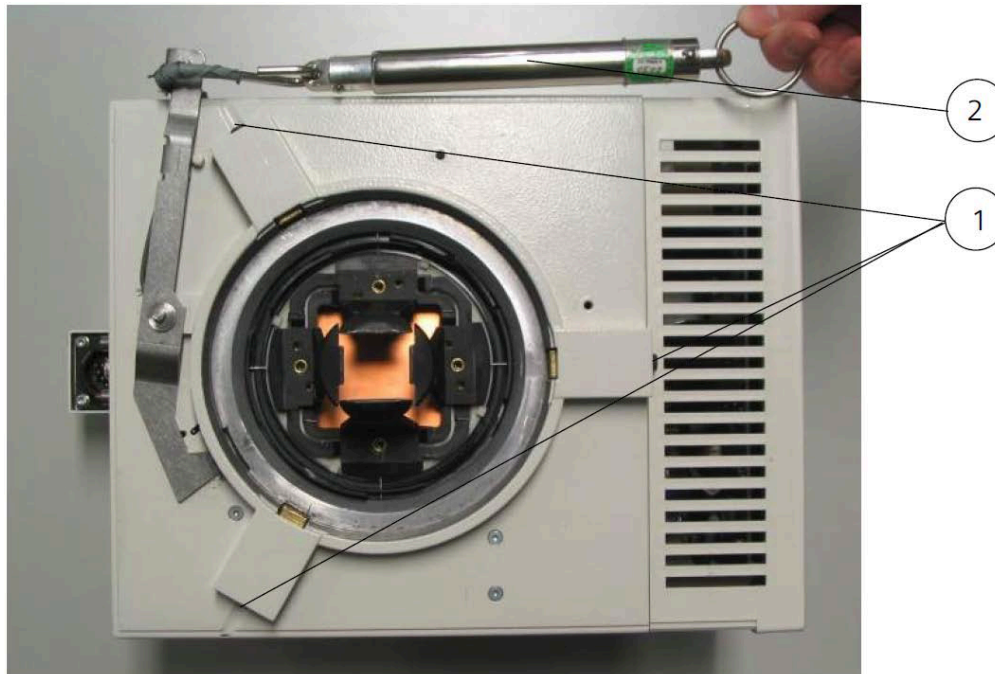
The collimator is designed for a focus to flange distance of 80mm. Please refer to specifications below, showing the mechanical interface (SIEMENS tube flange, part no.: 8440786).



The mounting means of the unit supporting this component, must be able to support a load of 24 kg (7 kg accessories included).

2.1.6 Setting Up the Collimator

For attaching the collimator to the tube flange, the three screws (1) with a distance of 120° on the tube flange are to be used.



2.1.6.1 Fastening Instructions for Collimator with rotating flange

Note Collimators with a rotating flange are delivered ex-factory with a lightly greased flange.

- Place the collimator on the tube unit flange, insert the screws and tighten them slightly. Then tighten one of the 3 screws (1) so the collimator just can no longer be turned.

!

Carefully place the collimator on the tube unit. The collimator blades are extremely sensitive and can be damaged very easily.

- Hook a spring balance (100N) (2) to the lever of the rotating flange.
- Loosen the screw again so that the collimator is able to turn if a force of 20 – 30 N is applied to the spring balance. Tighten one of the other two screws to 40 – 50 N as described previously and tighten the 3rd screw to 60 – 70 N using the spring balance.

CAUTION

G_X012_F1G1U1M3

Screws fastening the collimator to the tube assembly come loose.

Risks of injury due to falling collimator.

- ◆ Follow the fastening instructions for the collimator and mount the collimator backlash-free.


2.1.6.2 Fastening Instructions for mounting of the fixed collimator

- Place the collimator on the tube unit flange, insert the screws and tighten them slightly. Then tighten one of the 3 screws (1) so the collimator just can no longer be turned.

!

Carefully place the collimator on the tube unit. The collimator blades are extremely sensitive and can be damaged very easily.

- Loosen this screw again by a half turn.
- Repeat this procedure with another screw.
- Just tighten the 3rd screw a little bit, so the collimator cannot be turned any more.
- Tighten the 1st and the 2nd screw half turn back again.

**CAUTION**
G_X012_F1G1U1M2

Screws fastening the collimator to the tube assembly come loose.
Risks of injury due to falling collimator.

- ◆ Maximum torque to fasten the screws: 5 Nm.

!

The system supplier has to ensure that the tube flange is able to support the weight of the collimator and his accessories.

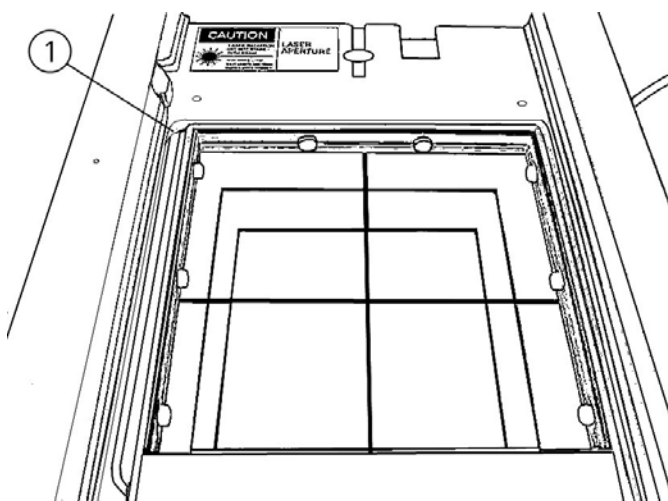
2.1.6.3 Assembling the DAP Chamber

Note

DAP chambers with external connections as well as DAP chambers which are compatible with CANopen can be installed in the collimator N II.

On the OT collimators, the window with the crosshairs has to be removed before installation. The DAP chamber has to be mounted under the collimator holder frame with its mounting. The window is no longer needed after installing the DAP chamber.

The line and the plug of the DAP chambers, which are compatible with CANopen, have to be pushed through the aperture in the casting holder (1) and connected to the plug X17 on PCB D21 resp. plug X5 on PCB D77.



If a DAP chamber with CAN termination is used, the CAN termination of the collimator has to be removed:

- On collimator versions without wedge filter unit (all collimator models except Collimator AFL DSA01 II, Collimator AFL DSA01 II eL and Collimator AF DSA01 II) remove the connector from D21 X4.
- On collimator versions with wedge filter unit (Collimator AFL DSA01 II, Collimator AFL DSA01 II eL and Collimator AF DSA01 II) remove connector from D204 X4 (respectively set the jumper D4 X12 to 2-3).
- For models Collimator AL04 II eL and Collimator AL04 II -D remove jumper D77 X81.

For conventional DAP chambers with external connections, the line is passed through on the back side of the collimator. The crosshairs then have to be adjusted to the center of the collimation and the screws of the holder frame have to be tightened.

2.1.7 Electrical Installation

The collimator requires a power supply of:

- 24 V_{DC} ± 10% input with a maximum current of 2.0 A (max. 3.0 A for Collimator ML 01 II, Collimator AF DSA01 II, Collimator AFL DSA01 II eL and Collimator AFL DSA01 II).
- 12 ... 27V_{DC} input with a maximum current of 150 mA at nominal voltage (15 V) for the CAN interface; max. current 400 mA when using a DAP chamber compatible with CANopen.



A fuse for the CAN voltage is required on the system side.

The collimator with halogen light requires an additional power supply of:

- 28 ... 40 V_{AC} input with a maximum current of 10A for the halogen light indicator.
At input voltage > 30V_{AC} the max. current is 8.0A.

The collimator with LED light does not require an additional power supply.



According to IEC 60601-1 the supply voltage shall be separated from the mains supply by double or reinforced insulation. The power supplies have to be provided by the system.

2.1.7.1 Electrical Wiring and Connections

- Collimator: TE CPC Connector (206036-1).
- Wiring harness: TE CPC Connector (206037-3).

Connector X1 (except Collimator AL04II eL and Collimator AL04 II -D)

Pin #	Port	Description	Not applicable for
1	Power supply collimator	+ V _{DC}	
2	Power supply collimator	- V _{DC}	
3	Ground	PE	
4	n.c.	n.a.	
5	CAN data	NEG CAN	
6	CAN data	POS CAN	
7	Power supply halogen light	V _{AC}	Collimator A01 II, Collimator AF01 II, Collimator AF01 A II, Collimator AF DSA01 II
8	Ground	PE	
9	Power supply halogen light	V _{AC}	Collimator A01 II, Collimator AF01 II, Collimator AF01 A II, Collimator AF DSA01 II
10	n.c.	n.a.	
11	Power supply light	V _{AC/DC}	Collimator A01 II, Collimator AF01 II, Collimator AF01 A II, Collimator AF DSA01 II
12	Ground	PE	
13	Power supply CAN	- V _{DC}	
14	Power supply CAN	+ V _{DC}	
15	Power supply light	V _{AC/DC}	Collimator A01 II, Collimator AF01 II, Collimator AF01 A II, Collimator AF DSA01 II
16	Ground	PE	

Connector X1 (for models Collimator AL04II eL and Collimator AL04 II -D)

Pin #	Port	Description
1	Power supply collimator	+ V _{DC}
2	Power supply collimator	- V _{DC}
3-4	n.c.	n.a.
5	CAN data	NEG CAN
6	CAN data	POS CAN
7-12	n.c.	n.a.
13	Power supply CAN	- V _{DC}
14	Power supply CAN	+ V _{DC}
15-16	n.c.	n.a.



Halogen light (maximum current 10A):
The power supply (AC) for the halogen lamp is not fused in the collimator. It is required to use a IEC 60127 slow-blow fuse 250VAC/T10AL on system side. If a minimum input voltage of 30VAC is guaranteed, a slow-blow fuse of 250VAC/T8AL can be used.

Ground wire resistance to X1: maximum 50 mΩ.

Pins X1.3, X1.8, X1.12 and X1.16 have an internal grounding (except for models Collimator AL04 II eL and Collimator AL04 II -D). A grounding point is alternatively provided close to the connector, suitable for a grounding wire with 4 mm cable lug. 24 VDC has to be shielded; the shield is grounded.

Shielding of system cables shall be considered.

2.2 Operation

2.2.1 Safety Information

! During operation of the collimator ensure that the collimator can be safely operated.

CAUTION

G_X012_F3G3U1M2

Laser light.

Eye injury.

- ◆ Do not look into the beam.
- ◆ Take care that neither you nor any other person looks directly into the light beam.
- ◆ Close the laser radiation exit of the laser localizer with the sliding cover to protect the eyes of the patient or any other person.

CAUTION

G_X012_F3G2U1M2

If the halogen lamp of the light localizer burns for a long time the lamp housing can heat up.

Danger of burns.

- ◆ Avoid contact with lamp housing to avoid burns.
- ◆ The maximum permissible operation time duty cycle is 50% (90 seconds on to 90 seconds off).
- ◆ The permanent on time of the light must not exceed 10 minutes.

CAUTION

G_X012_F3G2U1M2

If the LED of the light localizer burns for a long time the heatsink can heat up.

Danger of burns.

- ◆ Avoid contact with the heatsink to avoid burns.

CAUTION

G_X012_F3G4U1M2

Photobiological effect of ultraviolet radiation.

Eye injury.

- ◆ Do not look into the light beam for longer than 15 seconds.
- ◆ Always keep enough distance to the collimator.

2.2.2 Software Interface

The software interface of Collimator N II is described in the following documents for collimators with:

- CAN interface: “CAN protocol structure collimator N” 3839458-EPH-03S
- CAN interface Collimator AL04 II eL and AL04 II -D: 3834939-EPH-03S
- CANopen (DS402): “Software Functional Specification / Collimator Profile -CANopen Device Profile for X-Ray Collimators” 3834939-EPH-01S

Note The CAN / CANopen interface is not available for Collimator ML01 II.

2.2.2.1 CAN Baud Rates

The following table displays the factory settings for the CAN baud rates:

Article code	CAN	CANopen	100 kBaud	125 kBaud	250 kBaud	500 kBaud
10092602	x		x			
10092610	x					x
10092612	x					x
10092603	x		x			
10092604	x		x			
10092614	x		x			
10092605	x			x		
10092615	x			x		
10092606		x				x
10092607	x			x		
10092608	x			x		
10092618	x			x		
10092609		x				x
10092619	x					x
10092629	x					x
10092623	x				x	
10092624	x				x	
10092627	x				x	
10092634	x				x	

2 Getting Started

2.2.2.2 Download of the Software (SW) via CAN bus

The procedure for downloading via CAN bus is described in the document "CAN protocol structure collimator NII 3839458-EPH-03S respective 3834939-EPH-03S for Collimator AL04 II eL and Collimator AL04 II -D.

2.2.2.3 Download via Serial Interface

To update the collimator SW by downloading via the serial interface, open the front door on the collimator. Please open or close the door with power switched off to avoid short circuits.

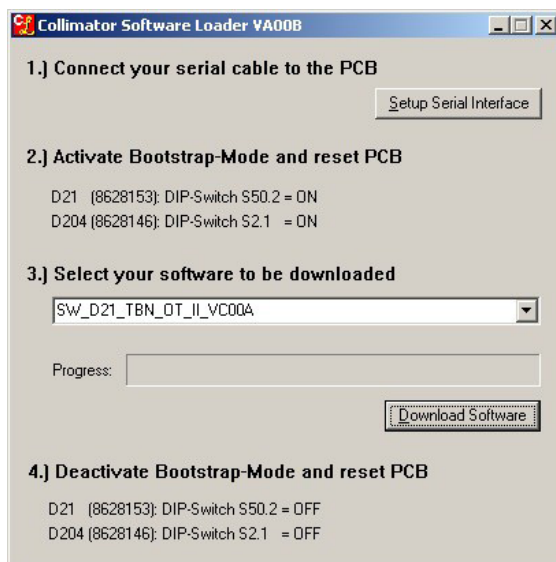
Note

For installation of the SW, a Service PC and a null modem cable (9 pole sub-D serial crossover cable; standard cable for RS232 interface) is required.

Note

Serial download is not supported for Collimator AL04 II eL and Collimator AL04 II -D.

- ◆ Start the download program (e.g. "10092711_PBL_II_VC00H.exe").
- ◆ It extracts the collimator SW loader along with the collimator SW to a directory (e.g. D:\temp) on the Service PC.
- ◆ Switch the system OFF.
- ◆ Connect the Service PC (COM port) and the collimator D21.X12 (top right) with a serial cable.
- ◆ Set the D21.S50.2 DIP switch in the collimator (on the right, next to the processor) to ON.
- ◆ Switch the system ON and start the Collimator SW Loader.



- ◆ Select the COM port ("Setup Serial Interface").
- ◆ Select the released SW (e.g. 10092711_PBL_II_VC00H.exe) and press "Download Software".

- ◆ After completing the download, set DIP switch D21 S50.2 to OFF and perform a reset with switch D21.S2 (top left).

Note After a successful download, the collimator performs a search run.

- ◆ Switch the system OFF.
- ◆ Remove the null modem cable and close the collimator.
- ◆ Finally, the new SW version for the collimator must be entered in the Compatibility List attached to the system.

The SW download is now completed.

2.2.3 Settings

2.2.3.1 Configuration

The collimator is configured using DIP switch S1 on the PCB D21. It is factory-set and should not be changed because it must correspond to the collimator model.

DIP switch	S1.1	S1.2	S1.3	S1.4
Collimator mounted at 0° with reference to the patient (not available for CANopen interface)	ON			ON
Collimator mounted at 90° with reference to the patient (not available for CANopen interface)	OFF			ON
Motorized prefilter exists		ON		ON
No motorized prefilter exists		OFF		ON
Iris exists (not available for CANopen interface)			ON	ON
No iris exists (not available for CANopen interface)			OFF	ON
Adjustment mode				OFF

Note The locations of the DIP switches are shown in the wiring diagram of each collimator.

Note Accessing the adjustment mode is only possible during collimator testing in the factory.

Note Configuration via DIP switch is not supported for Collimator AL04 II eL and Collimator AL04 II -D.



Switch S1.4 on PCB D204 and D21 should not be switched from OFF to ON while the collimator is connected to voltage to avoid the risk of changing the settings unintentionally. Otherwise adherence to the specifications can no longer be ensured.

2.2.3.2 CAN Transfer Rate

The collimator had DIP switch S3 on PCB D21 and S3 on PCB D204 (if available) for setting the CAN transfer rate.

Transfer / transmission rate	Encoding / code		
	S3.1	S3.2	S3.3
100 kBaud	ON	OFF	ON
125 kBaud	OFF	ON	OFF
250 kBaud	ON	ON	OFF
500 kBaud	OFF	OFF	ON
1000 kBaud	OFF	ON	ON

For Collimator AL04 II eL and Collimator AL04 II -D CAN transfer rate can be set via switch S1.2 and S1.3 on PCB D77 resp. via configuration object.

Transfer / transmission rate	Encoding / code	
	S1.2	S1.3
125 kBaud	ON	OFF
250 kBaud	OFF	ON
500 kBaud	OFF	OFF
Config value*	ON	ON

*If a value is stored in config object it will be used, otherwise there is a fall back to 500 kBaud.

2.2.3.3 Emergency Boot

With the 16-bit collimator, it is possible to transfer the software to board D21 and, if available, to board D204 or to board D77 via CAN download. The download of the software is described in the document "CAN protocol structure collimator NII 3839458-EPH-03S.

Note The collimator has a boot firmware for performing the CAN download.

If the wrong application software has been loaded to the collimator by mistake, it is possible to force the collimator to run in emergency boot mode and enable CAN download by setting switch S3.4 on D21, resp. D204 or switch S1.4 on PCB D77 to ON and thereby resetting the collimator. After On completion of the download procedure, the switch must be set back to the OFF position and reset again.

Configuration	Encoding / code
	D77 S1.4 / D21 S3.4
Emergency boot active	ON
Emergency boot inactive	OFF

2.2.3.4 Collimator Plane / Node ID

The two rotary switches S12 and S13 are attached to PCB D21 to set collimator plane A or B (for collimators with CAN interface):

Collimator plane	Encoding / code	
	S12	S13
A (default)	4	0
B	4	4

On collimator variants Collimator AFL DSA01 II, Collimator AL DSA01 II and Collimator AL DSA01 II eL the two rotary switches S12 and S13 are attached to the PCB D204 to set collimator plane A or B (for collimators with CAN interface) additionally:

Collimator plane	Encoding / code	
	S12	S13
A (default)	4	1
B	4	5

For Collimator AL04 II eL and Collimator AL04 II -D there is a DIP switch S1.1 on PCB D77 available. The Node ID can be configured depending on the used CAN ID configuration object in the following way:

Collimator plane	Switch S1.1	Node ID config object	Resulting Node ID
A (default)	OFF	Not defined = empty	40
B	ON	Not defined = empty	44
A	OFF	Set Node ID value*	see config object
B	ON	Set Node ID value*	see config object

*Node ID can be individually set as needed via config object

For collimators with a CANopen interface, individual node-IDs can be set according to the CANopen standard.

2.2.3.5 Halogen Lamp Voltage

DIP switch S1.4 on PCB D22 can be used to reduce the lamp voltage for the light localizer by approximately 1.5 V and thus considerably increase lamp life.

!

This setting is only permissible for collimators operating without DAP chambers because the legal stipulations regarding light localizer brightness in case of undervoltage on collimators with DAP chambers are no longer met.

DIP switch S1.4 D22	DAP chamber present	Lamp voltage
ON (default)	YES	Normal
OFF	NO	Reduced

2.2.3.6 Lamp Timer

Model Collimator ML01 II

Via the rotary switch on PCB D20 the default value of the lamp burning time can be set to four specific values (an on-time of 90 s is factory-set) as described in the following table:

Light localizer on-time [s]	Switch position
100	4
90	3
60	2
30	1

Other Collimator Models

DIP switches S1.1 and S1.2 on PCB D22 resp. D23 eL can be used to set the default value of the lamp burning time (an on-time of 90 s is factory-set).

Note This option is not available for collimators with CANopen.

Note For Collimator AL04 II eL and Collimator AL04 II -D light localizer on-time can only be changed via configuration object and not via DIP switches

Light localizer on-time [s]	S1.1	S1.2
90	ON	ON
60	OFF	ON
30	ON	OFF
10	OFF	OFF

Note Alternatively, the default value of the lamp burning time is steplessly adjustable between 0 and 118 s via CAN interface.

2.2.3.7 Knob Behavior

DIP switch S1.3 on PCB D22 resp. D23 eL can be used to change the behavior of the knobs for collimation adjustment (movement of the leaves).

Note This option is not available for collimators with CANopen, for Collimator AL04 II eL and for Collimator AL04 II -D.

DIP switch S1.3 on D22 /D23 eL	Knob behavior
ON (default)	Leaf movement proportional to knob speed
OFF	Knob behavior of the old 8-bit collimator generation is available (approximately 4 rotations required from the smallest to the largest format)

2.2.3.8 Knob Rotation Behavior

For Collimator AL04 II eL and Collimator AL04 II -D the direction of knob rotation for opening and closing can be adjusted via configuration object independently for each blade pair.

2.2.4 Initialization and Search Run

An initialization will be performed after switching ON or resetting the collimator. The system should initiate a search run after approximately 50 exposures in X-ray systems, respectively after 5 patients in FLUORO systems. Upon initiation of the search run, the collimator determines or corrects its current position.

CAUTION

G_X012_F5G1U2M1

Incorrect collimation.
Risk of unnecessary radiation.

- The system shall initiate a search run periodically. In case of malfunction an error message is sent via the CAN interface.

CAUTION

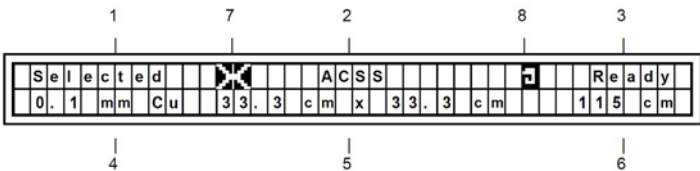
G_X012_F6G1U1M1

Collimator initialization during radiation.
Risk of unnecessary radiation.

- The system/subsystem must prevent any initialization or search run during radiation of the patient.

2.2.5 Features of the Collimator

2.2.5.1 Display Field



No.	Function displayed on the field
(1)	Selected = Selection of the X-ray unit
(2)	Operating mode: ACSS /PBL = Automatic collimation to cassette format Manual = Manual format collimation
(3)	Ready = Exposure enabled
(4)	Selected Cu prefilter in [mm] if prefilter is selected using a button or via remote control (not available on collimators with manual filter unit)
(5)	Format display (height x width in cm or inches)
(6)	SID = Source Image Distance (in cm or inches)
(7)	Collimator centered on image receptor
(8)	Collimator rotated

2.2.5.2 Light Localizer with Centering Crosshairs

The light localizer can be switched on or off by the light button on the front operating panel or via CAN telegram. The centering crosshairs of the full-field light localizer show the center lines of the field of view. An internal timer limits the illumination time. The timer for illumination time can be set up either using DIP switches or via CAN telegram.

Error Message for Halogen Bulb Change

Note The halogen lamp control unit includes a limitation of the inrush current to increase lamp life.



As soon as the brightness of the halogen lamp decreases, a message is shown in the collimator display.

The message is then displayed for about 5 seconds every 10th time the lamp is used. The bulb can then be changed after operation. The required minimum brightness cannot be guaranteed as long as the message is displayed periodically on the collimator.

Although it is possible to continue working with less brightness, changing the bulb as soon as possible is recommended.

2.2.5.3 Laser Line Localizer

The laser line localizer generates a red laser line that can be used to center the tube unit in the middle of the receptor manually. The laser line localizer can be switched on and off by the light button on the front operating panel. An internal timer controls the illumination time.

A slider can be used to cover the radiation exit of the line laser.

The collimators with line laser are delivered with a set of additional adhesive warning labels in different languages. The suitable label has to be put on the housing of the collimator next to the beam aperture together with the laser warning symbol according to IEC 60825-1 when assembling the system.

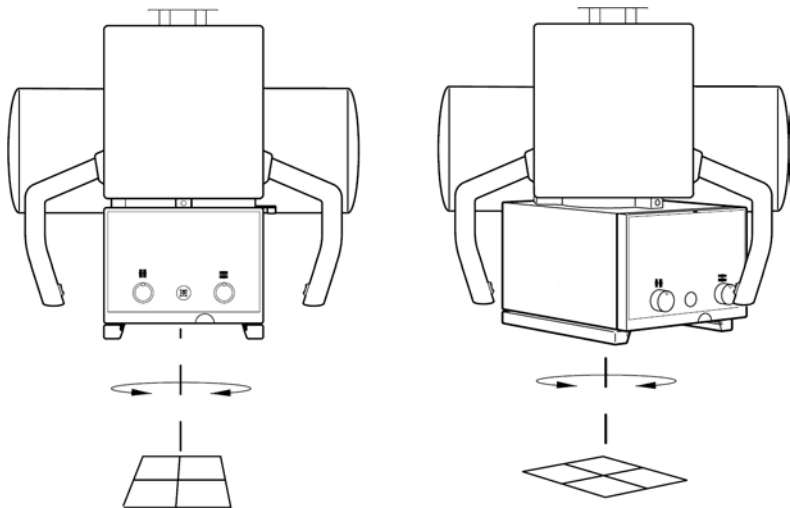


G_X012_F3G3U1M2

- Laser light.
Eye injury.
- ◆ Do not look into the beam!
 - ◆ Take care that neither you nor any other person looks directly into the light beam.
 - ◆ Close the laser radiation exit of the laser light localizer with the sliding cover to protect the eyes of the patient or any other person.

2.2.5.4 Rotation Flange

The collimator can be rotated out of the stop position 0° by pulling the stop lever towards the front operating panel. The maximum rotation in both directions is 45°+10° by using the Siemens tube flange. Ensure that the rotation is not limited by the wiring harness.



Rotating the Collimator ±45° around the Central Beam Axis

- ◆ Move the detent lever on the collimator towards the front panel, i.e. towards the operator.
- ◆ Grasp the collimator with both hands and rotate it by the desired angle in the required direction.

Rotating the Collimator to the 0° Lock-in Position

- ◆ Grasp collimator with both hands and turn it to the lock-in position at 0°.

CAUTION

G_X012_F1G2U1M1

Manual rotation of the collimator.
Risk of injury of the hands or fingers.

- ◆ Always pay attention to your hands to ensure that they are not pinched or crushed between the collimator and other parts of the system.

2.2.5.5 Locking Spring

The locking spring prevents inserted accessories from slipping out of the accessory rails. The locking spring has to be pressed to remove the accessories.

2.2.5.6 Prefilter Selection

CAUTION

G_X012_F5G4U1M1

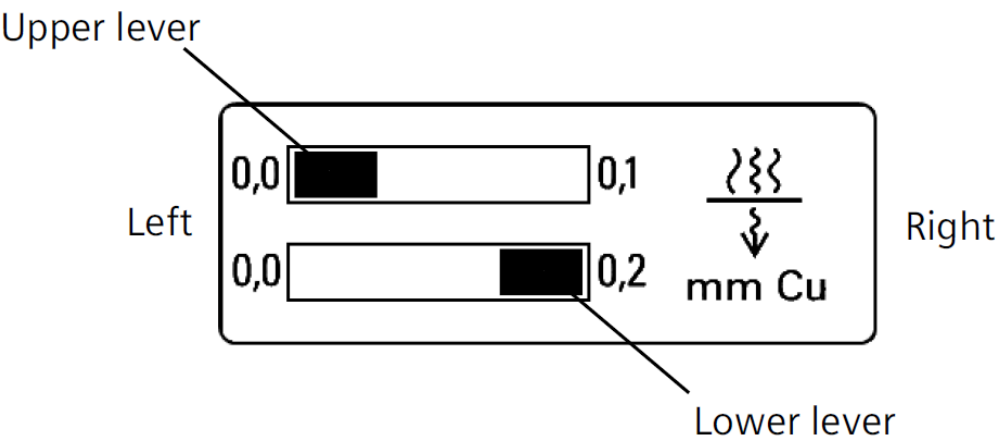
Incorrect filter selection.
Risk of increased radiation dose for the patient.
◆ Select the filter carefully.

Manual Prefilter Selection

Manual prefilter selection is performed using the two levers:

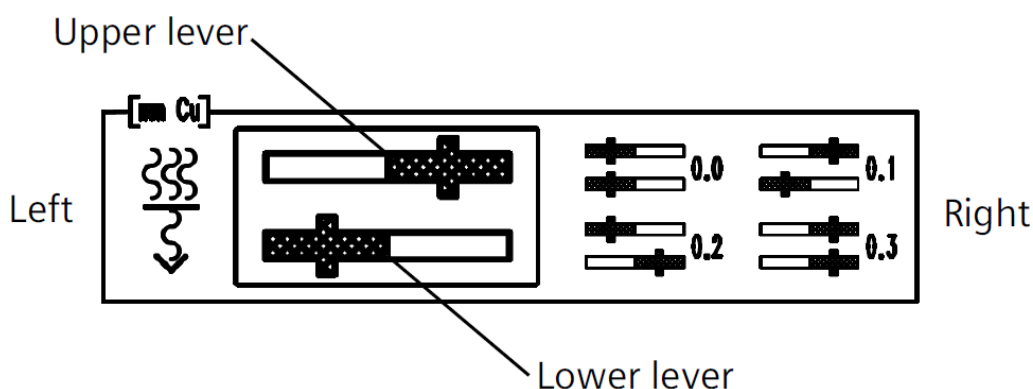
Cu prefilter	Lever position	
	Upper lever	Lower lever
0.0 mm	Left	Left
0.1 mm	Right	Left
0.2 mm	Left	Right
0.3 mm	Right	Right

Control Panel for Model Collimator ML01 II



The two levers are located on the left side of the collimator.
Also, an indicator is placed on the left side of the collimator for proper positioning of the levers.

Control Panel for Models Collimator AL01 II and Collimator AL01 II eL



The two levers are located on the left side of the collimator.

Motorized Prefilter Selection



For CAN Standard interface, if the prefilter is selected by pressing the button for prefilter selection on the front operating panel, the Cu prefilter changes to the next value each time the button is pressed.

Possible Cu prefilter settings in right order:

0.0 mm (none) -> 0.1 mm -> 0.2 mm -> 0.3 mm -> 0.0 mm (none).

The value of the chosen motorized prefilter setting is shown in the display field.

For CANopen interface only a message will send by the Collimator if button is pressed. This message has to be processed by system and a filter change has to be triggered by system in this case, too.

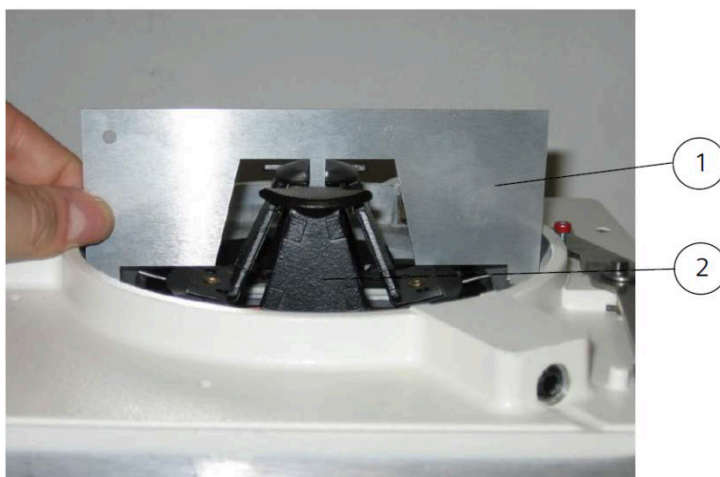
2.4 Adjustment

2.4.1 Adjusting the off focal blades

Note Only adjust the off focal blades if necessary (e.g. if the leaves have been bent after removing the protective cap).

Note An adjustment gauge to adjust the off focal blades is included in the shipment of the collimator.

- ◆ The adjustment gauge (1) is centered by the collimator flange.



- ◆ When the off focal blades (2) are completely closed, the leaves for vertical and horizontal collimation (that are close to the focus) should barely touch the pin of the adjustment gauge or have a maximum clearance of 1 mm.
- ◆ If the leaves are not adjusted properly, they have to be subsequently adjusted by carefully bending their carrier plates.

! Bend the plates carefully!
The lead leaves and the guide pins should not be damaged.

Note The adjustment has to be accomplished for both pairs of plates.

2.4.2 Adjusting the Light Field

2.4.2.1 Light Field – Radiation Field

If the coincidence of the light field and the radiation field is not adequate (e.g. tolerances of the focus point), the light field can be centered using the two Allen screws (2), (3) on the top of the collimator.

Note

The slot-head screw (1) next to the two adjustment screws must not be loosened under any circumstances!



- ◆ Adjustment in the x-direction (height): If the screw (2) is turned clockwise, the light field moves to the right and vice versa.
- ◆ Adjustment in the y-direction (width): If the screw (3) is turned clockwise, the light field moves to the back and vice versa. The adjustment range in this direction is about three times larger than the range in the x-direction.
- ◆ The maximum adjustment range is approximately ± 5 mm (with SID 115 cm).

Note

The adjustment screws may only be turned until the resistance of the compression springs can be felt. The screws must not be loose!

- ◆ After adjusting the light field, the crosshairs window can be readjusted by loosening the 4 fastening screws of the holding frame and the line laser if needed.

Note

The adjustment of the light field may have an effect on the adjustment of the system. If necessary, it must be readjusted, too.

2.4.2.2 Light Field Size – Halogen Lamp

In order to change the size of the light field, remove the lamp cover and the heat shield first.

CAUTION

G_X012_F3G2U1M2

If the halogen lamp of the light localizer burns for a long time, the lamp housing can heat up.

Danger of burns.

- ◆ Avoid contact with lamp housing to prevent burns.
- ◆ The maximum permissible operation time duty cycle is 50% (90 seconds on to 90 seconds off).
- ◆ The permanent on time of the light must not exceed 10 minutes.



- ◆ Use a 5.5 mm open-end wrench to loosen the clamping screw (1).
- ◆ To enlarge the light field, turn the screw (2) clockwise.
- ◆ To reduce the size of the light field, turn the screw (2) counterclockwise.
- ◆ After adjusting the size of the light field, tighten the clamping screw (1) again.

2.4.2.3 Light Field Size – LED

In order to change the size of the light field, remove the lamp cover at first.

CAUTION

G_X012_F3G2U1M2

If the LED of the light localizer burns for a long time, the heatsink can heat up.

Danger of burns.

- ◆ Avoid contact with the heatsink to prevent burns.

⚠ CAUTION

G_X012_F3G4U1M2

Photobiological effect of ultraviolet radiation.

Eye injury.

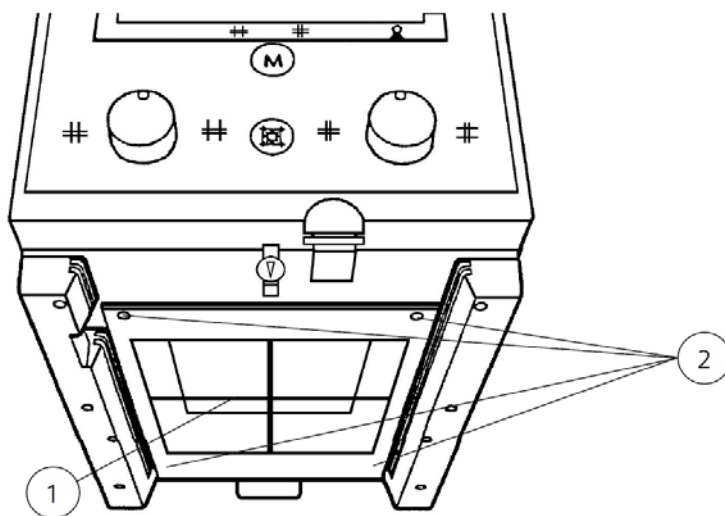
- ◆ Do not look into the light beam for longer than 15 seconds.
- ◆ Always keep enough distance to the collimator.



- ◆ Use a 5.5 mm open-end wrench to loosen the clamping screw (1).
- ◆ To enlarge the light field, push the heatsink (2) towards the housing.
- ◆ To reduce the size of the light field, pull out the heat sink (2).
- ◆ Tighten the clamping screw (1) again.

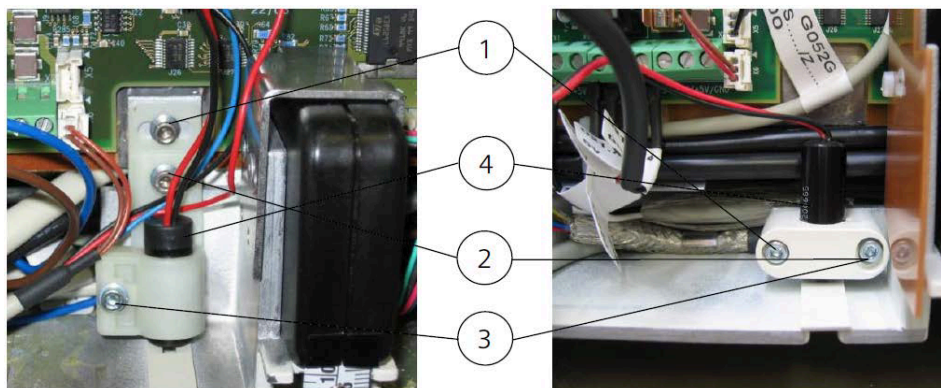
2.4.3 Adjustment of the Crosshairs

The crosshairs (1) of the collimator can be adjusted after loosening the 4 fastening screws of the holding frame (2).



2.4.4 Adjustment of the Line Laser

- ◆ Loosen the screws (1) and (2) to get the line laser (4) centered again.



- ◆ The laser holder may now be turned around the axis of the screw (2).
- ◆ To realign the laser line coaxial to the crosshairs, the screw (3) has be loosened so the laser (4) can be rotated around its axis in the holder.

2.4.5 Adjustment of the Rotary Flange

- ◆ To adjust the stop position of the rotary flange, loosen the clamping screw (1).



- ◆ The parallelism of the radiation field can be adjusted by the eccentric bolt (2).
- ◆ Tighten the clamping screw (1) again.

2.4.6 Adjustment of the 0° Incremental Switch

- ◆ The 0° incremental switch (1) can be adjusted using a small screwdriver.



- ◆ The switch must be actuated when the collimator is engaged at its hold point.

3 Lifecycle

3.1 Maintenance

3.1.1 General Information

Note No maintenance is necessary for the Collimator and for the implemented laser diverse.

The collimator was designed for a lifetime of 10 years (80 patients a day, 250 working days a year).

3.1.2 General

3.1.3 Cleaning and Disinfection

! Before cleaning shut down the system properly.

3.1.3.1 Cleaning Hazards

⚠ CAUTION

G_X012_F8G8U1M1

Use of harsh cleaning agents, liquids or sprays.
When cleaning the collimator, liquids can seep into the openings of the system and cause electric shock, short circuits, or corrosion of electrical parts.

Risk of electrical hazard or damage to the system.

- ◆ Use only substances for cleaning and disinfection, which are recommended, but no sprays.
- ◆ Do not let cleaning liquids seep into the openings of the system (e.g., air openings, gaps between covers).
- ◆ Observe the following cleaning and disinfection instructions.

! Harsh cleaning agents (e.g. acetone or alcohol) can damage the enameled surface of the collimator cabinet.

- ◆ Use special enamel cleaning agents.

3.1.3.2 Required Tools and Cleaning Agents

- Lint-free cleaning cloths.
- Brush to remove dust.
- Only use water or a lukewarm diluted household cleaning agent solution.
- For plastics, use only special plexiglass cleaning agents, dish washing detergent, soapy water or laundry detergent.
- For enameled surfaces, a special cleaning agent is recommended.



Do not use scouring cleaning agents, organic solvents or solvent-based cleaning agents (e.g., benzene, alcohol, spot remover) because of potential incompatibility with the materials of the collimator!

3.1.3.3 Required Tools and Disinfectants

- Lint-free cleaning cloths.
- Solutions of common surface disinfectants (e.g., aldehyde based and/or amphoteric based surfactants) are recommended for disinfection.



Phenol-based or chlorine-releasing agents can harm the surfaces or cause corrosion and therefore are not recommended for cleaning. The same applies to undiluted solutions with a high content of alcohol (e.g., cleaning agents to disinfect hands).



The concentration of disinfectants in the air must not exceed the statutorily defined limit. Observe the instructions given by the manufacturer of the disinfectants.

3.1.3.4 Procedure

- ◆ Clean and disinfect all contaminated parts.
- ◆ Clean and sanitize all parts which have (or had) contact with the patient.
- ◆ Wipe the collimator with a damp cloth or cotton pad.

3.2 Replacement

3.2.1 General Safety Information

! Before performing the work steps, read the instructions thoroughly for each step.

! Improper replacement of parts can cause a malfunction or mechanical damage.

- ◆ Replace damaged or worn parts only with original parts.

3.2.2 Replacing the Off Focal Blades

3.2.2.1 Required Tools and Materials

Note System knowledge is required for installation.

- Spare parts kit, Material No.: 77 36 759.
- Siemens standard tool kit.
- Checking gauge provided ex-factory.

3.2.2.2 Preparations

- Switch the system OFF.
- Remove the collimator from the system.

3.2.2.3 Replacing the Off Focal Blades

!

To facilitate the installation the off focal blades and curved rings can be operated manually while the power supply is switched off.

- ◆ Carefully turn the off focal blades into the position shown in the illustration.
- ◆ Remove the 4 mounting screws.



- ◆ Remove the defective blades.

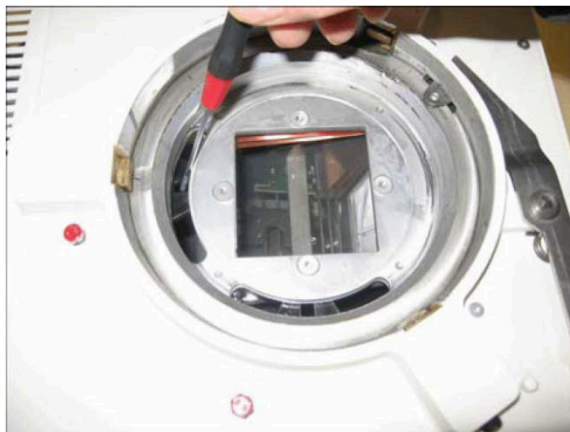
Note

Make sure that the defective off focal blades are complete after removing them from the collimator. Remove possible fragments from the casing of the collimator.

3.2.2.4 Inserting the Curved Rings

If the curved rings have to be replaced, act in accordance with the following steps.

- ◆ Position the drive bracket in the middle of the opening.



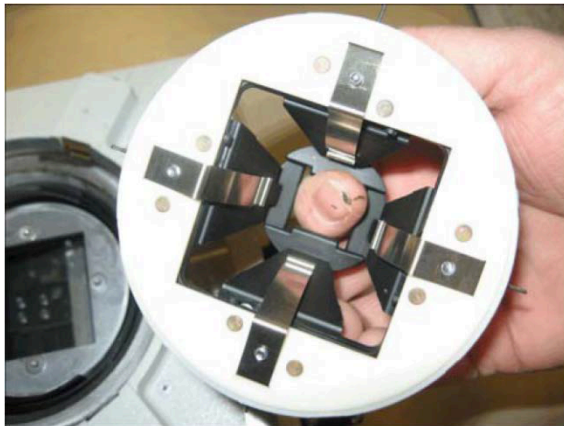
- ◆ Insert the curved rings into each other.



- ◆ Put the studs for the curved rings into the slots of the drive bracket. The studs for the inner ring must be inserted in the direction of the control panel or the control board.

3.2.2.5 Assembly of the Off Focal Blades

- ◆ Assemble the plate unit. All screws and springs must be inserted. The springs have to be pressed flush against the white support plate.



- ◆ Insert the plate unit into the collimator.
- ◆ Secure the plate unit with the 4 intended screws.



Note

Ensure that the off focal blades are in the right position. The slot between the two blades of the top pair must be parallel to the operating front or the control board.

Note

If needed readjust the off focal blades as described in the chapter "Adjustment". The adjustment has to be accomplished for both pairs of blades.


3.2.2.6 Final Work Steps


- ◆ Reinstall the collimator back into the system.
- ◆ Switch the system ON.
- ◆ Generate several test exposures at different collimator settings:
 - minimum collimator opening.
 - maximum collimator opening.
 - height blades closed to minimum, width blades opened to maximum.
 - height blades opened to maximum, width blades closed to minimum.
- ◆ If further adjustments should be necessary, refer to the chapter “Adjustment”.

3.2.3 Replacement of the Halogen Bulb of the Light Localizer

Note	The halogen bulb can be changed by the user.
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3.2.3.1 General Safety Information

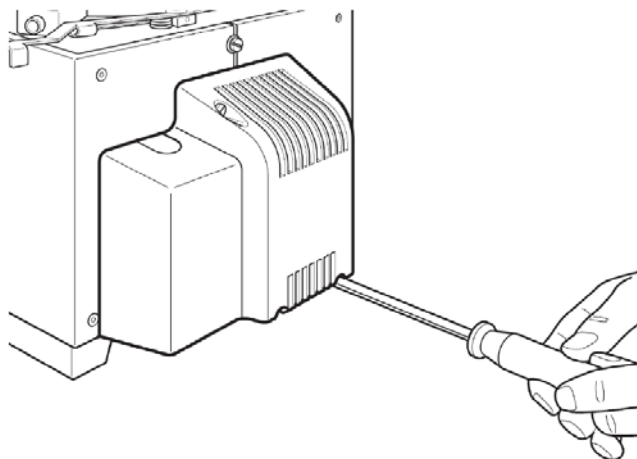
<div>CAUTION</div> <div>G_X1012_F3G2U1M2</div>	<p>If the halogen lamp of the light localizer burns for a long time, the lamp housing can heat up.</p> <p>Danger of burns.</p> <ul style="list-style-type: none">◆ Avoid contact with lamp housing to prevent burns.◆ The maximum permissible operation time duty cycle is 50% (90 seconds on to 90 seconds off).◆ The permanent on time of the light must not exceed 10 minutes.
--	--

<div>CAUTION</div> <div>G_X1012_F3G1U1M2</div>	<p>Lamp breaks.</p> <p>Patient and/or user injured by glass splinters.</p> <ul style="list-style-type: none">◆ Use only OEM Siemens spare parts.
--	---

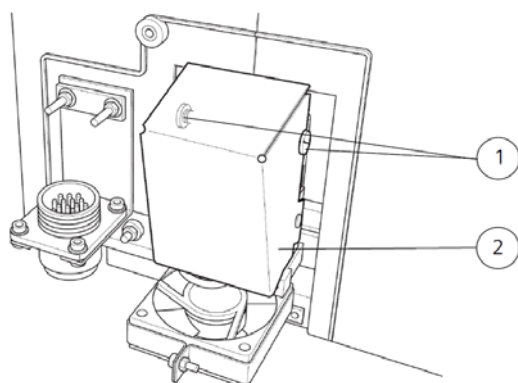
Note	The description of the bulb type is printed on a label on the back of the collimator.
------	---

3.2.3.2 Replacing the Halogen Bulb

- ◆ Switch the system OFF.
- ◆ If necessary, turn the collimator to get better access.
- ◆ Loosen the 3 fastening screws of the lamp cover using a conventional slot screwdriver.



- ◆ Remove the lamp cover.



Heat shield might be very hot! Let it cool down before removing it.

- ◆ Loosen the two heat shield screws (1) by one turn.
- ◆ Remove the heat shield (2).

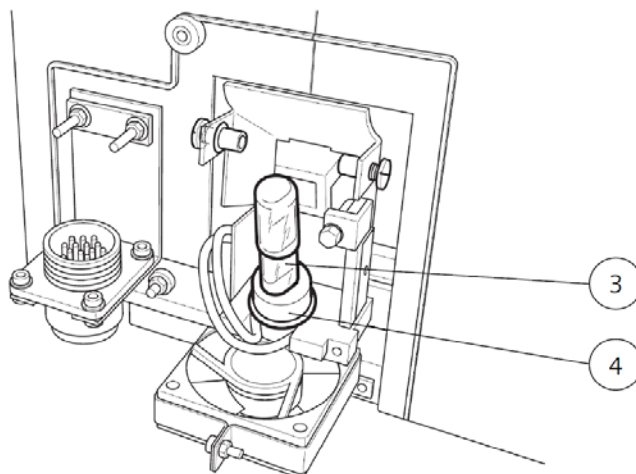
⚠ CAUTION

G_X1012_F3G2U1M2

If the halogen lamp of the light localizer burns for a long time, the lamp housing can heat up.

Danger of burns.

- ◆ Avoid contact with lamp housing to prevent burns.
- ◆ The maximum permissible operation time duty cycle is 50% (90 seconds on to 90 seconds off).
- ◆ The permanent on time of the light must not exceed 10 minutes.



- ◆ Remove the defective bulb (3).
- ◆ Insert the new halogen bulb (3) using a cloth.

Note

Ensure a proper fit of both contacts in the lamp socket (4) i.e. make sure that the pins are completely plugged into the jacks.

- ◆ Put the heat shield into position and tighten the screws.
- ◆ Attach the lamp cover.
- ◆ Switch the power supply ON.

⚠ CAUTION

G_X1012_F3G1U1M2

Lamp breaks.

Patient and/or user injured by glass splinters.

- ◆ Use only OEM Siemens spare parts.

3.2.4 Replacement of the LED Module

3.2.4.1 General Safety Information

CAUTION

G_X1012_F3G2U1M2

If the LED of the light localizer burns for a long time the heatsink can heat up.

Danger of burns.

- ◆ Avoid contact with the heatsink to avoid burns.

CAUTION

G_X1012_F3G4U1M2

Photobiological effect of ultraviolet radiation.

Eye injury.

- ◆ Do not look into the light beam for longer than 15 seconds.
- ◆ Always keep enough distance to the collimator.

3.2.4.2 Replacing the LED Module

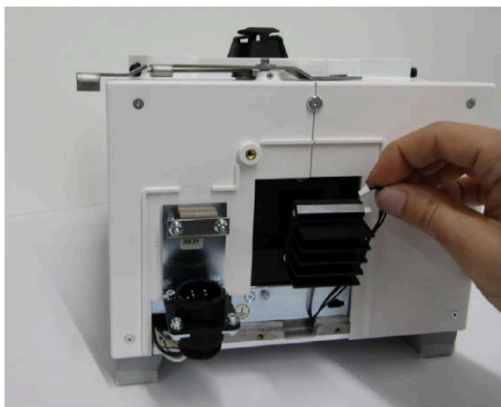


The replacement of the LED module must be performed by a trained service engineer!

- ◆ Move the collimator into a convenient working position.
- ◆ Switch the system OFF.
- ◆ Remove the cover of the LED module by Loosening the 3 fastening screws (1) of the LED cover using a conventional slot screwdriver.

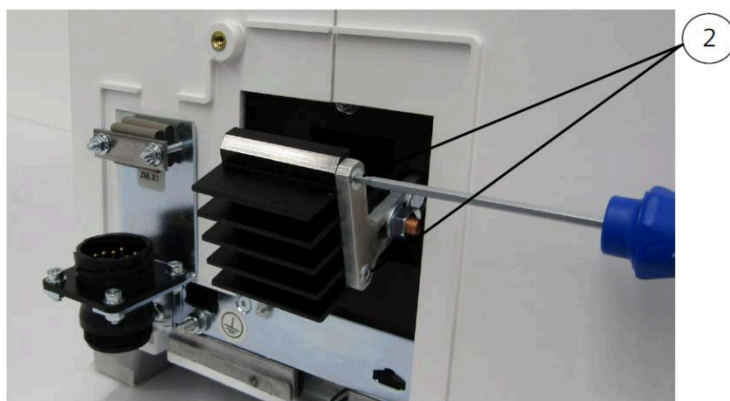


- ◆ Disconnect cable from the LED module.



Be careful! Do not pull on the cable!

- ◆ Disassemble the heatsink and LED module by removing the two countersunk head screws (2).

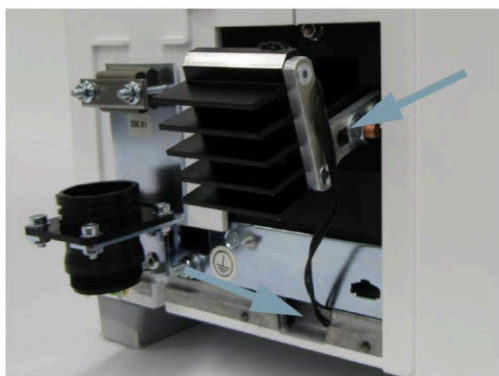


- ◆ Reassemble the new LED module in place with the two countersunk head screws and replug the cable at the top of the module.

!

The chamfer of the heat sink and the mounting bracket need to face upwards! The cable shall be routed outside the light spot!

- ◆ Carefully slide excess cable length on the bottom back into the housing to ensure that they are not pinched by the module housing.



- ◆ Switch on the system and adjust the light field as described in chapter "Adjusting the Light Field".
- ◆ Reinstall the LED module cover.

3.3 Disassembly and Disposal

3.3.1 Disassembly

3.3.1.1 General Safety Information



Protect the collimator against damage (e.g., from falling) during removal.
e.g. place a table or a cart with a foam plastic cushion under it.

3.3.1.2 Disassembling the Collimator

- ◆ Move the collimator into an appropriate working position.
- ◆ Switch the system OFF.
- ◆ Disconnect all cables and connectors. To do this, the cover on the back must be removed.



- ◆ Evenly loosen the 3 Allen screws (1) on the top edge of the collimator and remove the collimator from the system.



While loosening the screws, make sure to support the collimator and secure it against damage!

Note

Please note that any attachments (such as laser crosshairs or DAP chambers) must be removed from the collimator.

3.3.2 Disposal

The “Recycling Management and Waste Management Act” assigns responsibility for component disposal to the manufacturer/distributor. Therefore, perform disposal according to environmental guidelines. This manual can be used to determine types, quantities, and locations of hazardous waste materials.



G_X1012_F8G6U1M2

Improper waste disposal

Damage to the environment

- ◆ Dispose of waste material according to the national industry standards.
- ◆ Take account of local regulations governing the disposal of the component.

3.3.2.1 List of Hazardous Materials

Hazardous Material	Quantity
Lead (Pb)	up to 3 kg

The following parts of the collimator consist of (or at least contain) lead:

- Covers.
- Rectangular and iris leaves.
- Off focal blades with optional lead plate.
- Radiation protection plate behind PCB D21 respectively D204.
- Plate below rectangular collimation.
- Lead cover in the cast housing.
- Bottom cast holder in Collimator AFL DSA01 II and Collimator AF DSA01 II.



In order to comply with legal requirements concerning the environmental compatibility of our components (protection of natural resources and waste prevention) we endeavor to reuse parts and return them to the production cycle. By taking extensive quality assurance measures we guarantee the functional efficiency, quality and durability of reconditioned parts as well as for factory-new components.

4 Appendix

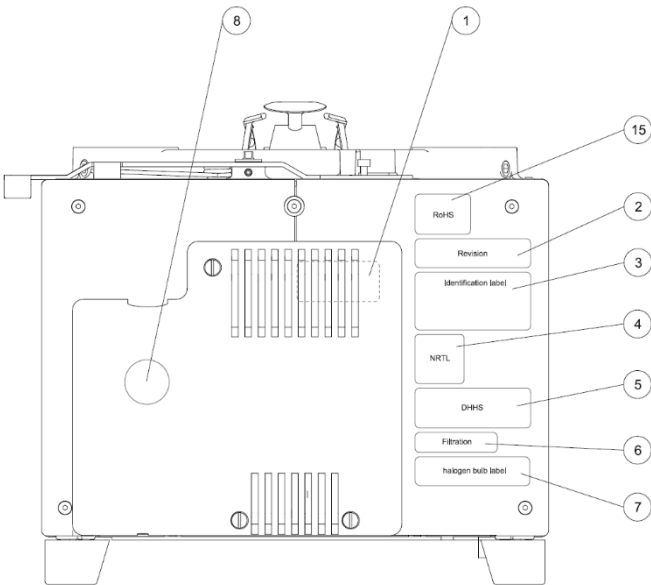
4.1 Labeling

4.1.1 Location of Labels

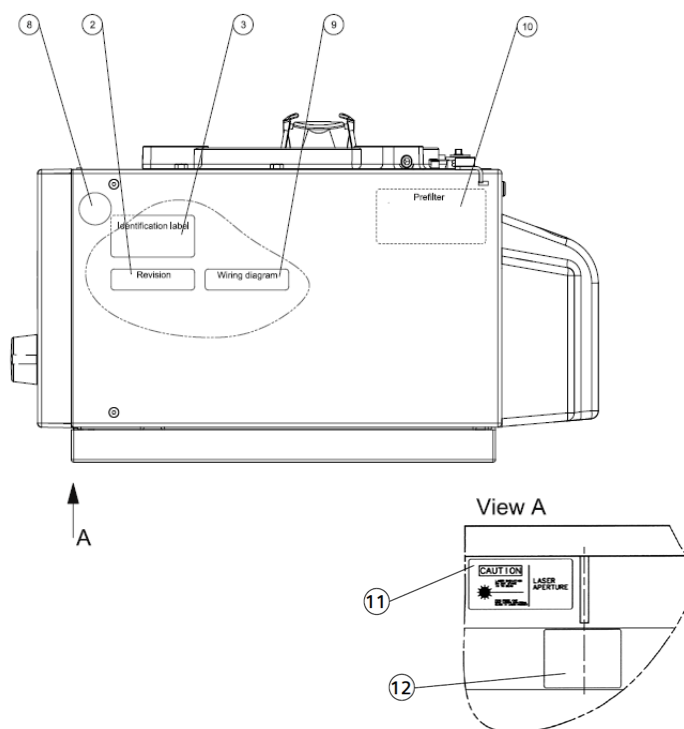
Note The labels are subject to change. Therefore the labels shown in this chapter should only serve as examples. Order, location and orientation of the label may vary within the corresponding collimator side.

4.1.1.1 Collimator OT (over table)

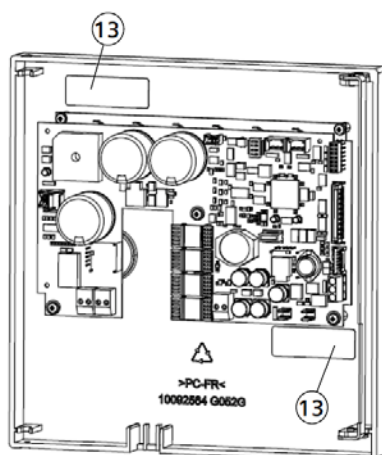
Location of Labels (collimator OT), back side



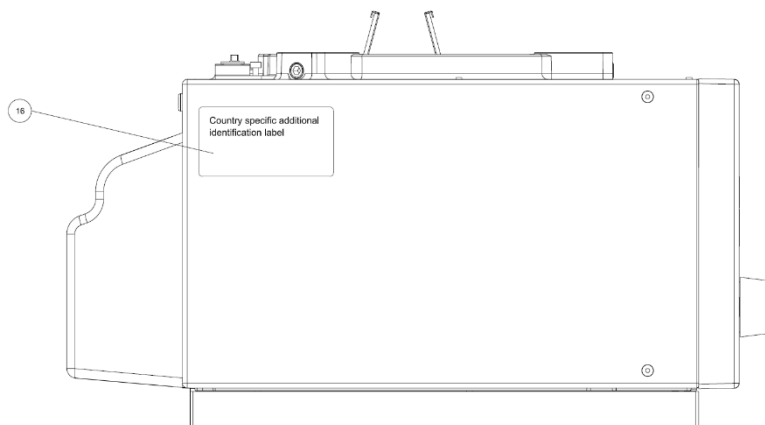
Location of Labels (collimator OT), inside



Location of Labels (collimator OT), panel

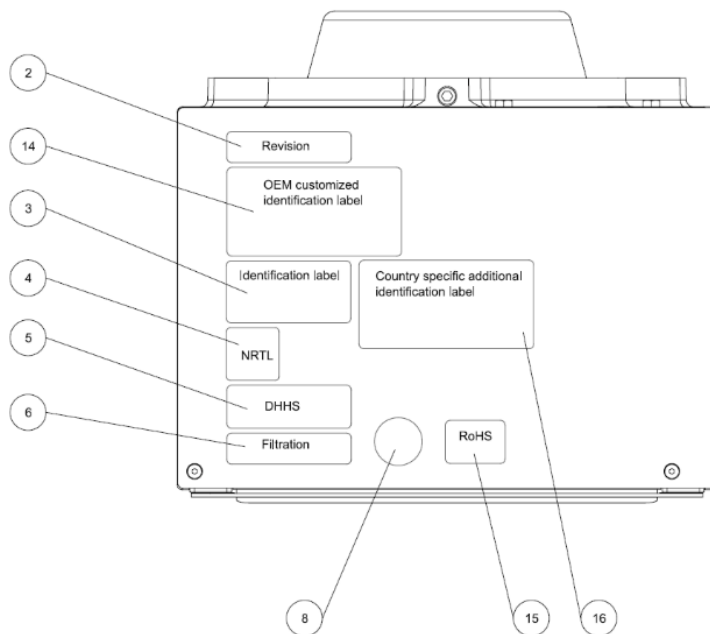


Location of Labels (collimator OT), side

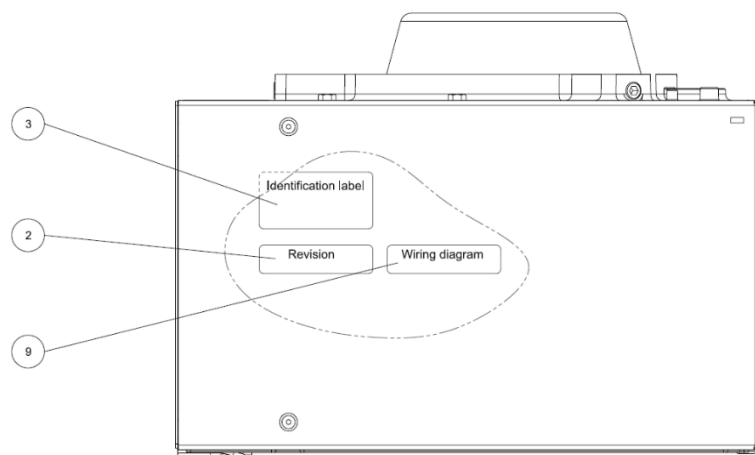


4.1.1.2 Collimator UT (under table)

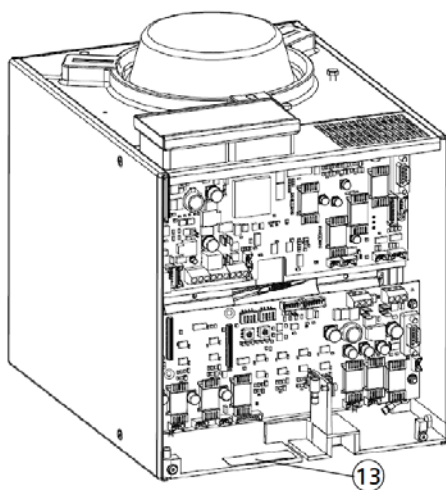
Location of Labels (collimator UT), front side



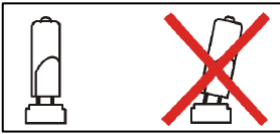
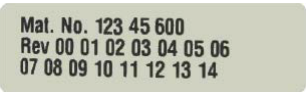
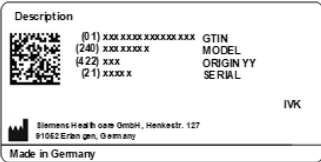



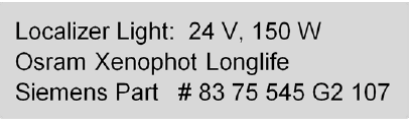

Location of Labels (collimator UT), inside


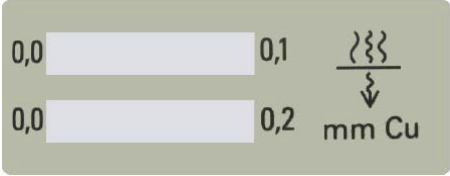


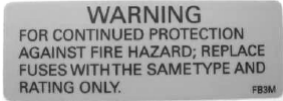
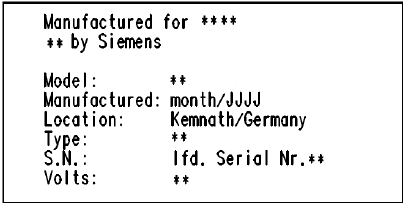






Location of Labels (collimator UT), panel inside



4.1.1.3 Table of Labels

No.	Label	Description
(1)		Lamp label (collimator with halogen lamp only)
(2)		Revision label
(3)		Identification label
(4)		UL Classified C US Label MEDICAL – GENERAL MEDICAL EQUIPMENT AS TO ELECTRICAL SHOCK, FIRE AND MECHANICAL HAZARDS ONLY IN ACCORDANCE WITH ANSI/AAMI ES 60601-1 (2005) + AMD (2012), CAN/CSA-C22.2 No. 6060-1 (2008) + (2014) E347424
(5)		DHHS label
(6)		Filtration label
(7)		Halogen bulb label (collimator with halogen lamp only)
(8)		Follow instructions for use

No.	Label	Description
(9)		Wiring diagram label
(10)		Prefilter label(model AL01 II with manual prefiltration only)
(11)		Laser beam label
(12)		Laser label set
(13)		Warning label UL
(14)		OEM customized identification label (Models 10092623, 10092624, 10092634 only)

No.	Label	Description
(14)	<div><p>COLLIMATOR – AF DSA 01 II 24 / 12 V DC</p><p> Made in Germany by SIEMENS</p><p>For **** ****</p><p>REF 5245319 SN **</p><p> JJJJ-TMM</p></div>	OEM customized identification label (Model 10092627 only)
(15)	<div></div>	RoHS label (labeling is optional)
(16)	<div></div>	Country specific additional identification label with: - CFDA Registration No.: 20182062444

4.2 Accessories

4.2.1 Compensation Filters

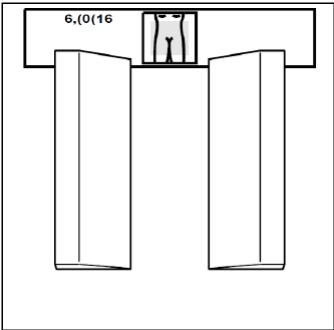
Information about maximum weight and mounting dimensions of accessories can be found in chapter “Protective Measures”.

4.2.1.1 Utilization

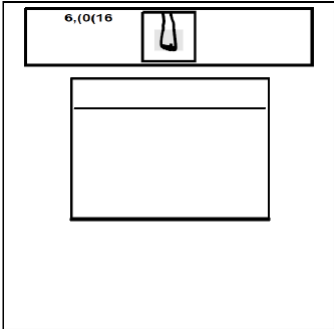
Absorption compensation for acquisitions of

Compensation filter	Part No.
Pelvis	8375917 G2107
Foot	8375925 G2107
Infant skull	8375891 G2107
Adult skull	8375909 G2107
Shoulder	8375933 G2107
T-spine, L-spine	8375461 G2107
Additional filter 1 mm Al + 0.1 mm Cu	9714965 Y0388
Additional filter 1 mm Al + 0.2 mm Cu	9714973 Y0388

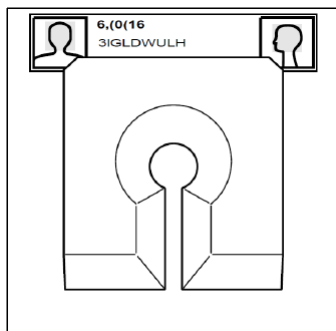
Pelvis



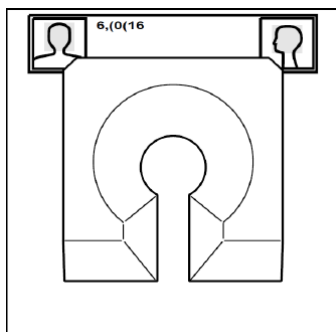
Foot



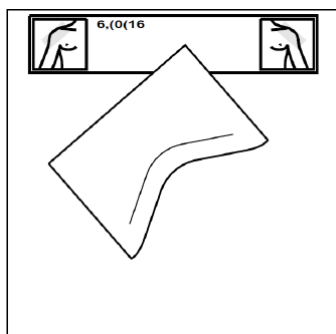
Infant skull



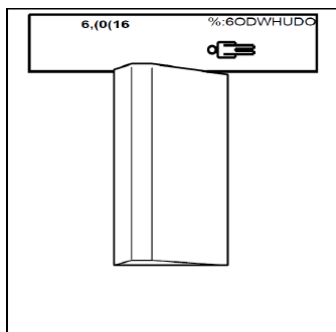
Adult skull



Shoulder



T-spine, L-spine



4.2.1.2 Attaching a Filter



The operating personnel must ensure that the filters are attached properly.

- ◆ Slide the filter into the two accessory rails of the collimator with the aluminum part facing downwards.
 - The safety spring in the left rail is pushed aside in this case.
- ◆ Push the filter up to the stop.

CAUTION

G_X012_F8G5U1M2

The force on accessory rails shall not be exceed 70 N (7 kp).

**The rails could be damaged by the use of excessive force.
 A proper seating of the accessories or auxiliary devices could then no longer be guaranteed.**

- ◆ Do not exert any force on the multileaf collimator or its rails when inserting the accessory or auxiliary device.

If you exert too much pressure on the accessory rails, the position of the tube assembly can change.

- ◆ As a consequence, you will have to change the settings of the RHA (Rotation about Horizontal Axis)

4.2.1.3 Removing a Filter

- ◆ Push the safety spring in the left rail aside.
- ◆ Pull the filter out of the accessory rails of the collimator.
- ◆ Keep the filter secured in the holder.



Please be careful when handling the compensation filters and three-field templates. They are thin, scratch-sensitive, and may become unusable due to rough handling.

4.2.1.4 Three-field Template, Set

For exposing the IONTOMAT ionization chambers on the object that you want to expose.
 The three-field templates are available as a complete set or individually for the following SIDs:

Three-field template	Part No.
SID: 175 cm - 220 cm	8453987 X1651
SID: 130 cm - 175 cm	8453979 X1651
SID: 110 cm - 130 cm	8453961 X1651
SID: 90 cm - 110 cm	8453953 X1651

!

Incorrect patient orientation

Image without diagnostic value

- ◆ Make sure that you use the correct three-field template for the SID used.
- ◆ Ensure that the three-field template is correctly attached.

4.2.1.5 Using the Three-Field Templates

- ◆ Push the locking lever on the left accessory rail to the left.
- ◆ Slide the template into the collimator accessory rail in the correct direction for exposing the ionization chamber.
 - The locking lever on the accessory rail springs to the right.
- ◆ Check that the template is seated firmly in the collimator.
- ◆ Expose the ionization chambers. To do so, switch on the light of the collimator.

4.2.1.6 Storing the Three-Field Templates

- ◆ Push the locking lever on the left accessory rail to the left.
- ◆ Pull the template out of the accessory rails.
 - The locking lever on the accessory rail springs to the right.
- ◆ Store the three-field templates in a suitable location.

!

Please be very careful with the three-field templates. They are thin and sensitive to scratching.

If handled carelessly, they can become useless.

4.2.1.7 N-Spacer 380

- ◆ Push the locking lever on the left accessory rail to the left.
- ◆ Pull the template out of the accessory rails.
 - The locking lever on the accessory rail springs to the right.
- ◆ Store the N-Spacer 380 in a suitable location.
- ◆ The N-Spacer 380 has the Part No. 11293644.

4.2.2 Camera Option

4.2.2.1 Interface description

Note Currently the camera option is only available for Collimator AL04 II -D and Collimator AL04 II eL.

RJ45, data connection GigE, according TIA-568A

Pin #	Port	Description
1	DA+	pair 3
2	DA-	pair 3
3	DB+	pair 2
4	DC+	pair 1
5	DC-	pair 1
6	DB-	pair 2
7	DD+	pair 4
8	DD-	pair 4

4.2.2.2 Installation

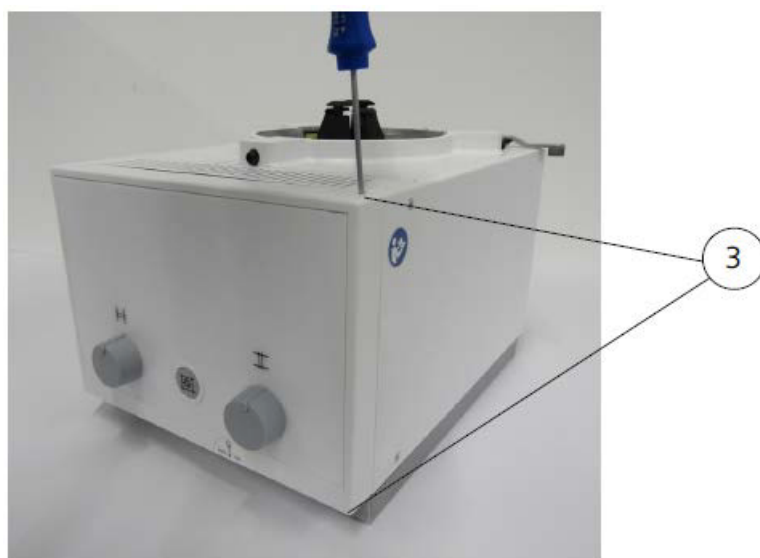
- ◆ Switch the system OFF and unpower the collimator.
- ◆ If necessary, turn the collimator to get better access.
- ◆ Loosen the 3 fastening screws (1) of the LED cover using a conventional slot screwdriver.



- ◆ Loosen the 5 fastening screws (2) of the side cover and remove the cover from the collimator.



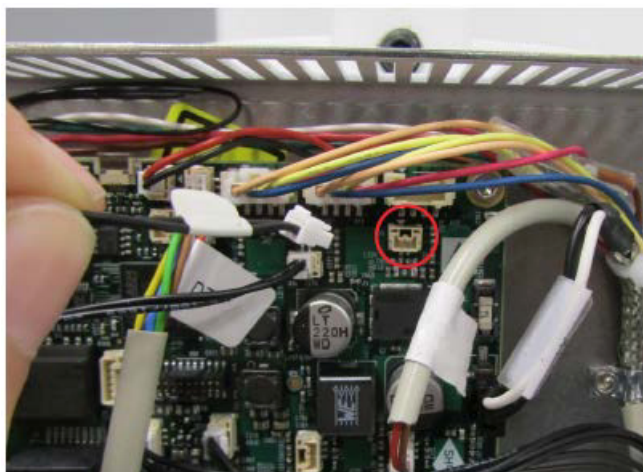
- ◆ Loosen the 2 fastening screws (3) on top and bottom of the front panel in order to open it.



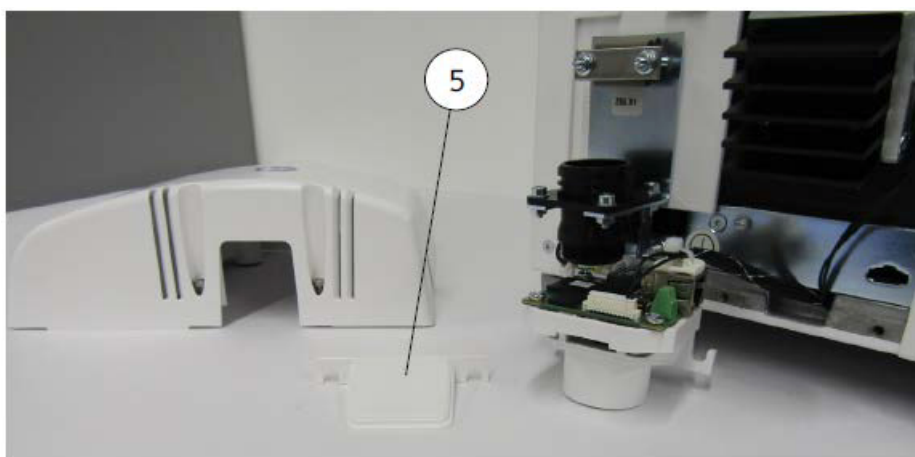
- ◆ Pass the cable at the backside through the hole. Route the cable through the collimator and fix it using the existing clamps (4).



- ◆ Plug in the connector to X70 on PCB D77.



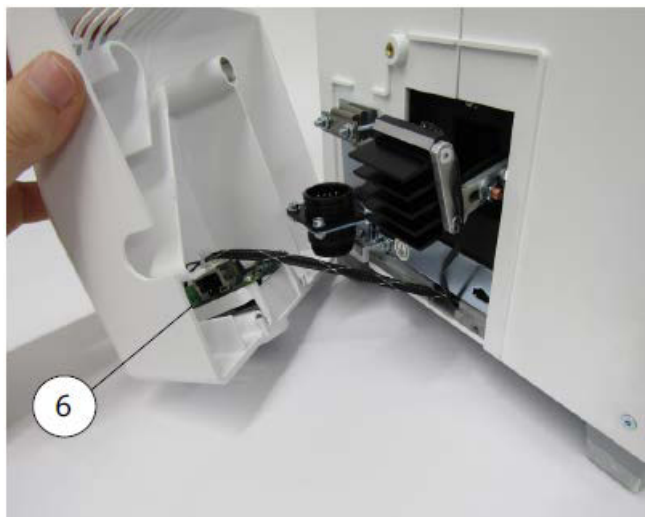
- ◆ Close the front panel and fix it by re-tightening the screws on top and bottom of the panel.
- ◆ Reassemble the side cover of the Collimator and secure it with the known 5 screws.
- ◆ Remove the closer (5) from the back cover to prepare exchange with camera module.



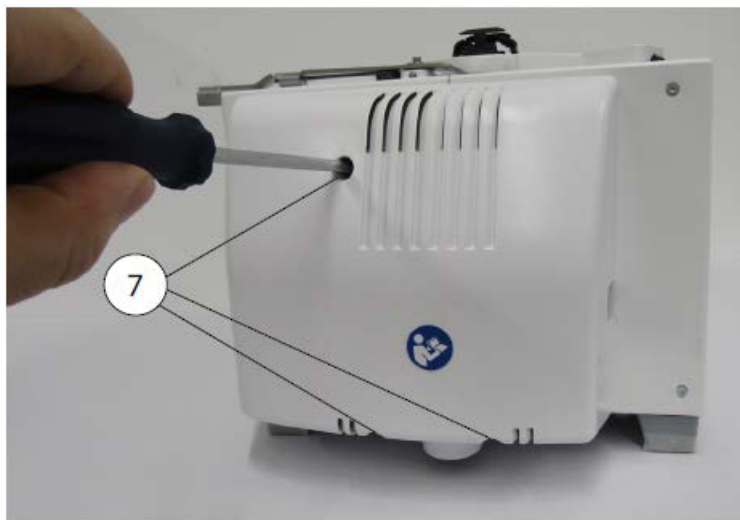
Note

The camera focus is pre-adjusted. Do not dismount lens or camera from the white camera support bracket. This might lead to blurry pictures.

- ◆ Plug in GigE data cord from system to Ethernet port (6) and insert camera module in the rear cover.



- ◆ Reassemble the LED cover by fastening screws (7) of the LED cover using a conventional slot screwdriver.



- ◆ Repower system.

The information in this document contains general descriptions of specifications and options as well as standard and optional features which do not always have to be present in individual cases.

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