*SCAN*cube IV Serie

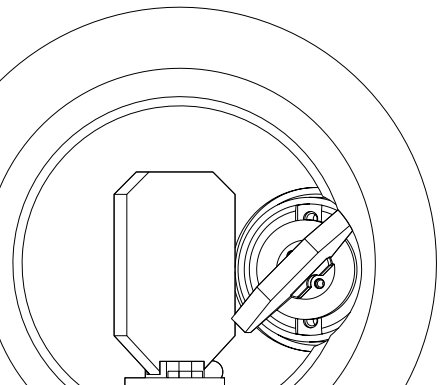
The *SCAN*cube IV series impresses with its robust and compact design, its excellent dynamics, and its attractive price-performance ratio. It is an outstanding choice for both standard and demanding laser applications.

Key Features

- Compact and lightweight design
- Excellent price-performance ratio
- Application specific tuning variants to choose from
- Improved linearity
- Feedback function for actual position, temperature, and status values

Typical Applications

- Marking and Coding
- Additive Manufacturing
- Laser Cleaning
- Welding
- Cutting
- Textile Applications



SCANLAB
innovators for industry

Applications

Compact and Versatile

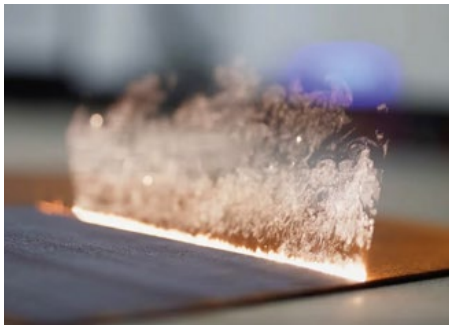
The *SCAN*cube IV combines 35 years of SCANLAB expertise in a powerful scan system. With five aperture sizes and different tuning variants, the *SCAN*cube IV series offers maximum flexibility for a wide range of applications.

Marking and Coding

In marking applications, maximum speed and flexibility are the main priorities. The systems of the *SCAN*cube IV series excel with their exceptional dynamics and compact design. Improved linearity compared to the *SCAN*cube III simplifies commissioning and reduces calibration effort.

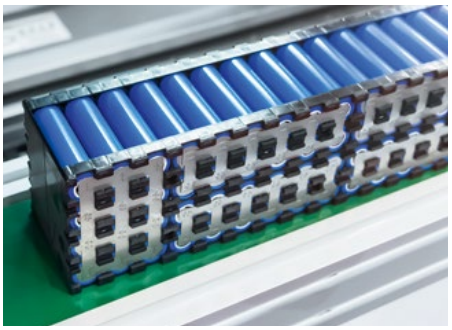
Additive Manufacturing

Processes in additive manufacturing place high demands on the dynamics, precision, and repeatability of a scan system in order to ensure consistently high part quality. With its digital control and improved drift performance compared to the *SCAN*cube III, the *SCAN*cube IV offers an ideal entry point into these demanding processes.



Laser Cleaning

In laser cleaning, scan systems must offer a combination of high power compatibility and dynamic performance. With the integrated readback function, relevant system and position data can be continuously recorded, enabling process monitoring that is particularly valuable under thermally demanding conditions.



Welding

The welding market places high demands on the power tolerance and robustness of scan systems. The integrated mirror air cooling of the *SCAN*cube IV 30 enables laser powers of up to 5 kW. With appropriate system integration, protection classes up to IP66 can be achieved, allowing *SCAN*cube IV systems to be used safely even in demanding industrial environments.

Cutting

With their larger apertures, the *SCAN*cube IV series is ideally suited for laser cutting applications. The digital servo board ensures maximum contour accuracy, enabling particularly clean, repeatable cutting results.

Textile Applications

The versatility of the *SCAN*cube IV series makes it ideal for textile applications – from large area jeans bleaching, which can now be optimally implemented thanks to the larger apertures, to delicate patterns and creative design effects. With the integrated readback channel, the *SCAN*cube IV enables monitoring of process quality.

Tunings

Application specific variants

The dynamic adjustment of a scan system is referred to as tuning. It describes the specific fine tuning of the controller in order to optimally adapt the motion dynamics of the scan system to the desired scanning behavior.

For this reason, SCANLAB offers several application specific tunings for the *SCAN*cube IV series. These make it possible to optimally adapt the scan system to different processing tasks.

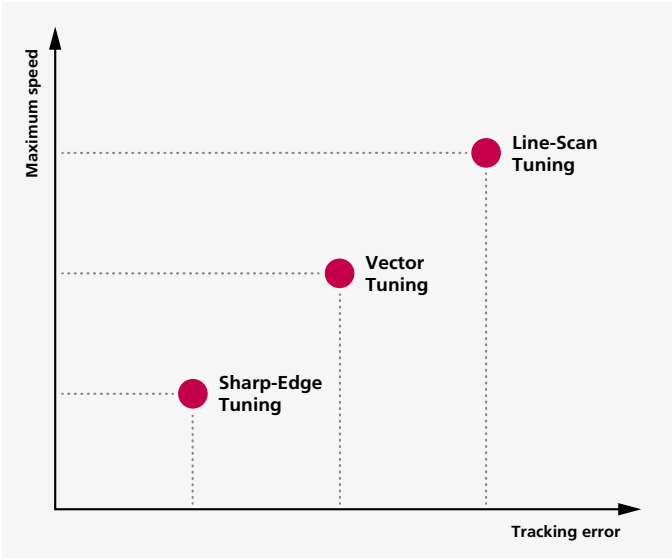
The following tuning variants are available

- **Vector Tuning as a universal tuning**
  With a balanced combination of maximum speed and tracking error, Vector Tuning is ideal for versatile processing tasks:
  - Logos / large processing patterns
  - Medium-sized bitmaps / QR codes
- **Sharp-Edge Tuning for writing**
  The low tracking error enables precise, sharply defined corners. Jobs with frequent changes of direction can be executed efficiently:
  - Expiry dates and serial numbers
  - Small bitmaps / QR codes
- **Line-Scan Tuning for bitmap applications**
  The high maximum speed allows large-area bitmap applications to be executed particularly quickly
  - Hatching and structuring tasks
  - Large bitmaps / QR codes

Overview of tuning options

Aperture	7	10	14	20	30
Vector Tuning	●	●	●	●	●
Sharp-Edge Tuning	●	●	○	○	○
Line-Scan Tuning	○	●	○	○	○

● available ○ on request



Digital control

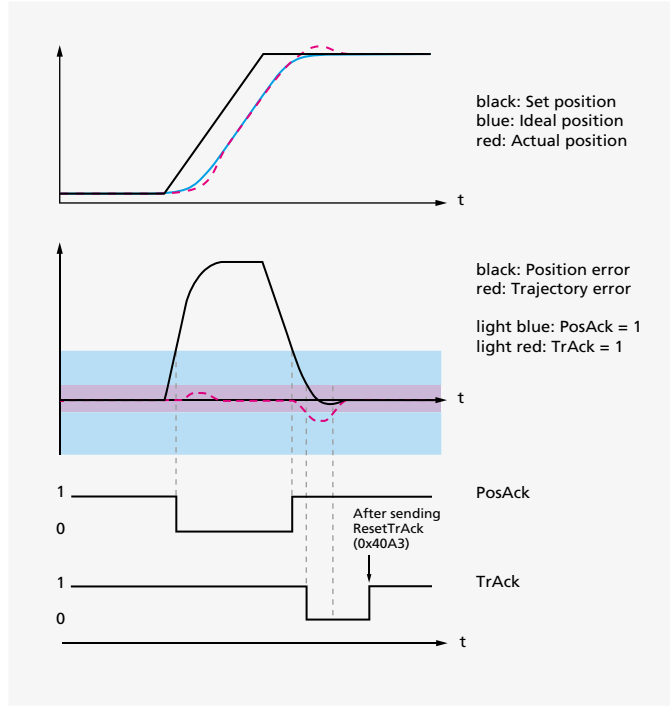
Reduced system-to-system variation between systems

The *SCAN*cube IV product line is based on SCANLAB's new generation of digital servo boards, which operate using a digital control algorithm. While conventional analog systems show a technology related system-to-system variation of the tracking error, the *SCAN*cube IV series benefits from an automized tuning procedure to ensure a uniform tracking error across all scan systems.

This offers crucial advantages: Due to the extremely low variation, all *SCAN*cube IV systems display nearly identical dynamic behavior with respect to tracking error. As a result, no machine specific parameterization of the laser control is req uired when setting up a system. A substitution of individual devices is also possible as a true 1:1 replacement without the need for adjustments to parameter settings, processes, or applications.

Quality monitoring and sensor technology

The *SCAN*cube IV features integrated readback functions which, in combination with an RTC control card, opens up extensive monitoring and diagnostic capabilities. Relevant system and position data can be continuously recorded, monitored and analyzed together with the RTC6 and the StreamParser. This enables permanent quality monitoring.



The *SCAN*cube IV also features the new TrAck status signal (Trajectory Acknowledgement). As an alternative to PosAck (Position Acknowledgement), it alerts the user when the scan head deviates too far from the target trajectory it is supposed to follow. The threshold at which the warning is issued can be defined individually.

The *SCAN*cube IV is equipped with an additional temperature sensor on the servo board. These sensor signals can be evaluated and error and warning thresholds can be configured.

Apertures

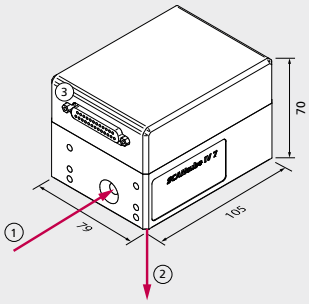
	*SCAN*cube IV 7	*SCAN*cube IV 10
		
Aperture [mm]	**7**	**10**
Dimension [mm]	105 x 79 x 70	114 x 96.5 x 101.6
Beam displacement [mm]	9.98	12.54
Weight [kg]	1	2.1
Application	• **Marking and Coding** • **Laser Cleaning**	• **Marking and Coding**

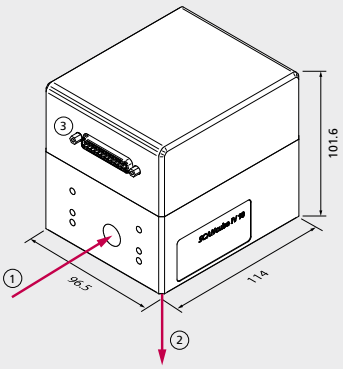
*SCAN*cube IV Series

Technical drawings

Legend

1. – Beam in
2. – Beam out
3. – Combined connector for control and power supply
4. – Air cooling connection

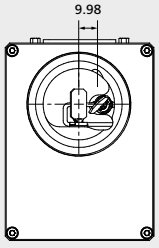


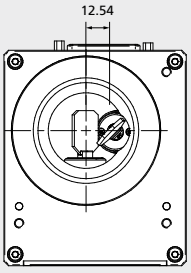


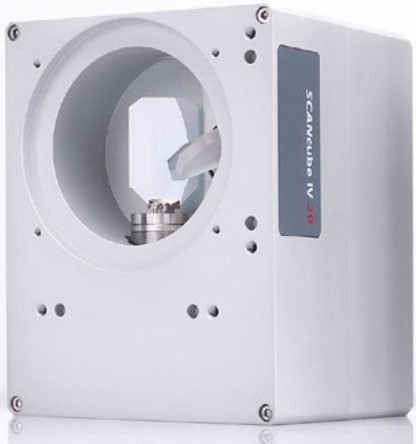
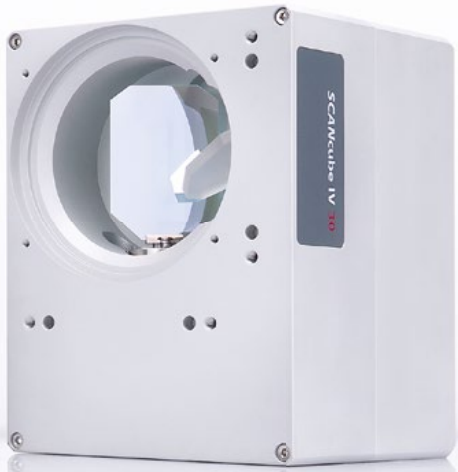
Additional Details

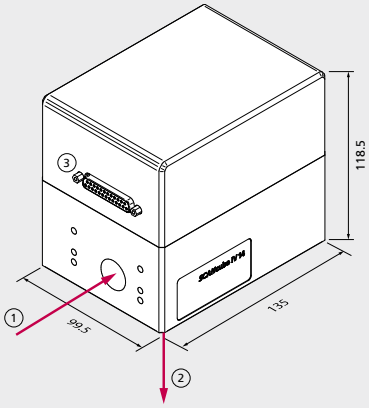
Detailed information and dimensions for the beam inlet and outlet connections are available upon request or on our website at:

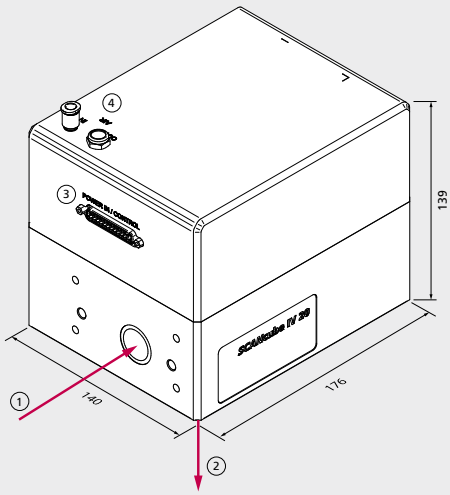
https://www.scanlab.de/en/products/scan-systems/scancube/iv-series

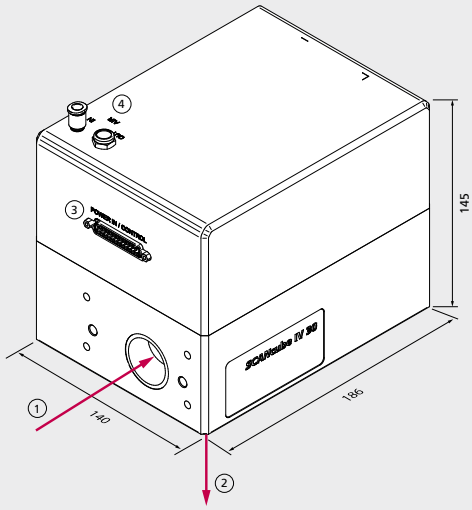


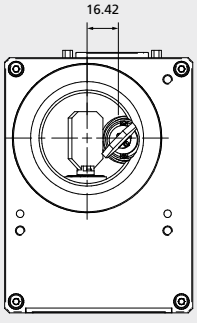


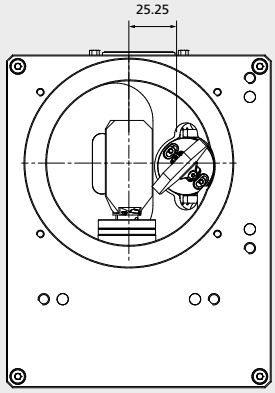
*SCAN*cube IV 14	*SCAN*cube IV 20	*SCAN*cube IV 30
		
14	**20**	**30**
135 x 99.5 x 118.5	176 x 140 x 139	186 x 140 x 145
16.42	25.25	35.54
2.7	5.3	5.4
• **Marking and Coding** • **Additive Manufacturing**	• **Welding** • **Cutting** • **Additive Manufacturing** • **Laser Cleaning**	• **Welding** • **Cutting** • **Textile Applications** • **Laser Cleaning**

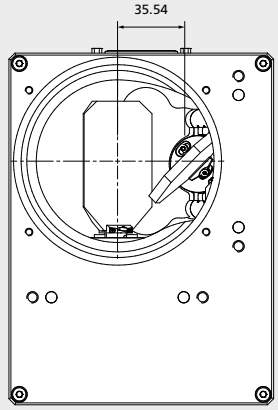












Specifications

Dynamics

(*preliminary specifications)	*SCAN*cube IV 7*	*SCAN*cube IV 10	*SCAN*cube IV 14	*SCAN*cube IV 20	*SCAN*cube IV 30
Aperture [mm]	7	10	14	20	30
Tuning [1]	Sharp-edge	Vector	Vector	Vector	Vector
Tracking error [ms]	0.02	0.08	0.11	0.23	0.37
Typical speeds					
Maximum speed [rad/s]	150	130	90	60	44
CPS [2]					
high quality [cps]	1300	700	540	320	185
good quality [cps]	1840	950	750	410	250
Marking speed					
high quality CPS [rad/s]	30	18.75	15.6	8.2	4.2
good quality CPS [rad/s]	45			10.6	6.7
Step response time	[3]	[3]	[3]	[4]	[4]
10 mrad [ms]	0.10	0.20	0.28	0.53	0.81
100 mrad [ms]	0.70	0.89	1.28	2.03	2.86

[1] further tuning options available upon request
[2] single-line character set, 1 mm height
[3] tolerance band ± 450 µrad
[4] tolerance band ± 250 µrad

Precision & Stability

	*SCAN*cube IV 7	*SCAN*cube IV 10	*SCAN*cube IV 14	*SCAN*cube IV 20	*SCAN*cube IV 30
Repeatability (RMS) [µrad]	< 2	< 2	< 2	< 2	< 2
Positioning resolution (SL2-100) [bit] [5]	20	20	20	20	20
Nonlinearity [mrad] [6]	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7
Temperature drift					
Offset [µrad/K]		< 20	< 20	< 20	< 20
Gain [ppm/K]		< 20	< 20	< 35	< 35
Long-term drift					
8-h-drift (after 30 min warm-up) [7]					
Offset [µrad]		< 50	< 50	< 50	< 50
Gain [ppm]		< 50	< 50	< 50	< 50

[5] based on the full angle range (e.g. positioning resolution 11 µrad for angle range ±0.36 rad)
[6] related to 0.77 rad
[7] at constant ambient temperature and load

Common Specifications

Optical performance	
Typical scan angle [rad]	±0.35
Gain error [mrad]	< 5
Zero offset [mrad]	< 5
Power requirements (RMS)	30 V, or 24 V [8]
Interface	
digital version	SL2-100, or XY2-100 [9]
IP protection class	IP 50, IP 66 [10]
Operating temperature [°C]	25 ± 10

(all angles are in optical degrees)
[8] on request
[9] *SCAN*cube IV 20/30 offers both protocols with automatic detection of the protocol as a standard
[10] With suitable integration, protection classes up to IP66 can be achieved

Counterfeit Protection

We equip all scan systems and RTC control cards with a forgery-proof label that contains the following features:

- individual coding
- holographic elements
- authentication features that are not directly visible
- not removable without residue

The allocation and traceability is secured by individual coding in combination with uniquely assigned serial numbers.

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