SI-JET Series

▶ **SI-JET-CONLAS3-...**

In Proud Partnership with Sensor Instruments

PAQUiN SENSORS

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By way of the three laser beams, the SI-JET-CONLAS3 spray jet control system uses three laser beams to monitor the density as well as the symmetry around the opening angle of the spray jet. With the comprehensive SI-JET-Scope software the system can be parameterised under Windows®.

- Telecentric design enables a big transmitter/receiver distance (measuring range from 50 mm to 2000 mm)
- Averaging (over 32000 values)
- RS232 interface (USB or Ethernet converter is available)
- Windows® unser interface, scope function
- Various teach possibilities (via PC or PLC)
- 5 digital outputs for output of the detected vectors
- High resolution (12-bit-A/D-converter)
- Brightness adjustment can be activated (STATIC, DYNAMIC)
- Various evaluation algorithms can be activated
- Temperature compensated
- Up to 32 vectors can be taught (max. 64 in group mode)
- Scan frequency max. 45 kHz (in DC operation), switching frequency typ. 60 kHz
- High dynamic range due to adjustable transmitter power adjustment and receiver amplification
- Insensitive to outside light in AC operation
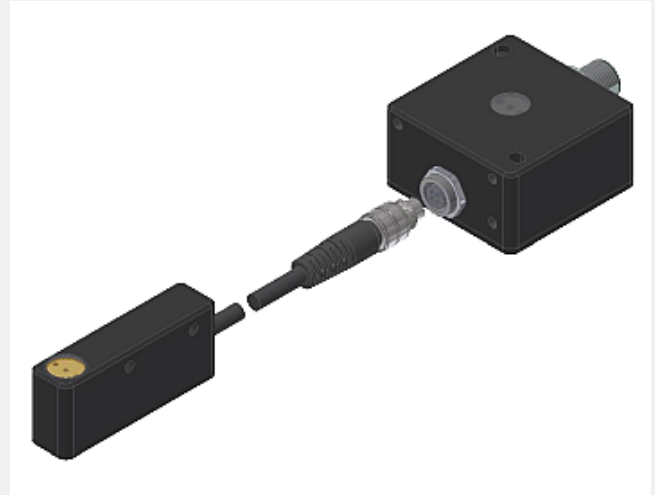
Design

Product name:

Receiver (electronic control unit):
SI-JET-CONLAS3-R
(incl. Windows® software SI-JET-Scope as of V4.0)
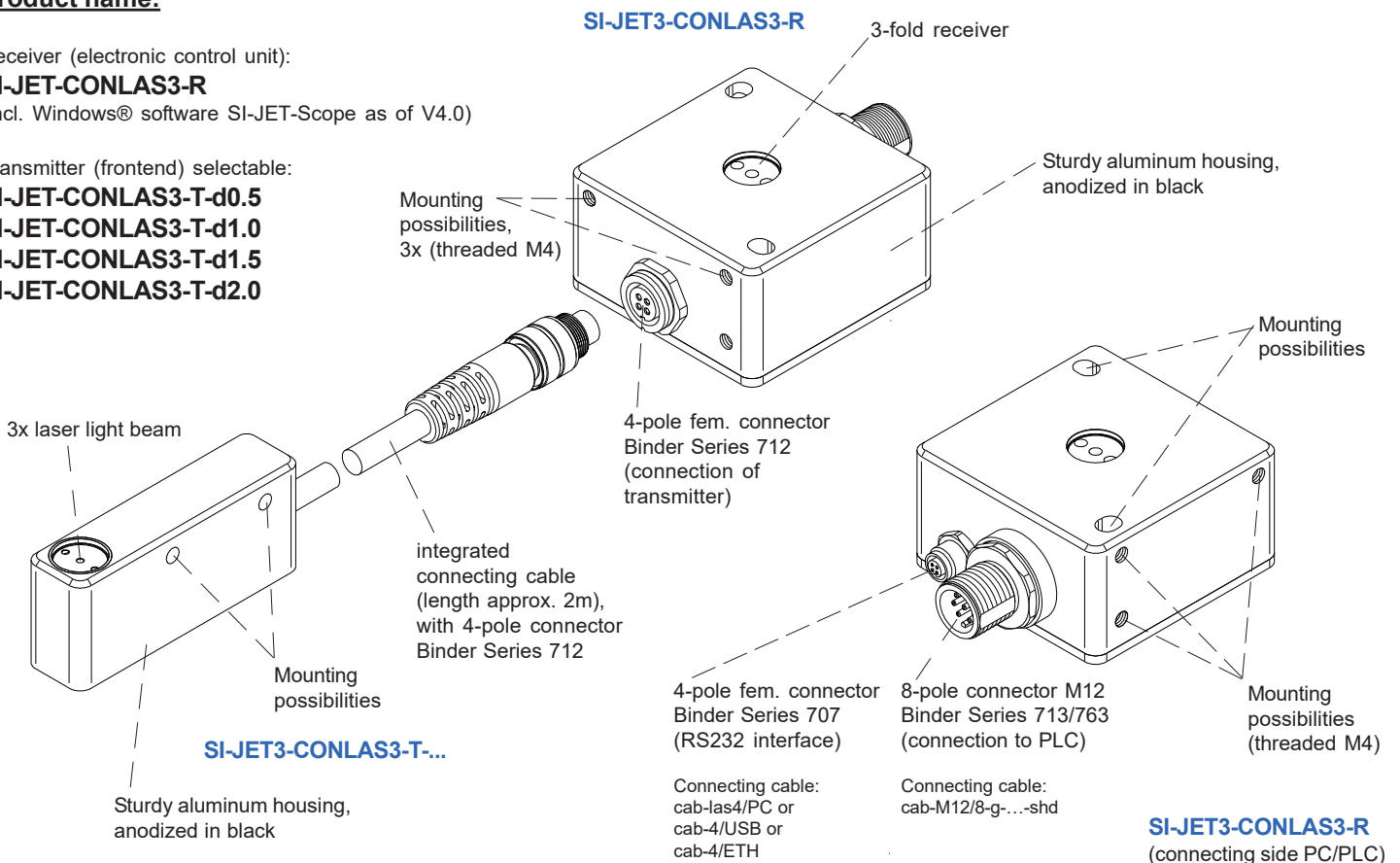
Transmitter (frontend) selectable:
SI-JET-CONLAS3-T-d0.5
SI-JET-CONLAS3-T-d1.0
SI-JET-CONLAS3-T-d1.5
SI-JET-CONLAS3-T-d2.0

SI-JET3-CONLAS3-R

3-fold receiver

Sturdy aluminum housing, anodized in black

Mounting possibilities, 3x (threaded M4)

4-pole fem. connector Binder Series 712 (connection of transmitter)

3x laser light beam

integrated connecting cable (length approx. 2m), with 4-pole connector Binder Series 712

Mounting possibilities

SI-JET3-CONLAS3-T-...

Sturdy aluminum housing, anodized in black

Mounting possibilities

4-pole fem. connector Binder Series 707 (RS232 interface)

Connecting cable: cab-las4/PC or cab-4/USB or cab-4/ETH

8-pole connector M12 Binder Series 713/763 (connection to PLC)

Connecting cable: cab-M12/8-g-…-shd

Mounting possibilities (threaded M4)

SI-JET3-CONLAS3-R
(connecting side PC/PLC)

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Technical Data

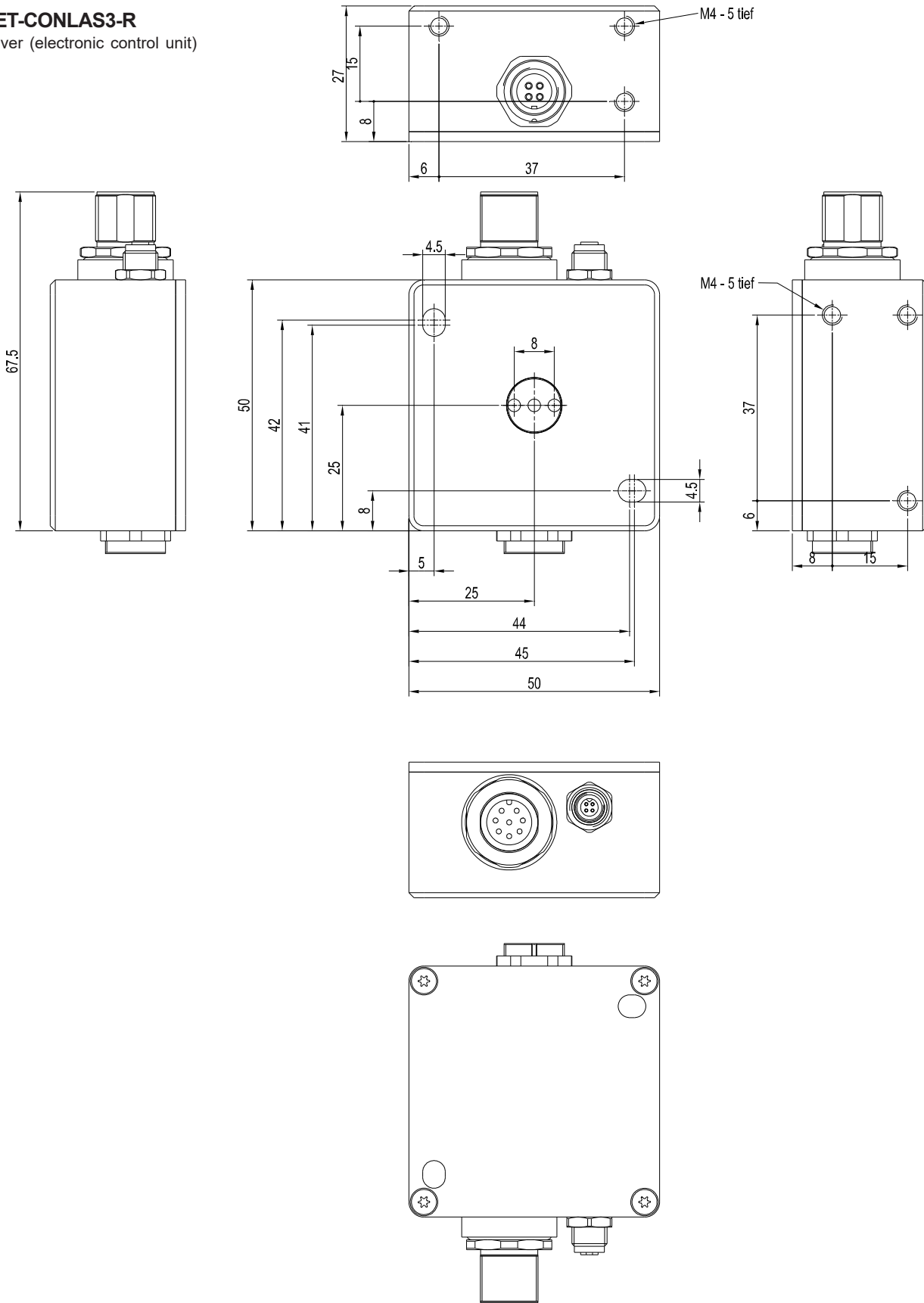| Model	SI-JET-CONLAS3-R receiver (electronic control unit)
Voltage supply	+24VDC (± 10%), reverse polarity protected, overcurrent protected
Current consumption	< 150 mA
Max. switching current	100 mA, short circuit proof
Outputs digital (5x)	OUT0 ... OUT1 (Pin 4 ... Pin 8): digital (0V/+24V), npn-/pnp-able (bright-/dark-switching, can be switched)
Input digital (1x)	IN0 (Pin 3), digital (0V/+24V)
Interface	RS232
Pulse lengthening	0 ... 100 ms, adjustable via PC software
Averaging	max. 32768 values, adjustable via PC software
Scan frequency (alternating light operation/ direct light operation)	LED operation (LASER), can be switched via PC software: AC operation: max. 24 kHz (depends on parameterization) DC operation: max. 45 kHz (depends on parameterization)
Switching frequency	typ. 60 kHz
Measuring range	typ. 50 mm ... 2000 mm
Receiver	3-fold-receiver for the left, center and right component of the light transmitted by the measuring object
Optical filter	Interference filter
Receiver gain setting	8 steps (AMP1 ... AMP8), adjustable via PC software
Ambient light	max. 5000 Lux
Temperature drift X,Y	$\Delta X/\Delta T$; $\Delta Y/\Delta T$ typ. 0,2 digits/°C (< 0,01% / °C)
Memory capacity	non-volatile EEPROM with parameter sets for max. 31 vectors (max. 64 vectors in GROUP mode)
Housing dimensions	LxWxH approx. 50 mm x 50 mm x 27 mm (without flange connectors)
Housing material	aluminum, anodized in black
Enclosure rating	IP67
Connecting cables	to PLC: cab-M12/8-g-...-shd to PC/RS232 interface: cab-las4/PC or cab-las4/PC-w to PC/USB interface: cab-4/USB or cab-4/USB-w to PC/Ethernet interface: cab-4/ETH
Type of connector	connection to PLC: 8-pole M12-connector (Binder 713/763), connection to PC: 4-pole fem. connector (Binder 707) connection to transmitter (frontend): 4-pole fem. connector (Binder 712)
Operating temp. range	-20°C ... 55°C
Storage temperature range	-20°C ... 85°C
EMC test acc. to	DIN EN 60947-5-2 CE

Technical Data

Model	SI-JET-CONLAS3-T-d... transmitter (frontend)
Transmitter (light source)	laser diode, 670 nm
Beam path	telecentric, spot size depends on the aperture: SI-JET-CONLAS3-T-d0.5: typ. Ø 0.5 mm with light exit at transmitter side SI-JET-CONLAS3-T-d1.0: typ. Ø 1.0 mm with light exit at transmitter side SI-JET-CONLAS3-T-d1.5: typ. Ø 1.5 mm with light exit at transmitter side SI-JET-CONLAS3-T-d2.0: typ. Ø 2.0 mm with light exit at transmitter side
Transmitter control	can be switched via PC software: alternating light operation (LED MODE AC) or direct light operation (LED MODE DC)
Housing dimensions	LxWxH approx. 60 mm x 15 mm x 25 mm
Housing material	aluminum, anodized in black
Enclosure rating	IP 67
Connecting cable / type of connector	integrated cable (length approx. 2 m) with 4-pole circular connector Binder 712, for direct connection to receiver (electronic control unit)
Operating temperature range	-20°C ... +55°C
Storage temperature range	-20°C ... +85°C
EMC test acc. to	DIN EN 60947-5-2　　CE

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(1481.02)
Subject to alteration

Dimensions

SI-JET-CONLAS3-R
Receiver (electronic control unit)

All dimensions in mm
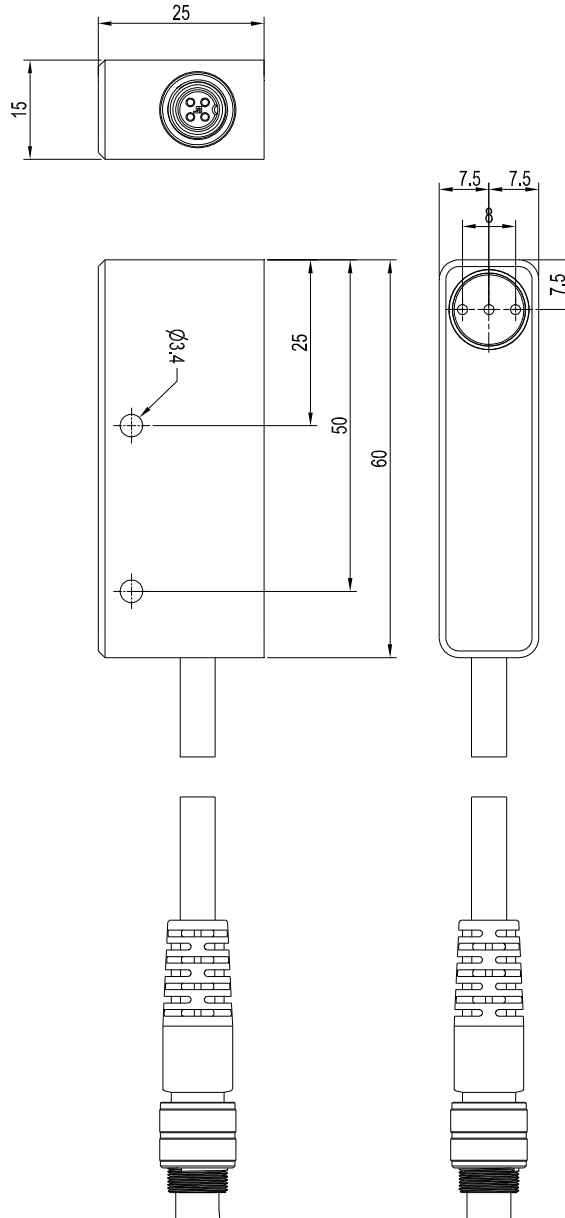
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Dimensions

SI-JET-CONLAS3-T-d...
Transmitter (frontend)

All dimensions in mm

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Connector Assignment

Connection SI-JET-CONLAS-3-R (receiver/electronic control unit) to PLC:
8-pole M12 connector Binder Series 713/763

Pin:	Color:	Assignment:
1	white	GND (0V)
2	brown	+24VDC (±10%)
3	green	IN0
4	yellow	OUT0 (Digital 0: typ. 0 … 1V, Digital 1: typ. +Ub – 10%)
5	grey	OUT1 (Digital 0: typ. 0 … 1V, Digital 1: typ. +Ub – 10%)
6	pink	OUT2 (Digital 0: typ. 0 … 1V, Digital 1: typ. +Ub – 10%)
7	blue	OUT3 (Digital 0: typ. 0 … 1V, Digital 1: typ. +Ub – 10%)
8	red	OUT4 (Digital 0: typ. 0 … 1V, Digital 1: typ. +Ub – 10%)

Connecting cable:
cab-M12/8-g-(length)-shd   (shielded)
cab-M12/8-w-(length)-shd   (shielded) (angle type 90°)
(standard length 2m, also available: 5m)

cab-M12/8-g-...-shd
(max. length 5m, outer jacket: PUR)
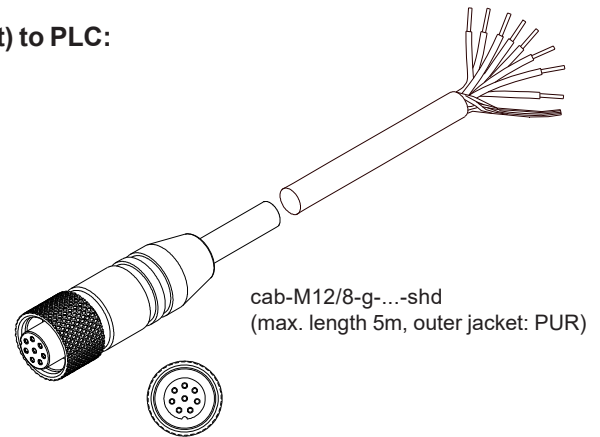
Connection SI-JET-CONLAS-3-R (receiver/electronic control unit) to PC:
4-pole fem. connector Binder Series 707

Pin:	Assignment:
1	+24VDC (+Ub, OUT)
2	GND (0V)
3	RxD
4	TxD

Connection via RS232 interface at the PC:
Connecting cable:
cab-las4/PC-(length)
cab-las4/PC-w-(length) (angle type 90°)
(standard length 2m)

alternative:
Connection via USB interface at the PC:
USB converter (incl. driver software):
cab-4/USB-(length)
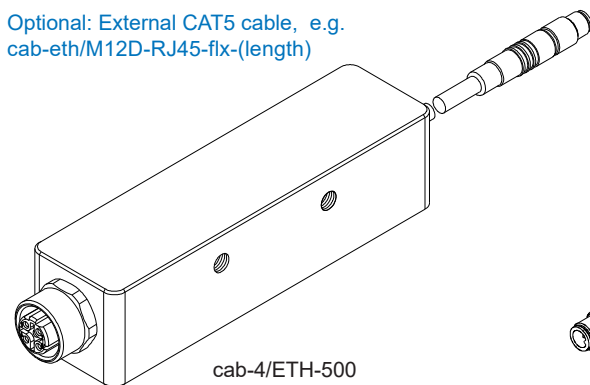cab-4/USB-w-(length) (angle type 90°)
(standard length 2m)

alternative:
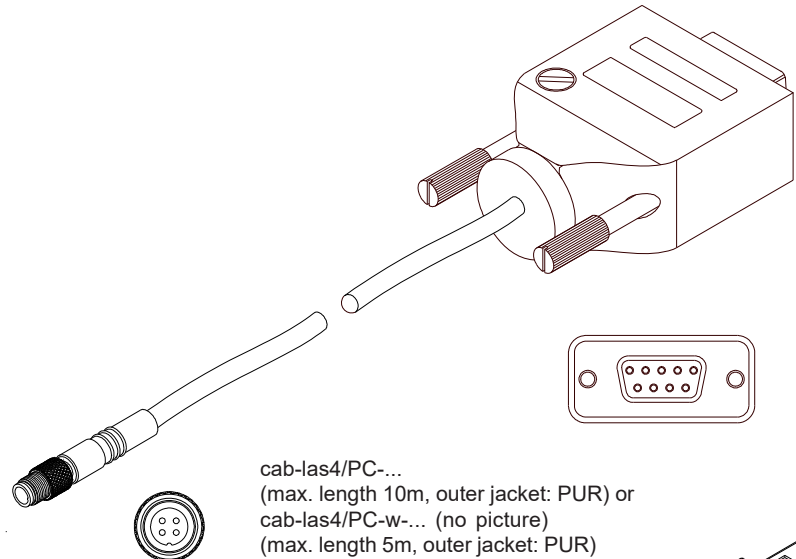*Connection to local network via Ethernet bus:*
Ethernet-Converter (incl. software „SensorFinder"):
cab-4/ETH-500
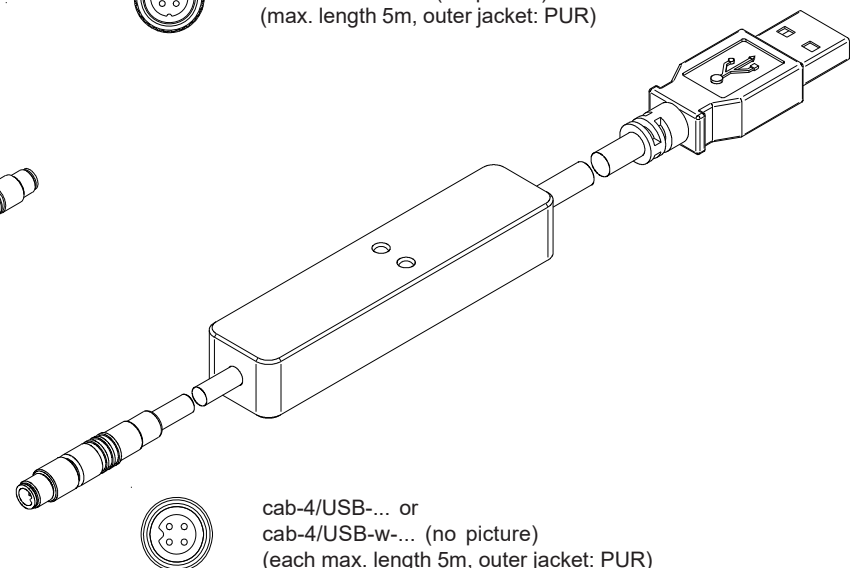(standard length 0.5m)

Optional: External CAT5 cable, e.g.
cab-eth/M12D-RJ45-flx-(length)

cab-las4/PC-...
(max. length 10m, outer jacket: PUR) or
cab-las4/PC-w-... (no picture)
(max. length 5m, outer jacket: PUR)

cab-4/ETH-500
(length 0.5m, outer jacket: PUR)
4-pole M12 fem. conn. (D-coded)
for connection of an external
CAT5 cable, e.g.
cab-eth/M12D-RJ45-flx-(length)

cab-4/USB-... or
cab-4/USB-w-... (no picture)
(each max. length 5m, outer jacket: PUR)

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Connector Assignment

Connection SI-JET-CONLAS3-T-d... transmitter (frontend)
to SI-JET-CONLAS3-R receiver (electronic control unit)
4-pole connector Binder Series 712

Pin: Assignment:
1   Enable (Laser an/aus)
2   +5V
3   I-Control
4   GND (0V)

Connection:
Transmitter (frontend) is connected directly to
receiver (electronc control unit*)* via the integrated cable
(cable length approx. 2m)
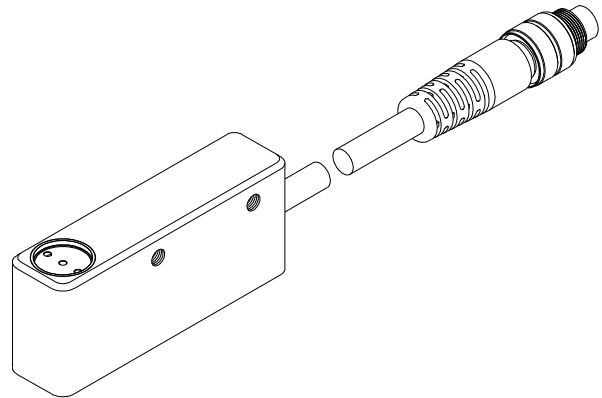
Measuring Principle

The SI-JET spray jet sensor allows highly flexible signal acquisition. The sensor, for example, can be operated in alternating-light mode (AC mode), which means the sensor is not influenced by external light, or in constant-light mode (DC mode), which provides outstanding high-speed sensor operation. With stepless adjustment of the integrated light source, selectable gain of the receiver signal, and an INTEGRAL function the sensor can be adjusted to almost any surface.

The SI-JET spray jet sensor detects the radiation that is transmitted from the measurement object. Depending on the system a red-light LED or a laser diode with adjustable transmission power is used as a light source for the SI-JET sensor. An integrated 3-fold receiver is used for the left, center, and right component of the light transmitted from the measurement object.

Raw data are detected and displayed with 12 bit resolution.

A density and two symmetry values are formed from the detected values for the left, center, and right channel. These values and their individually adjustable tolerances represent a status, and this status is referred to as a vector.

The sensors of the SI-JET series can be „taught" up to 31 vectors that can be directly provided at the outputs, and up 64 vectors that can be output by way of grouping.

As a special feature the sensor can be taught two completely independent parameter sets. Input IN0 can then be used to tell the sensor which parameter set it should work with. Vector detection either operates continuously or is started through an external PLC trigger signal. The respective detected vector either is provided as a binary code at the 5 digital outputs or can be sent directly to the outputs, if only up to 5 vectors are to be detected.

Through input IN0 the sensor can be taught up to 31 vectors (max. 64 vectors in group mode). For this purpose the corresponding evaluation mode must be set with the software.

In another evaluation mode a switching threshold can be set for each of the 3 channels left, center, and right. The respective output switches when the value falls below this threshold.

Parameters and measurement values can be exchanged between PC and sensor through the RS232 interface. Through this RS232 interface all the parameters for vector detection can be stored in the non-volatile EEPROM of the sensor. When parameterisation is finished, the sensor continues to operate with the current parameters in STAND-ALONE mode without a PC.

Necessary firmware updates can be easily performed through RS232, also with the sensor installed.

The sensors of the SI-JET series can be calibrated (channel calibration). Such calibration is performed in transmitted-light mode, when there is no object between transmitter and receiver.

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Parameterization

Windows® user interface:
(The current software version is available for download on our website.)

The SI-JET spray jet sensor is parameterized under Windows® with the SI-JET-Scope software.
The Windows® user interface facilitates the teach-in process at the color sensor and supports the operator in the task of adjustment and commissioning of the sensor.
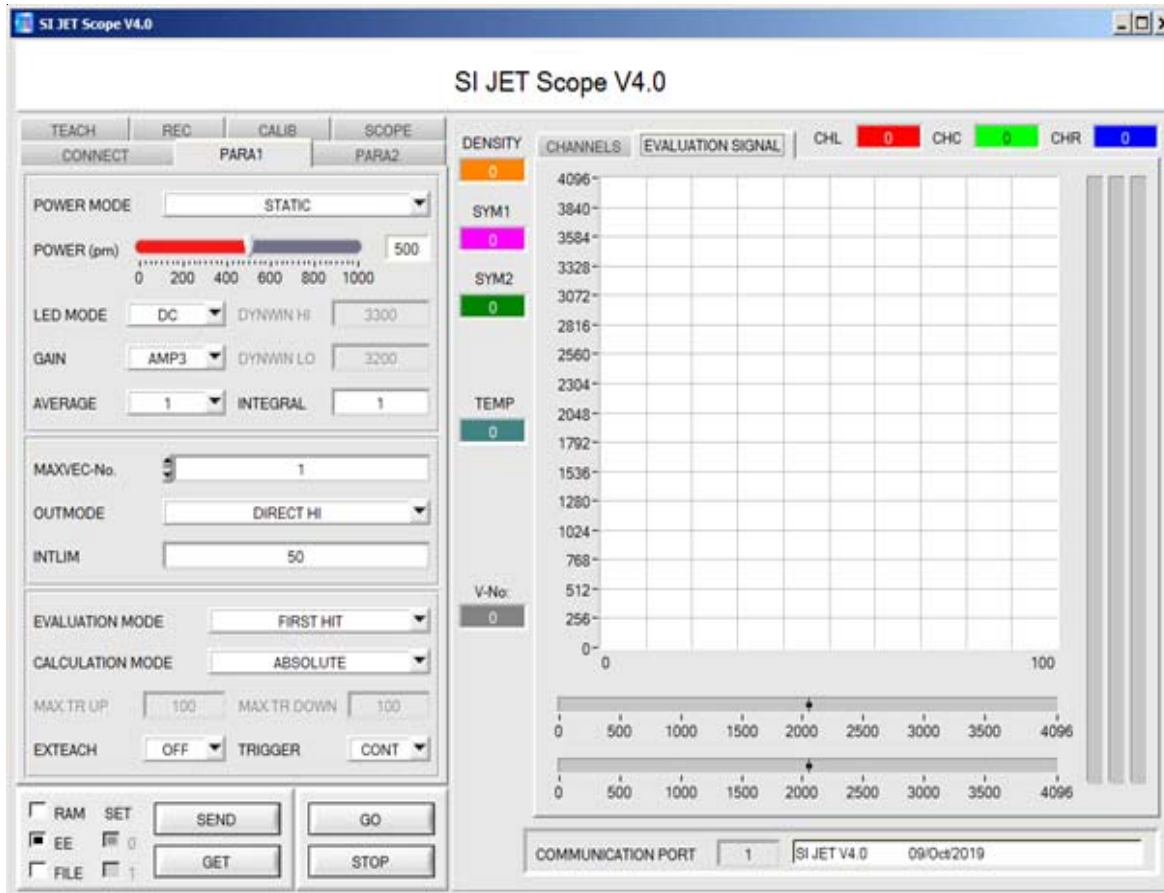
The RS232 interface (tab PARA1 or PARA2) is used for setting parameters such as:

- POWER MODE: Setting the operating mode of automatic power correction at the transmitter unit (transmitter LED)
- LED MODE: Setting the control mode for the integrated light source of the sensor.
- GAIN: Setting the gain of the receiver
- AVERAGE: Averaging over a maximum of 32768 values
- INTEGRAL: This function field is used to set the number of scan values (measurement values) over which the raw signal measured at the receiver is summed up. This integral function allows the reliable detection even of extremely weak signals
- MAXVEC-No.:   Number of vectors to be checked
- OUTMODE: Triggering of the digital outputs
- INTLIM: Setting an intensity limit (minimum intensity required for evaluation)
- EVALUATION MODE: Various evaluation modes to choose from (FIRST HIT, BEST HIT, MIN DIST, COL5, THD RGB)
- CALCULATION MODE: There are 2 methods of teaching a vector, which are selectable via CALCULATION MODE. The CALCULATION MODE = ABSOLUTE defines how the values for DENSITY, SYM1 and SYM2 are calculated from the raw signals CHL, CHC and CHR. In CALCULATION MODE RELATIVE all three channels CH_L, CH_C and CH_R (red, green and blue line) are normalised to their respective current maximum (red, green and blue dashed line).
- EXTEACH: In all the evaluation modes teaching of a color can be performed externally through IN0
- TRIGGER: Continuous or external or self trigger

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Data Recorder

Function of the data recorder:

The SI-JET-Scope software features a data recorder that makes it possible to save the data that are acquired and calculated by the sensor. The recorded file is saved to the hard disk of the PC and can then be evaluated with a spreadsheet program.

Recording depends on the EVALUATION MODE that is chosen. Several EVALUATION MODES do not need certain data, therefore these data will be set to 0, i.e. for these data the value 0 will be recorded.

RECORD MODE	AUTO LIMITED ▼

RECORD-TIME INTERVAL [sec]	1.00
RECORD VALUES (MAX 32767)	1000

TOTAL RECORD TIME (days hours min sec)

0	0	16	40.00

RECORDED	REMAINING
0	1000

START RECORD	STOP RECORD

ID [   ]

SELECT RECORD FILE	SHOW GRAPH

d:\Mist\RecordFile.dat

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