



Leica TCS SP5

The Only Broadband Confocal

Technical Documentation

Leica
MICROSYSTEMS

Uniting Two Worlds

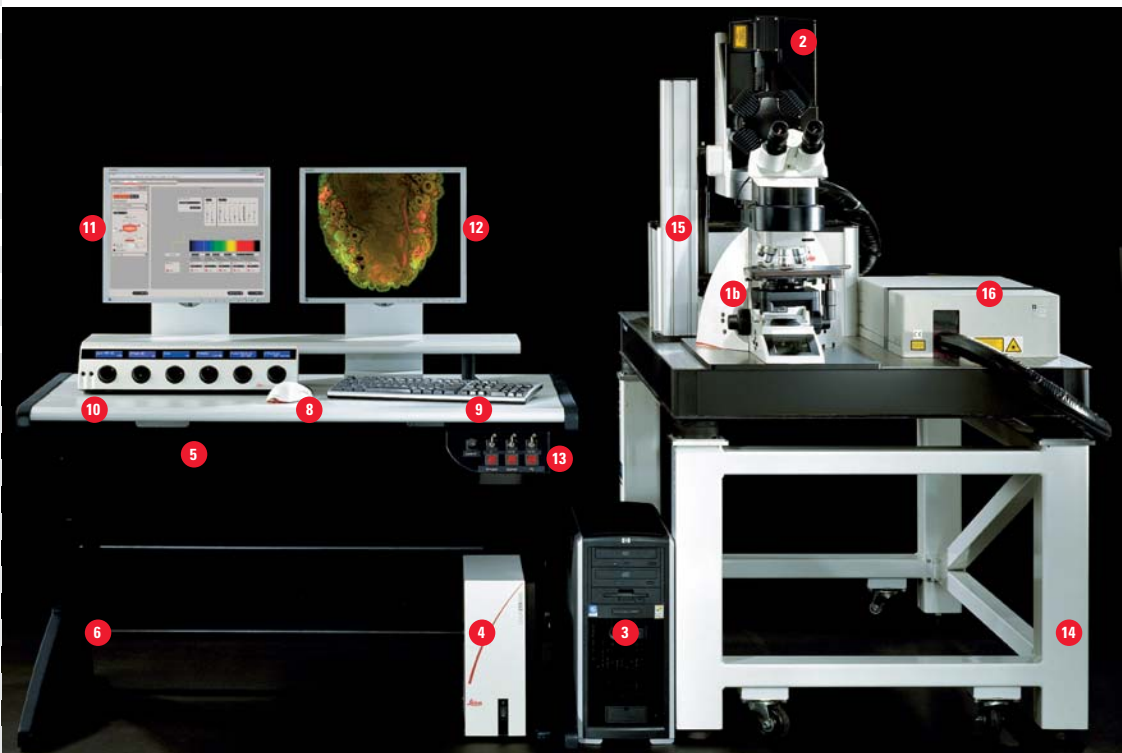
Leica TCS SP5

The system accomplishes the most demanding requirements in recent multi-fluorescence research by groundbreaking new technologies to maximize spectral and multichannel performance. The Leica TCS SP5 is made to meet your needs as a scientist who wants to reach higher.

- Up to five true spectral confocal channels simultaneously:
fast and brilliant imaging
- Prism spectrometer for high transmittance and tunability:
flexible and efficient band selection
- AOBS® beam splitter: maximal transmissive and
spectrally adaptive
- Illumination regimes switchable in microseconds:
for fast dynamic measurements
- Beam splitting for new dyes or laser lines instantly:
comfortable and cost efficient
- Tandem-scanning system standard and resonant scanner
in one system: all applications in one system
- Automatic calibration routines: safe and convenient
- Intensity control by intermediate image monitoring:
secure and stable illumination
- Up to 2 channels for spectral FLIM – one more dimension:
spectral resolved fluorescence life time imaging
- FLIM by pulsed IR laser or pulsed 405 nm diode laser available
- 4 + 4 non-descanning detectors for multiparameter multiphoton
microscopy
- Emission port for individual purposes
- 2-channel FCS: fluorescence cross correlation spectroscopy
(FCCS)
- Region of interest spectrometer: fast spectra
from living samples in situ
- Laser ports for UV VIS and IR: all in one system
- UV 351/364 nm and 405 nm in one system
- Emission detection from 400 nm to 800 nm
- High resolution imaging with 8k x 8k pixels (64 Mpix images) –
fast and accurate
- Fast frame rates with resonant scanning system up to 200 frames
per second at all zoom factors and with panning feature
- Optical field rotation over 180 degrees for all scanner types and
wavelengths
- Fully user guiding graphical interface
- Software wizards for FRAP, FLIP and FRET









- 1 Research Microscope
 - a Inverted
 - b Upright
- 2 Scanhead
- 3 Workstation
- 4 Microscope Control Unit
- 5 Laser and Power Supply
- 6 Computer Table
- 7 Microscope Table
- 8 Computer Mouse
- 9 Keyboard
- 10 Control Panel
- 11 Control Monitor
- 12 Image Monitor
- 13 Supply Control
- 14 Optical Table for Multiphoton Systems
- 15 Beam Routing for Multiphoton Laser
- 16 Multiphoton Laser

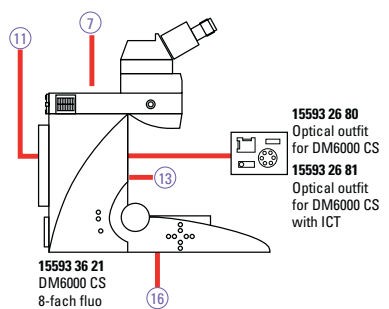
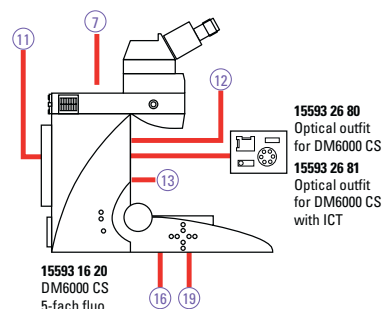
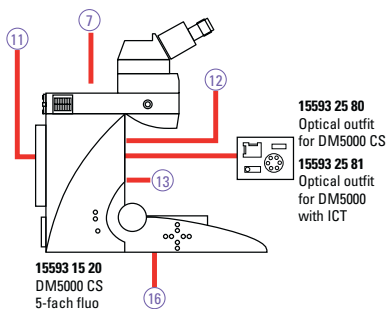
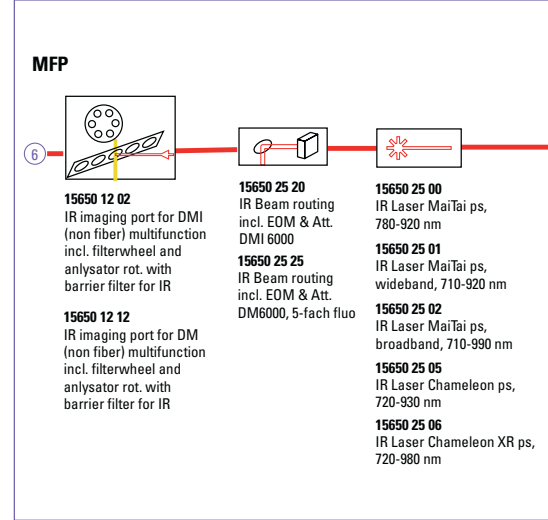
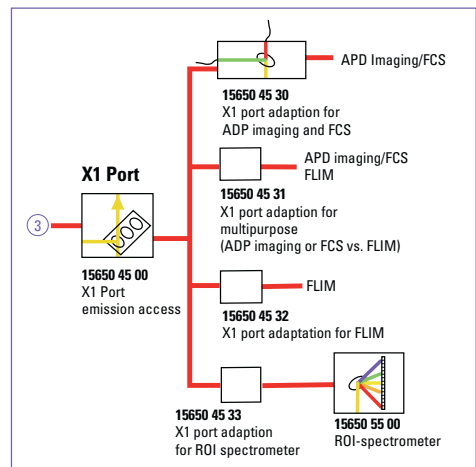
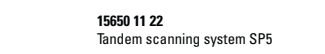
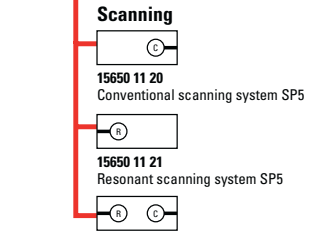
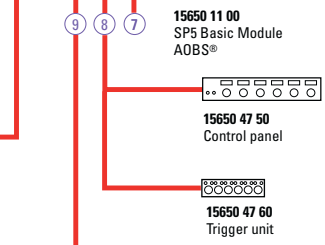
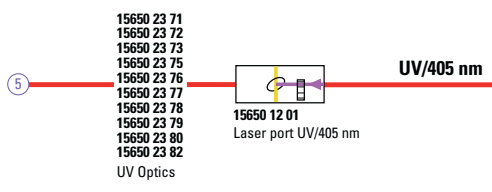
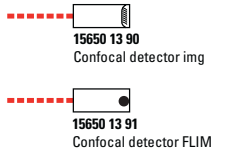
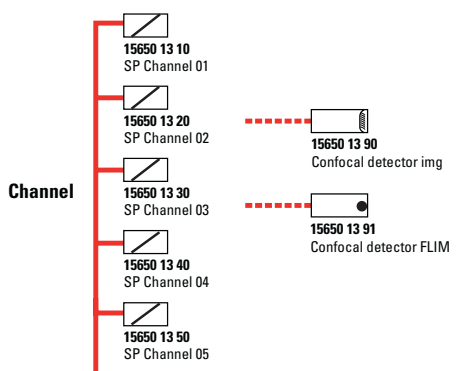
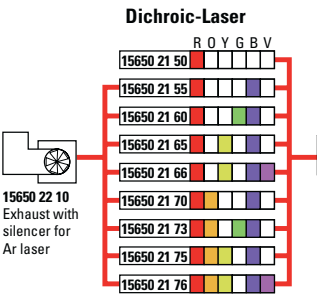
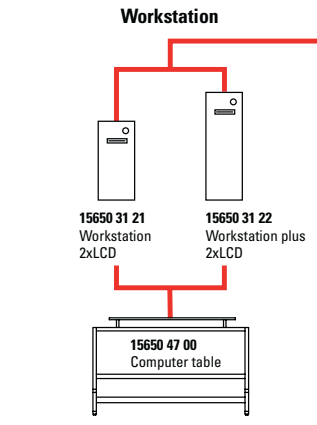
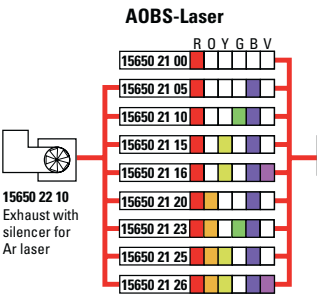


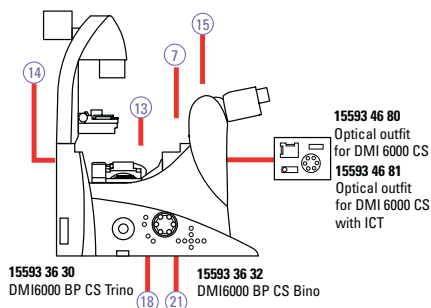
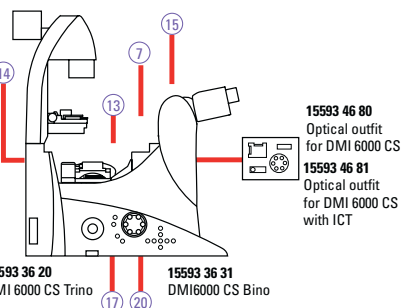
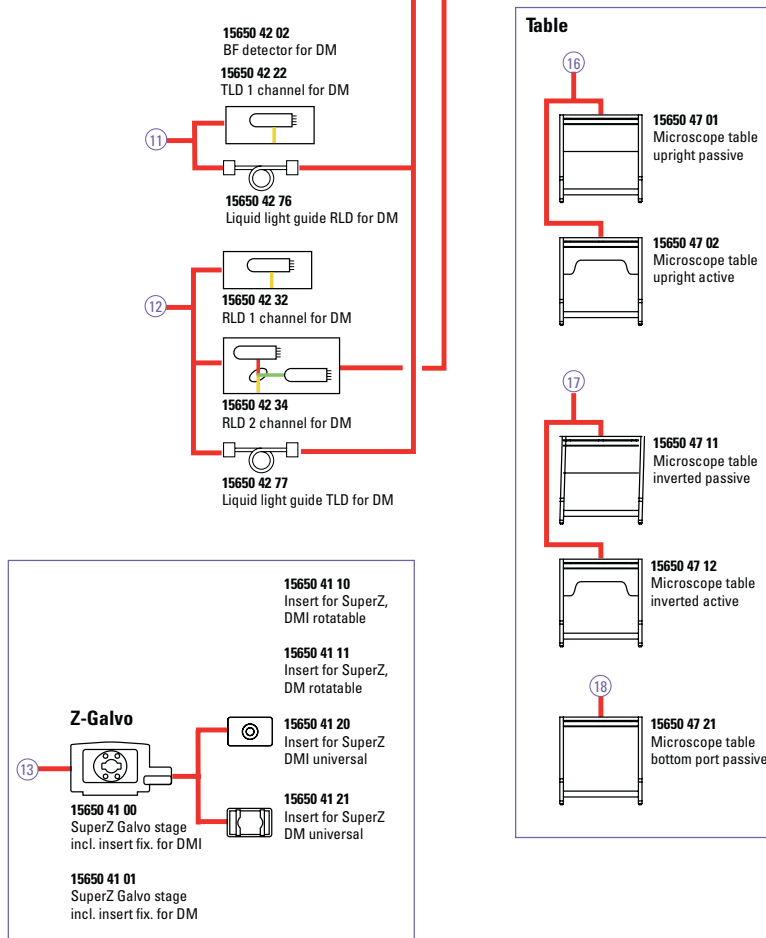
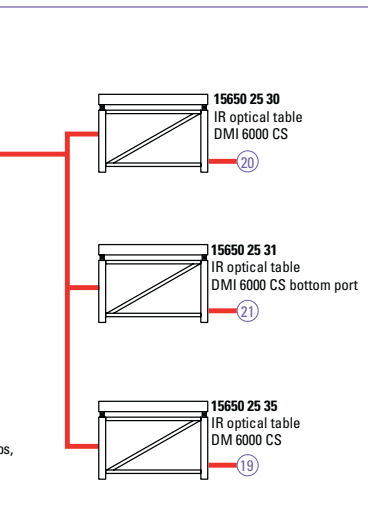
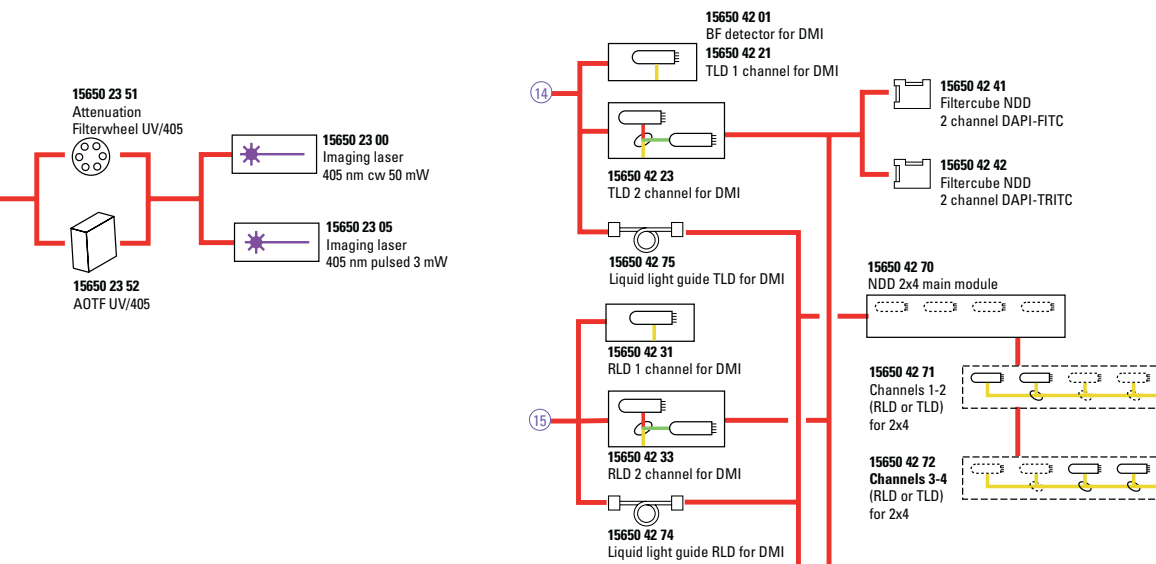
Specifications

| | | |
|--------------------------|---|--|
| Microscopes | upright | Leica DM5000 CS |
| | | Leica DM6000 CS |
| | inverted | Leica DMI 6000 CS |
| | | Leica DMI 6000 CS bottom port |
| Z-drive | SuperZ galvanometer stage motorfocus (stand) | 1500 µm travel range/3 nm stepsize travel range depending on mechanics of microscope/15 nm step size |
| Lasers | VIS | diode 18 mW 442 nm |
| | | Ar 100 mW 458, 476, 488, 496, 514 nm |
| | | HeNe 1 mW 543 nm |
| | | HeNe 2 mW 594 nm |
| | | HeNe 10 mW 633 nm |
| | | DPSS 10 mW 561 nm |
| | UV | diode 50 mW 405 nm |
| Pulsed lasers (FLIM) | UV | Ar UV 50 mW 351, 364 nm |
| | | diode 3 mW 405 nm pulsed |
| | IR | TiS 1.2ps 1 W 720...1000 nm (various ranges) |
| Excitation modulation | AOTF VIS | 8 channels |
| | AOTF UV | 3 channels |
| | EOM IR | yes |
| Optics | scan head transfer | by user (within all stands as above) |
| | number of Laser ports for imaging | up to 3 (UV - VIS - IR) |
| | number of lasers for imaging | up to 8 |
| | excitation - emission splitting | Acousto Optical Beam Splitter (AOBS®) or dichroic mirrors |
| | detection range | 400...800 nm |
| | UV and IR imaging | sequential or simultaneous |
| | field upgradable to IR | yes |
| | UV correction | individual precise correction optics (6 positions) |
| pinhole | alignment stable single pinhole | |
| pinhole diameter control | motorized by software, automatic mode available | |
| Scanner | scanning concept | optically correct scanning at low inertia |
| | switch conventional - resonant scanner | conventional and resonant scanner in one system (optional) |
| | vibration insulation | passive (active optional) |
| Conventional (C) | max line frequency | 2800 Hz |
| | min line frequency | 1 Hz |
| | scan speed granulation | 1400 |
| | max frame rate 512 x 512 | 5 Hz |
| | max frame rate 512 x 16 | 50 Hz |
| | beam park | yes |
| | max frame resolution | 8192 x 8192 pixel |
| | scan zoom | 1,0 ... 64 x |
| | panning | yes |
| | field rotation | 200° optical |
| field diameter | 22 mm | |
| Resonant (R) | max line frequency | 16000 Hz |
| | min line frequency | 8000 Hz |
| | scan speed granulation | 1 |
| | max frame rate 512 x 512 | 25 Hz |
| | max frame rate 512 x 16 | 250 Hz |
| | beam park | no |
| | max frame resolution | 1024 x 1024 pixel |
| | scan zoom | 1,7 ... 64 x |
| | panning | yes |
| | field rotation | 200° optical |
| field diameter | 15 mm | |

| | | |
|------------------|--|--|
| Scan modes | t | yes (conventional scanner) |
| | xt | yes |
| | xλ | yes |
| | xyt | yes |
| | xyλ | yes |
| | xz | yes |
| | xzλ | yes |
| | xyz | yes |
| | xyzλ | yes |
| | xyt | yes |
| | xzt | yes |
| | xyzt | yes |
| | xytz | yes |
| Detection | emission separation | highly sensitive prism spectral detector |
| | max spectral confocal channels | 5 |
| | tunability of emission bands | yes |
| | tuning steps of emission bands | 1 nm |
| | spectral channels for FLIM | up to 2 |
| | sensors | high sensitivity low noise PMT: R 9624 |
| | digitization | 12 or 8 bit per channel |
| | max grey resolution | 16 bit imaging |
| | read out frequency | 40 MHz |
| | transmitted light detector | optional, allowing BF, DIC, Ph etc |
| | non descanned transmitted light channels | up to 4 channels (MP) |
| | non descanned reflected light channels | up to 4 channels (MP) |
| Electronics | scanner control | digitally at high performance (FPGA, field programmable gate arrays) |
| | trigger in/out functions | yes |
| | auxiliary data input channels | up to 2 |
| | max channels in parallel | 15 |
| | computer | high performance PC workstation programmable control panel with LCD function & value display |
| Software | general | intuitive and guiding user interface context sensitive online help system multi-dimensional data acquisition region of interest (ROI) scan excitation line/frame sequential scan emission spectrum recording quantification tools multi-color restoration, spectral unmixing general time lapse experiment control tile scanning (mosaic scan) |
| Software options | Live Data Mode | Interactive data recording also allowing job-sequencing and online evaluation |
| | Advanced Mark & Find | combines Mark & Find with sophisticated 3D recordings, Live Data Mode etc. |
| | 3D visualisation | maximum and other projections, simulated fluorescence process, rotation animations, stereo pairs, red-green anaglyphes, high color coded extended depth of focus images etc. |
| | Colocalisation | histogram based colocalisation and area measurements |
| | Deconvolution | deconvolution option for widefield images, confocal images and 4pi images |
| | MicroLab | FRAP wizard, FRAPxt wizard, FLIP wizard, FRET SE wizard, FRET AB wizard etc. |
| Extensions | fast ROI-spectrometer | optional |
| | FCS (2 channel) | optional |
| | FLIM (2 channel) via auxiliary emission | optional |
| | auxiliary emission port | optional |
| | environment accessories | various options |

- Laser:**
-  R: HeNe 10 mW 633 nm
 -  O: HeNe 2 mW 594 nm
 -  Y: DPSS 10 mW 561 nm
 -  G: HeNe 1 mW 543 nm
 -  B: Ar 100 mW 458, 476, 488, 496, 514 nm
 -  V: Diode 18 mW 442 nm





System Overview Leica TCS SP5

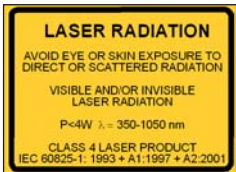
Installation Requirements



visible and ultraviolet radiation:



infrared radiation:



| | |
|----------------------------|---|
| Weight base system: | VIS: max. 320 kg UV: max. 428 kg IR: Optical bench 900 x 1500 mm: + ca. 280 kg IR Laser System: + ca. 100 kg |
| Heat load max.: | VIS: 3.2 kW UV: 5 kW IR: 1.5 kW |
| Separate cooling: | UV laser, air-cooled heat exchanger / water-cooled heat exchanger IR laser, air-cooled heat exchanger (chiller) |
| Electric supply: | VIS lasers: 100...240 V AC ± 10% 2 x 1600 VA, 50/60 Hz (Power input 1+2) UV laser: 208...240 V AC ± 10% 34... 29 A, 50/60 Hz IR laser: 100...240 V AC ± 10% 15... 10 A, 50/60 Hz Chiller for IR laser: 110 V/230 V AC ± 10% 10 A/6 A, 50/60 Hz |
| Environment: | Room temperature: +18 to + 25°C Avoid proximity to air conditioning equipment Protect from dust Room darkening recommended |

