



Screwdriving technology

Automation

Air motors

Air tools

DEPRAG

**Standardized
assembly cells**

DCAM DEPRAG COMPACT-ASSEMBLY-MODULE

The Compact Assembly Platform

- **Short Cycle Times**
- **Compact Design**
- **High Uptime**
- **Integrated Positioning- and Sequence Controller**
- **Torsion-Resistant Steel Frame**
- **Short Design- and Lead Times**
- **Uniform Machine Concept**
- **ESD-Execution available**

In comparison to conventional robotic systems, the DCAM sets itself apart through its uniform and compact machine-design. Because of the modular and flexible platform, as well as the freely programmable axes, the DCAM is well suited for many different assembly and production tasks. The large, standardized workarea up to 600 x 600 x 150 mm [23.6 x 23.6 x 5.9 inches] and the option to integrate up to three freely programmable axes, allows for maximum machine flexibility.

In addition, the DCAM can be supplied with optimally adapted stepper-motors or - on special request - with servomotors. The machine can be operated using the integrated keypad of the DEPRAG motion controller. A user-friendly software editor establishes the processing programs, which can also be input offline by the use of a PC. The essential components of the DCAM are:

- Axis Module
- Controller
- Machine Base
- Part-Loading
- Processing Module (i.e. Screwdriver Function Module - SFM)



1. The Platform Concept

Through the constant expansion of the previous DCAM-A product and by adding our long-term experiences, we have succeeded in developing a uniform and optimized assembly module. All modules were revised to allow a faster ROI and were linked to an especially flexible platform-concept. Software tools enable a fast and exact design, as well as the comprehensive structure of an ordered DCAM-B. This allows us to offer very quick design- and lead-times. In principle, our customer receives a customer-specific solution, which contains, thoroughly tested- and well- established standard components.

1.1 Machine Base

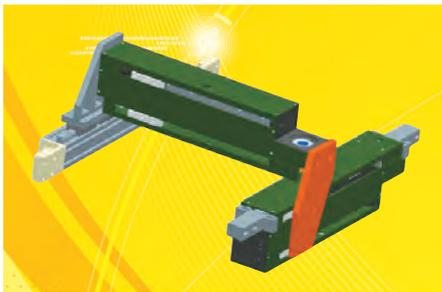
The DCAM base-module consists of a powder-coated steel frame with a height adjustable table, a closed or open top cover and a foot support. The machine frame is available in

- Table- or Floor Mount
- Workplace Module (Stand-Up or Sit-Down)
- Assembly Line Module

For an example of a table mount unit, please refer to Page 4; a Floor Mount unit is shown on this catalogs' front page.

1.2 Axis Module

The axis module consists of linear axes with tooth-ring drive and if needed an added Z-axis with ball screw. As drive-motors we use highly developed 3-phase stepper motors or if requested, servo motors.



1.3 Control

The DCAM-B is equipped with a controller, which allows up to 199 inputs and outputs, controls 1 to 3 axes and connects to several different communication modules. The new controller also allows that necessary electrical components may be added. An external operating module is available, which simplifies the input of coordinates while in teach mode. The operating keypad is pluggable and can be connected with other DCAM-B machines.

The standard functions in manual stations include:

- individual control of each axis
- fast traverse of each axis
- parameter adjustment of each axis
- teach mode by a user-friendly editor
- selection of programs
- manual indexing

The following functions are offered in the automatic mode:

- automatic selection of programs, i.e. through bar-code reader, part identification feature or external start signal
- step-by-step operation
- power supply testing

Another interesting option is the possibility to integrate a remote service-module for the axis control. When connected to a special modem, all operational conditions and parameter can be read and interpreted immediately without placing a service call. An optimization of the axis parameter can be performed by the remote service-module as well. These possibilities guarantee a considerably reduced response time and an expensive visit by a technician may be avoided. Please refer also to our catalog D 3350 E.

2. The Module Layout

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2.1 Part Loading

Our module concept not only offers a choice between standard part-load options, but it also allows the combination of different loading methods. For example, the slide-table module may be combined with a safety-door, or the automatic indexing table can be combined with a light-curtain module. It is also possible to integrate a manual workstation with a linear transfer system. Please refer to the different layouts offered (Item No.4, Page No. 3).

The following load-modules are available and can be scaled to fit your parts:

- Rotary Index Table (RST), manual and automatic
- Linear Transfer System (LTS)
- Slide Table (ST), automatic/manual, single/double

2.2 Application Module

- DEPRAG Screwdriver Function Modules (see catalog D 3310 E)
- DEPRAG Testing Modules

2.3 Component Feed System

The feeding module is another standard product offered by DEPRAG and it can easily be integrated into the DCAM-B. Our feed systems allow the transport and presentation of all kind of assembly components, such as screws, nuts, and tapes-on-reel (such as labels, seals, etc.) and any other part that is transported using pallets or blisters. The feed system can be integrated externally, using its own individual floor-stand or it can be directly integrated into the DCAM frame. Naturally, even an integrated feed system is modular and can be pulled out of the machine to allow for easy access during maintenance. To facilitate a fast product changeover, our feeders can also be installed using special holding brackets.

- Screw Feeder (SZG)
- Part Feeder (TZG)
- Pallet Feeder (PZG)

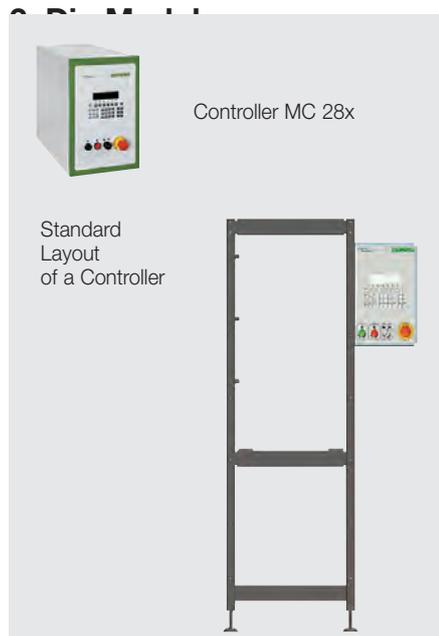
2.4 Safety Modules

Our safety components are built to be modular as well and they are designed to correspond with our customers' applications by providing a closed- and appropriately-sized system.

Naturally, all safety combinations are built to fulfill our clients' safety regulations.

A hazard-analysis of the complete application can be provided to our customer – on special request – in electronic format (pdf or rtf).

- Safety Light Curtain (LVH)
- Safety Lift Door (HT) manual/automatic



3. Application Areas of the DCAM

The DCAM is the ideal basis for your application where several assembly tasks (or assembly lines), must effectively be processed, in a precise and expedient fashion. Particularly, our expertise and the extensive repertoire of our standard products will be helpful for the following applications (assembly tasks):

Screwdriving

...achieved by the use of a Screwdriver Function Module (SFM-L) with a stationary Screwdriver, available in the most different designs, and perhaps including our transducer technology as well as corresponding Screwfeeder. Additional information can be seen in our catalog D 3830 E.



Labeling

of: Labels
Tags

...through vacuum- or magnetic-, pressure- or form-positive grippers.

Testing

of: presence, pressure,
temperature, position,
function, etc.

...achieved by the use of contact- and non-contact sensors and a correspondingly defined measuring electronic.

Lubricating

...achieved by the use of a metering valve with nozzle, mounted to the Z-axis and connected to a dispenser unit.

Mating

with: pick- and place unit, or
vacuum suction, etc.

...in combination with the corresponding feeding system, such as a tape-on-reel-feeder.

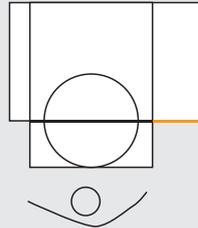
Marking

with: punching-, labeling-,
lettering-, pad-printing, etc.

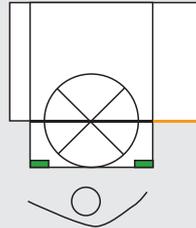
4. Possible Layouts of a DCAM

Rotary Index Table (RST)

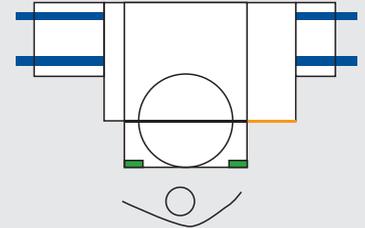
Choice of electrical or manual rotary index tables. To start our electrical rotary tables, we use ergonomically situated opto-touch buttons.



Manual actuated rotary-table with 2-positions

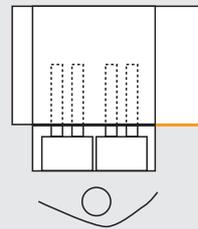


Automatic rotary-table with 4-positions and 2-hand start buttons

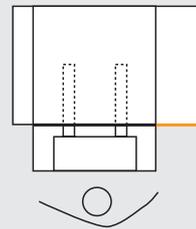


Automatic rotary-table with 2-positions, 2-hand start buttons and integrated into a linear transfer system

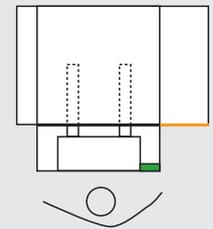
Slide Table (ST)



Manual actuated, automatic retracting dual slide table

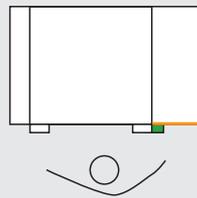


Manual actuated, automatic retracting single slide table



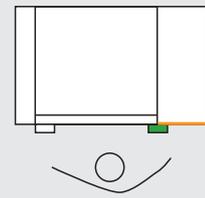
Single slide table with 1-hand start button and additionally secured by a safety flap

Safety Light Curtain (LVH)



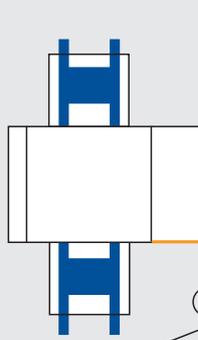
Safety light curtain with 1-hand start button (automatic start is available as an option)

Safety Lift-Door (HT)

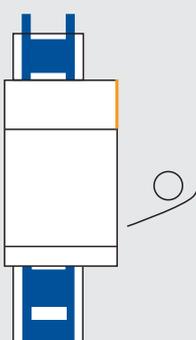


Safety lift-door with 1-hand start button, additionally secured by a safety actuator-strip (manual operation is possible)

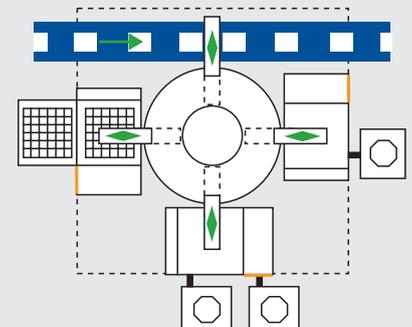
Linear Transfer System (LTS)



LTS in flow-through layout (for parts with a high profile)



LTS in transverse layout (for parts with a low profile)



LTS in offline layout, connected to a rotary index table

5. Work Areas of the DCAM

The DCAM-B offers a choice of Z-direction (vertical) between 75 mm and 150 mm [2.952 and 5.906 inches].

In X- and Y-direction we offer 250 mm, 400 mm and 600 mm [9.842" / 15.748" and 23.622"]. The distances in both directions can be freely combined.

		600
		400
600	400	250

The DCAM-B work areas are available as stated on the top of this page. The machine frame is also adjustable, independent from the axis system. However, such an adjustment depends on any attached peripherals (such as Feeder, RT, LTS).

6. DCAM Advantages

Efficiency

Full efficiency is achieved by industrialization and automation, such as:

- automatic part-loading
- continuous operation
- short cycle times
- parallel operation

Quality Assurance

Through regulated automation and comprehensive documentation of the assembly process.

Flexibility

- by modular and open layout for fast refitting to a different application
- by free programmability of X-Y- and Z-axes.

Short Lead Times

The DCAM-B has a very short lead time, because of the readily available and highly qualitative components used. Naturally, the large share of our well-proven standard components helps increase the DCAM's continued availability. Additionally, when using this module for an application such as screwdriving, all components are made by DEPRAG, from the screwfeeder to the screwdriver.

Planning

Because of the module principle, we need less time to implement customer- and application-specific design requirements. The result is that our customer receives a specialty machine with the safety-features and quality of a standard product.

Naturally, our technicians and design engineers can support you with any questions relating your machine configuration.



Technical Data

	Type	DCAM-B1	DCAM-B2	DCAM-B3
Dimensions (WxHxL) without controller	mm	610x800x625	610x800x625	610x800x625
Controller	inch.	24 x 31.5 x 24.6 MC 281	24 x 31.5 x 2.6 MC 282	24 x 31.5 x 24.6 MC 283
Programming Language		DEPRAG Robot Programming Language		
Inputs		16	32	48
Outputs		16	32	48
Power Supply	V/Hz	230 / 50 (115 / 60)	230 / 50 (115 / 60)	230 / 50 (115 / 60)
Power Consumption	VA	1600	1800	2000
Breaker Capacity Output	A	0.5	0.5	0.5
Number of Axes		1	2	3
Number of Positions		2500	2500	2500
Indexing Programs		100	100	100
Effective distance of movement (X/Y/Z)	mm	250	250 / 250	250 / 250 / 150
	inch	9.8	9.8 / 9.8	9.8 / 9.8 / 5.9
Speed of movement (X/Y/Z)	m/sec	1.5	1.5 / 1.5	1.5 / 1.5 / 0.2
	ft/sec	4.9	4.9 / 4.9	4.9/4.9/656
Accuracy (X/Y/Z)	mm	± 0.05	± 0.05 / ± 0.05	± 0.05 / ± 0.05 / ± 0.05
	inch.	± 0.002	± 0.002 / ± 0.002	± 0.002 / ± 0.002 / ± 0.002
Maximum Weight Capacity	kg / lbs.	15 / 33	15 / 33	4 / 8.8
Maximum acceleration under load (X/Y/Z)	m/sec ²	5	5 / 5	5 / 5 / 5
	ft/sec	16.4	16.4 / 16.4	16.4 / 16.4 / 16.4

The DCAM is also available with a controller for servo motors.

Required / Optional Accessories

Components	Part No.
Part-Loading	
Rotary Index Table automatic	
1-Hand Start Button	RT-1HD
2-Hand Start Button	RT-2HD
Light Curtain	RT-SLC
Rotating Safety Flap	RT-SC
Linear-Transfer Module	All types
Lift/Locate Module	H25-300; B100xT100 – B500xT500
Inlet/Outlet Chute	LTS-Cover
Slide Table Single (E) Double (D)	ST-D(E)-150x150; ST-D(E)-400x400
Manual Insertion (automatic eject)	M-I/A-O
Automatic Insertion and Eject	A-I/A-O
Insertion by 2-Hand Start Button (automatic eject)	2HD-I/A-O
Part Fixture	
Free-form based	WA-FF
End-stop based	WA-AF
Applications Module	
DEPRAG Screwdriver Function Module	SFM-L; SFM-N
DEPRAG Testing Module	SFM-PC
Component-Feeding	
DEPRAG Screw-Feeder	SZG-XXX
DEPRAG Part-Feeder	TZG-XXX
DEPRAG Pallet-Feeder	PZG-XXX
Safety Systems	
Safety Light Curtain	
1-Hand Start Button	SLC-1HD
2-Hand Start Button	SLC-2HD
automatic Start	SLC-A
Safety Lift-Door (H=Stroke, B=Width)	H400xB400-H400xB800
manual	HT-M
automatic (1-Hand Start Button)	HT-1HD

Optional Equipment

Design Group	Type
Operational Light	APL
Manual Operating Element	MC 180 TP
Communications Module	
PROFI-BUS DP (Slave)	939083
ETHERNET	939082
Pneumatic Valve Package	all brands – based on CAN
I/O-Bus Package	all brands – based on CAN
Teach Pendant	

DCAM Application Examples



Picture 1: DCAM Screwdriving Unit, vertical from top, with automatic Screwfeeding
For conveyor-integrated assembly of diplexer components using a Single-Spindle SFM-L.



Picture 2: DCAM Screwdriving Unit, underfloor [inverted], with automatic Screwfeeding
For the assembly of contacts to PC-boards

DEPRAG

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