

Leica TCS STED

Beyond the Limits!
Technical Documentation

Living up to Life

Leica
MICROSYSTEMS

Leica TCS STED Features

- Fully integrated STED-software for immediate and easy access to superresolution
- Improved resolution purely optically achieved: special point spread function with optimal "zero"
- STED Platform: Leica TCS SP5 as well approved basis for high stability and minimized failure rate
- Software controlled auto-alignment of excitation and depletion beam: easy, time saving & long term stable
- STED penetration depth up to 20 μm (dependent on sample and embedding): inner regions of samples can be investigated with STED
- Special STED objective: perfect chromatic correction for maximized STED efficiency
- STED as Leica TCS SP5 upgrade available
- Combination of dynamic spectral photo detectors (PMT) and ultra sensitive Avalanche Photo Diodes (APD): sample adapted detection, less critical sample preparation
- Complete TCS SP5 AOBs with full range multiphoton for maximum flexibility: suited for imaging core facilities
- Fully integrated DFC360 FX: for fast visualization of invisible IR-emitting ATTO-dyes
- Combination of STED and up to 4 confocal detection channels: for highest resolution multicolor recordings

Leica TCS SP5 Highlights

- High speed live cell imaging and high resolution morphology - All In One
- Prism spectrometer for high transmittance and tunability
 - Fastest true confocal system with rates up to 200 frames per seconds
 - Acousto-optical beam splitter (AOBS): maximal transmissive and spectrally adaptive
- Region of interest spectrometer: fast spectra from living samples in situ
- Illumination regimes switchable in microseconds: fast dynamic measurements
- Software wizards for FRAP, FLIP and FRET



- 1 Inverted research microscope DMI6000 CS
- 2 Scan head
- 3 Laser and power supply
- 4 Computer table
- 5 Air damped optical table
- 6 Control panel
- 7 Supply control
- 8 Beam routing for infrared laser
- 9 STED module
- 10 APD detection unit
- 11 PDL-800 for 635 nm STED excitation laser
- 12 Titan Sapphire laser
(Not shown: DFC 360FX and NDD detection unit)

STED Modul		
Mechanics		
Lasers	STED excitation	Ultra stable and compact device, firmly fixed to scanner
	STED Depletion	pulsed (80 MHz) diode 9 mW 640nm
		pulsed (80 MHz) TitanSapphire, tuning range: 725- 850 nm, variable
output power		
Software		
Optomechanics		
	used imaging port	UV-port (no UV available)
	modulation of depletion PSF	automated beam adjustment for perfect alignment of excitation and
	depletion laser, average duration: <2 min	

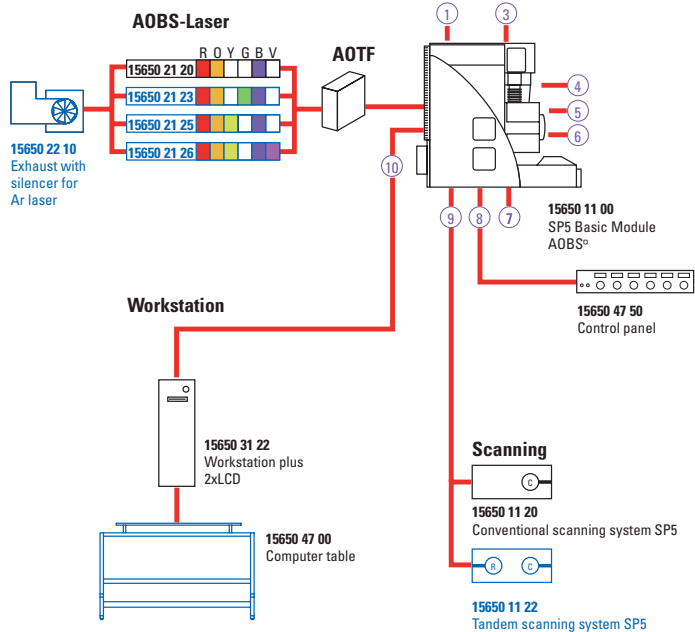
Specifications*

Microscope	inverted	Leica DMI6000 CS Trino
Z-drive	SuperZ galvanometer stage motorfocus (stand)	1500 μ m 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
Pulsed lasers	IR	TiS 1.2ps 1 W 720...1000 nm (various ranges) diode 9 mW 640 nm
Excitation modulation	AOTF VIS EOM IR [AOM IR]	8 channels yes
Optics	number of laser ports for imaging number of lasers for imaging excitation - emission splitting	3 (STED, VIS, IR) up to 8 Acousto Optical Beam Splitter (AOBS®) or dichroic mirrors
	detection range pinhole pinhole diameter control	400...800 nm alignment stable single pinhole motorized by software, automatic mode available
Scanner	scanning concept switch conventional - resonant scanner vibration insulation	optically correct scanning at low inertia conventional and resonant scanner in one system (optional) active
Conventional (C)	max line frequency min line frequency scan speed granulation max frame rate 512 x 512 max frame rate 512 x 16 beam park max frame resolution scan zoom panning field rotation field diameter	2800 Hz 1 Hz 1400 5 Hz 50 Hz yes [no] 8192 x 8192 pixel 1,0 ... 64x [2,0 ... 64x] yes 200° optical [no] 22 mm
Resonant (R)	max line frequency min line frequency scan speed granulation max frame rate 512 x 512 max frame rate 512 x 16 beam park max frame resolution scan zoom panning field rotation field diameter	16000 Hz 8000 Hz 1 25 Hz 250 Hz no 1024 x 1024 pixel 1,7 ... 64x [2 ... 64x] yes 200° optical [no] 15 mm

* Text in brackets: deviant specifications when system is used in STED mode

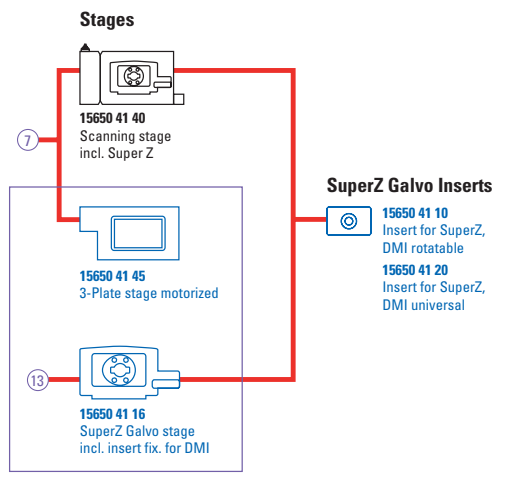
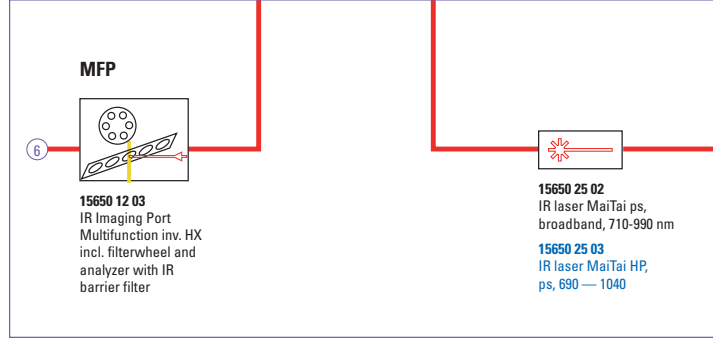
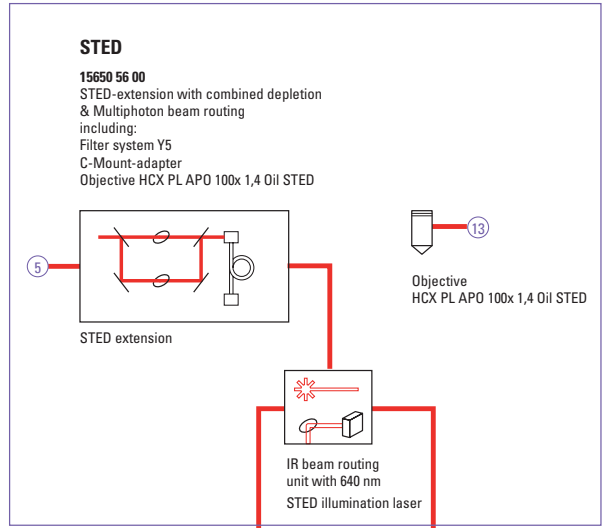
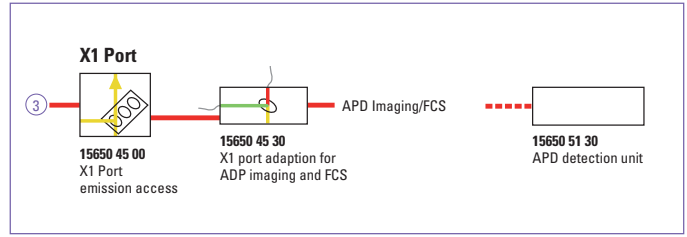
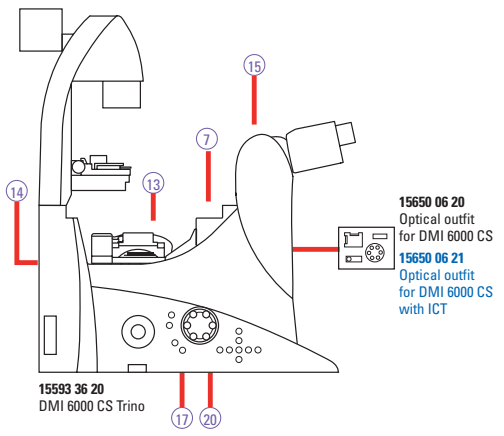
Laser:

	R: HeNe 10 mW 633 nm
	D: 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



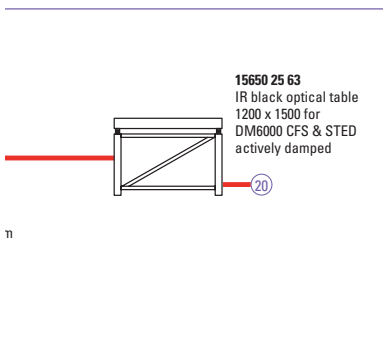
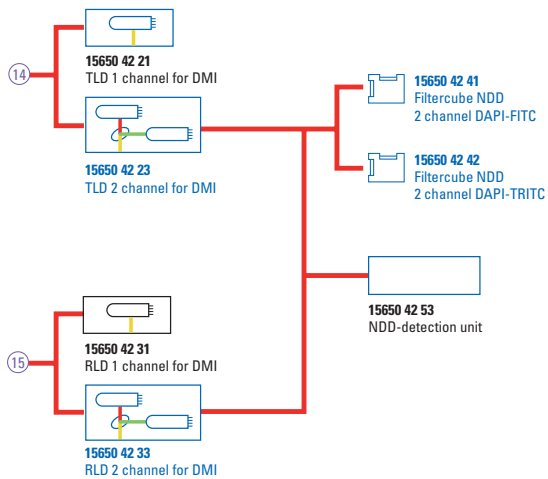
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 Leica DFC360FX
 Digital camera kit

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 Leica DFC350FX
 Digital camera kit





System Overview Leica TCS STED



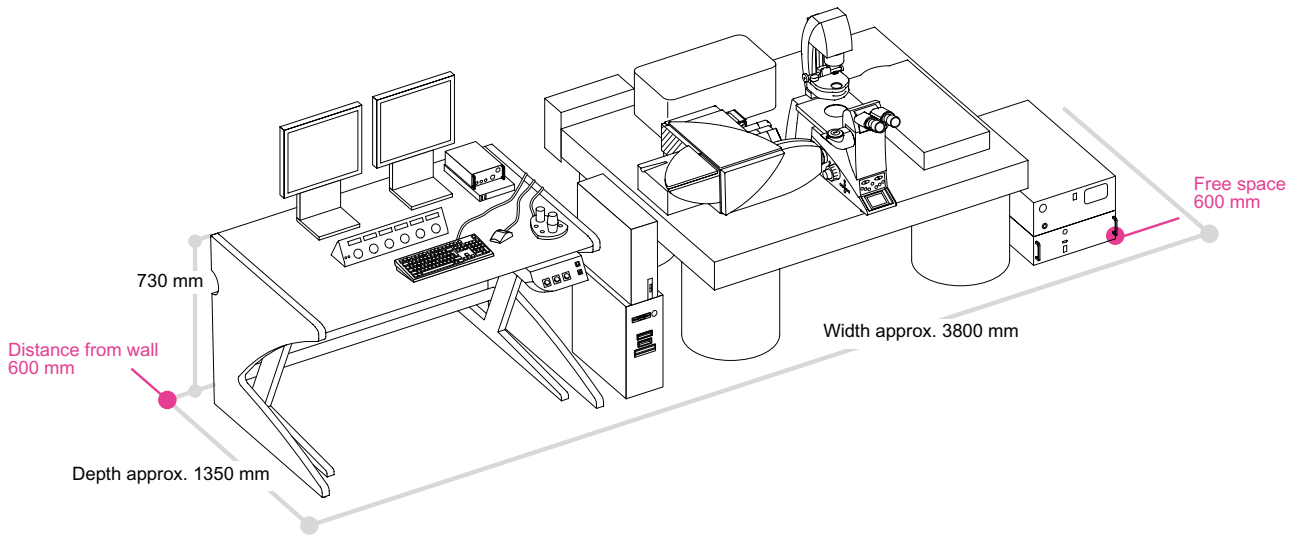
Legend:
 Black elements: basic modules
 Blue elements: optional modules



Installation Requirements



Including optical bench & IR laser system:	740 kg
Heat load max:	6,2 kW
Separate cooling:	IR laser, air cooled heat exchanger (chiller)
Electric supply:	Minimum three separate phases:
	VIS lasers: 100...240 V AC ± 10%
	2 x 1600 VA, 50/60Hz (Power Input 1 + 2)
	IR laser: 100...240 V AC ± 10%
	15...10 A, 60/60 Hz
	Chiller for IR laser: 110 V/230 V AC ± 10%
	10 A/6, 50/60 Hz
Environment:	Temperature: 23°C ± 1°C
Humidity: ca: 40 – 50% 1013 hPa	
	Max floor vibration amplitudes:
	- frequency range 5 Hz ... 30 Hz: 30 µm/sec rms
	- frequency range > 30 Hz: 60 µm/sec rms
	Internet access for advanced remote diagnostics
	Room must comply with country-specific regulations for laser class IV
	Room darkening recommended
	Protect from dust
	Separate room for IR laser chiller recommended (fiber length: 3 m) to minimize vibrations, noise and heat



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