NANOFINDER -S (s/n 30611)
SPECIFICATIONS

Microscope: NIKON TE-2000
Laser Operational Wavelength: 441,6 nm

1. LIST OF COMPONENTS

		Quantity (pce)
1. Optical-mechanical unit (OMU)		
1.1	Housing	
	- with UV optics (244-420 nm)	
	- with VIS-NIR optics (442-850 nm)	1
	- with IR optics (600-1000 nm)	
1.2	Laser radiation delivery	
1.2.1	Single input port with automatic shutter and holder for plasma line rejection filter	1
1.2.2	Double input port with two automatic shutters and holders for plasma line rejection filter	
1.2.3	Beam splitter for double input port	
1.2.4	Plasma line rejection filter (SEMROCK, part number LL01-442)	1
1.3	Polarizers	
1.3.1	Polarizer's unit with manual control (excitation channel)	1
1.3.2	Polarizer's unit with automatic control (detection channel)	1
1.3.3	Glan-Taylor prism	
	- 244 – 420 nm	
	- 390 – 1000 nm	2
1.3.4	Single-position automatic positioner for $\lambda/2$ waveplate	
1.3.5	Three-position automatic positioner for $\lambda/2$ waveplate	1
1.3.6	$\lambda/2$ waveplate (441,6 nm)	1
1.4	VND-filter unit with automatic control (excitation channel)	1
1.4.1	VND-filter (0-3D)	1
1.5	Automatic positioner for telescope with variable magnification (Beam expander)	1
1.6	Three-position automatic positioner for edge/notch filters (Beam splitter)	1
1.6.1	Edge filter (OMEGA, part number 441,6 AELP-GP)	2
1.6.2	Holographic notch filter	
1.6.3	Dichroic mirror	
1.6.4	Mirror with chromium coating	2
1.7	Six-position automatic positioner for interference filters (motorized bandpass filters)	1
1.7.1	Narrow-band filter	1
1.7.2	Wide-band filter	
1.8	Three-coordinate (x,y,z) automatic objective positioner with an objective	1
1.9	Automatic crossed slit	1
2. Monochromator-Spectrograph MS5004i (Imaging)		
2.1	Housing	
	- with Al optics (Al + MgF_2)	
	- with Ag optics (Ag + SiO_2)	1
	- with Au optics (Au)	
2.2	Diffraction gratings (1 to 4 pcs)	4
2.3	Exit slit	
	- combined (manually/automatically controlled)	1
	- manually controlled	
2.4	Adapter	
	- for CCD	1
	- for PMT	
	- for PMT with support	1
	- for APD with objective	
	- for streak-camera	
3. OMU output port		
3.1	Adapter with objective for fiber optic (FC connector)	
3.2	Optical quartz fiber optic (0.05 x 2000 mm)	
3.3	Adapter for PMT	
3.4	PMT housing	

4. OMU and microscope coupling		
4.1	Single-position unit with mirror	
4.2	Three-position switch with mirrors	1
5. Modules and add-on devices		
5.1	Module "Reference"	1
5.2	Module "Reflection"	1
5.3	Galvanic mirrors unit	1
5.4	Piezo Z-scanner	1
5.5	SERS add-on device	
5.6	Transmission add-on device	
6. Other components		
6.1	External automatic shutter	1

2. SPECIFICATIONS OF OPTICAL COMPONENTS

1. Excitation channel

1.1. Turning mirrors	
1.1.1. Angle, deg.	45
Diameter, mm	25
Reflection 442 nm, %	≥ 99
Position in Fig. 1	2, 3, 8,
1.1.2. Angle, deg.	50
Diameter, mm	25
Reflection 442 nm, %	≥ 99
Position in Fig. 1	9
1.1.3. Angle, deg.	22,5
Diameter, mm	25
Reflection 442 nm, %	≥ 99
Position in Fig. 1	18, 18^1
1.2. Telescope	
Magnification	1.8^x-7.2^x
Input diameter, mm	4.6
Output diameter, mm	11.3
Transmission 442 nm, %	≥ 96
Position in Fig. 1	7
1.3. λ/2 wave plate	
Wavelength, nm	441,6
Diameter, nm	20
Position in Fig. 1	10
1.4. Mirror with Cr coating	
Angle, deg.	0-15
Diameter, mm	25
Transmission/Reflection	1/1, 1/4
Wavelength range, nm	442 – 850 nm
Position in Fig. 1	11

2. Detection channel

2.1. Objective before crossed slit	
Focal length, mm	150
Operational aperture, mm	15
Transmission 442 – 850 nm, %	≥ 95
Position in Fig. 1	16
2.2. Turning mirror	
Angle, deg.	45
Diameter, mm	25
Reflection 442 – 850 nm, %	≥ 97
Position in Fig. 1	17

3. OMU and microscope coupling

3.1. Mirrors

Angle, deg.	45
Diameter, mm	25
Position 1: Reflection 442 - 850 nm, %	≥97
Position 2: Reflection/Transmission (390-850 nm)	9/1
Position 3:	mirror with $Ag+SiO_2$-coating

4. "Reflection" module

4.1. Objective

Focal length, mm	150
Clear aperture, mm	15
Transmission 442 – 850 nm, %	≥ 95
Position in Fig. 1	19

5. Monochromator/Spectrograph MS 5004i

5.1. System

Configuration	vertical, symmetrical
Focal length, mm	520
F/number (input)	9.8
Imaging magnification	1.0
Turret	four-positional
Grating selection repeatability (image vertical position), mm	±0.049
Optical components	4 gratings
Ports	1 input, 2 output
Stray light (20 nm from 633 nm)	10^{-5}
Grating size, mm	40x55
Grating coating	$Al + MgF_2$
Main mirrors	spherical
Mirrors coating	$Ag + SiO_2$

5.2. Wavelength

Gratings, L/mm	150	600	1800	75
Blaze wavelength, nm	500	500	500	Echelle
Grating rotation range, nm	0-11640	0-2910	0-970	0-24540
Dispersion, nm/mm	12.72	3.169	0.938	see Table
Step size, nm (average)	$13.44 \cdot 10^{-3}$	$3.36 \cdot 10^{-3}$	$1.12 \cdot 10^{-3}$	$26.88 \cdot 10^{-3}$
Spectral resolution, nm	0.24	0.06	0.02	see Table
Wavelength accuracy, nm	±0.32	±0.12	±0.04	±0.028*
Wavelength repeatability, nm	±0.089	±0.022	±0.007	$\pm 1.6 \cdot 10^{-3}$ **

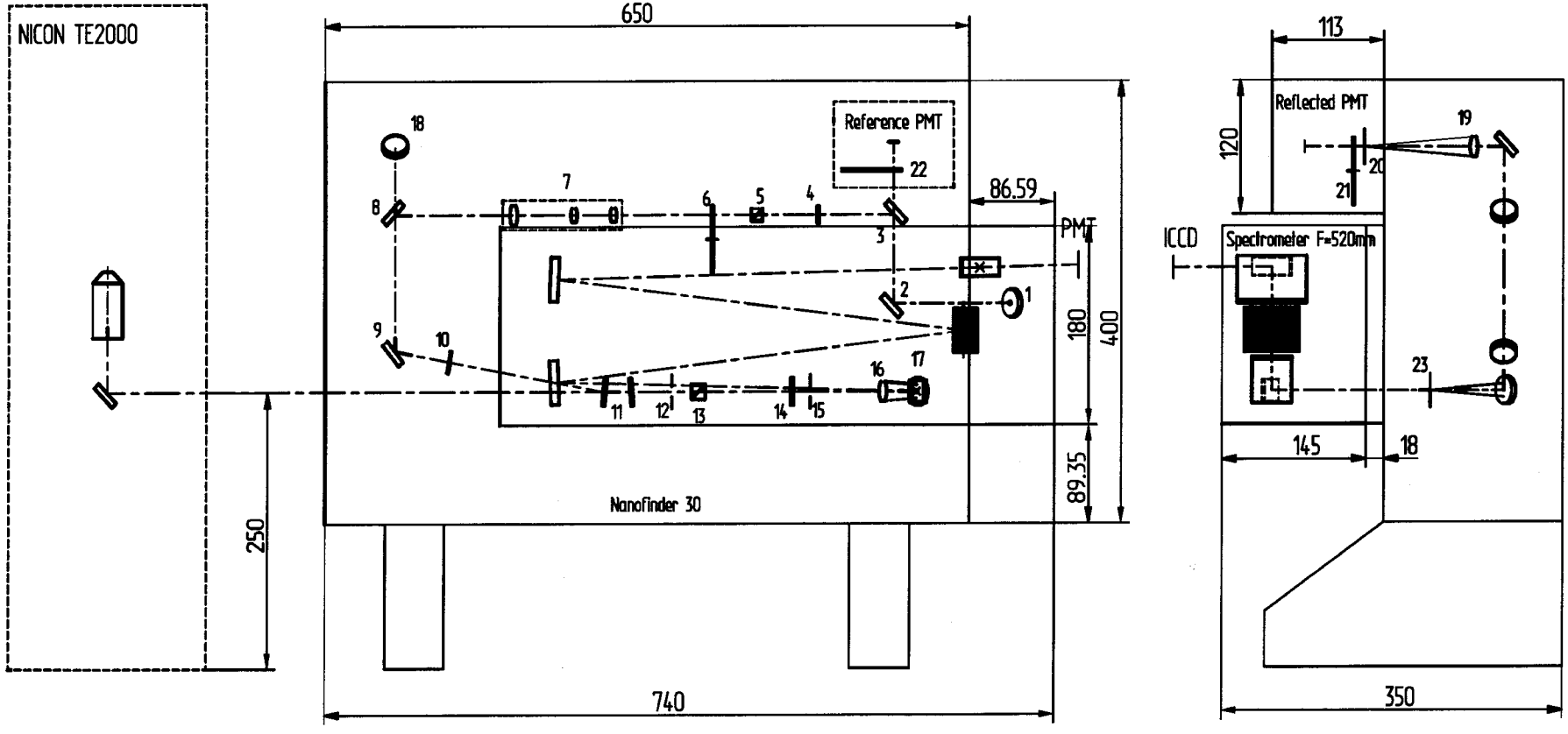
* At wavelength 500 nm; it changes from ±0.013nm to ±0.047nm in the spectral range 325-1100nm.

** At wavelength 500 nm; it changes from $\pm 1.04 \cdot 10^{-3}$ nm to $\pm 3.53 \cdot 10^{-3}$ nm in the spectral range 325-1100nm.

SPECIFICATION
of Echelle grating 75 L/mm

Table

λ, nm	Order	Free-dispersion space, nm	Dispersion, nm/mm	Resolution, nm (pinhole 20 μm)
325	74	4,39	0,149	0,0052
400	60	6,67	0,183	0,0064
450	53	8,49	0,206	0,0072
500	48	10,42	0,229	0,0080
550	44	12,50	0,252	0,0088
600	40	15,00	0,275	0,0096
650	37	17,57	0,298	0,0104
700	34	20,59	0,320	0,0111
750	32	23,44	0,344	0,0120
800	30	26,67	0,366	0,0128
850	28	30,36	0,389	0,0136
900	27	33,33	0,418	0,0146
950	25	38,00	0,435	0,0152
1000	24	41,67	0,452	0,0160
1050	23	45,65	0,481	0,0168
1100	22	50,00	0,504	0,0176



OMU optic schematic diagram (piezo-type, inverted microscope NIKON TE2000)

1 – beamsplitter; 2,3,8,9,18 – laser mirrors; 4 – plasma line filter; 5,13 – polarizer (Glan-Taylor prism); 6,21,22 – ND-filters; 7 – vario beamexpander; 10 – half wave plate; 11 – Edge or Notch filter (3-positioning); 12,15 – XY-adjusted irises; 14 – band-pass filters; 16,19 – objective XYZ-motorized; 17 – metal mirror; 20,23 – crossed slits (pinhole)

PHOTOMULTIPLIER TUBE TYPE : R928

CUSTOMER : HPN/SOLAR TII (BY) QUANTITY : 8 pcs.

Serial Number	(1) Cathode Luminous Sens. μA/lm	(2) Anode Luminous Sens. A/lm	(3) Anode Dark Current nA	(4) R/W x10^{-3}	(5) Cathode Blue Sens. Index		
CJ0106	303.0	3430.0	2.10	313.0	10.80		
CJ0109	164.0	2940.0	14.00	261.0	6.74	– Reference	
CJ0113	283.0	3500.0	5.60	367.0	9.33		
CJ0114	268.0	3020.0	7.10	371.0	8.73		
CJ0121	270.0	4220.0	2.60	331.0	9.28	– Spectral	
CJ0122	263.0	3830.0	3.10	346.0	8.52		
CJ0123	374.0	4390.0	11.00	417.0	10.50	– reflected	
CJ0124	361.0	2900.0	16.00	443.0	9.56		

NOTES

(1) (2) (4) (5) Light source : Tungsten filament lamp operated at 2856 K.

(2) (3) Overall supply voltage : 1000 V
Voltage distribution : The standard voltage distribution ratio listed in the HAMAMATSU photomultiplier catalog.

(3) The bulb of the tube is insulated from ground potential.

(4) The quotient of the red light sensitivity (measured with a Toshiba R-68 red filter) divided by the white light sensitivity.

(5) Measured with a Corning CS 5-58 blue filter (half stock thickness).

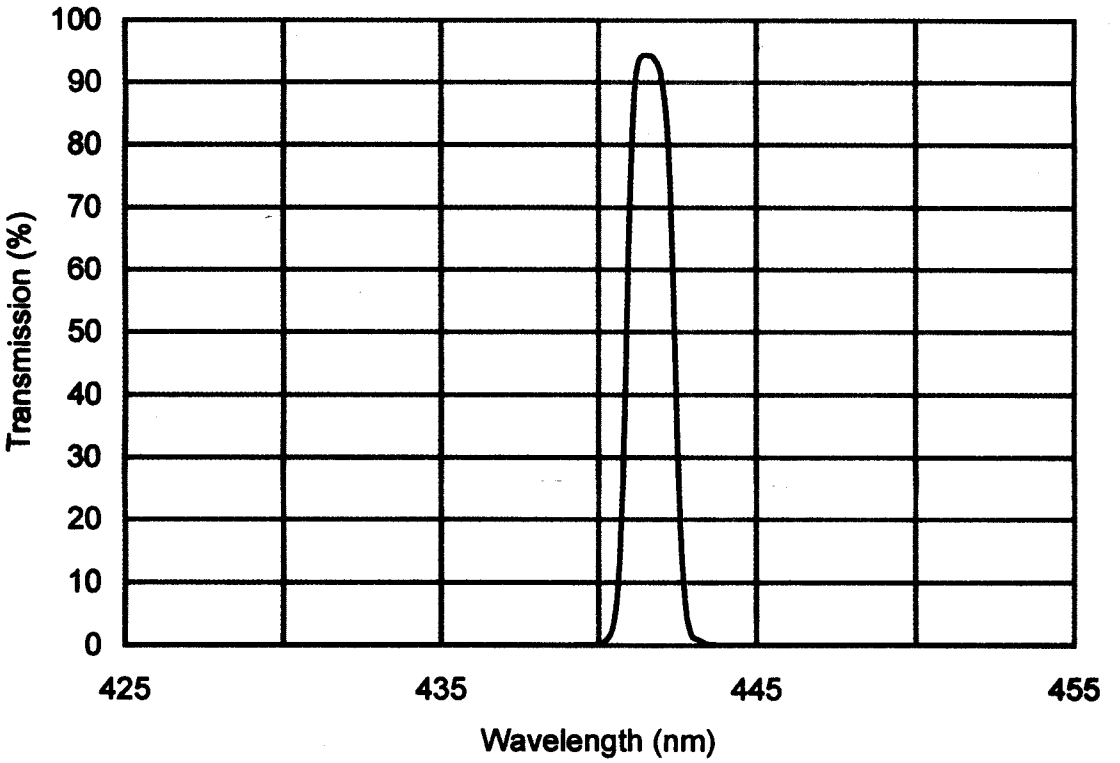
Date: JANUARY 18, 2005

Approved by : Y. Suzuki

HAMAMATSU
HAMAMATSU PHOTONICS K.K., Electron Tube Division
314-5, Shimokanzo, Toyooka-village, Iwata-gun, Shizuoka-ken, 438-0193 Japan, Telephone : 0539-62-5248, Fax : 0539-62-2205

Semrock

Transmission Scan

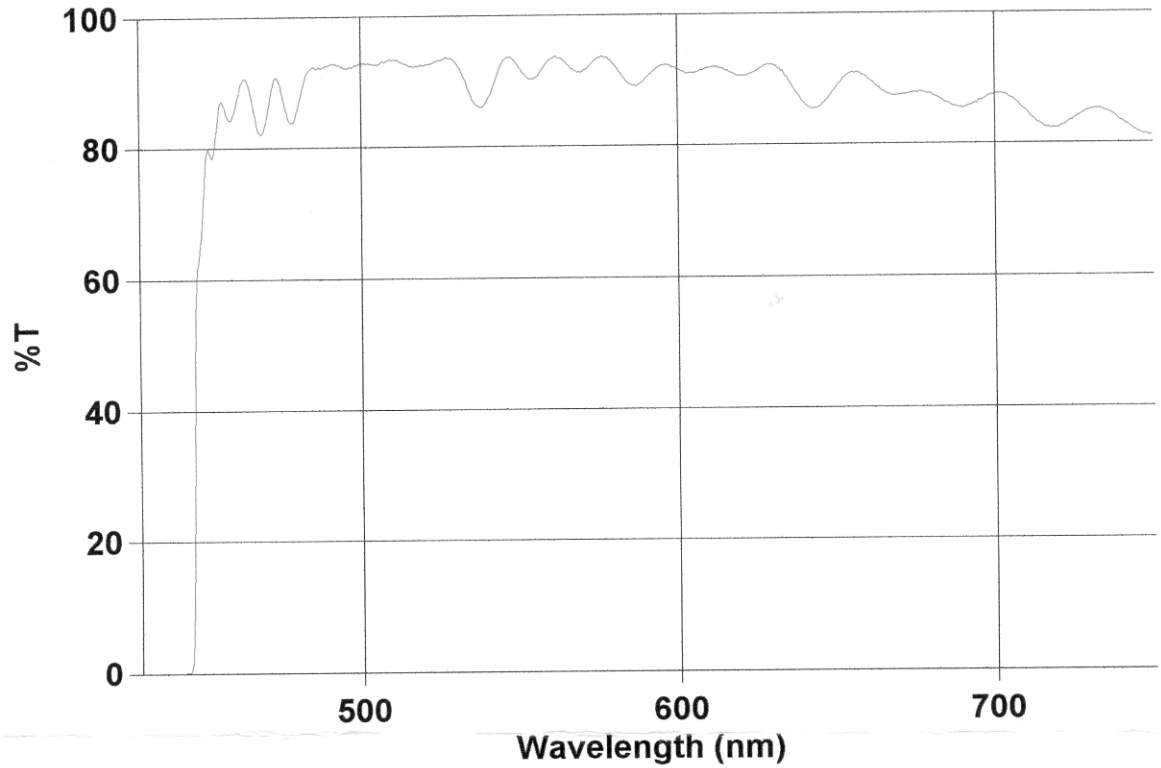


MaxLine™ Laser Line Filter

Part Number: **LL01-442**

Lot Number: **305032-305033**

Omega Optical, Inc.
Instrument Serial Number EL98113092



PN 441.6 AELP-GP; BATCH# 911; DATE CODE 0349; JZ