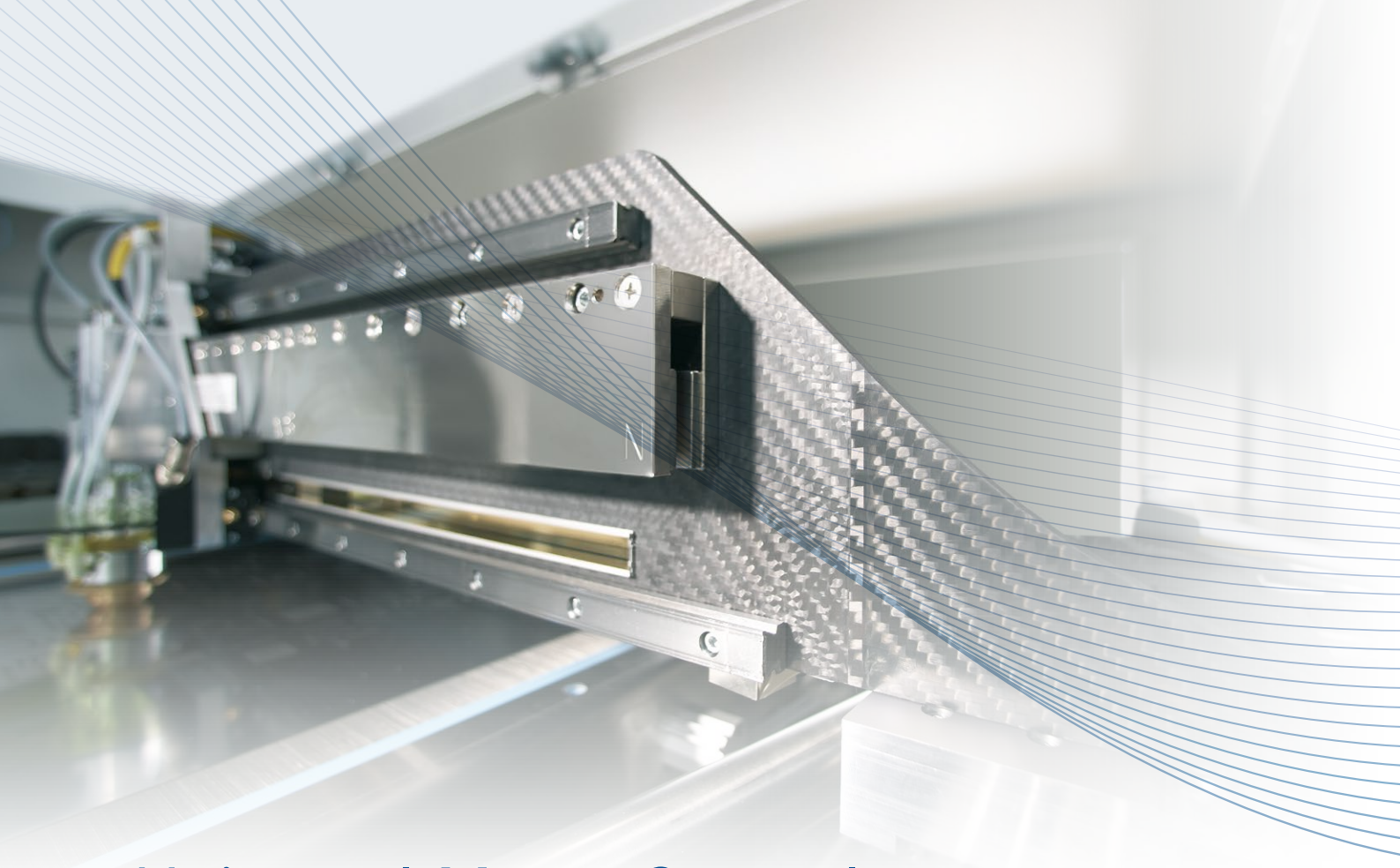


Quick, Exact, Universal Digital Axis Controllers of the LPKF DAC1005 Series





Universal Motor Control

In the development of system concepts, it is a big advantage if the motor controls can be integrated in an uncomplicated and universal fashion. The control should go easy on the development budget and optimally support the performance of modern drive components. The axis controllers of the LPKF DAC1005 series were developed for exactly these requirements. They precisely and quickly control linear, direct current and 2- or 3-phase stepper motors.

Performance Up, Costs Down

Alone or in a network – simple integration of the highly dynamic DAC1005 controllers saves time and money. Parameterization is done intuitively using proven LPKF Motion Tools.

Proven in the Field

LPKF's extensive experience in the development and implementation of demanding drive and machine concepts has been integrated in the LPKF axis controllers. The high level of reliability and practical model variants characterize the DAC1005 controllers. Interfaces for limit switches and encoders, for example, and digital and analog inputs and outputs are integrated – as is the control of distributed control processes, practically at the push of a button.

High Level of Control Quality

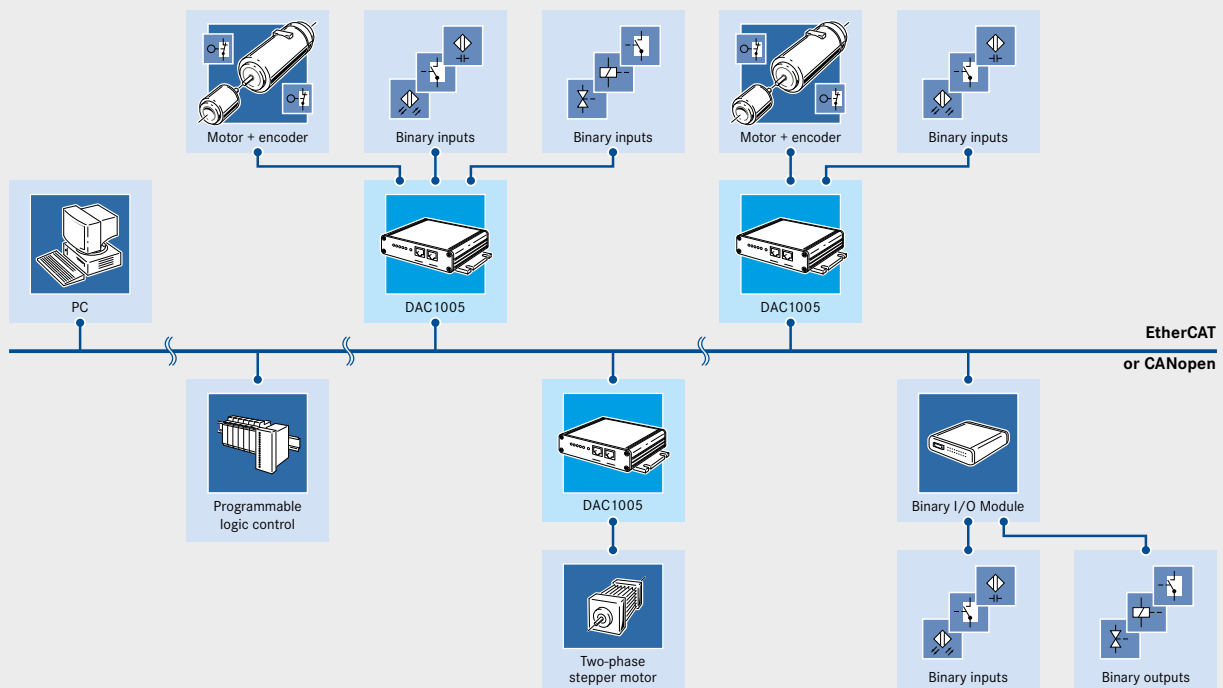
Powerful algorithms and high sampling rates ensure outstanding quality of control. They form the core of the compact digital control units. Controller tuning in the standard mode is carried out with test steps and corresponding step responses.

Transient oscillation to required positions and the course of the path can be further optimized in the model-based mode. An extra software package is available for this.

LPKF DAC1005:

- Outstanding controller performance
- Easy integration and set-up
- Quick EtherCAT communication
- Excellent price-performance ratio

Peripheral Machine Control with DAC1005



High-Speed Communication

The DAC1005 controllers have high-performance communication interfaces and are optionally available with field bus connections to EtherCAT or CANopen. The CANopen and EtherCAT interfaces of the DAC1005 are certified in accordance to international standards.

Peripherally arranged axis controllers can be modularly linked in nearly any fashion to a highly precise machine control of drive shafts, motors and other binary or analog actuators or sensors. Typical areas of use include:

- Positioning drives
- Quick, precise measurement and control equipment
- Automation systems

OEMs in particular benefit from an easy set-up via field bus and flexible topologies.

Software and Training

The LPKF controllers are delivered with powerful software tools. Due to numerous assistance functions, e.g., for configuration of the axis, standard parameterization is amazingly easy.

The optionally available LPKF Controller Design Tool also efficiently and effectively provides support in analysis and creation of models for model-matching control. Users thus get even more for their machine concept in a short time. Experienced application engineers make the introduction easy with a 1-day training course.

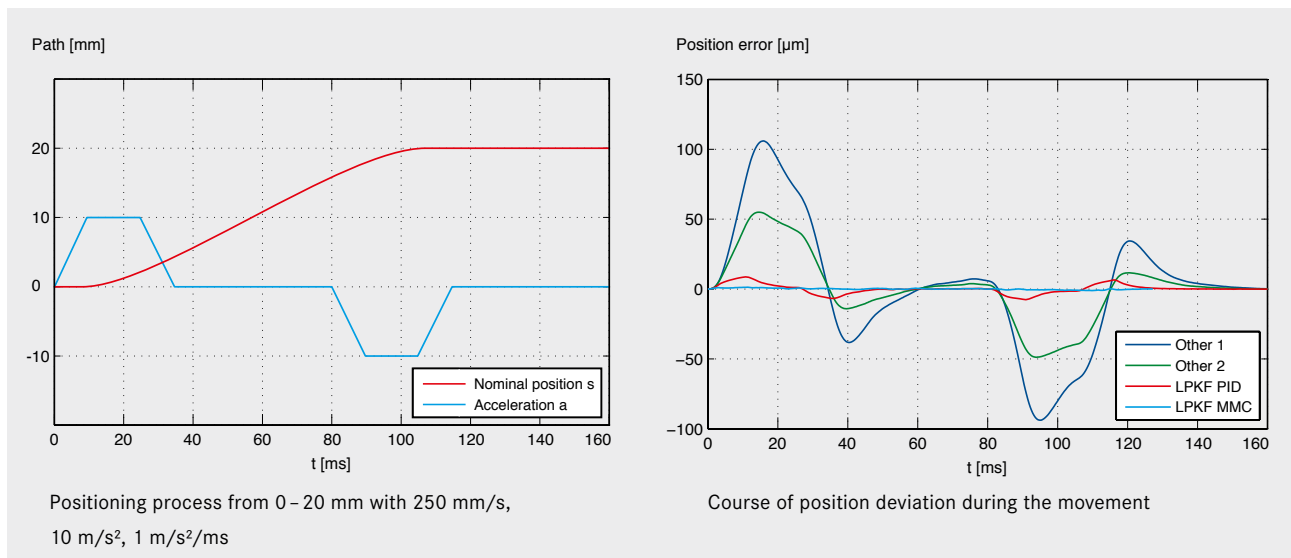
LPKF DAC1005

Values that are Convincing

The DAC1005 controllers take over the entire axis control. The integrated path generator specifies the nominal values for position control, with linear interpolation taking place under consideration of the maximum axis speed, acceleration and jerk. The servo-control takes place as a PID cascade or as a model-based control (MMC). The proprietary path control during the entire positioning process monitors the maximum permissible control deviation. Thanks to the LPKF control algorithms of the DAC1005, the servo-control sets benchmarks in comparison with commercially available standard products. In the model-based mode, these values can even be exceeded with the aid of proven software modules.

The following representation shows a positioning process with different axis controllers from 0 to 20 mm, with 250 mm/s and 10 m/s²:

- Very little control deviation in the case of control with a standard PID cascade of only 8.7 µm (market standard: 55 µm)
- Outstanding results by means of model-based control with a maximum control deviation of 1.3 µm in relation to the entire positioning process



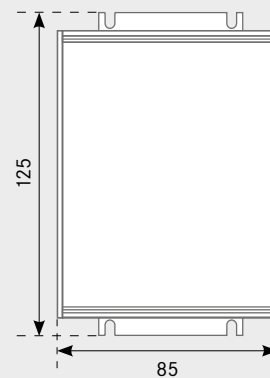
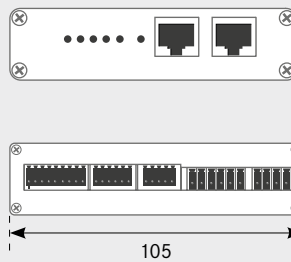
Variants at a Glance

The axis controllers can be used universally. There are different variants available for various applications. The small size also allows mounting the controller directly on the axis to be moved. 24/7 in an industrial environment? No problem for the DAC1005 axis controller.

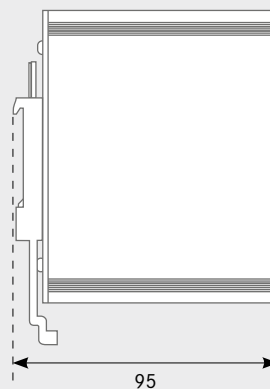
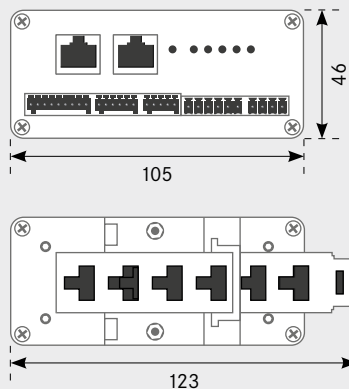
Designation	Output current Continuous	Peak	Communication	Type of mounting	Item number
DAC1005	5 A	5 A	CANopen, RS232	Mounting plate	780142
DAC1005-L	1 A	1 A	CANopen, RS232	Mounting plate	780211
DAC1005-P	5 A	15 A	CANopen, RS232	Mounting plate	780143
DAC1005-R	5 A	5 A	CANopen, RS232	Rail-mounted (DIN-Rail 35)	780222
DAC1005-RL	1 A	1 A	CANopen, RS232	Rail-mounted (DIN-Rail 35)	780212
DAC1005-RP	5 A	15 A	CANopen, RS232	Rail-mounted (DIN-Rail 35)	780213
DAC1005-D	5 A	5 A	CANopen, RS232	Mounting plate	780207
DAC1005-DL	1 A	1 A	CANopen, RS232	Mounting plate	780214
DAC1005-ER	5 A	5 A	EtherCAT, USB	Rail-mounted (DIN-Rail 35)	780215
DAC1005-ERL	1 A	1 A	EtherCAT, USB	Rail-mounted (DIN-Rail 35)	780216
DAC1005-ERP	5 A	15 A	EtherCAT, USB	Rail-mounted (DIN-Rail 35)	780217

Dimensions and Possible Connections

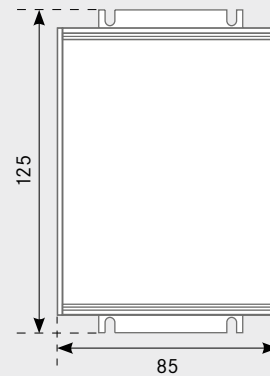
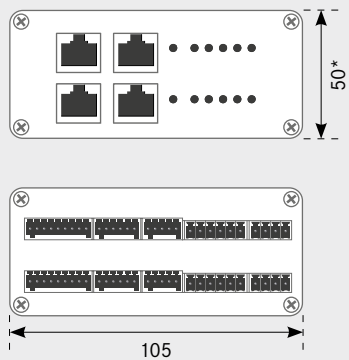
LPKF DAC1005



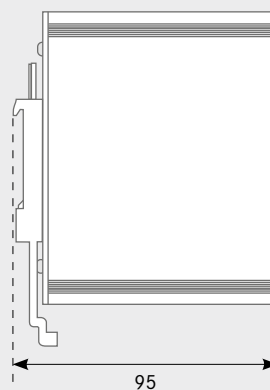
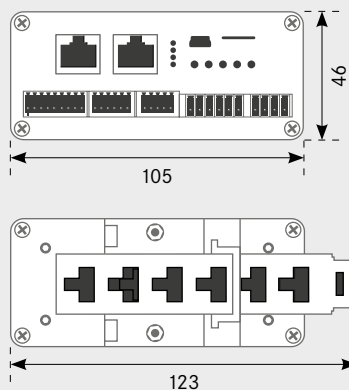
LPKF DAC1005-R



LPKF DAC1005-D



LPKF DAC1005-ER



Technical Specifications

DAC1005 / DAC1005-R / DAC1005-D / DAC1005-ER	Parameter	Min	Nom	Max
Operating voltages				
Logic and I/O port	+ I/O voltage	12 V	24 V	28 V
Motor circuit	+ Motor voltage	12 V	48 V	100 V
Power consumption				
	+ I/O voltage = + 24 V	1.5 VA*	2.8 VA**	36 VA***
Power output stage				
	PWM frequency	10 kHz	20 kHz	40 kHz
	Sampling period: current control	25 µs	50 µs	100 µs
	Resolution: current measurement		10 bits	
	Electrical strength			100 V
Encoder interface				
	Connection	Incremental encoder or analog encoder		
	Number	1 interface		
	Supply voltage encoder	5 V, max. 800 mA		
	Incremental encoder	Signals (RS422)	A, /A, B, /B, I, /I	
	Input voltage low	0 V		0.5 V
	Input voltage high	2.5 V		5 V
	Input frequency	0 Hz		1.25 MHz
	Interpolation		4-fold	
Analog encoder (interpolator)	Signals (differential)	SIN, /SIN, COS, /COS, REF, /REF		
	Input voltage	0.6 V _{SS}	1 V _{SS}	1.2 V _{SS}
	Input frequency	0 Hz		120 kHz
	Interpolation	4-fold		2048-fold
Stepper motor operation				
	Activation	proprietary		
	Resolution	corresponds to 256-fold micro-step		
Servo control				
PID cascade	Sampling period		200 µs	
Model-based controller without notch filter	Sampling period		250 µs	
Model-based controller with notch filter	Sampling period		300 µs	
Path generator				
	controls		1 axis	
	Types of interpolation	linear path interpolation		
Interface for limit switches				
	Supported limit switches	NPN, PNP, NC and NO		
	Number	2 limit switches		
	Inputs	Single end		
Single end input	Input voltage low	0 V		1 V
	Input voltage high	2 V		+ I/O voltage

* Without external load ** With an encoder (+ 5 V / 0.2 A) *** With maximum external load

DAC1005 / DAC1005-R / DAC1005-D / DAC1005-ER	Parameter	Min	Nom	Max
Inputs / outputs				
Digital inputs	Number		4	
	Input voltage low	0 V		0.8 V
	Input voltage high	2 V		28 V
	Input frequency	0 Hz		500 Hz
Digital outputs – open collector (short-circuit-proof and feedback-protected)	Number		4	
	Output voltage low	0.2 V		
	Output voltage high			+ I/O voltage
	Output current		0.2 A	0.4 A
	Permissible feedback voltage			50 V
	Switching frequency	0 Hz		1 MHz
Output 0 (PWM mode)	PWM frequency		5 kHz	
	PWM resolution		16 bits	
Analog inputs	Number		3	
	Input voltage	0 V		5 V
	Input frequency	0 Hz		1 kHz
	Resolution		10 bits	

Communication

RS232* (electrically decoupled)	Number		1	
	Baud rate	19.2 kBit/s		115.2 kBit/s**
	Protocol	ASCII or proprietary		
CAN* (electrically decoupled)	Number		1	
	Baud rate	125 kBit/s		1 MBit/s**
	Protocol	CANopen (CiA 402) or LocalCOM (proprietary)		
EtherCAT*	Number		1	
	Process data cycle time	500 µs		1500 µs
	Protokoll	CoE (CiA 402)		
USB*	Number		1	
	Protocol	proprietary		

* Type-dependent – see table of variant overview on p. 4

** Factory setting

Mechanical specifications		
DAC1005	Dimensions (W x H x D)	105 mm x 30 mm x 85 mm
	Weight	ca. 300 g
	Protection class	IP 40
DAC1005-R	Dimensions (W x H x D)	46 mm x 123 mm x 95 mm
	Weight	ca. 300 g
	Protection class	IP 40
DAC1005-D	Dimensions (W x H x D)	105 mm x 46 mm x 85 mm (125 mm x 50 mm x 85 mm incl. mounting plate)
	Weight	ca. 300 g
	Protection class	IP 40
DAC1005-ER	Dimensions (W x H x D)	46 mm x 123 mm x 95 mm
	Weight	ca. 300 g
	Protection class	IP 40

LPKF Laser & Electronics AG

Drive and control technology has a long tradition at LPKF in Suhl, Germany. Benefit from over 20 years of experience and an extensive know-how. Since 2012 this division is a part of the LPKF SolarQuipment GmbH, a 100% subsidiary of LPKF Laser & Electronics AG.

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