

Articulated systems

Assembly systems for Machine Vision



Six programmes for unlimited 3D variable, rapid and precise alignment. Perfect hold, lasting stability and problem-free dismantling and re-alignment.

Image processing and non-contact measuring and testing techniques are key factors for innovation in many manufacturing technologies. Modular assembly programmes by dk for machine vision, industrial image processing, optical inline measurement technology and general sensor systems offer outstanding positive effects regarding functionality, utility value and costs. During development, our set goal was the creation of the best solutions for machine vision with an outstanding range of options for mounting and positioning cameras, sensors, lighting, end-of-arm robotic tools and much more.

EcoLine

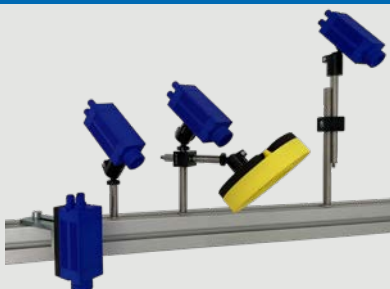
Simple mounts for machine vision can be configured economically using standard parts from the "SPANNFIX ECO" modular fixating systems programme for measurement technology. A comprehensive Ø12 mm column system with longitudinal and cross connectors enables horizontal and vertical constructions. In 50 mm pitch grid or infinitely variable adjustment. And even here, mounts can be generated that permit the attachment of several devices, e.g. a camera and the lighting, from a common base. A useful programme especially for simple image processing applications from the standard dk range.

MicroLine

The infinitely precise and fully reproducible fine adjustment, primarily for "proof of concept", is realised by analogue or digitally adjustable positioning elements as linear or rotary tables. The version with electronic digital display sets and reads the spatial X, Y and Z axes plus rotation and inclination to an accuracy of 100ths of a mm. Cameras on a SWA39 adapter or devices on a SWA39 mounting plate can be exchanged for others in seconds. That is why the system is not only very precise in its positioning but also incredibly fast in its handling.

ModuLine

As the name suggests, here we find ourselves in the maximum modular domain. We rely on the proven TurnStopLine and do without the central clamping mechanism. As a result, the programme is based on individual elements that can be combined as required. There are unlimited possibilities in terms of the size and complexity of the holders with just a few components. From simple camera mounts with just 1 joint to multi-joint systems for several separately alignable cameras on a common base. ModuLine was developed to streamline the cost-benefit effect for customer projects through scalability in line with requirements.



modular. simple. better.



VarioLine

A progressive clamping principle and extra large ball joints on sturdy articulated arms characterise this high-end line. VarioLine is the range for the demanding fixation of cameras and sensors that have to remain perfectly aligned over a long period of time. Due to tool-free one-hand operation, cameras can be aligned extra easily and quickly and, after the central clamping grip is tightened, are absolutely secure. Due to the variable action radius ranging from zero to a nominal dimension, a VarioLine arm replaces entire lines of conventional products. Simple project planning and investment security through maximum re-usability are the result.

TurnStopLine

TurnStopLine, the high-end version of the VarioLine series, is characterised by two technical highlights: the positive locking of the central joint by means of a pair of fine locking discs and the consequently enlarged base ball of the large clamping joint. This absolutely rigid fixation is required when dirt or lubricants reduce friction in the automation environment. Special applications such as the reliable long-term clamping of vision or sensor elements also require this technology. TurnStopLine is absolutely perfect for the highest requirements in machine vision applications.

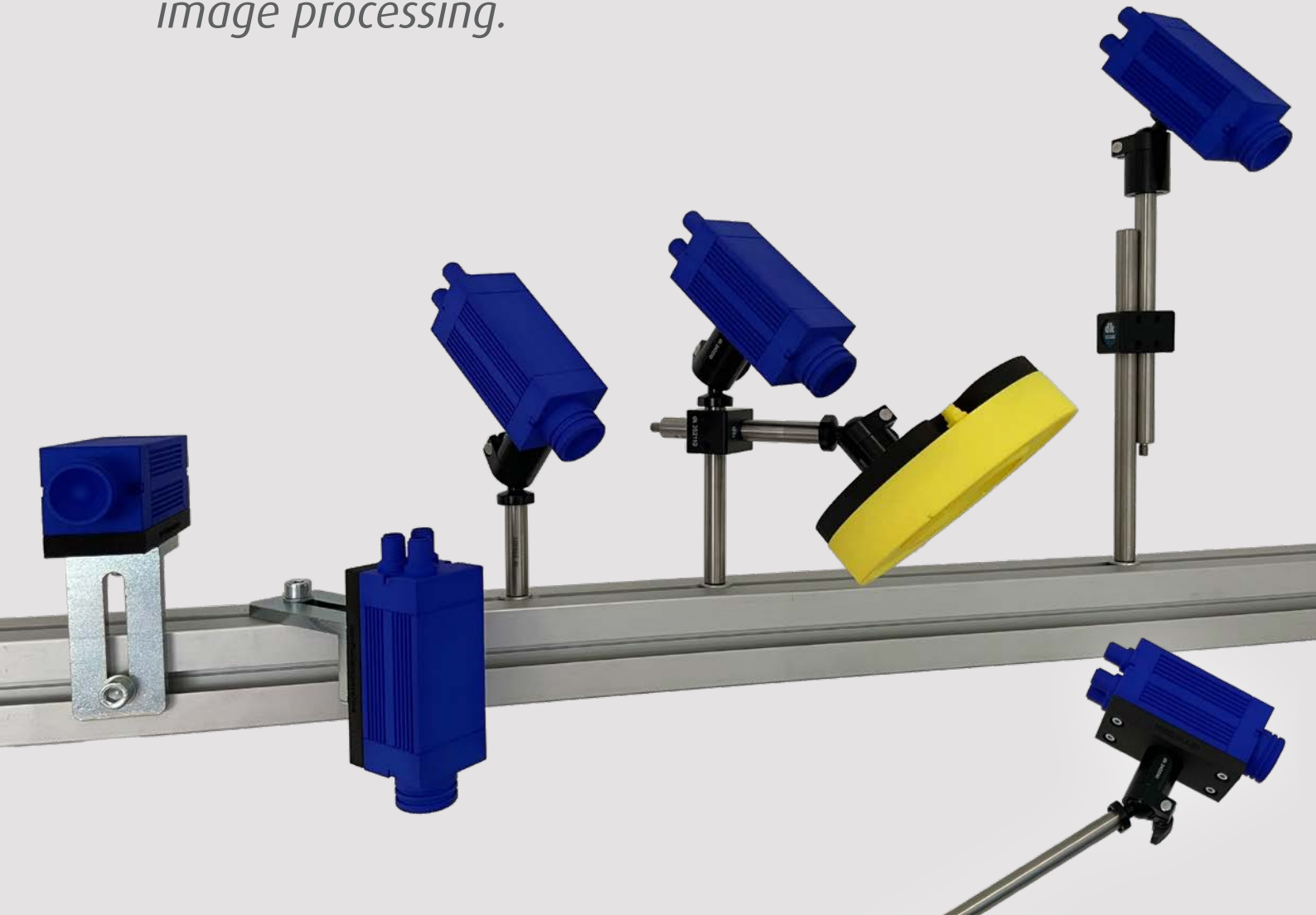
INOX HygienicLine

The 3D clamping joints for high-tech industries are designed for clean zones and sterile rooms with the categories "rustproof" and "steam sterilisable". Materiality, technology and design are conceived down to the last detail so that this product line qualifies even for the most sensitive industrial sectors. The characteristic mode of operation is retained: simple, fast and secure fixation with a central clamping unit for perfect positioning, alignment and holding. HygienicLine is used where chemical and microbiological resistance is a prerequisite.



EcoLine

Basics enable simple fixtures for industrial image processing.



STANDARD INSTEAD OF SPECIAL

The column structured systems in dk's standard modular system for dimensional metrology enable simple fixtures for industrial image processing to be economically achieved. A comprehensive Ø12 mm column system with longitudinal and cross connectors enables horizontal and vertical constructions. Column lengths in 50 mm pitch grid or with infinitely variable adjustment of X, Y, Z and rotation. The attached ball joint makes the camera setting even more 3D variable with just one clamp.



Individual components

Ø12 mm stainless steel columns with M6 thread

With one external thread and one internal thread, therefore extendable. Internal thread has a SW 3 hex socket for mounting

Description	Order number
Length 50 mm	368600
Length 100 mm	368700
Length 150 mm	368800
Length 200 mm	368900



Cross connector for Ø12 mm columns

Description	Order number
For connecting two columns at a 90° angle. The columns can be moved linearly and rotated. Clamped in the final position using 2 grub screws per connector	352110



Parallel connector for Ø12 mm columns

Description	Order number
For connecting two columns parallel to each other. The columns can be moved linearly and rotated. Clamped in the final position using 2 grub screws per connector	352000



360° joint for Ø12 mm columns

Description	Order number
For a 360° rotatable connection of two columns. The columns can be moved linearly and rotated. Clamped in the final position using a wing grip	352120



Ball joint ModuLine ML 20 Consisting of ball head and seat

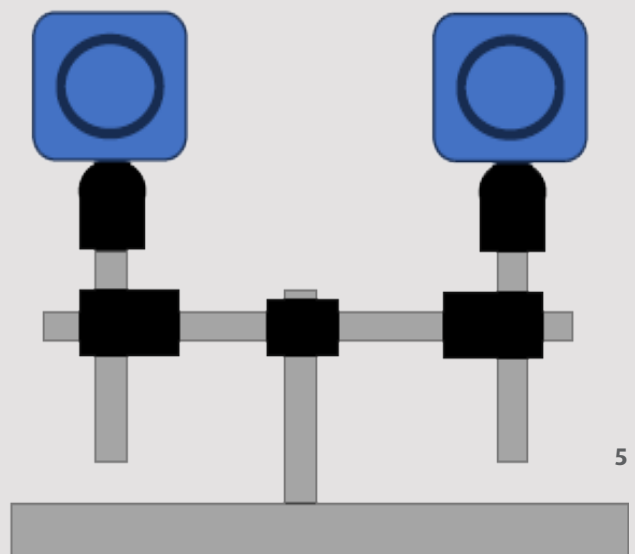
Ball joint or ball seat can be mounted on the base or sensor. Supplied with standard fastening materials. We can supply the appropriate screws required for a specific application on request

Description	Order number
Ball joint ModuLine ML-20-6 with M6 internal/external thread on ball (Supplied with ball head Art. 245652 and ball seat Art. 245550)	241211
Ball joint ModuLine ML-20-1/4 with 1/4" internal thread on ball (Supplied with ball head Art. 245655 and ball seat Art. 245550)	241215



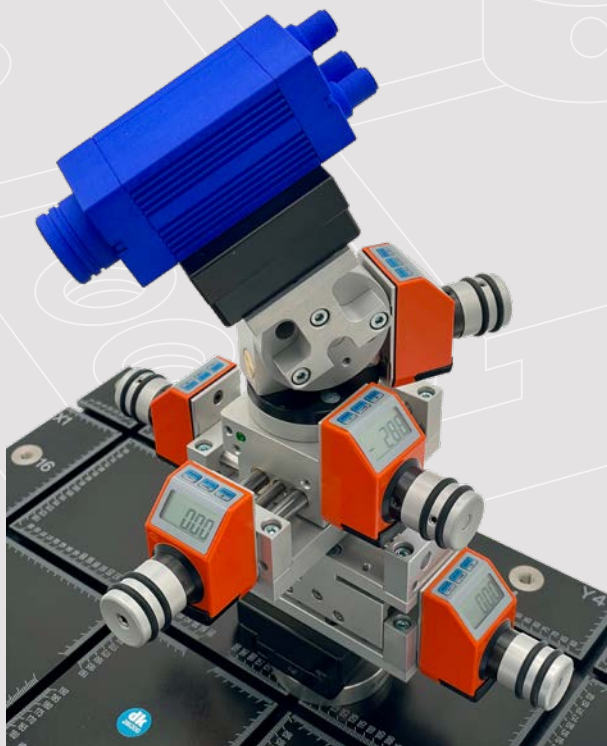
Universal 90° angle bracket, steel

Description	Order number
For attaching cameras with mounting plates to profile systems. Length 80/50 mm, width 40 mm. 1 hole and 1 slotted hole Ø9 mm. We can supply the appropriate screws for a specific application on request	245230



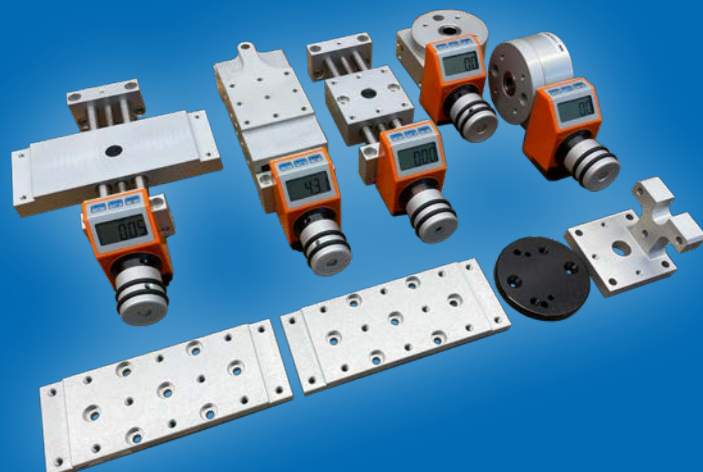
MicroLine

*The analogue or digital **fine positioning** of up to 5 axes for laboratory or test applications is provided by standard elements of the modular dk system of linear adjusters and rotary tables, proven in measurement technology.*



FINE POSITIONING FOR ALL LINEAR AND ROTARY SHAFTS

After rough positioning on the corresponding profile systems - which we are also happy to produce for you - infinitely variable fine adjustment is carried out using linear and rotary shafts with low or zero backlash: X, Y, Z rotation and inclination can be adjusted not only very precisely but also with absolute reproducibility. Perfect for changing settings in the conception phase. We have also developed other interesting features for different requirements in the "proof of concept" and "field application" fields, as can be seen in the ModuLine range.



The image shows a modular machine vision system, model SWA39, mounted on a precision table. The system consists of a blue camera head at the top, followed by a black mounting block with a silver adjustment knob. Below this is a silver cylindrical component with a black scale, and another black block with a silver adjustment knob. The base is a black block with a silver adjustment knob. The entire system is mounted on a precision table with a ruler. The background is a light gray with a white grid pattern.

SWA39 for machine vision
The quick-change system from dimensional metrology is also perfect for image processing.

The optional modular system, based on the dk quick-change interface SWA39 is particularly advantageous for the laboratories. The entire device is configured quickly and easily to meet respective requirements by combining the linear and rotary axes using the dk standard interface SWA39. Fine adjustment is carried out manually via spindle and worm drive, which can also be clamped in their final position. The system offers a wide range of options and products that have been tried and tested over many years.

Individual components can be customised

Manual positioning stage with electronic position indicator

Travel 48 mm. Display accuracy 0.01 mm. Reset function. Without axial play: no backlash due to pre-tensioned mounting; Self-locking; Holds the position even with vibrations. Spindle lockable. Optional additional clamping of the slides on the axes

Description

Order number

Linear positioning stage with mounting bracket

314700-08-D

Cross stage X/Y with mounting bracket

314710-08-D



Vertical stage with electronic position indicator

Description

Order number

Travel 8 mm. Display accuracy 0.01 mm; reset function; Backlash < 0.05 mm; self-locking; holds the position even with vibrations; spindle can be clamped; with mounting plate

314715-08-D



Rotary table with electronic position indicator

360 by worm drive. Display accuracy 0.1°. Reset function. Backlash max 0.15° due to pre-tensioned mounting; Self-locking; Holds the position even with vibrations

Description

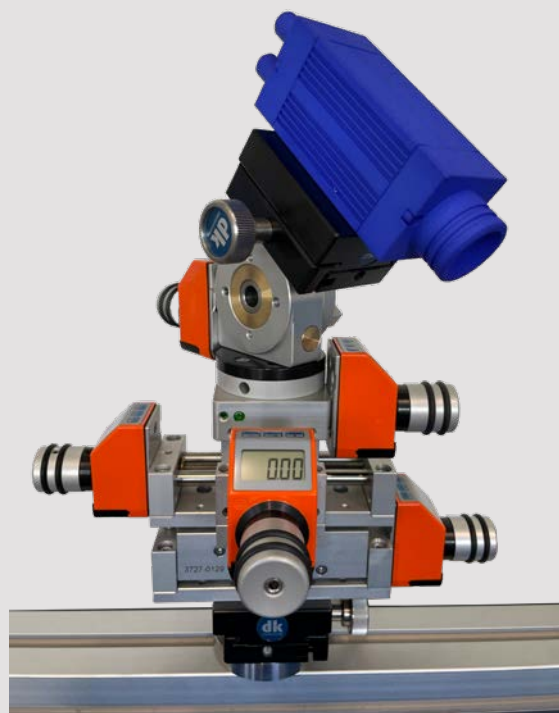
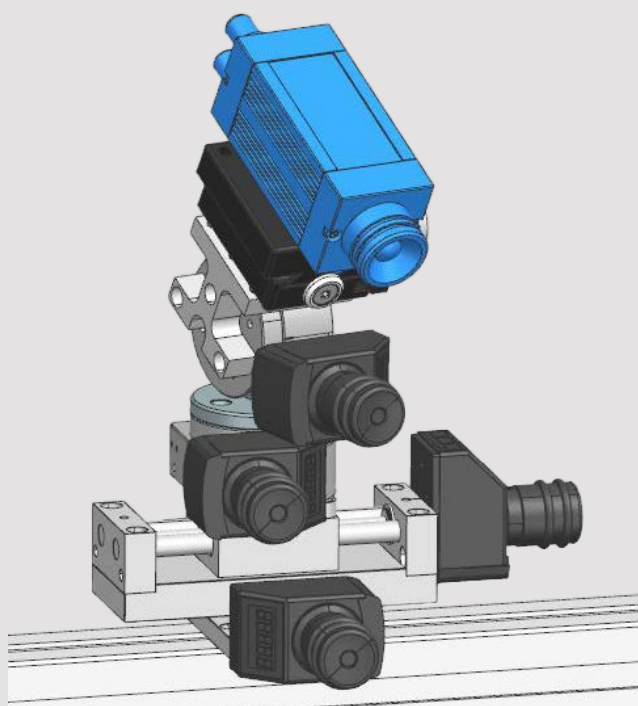
Order number

Rotary table

314720-08-D

Tilting stage with mounting bracket

314725-08-D



Basic mountings and device adapters on page 19. We will be happy to configure the device to suit your needs. Also available in other sizes and with additional accessories. Alternatively available as versions with scale knob or mechanical position indicator as well as a motorised versions.

Individual components in SWA39 quick-change system

Quick-action clamp with fastening screw

Quick-action base clamp for mounting all structural and adjustment elements of the SWA39 system; For direct fastening in tapped holes or T-slots

Description	Order number
With M6 fastening screw	285206
With M8 fastening screw	285208
With M10 fastening screw	285210
With M12 fastening screw	285212



Manual cross stage quick-action clamp with scale knob

Description	Order number
Travel 25 mm each; precise micrometre adjustment; backlash-free guides; self-locking; cross table with SWA39 interface and SWA39 quick-action clamp	314460



Manual quick-action rotary/pivot unit clamp with scale knob

Rotates through 360° and swivels +90°/-55°; precise adjustment in micrometres; backlash max. 0.15° due to pre-tensioned mounting; self-locking; holds position even in the event of vibrations

Description	Order number
Unit with SWA39 interface and SWA39 quick-action clamp	314030
Clamping set for swivel unit	314015



Quick-action clamp rotary/swivel unit with ball joint

Description	Order number
Rotates through 360° and swivels 90°; adjustable tensioning for safe and convenient operation; unit with SWA39 interface and SWA39 quick-action clamp	270500



Quick-action clamp 3 axis tilt drive

Description	Order number
Rotates through 360°; tilt infinitely adjustable up to 60° by clamping the tilt mechanism; with the first goniometer, a further 30° can be precisely tilted by a self-locking gear; infinitely variable 30° tilt at right angles with second goniometer, in addition, the quick-action clamp can be rotated a further 360°; all settings on scaled axes for perfectly repeatable adjustment; unit with SWA39 interface and SWA39 quick-action clamp	270650



These are only a few examples of the extensive SWA39 quick-change system featuring a large selection of basic and add-on elements. Camera mounting plates are provided with a matching SWA39 interface.

ModuLine

This maximum modular series from dk was specifically designed for machine vision. The product line provides streamlined cost-benefit effect for larger projects through scalability in line with requirements.



**With function head
ModuLine ML 20:
1 holder for 2 devices**

As the name suggests, here we find ourselves in the maximum modular domain. We use the tried-and-tested TurnStopLine as a basis and do without the central clamping mechanism. As a result, the programme is based on individual elements that can be combined as required. Very few components offer unlimited possibilities in terms of size and complexity of the holders. From simple camera mounts with just 1 joint to multi-joint systems for several separately alignable cameras on a common base. ModuLine was developed to streamline the cost-benefit effect for customer projects through scalability in line with requirements.



» With just 5 components
unlimited possibilities «

2 ball joints and TurnStop-joints in the modular system



Can be extended in 50 mm increments as required



Absolutely secure with just one clamping screw per joint



1 holder for 4 devices and all can be realigned
on 1 base joint



1 holder for 3 devices on 1 function head



TAMPER PROTECTION AND PREVENTION OF INCORRECT OPERATION

If alignment of a sensor is accidentally changed, e.g. during cleaning or servicing, measurement errors occur and it is incredibly time-consuming to find why these errors occur. So it is ideal for the bracket to be highly resistant to faulty operation or tampering! On the other hand, when initially developing a solution for a machine vision process, very simple and fast adjustment is an advantage.

ModuLine already includes the solutions for both applications:

PoC/Proof of Concept: tool-free adjustment for testing and laboratory

FA/Field Application: adjustment only with tools for industrial applications



PoC for ModuLine

The three joints are equipped with operating elements for convenient, tool-free adjustment as standard.

FA for ModuLine

ModuLine products are supplied with standard elements to replace operating elements so that the holder can only be adjusted using tools.

PoC for TurnStopLine and Varioline

With this system, central clamping progressively locks the three joints of the arm. The basic version is operated by an ergonomic star grip. A locking lever which can be "parked" in any position is optionally available.



FA for TurnStopLine and Varioline

Both operating elements can be removed and replaced via an M6 nut, so that the articulated arm can only be operated with a standard tool. **Ingenious:** The option with a locking lever can be easily reconfigured so that the entire joint can only be adjusted using a special tool. This is supplied with the lever option.



"EASY CHANGE" FOR TESTING AND LABORATORY

Intelligent quick-action system for camera, light and sensor: respective device remains mounted on one "half" of the joint, is separated from the other half of the joint mounted on the test setup without the need for tools and can be quickly replaced by another device or used at another location.



Fine tuning: The perfect configuration for every type and number of sensors, every position as well as every process



ModuLine individual components, combinable as required

Ball joint ModuLine ML 20 consisting of ball joint and seat

Ball joint or ball seat can be mounted on the base or sensor; supplied with standard fastening material; we can supply the appropriate screws required for a specific application on request

Description	Order number
Ball joint ModuLine ML-20-6 with M6 internal/external thread on ball (Supplied with ball joint Art. 245652 and ball seat Art. 245550)	241211
Ball joint ModuLine ML-20-1/4 with 1/4" internal thread on ball (Supplied with ball joint Art. 245655 and ball seat Art. 245550)	241215



Ball joint ModuLine ML 40 consisting of ball joint and seat

Description	Order number
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Ball joint with intermediate plate for attaching ModuLine extensions; seat with M8 internal threads and through-holes for M8 and M10 screws can be mounted on the base or sensor mounting plate; supplied with standard fastening material included; we can supply the appropriate screws required for a specific application on request (Supplied with: ball joint Art. 245664, ball seat Art. 245560 and intermediate disc 245803)

241227



Pivot joint ModuLine TurnStop ML 100

Description	Order number
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360° pivot joint with a pair of fine locking discs for positive locking of the joint for absolutely rigid long-term fastening; locking lever for clamping the lever in any position after fastening; lever removable for tamper-proof or faulty operation-proof end positioning; with tapped holes for screwing on ball joint, ball seat, extension and functional head; delivered with screws

241200



Extension ModuLine ML 20-50

Description	Order number
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Extension module with Ø25 mm and length 50 mm. For screwing onto 20 mm ball joint, 40 mm ball joint and swivel joint of the ModuLine series. Any number of extensions can be mounted together; with tapped holes for screwing on ball joint, ball seat and functional head. Can also be mounted coming off the function head for branched configurations; supplied with screws

245800



Function head ModuLine ML 20

Description	Order number
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Function module for screwing onto pivot joint of the ModuLine series and ModuLine extension; with tapped holes for screwing on ball joint, ball seat and other extensions; supplied with screws

245700



Selected ModuLine system sets

Clamping joint ModuLine 3D with 3 decentralised joints

Consisting of 20 mm ball joint at lower end, TurnStop joint in the centre and 20 mm ball joint on top; ball joint or seat can be mounted towards centre joint or sensor; supplied with standard fastening material; we can supply the appropriate screws required for a specific application on request

Description	Order number
Clamping joint ModuLine 3D ML-200-H with action range ca. 200 mm; (supplied with pivot joint ModuLine Art. 241200, 2 x ball joint Art. 245652 and 2 x ball seat Art. 245550)	241250-H
Clamping joint ModuLine 3D ML-300-H with action range of ca. 300 mm; (supplied with pivot joint ModuLine Art. 241200, 2 x extension Art. 245800, 2 x ball joint Art. 245652 and 2 x ball seat Art. 245550)	241252-H



Set for PoC application developers

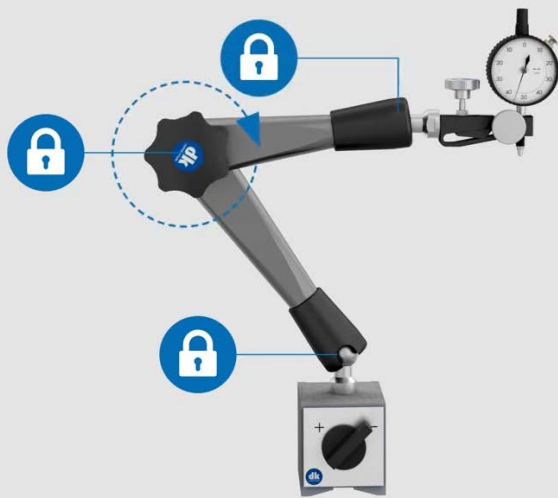
Basic sets for setting up several small but also larger and more complex configurations; process-orientated fixtures can be built in the "Proof of Concept" development area and adjusted as required without tools until a solution is found; these solutions can then be directly replicated in modular form in the actual "Field Application"

Description	Order number
ModuLine set S 4 x ball joint ModuLine ML-20-6 Art. 241211, 8 x extension ModuLine ML-20-50 Art. 245800, 2 x pivot joint ModuLine TurnStop ML-100 Art. 241200, 1 x function head ModuLine ML-20 Art. 245700	241290-S
ModuLine Set M 8 x ball joint ModuLine ML-20-6 Art. 241211, 1 x ball joint ML-40 Art. 241227 20 x extension ModuLine ML-20-50 Art. 245800, 4 x pivot joint ModuLine TurnStop ML-100 Art. 241200, 4 x function head ModuLine ML-20 Art. 245700	241290-M
ModuLine Set L 20 x ball joint ModuLine ML-20-6 Art. 241211, 4 x ball joint ML-40 Art. 241227 40 x extension ModuLine ML-20-50 Art. 245800, 10 x pivot joint ModuLine TurnStop ML-100 Art. 241200, 10 x functional head ModuLine ML-20 Art. 245700	241290-L



IN AN INSTANCE:

Articulated arms TurnStop and VarioLine 3D with progressive central clamping technology for effortless, quick fastening of camera, light and sensors that can be changed as often as needed. Permanent hold after fastening - just like a firmly welded device base.



PROGRESSIVE CLAMPING

The individual joints of the 3D arm are centrally fixated with just 1 operating element. With a progressive operating principle: the basic ball joint clamps first and the other two are free for further rough adjustment. When rotated further, the centre joint locks while the upper joint on the sensor still moves freely for fine adjustment. Rotate further to maximum clamping, then the overall alignment is permanently locked.



TurnStopLine combined with ModuLine elements



Device holder

Based on our experience, we have decided to provide the perfectly fitting instrument holder for every camera, sensor and instrument. In-house production makes this possible. Why exact orientation on the devices being positioned and not universal plates? Because an overall fixture can not have any weak points. It has to be stable, permanently rigid and neither too small nor too big. And, of course, they need exactly the right holes in the right places.

- » perfect hold
- » easy installation

Central locking knob

For fixation of all possible movements of the three system joints in 3D space. Simple and quick. Infinitely adjustable from smooth running to tight. With the TurnStop joints, positive locking in 2.3° increments by means of fine toothed discs for use in highest demand and under adverse environmental conditions.

- » one-hand operation
- » tool-free operation
- » perfect fine adjustment
- » maintenance-free and durable



3D articulated joints from dk stand for optimum adjustment possibilities and absolutely secure fastening in the field of machine vision. They are ideal for aligning and holding industrial imaging and sensor instruments.

Protective sleeve (optional)

Protects the ball joint from dirt and lubricating fluids.

- » perfect function
- » long service life

Progressive clamping

With the VarioLine and TurnStopLine ranges, the joints are not clamped simultaneously, but one after the other from the bottom to the top. The loosening of the clamps occurs in the opposite direction.

- » operating comfort by fine adjustment
- » prevents damage

Strong articulated arms

Due to particularly generously dimensioned light metal construction with rounded transitions. (ChromLine: Chromed steel)

- » permanent maximum stability
- » high repeat accuracy
- » comfortable handling
- » stable with low dead weight

Mechanical clamping principle

For long service life and fully maintenance-free. Power transmission through precision steel components.

- » no sudden pressure drop
- » independent of temperature
- » suitable for long-term clamping

Ball joint

With precise fit of ball and counter part. 360° rotation and over 180° swivel.

- » high retaining force
- » complete 3D flexibility

Base/Fastening elements

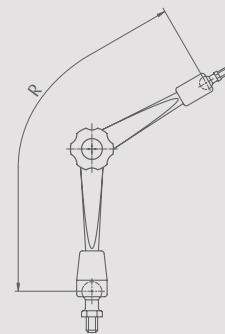
For example, die-cast retaining plates that have an M8 connection to the 3D joint as standard and two counterbores for different size screws. These plates available in two sizes are just two of the many fasteners we offer.

- » perfect hold
- » easy installation



3D Clamping joints

The dk articulated arm stands for each product line can be aligned easily, quickly, flexibly and precisely, and securely fastened without any play. All lines are equipped with our tried and tested, ergonomic star grip as standard. As an option, we are able to supply clamping joints with an indexable clamping lever, which not only enables maximum clamping force with less effort, but can also be "parked" in any position where space is limited.



Maximum action radius and all other radii in the 3D range from zero to maximum value.



Star grip



Clamping lever, indexable (-H)

VarioLine

Progressive clamping principle and large ball joints on extra strong articulated arms.

Clamping joint VarioLine VL-160 (action radius 160 mm, length 200 mm, threads M8/M8, progressive clamping)

Article No.	244010	244010-H
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Clamping joint VarioLine VL-280 (action radius 280 mm, length 320 mm, threads M8/M8, progressive clamping)

Article No.	244030	244030-H
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TurnStopLine

In addition to VarioLine toothed indexing discs in main joint and extra large ball joints for absolute rigid fixation.

Clamping joint TurnStopLine TS-160 (action radius 160 mm, length 200 mm, threads M8/M8, indexing discs, progressive clamping)

Article No.	241010	241010-H
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Clamping joint TurnStopLine TS-280 (action radius 280 mm, length 320 mm, threads M10/M8, indexing discs, progressive clamping)

Article No.	241031	241031-H
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HygienicLine

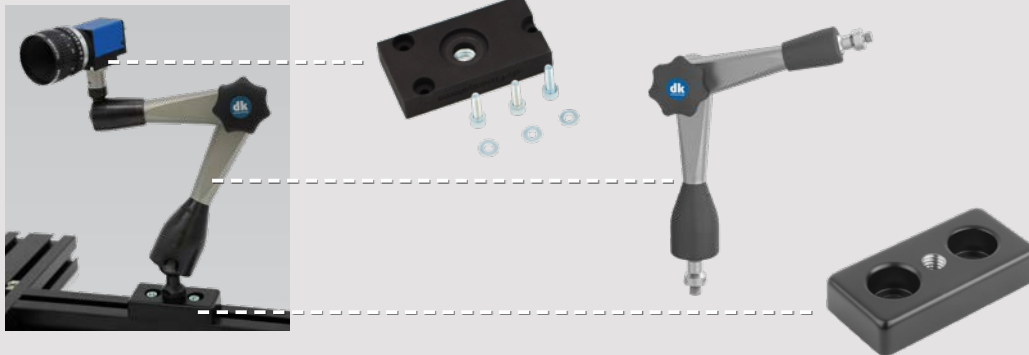
For use if rust or chemical and microbiological resistance is a prerequisite.

Individually designed to customer specifications (please let us know your exact requirements)



Assembly accessories

Fastening element for Machine Vision in the automation and AI sectors.



Base/Fastening elements

Universal fastening plate e.g. for mounting on aluminium profiles

Description	Order number
W x D x H: 60 x 30 x 12 mm, for M8 with 2 x 2 M5 and M6 fastening screws	245110-M8
W x D x H: 80 x 40 x 16 mm, for M8 with 3 x 2 M5 and M6 and M8 fastening screws	245111-M8

Universal clamp e.g. for mounting on plates

Description	Order number
Clamping width 40 mm, for M8 with clamping grip, M8 top and side	245201

Switchable magnet e.g. for mounting on steel parts

Description	Order number
Holding force 750 N, for M8, W x D x H: 50 x 60 x 55 mm	245012
Holding force 1,000 N, for M8, WxDxH 50x74x55 mm	245013

Extension column for setting 3D joints at fixed distances

Description	Order number
Hex column 17 AF each with M8 external and internal thread, L 50 mm	304100
Hex column 17 AF each with M8 external and internal thread, L 100 mm	304200



Camera/Sensor/Light holder and device plate

Camera/Device holding plate for all industrial cameras, lights and sensors

Description	Order number
With metal M8 internal thread for 3D clamping joints from dk incl. precise fitting bores, fastening screws and dimensions for all device types and manufacturers. Please provide us with type and hole pattern of the camera or the device to be mounted.	on request

Holder for round objects (e.g. fibre optics or sensors)

Description	Order number
Connection M8, suitable for 8 mm diameters (6 mm with reducer sleeve)	246048
Connection M8, suitable for 10 mm diameters	246501-M8
Connection M8, suitable for 11 - 16 mm diameters	246500-M8
Connection M8, suitable for 30 mm diameters	246510





TACTILE MEASURING



OPTICAL MEASURING



MACHINE VISION & SENSOR



CONTOUR & SURFACE MEASUREMENT



COMPUTED TOMOGRAPHY



3D LASER SCANNING



dk FIXIERSYSTEME GmbH & Co. KG

Ferdinand-Lassalle-Strasse 35
72770 Reutlingen, Germany

Tel. +49 (0) 7121 90 97 10
Fax +49 (0) 7121 90 97 120
info@dk-fixiersysteme.de
www.dk-fixiersysteme.de

modular. simple. better.

The entire world of fixating, clamping and positioning

The comprehensive standard construction sets with around 1,000 parts by dk FIXIERSYSTEME for metrology technology offer the following advantages:

- » Modular system that has grown and been tried and tested for decades
- » Modularity across different lines
- » Solutions for every positioning task
- » Economic efficiency through synergetic effects of several sector solutions

SWA39



SPANNFIX PRO



SPANNFIX ECO



QUADERFIX



SCHIENENFIX



MICROFIX



SWA39CT



SPEZIALFIX



ARTICULATED SYSTEMS



SWA39SURF



**FAST
REASSEMBLY
LIFELONG**

The basic principle of all dk FIXIERSYSTEME!

Our fixtures are of modular design, may be dismantled at a moments notice and reassembled to their initial state. The compatibility of dk FIXIERSYSTEME ensures perfect utility value.