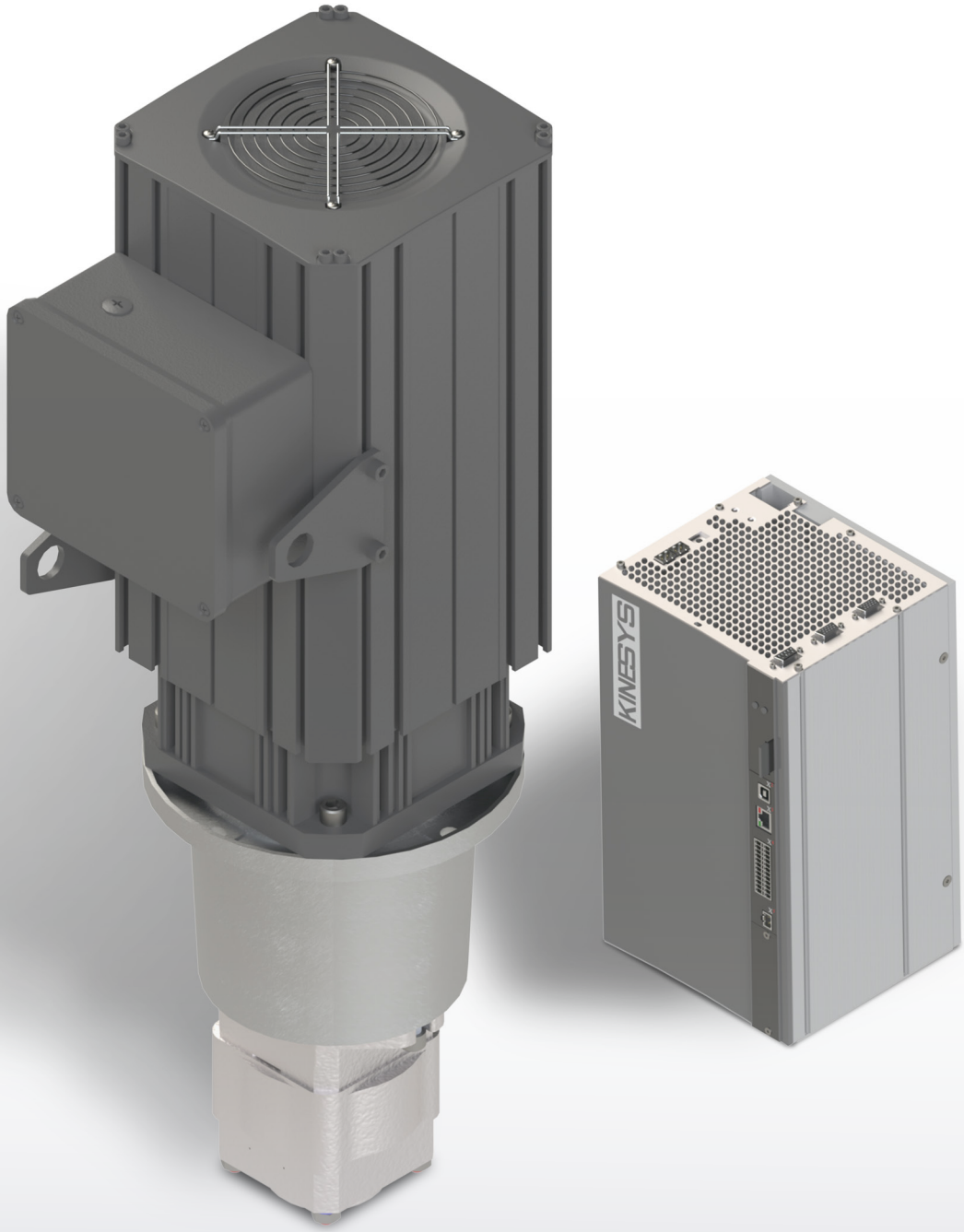
HYDAC INTERNATIONAL

KINESYS

Servo pump
DVA-Servo-Kit



EN 10.146.14.0/04.24

HYDAC was founded in 1963 in Sulzbach/Neuweiler in Germany, which is still the company's head office today.

With over 10,000 employees worldwide, HYDAC is one of the leading suppliers of fluid technology, hydraulic and electronic equipment.

With over 50 subsidiaries outside of Germany and more than 500 sales and service partners, HYDAC is within easy reach of its customers and a reliable partner worldwide.

Our wide range of products, combined with our acknowledged expertise in development, manufacturing, sales and service, is key to designing and manufacturing modern and reliable drive systems.

HYDAC KineSys stands for kinematic systems which are notable for their perfect symbiosis of hydraulic and electromechanical engineering.

Our customers are demanding ever higher productivity as well as efficient use of resources in their modern machines and systems. In light of constantly rising energy and raw material costs, the efficient design of the drive system is an important component of the overall “Life Cycle Cost Analysis”. This means that modern drive technology represents a competitive advantage.

Using the experience gained from many international projects, our industry and product specialists will analyse your application. Together we can quickly and accurately work out cost-effective solutions.

Depending on the application, different strategies are chosen for the drive task concerned, ranging from simple control through to a highly dynamic control system. We're able to make use of numerous test benches and simulation systems. It makes no difference whether it is a case of developing and manufacturing custom stationary or mobile systems or implementing series production solutions.

Access to the entire range of HYDAC products allows us to provide you with the best solution for your requirements. This streamlines the design and ensures maximum efficiency for your machine and system operation.

Providing you with the best solution is our challenge.

Table of Contents

Note

The information in this brochure relates to the operating conditions and applications described.

For applications and/or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

1 Servo pumps

1.1 Why choose a servo pump?

When it comes to modernising systems, the servo pump quickly comes into play as an expression of future-proof and energy-efficient technology. It builds the bridge to the hydraulic world of tomorrow and creates the link to the machine control system. But that's not all. The servo pump is ultimately just one element in a chain of system components and steps that all influence each other. A servo pump is great – if it is used correctly.

We offer you our HYDAC DVA-Servo-Kit product range as a servo pump drive package that allows you to integrate a servo pump with ease.

1.1.1 In which applications is the DVA-Servo-Kit used?

Using a servo pump is effective wherever highly dynamic and energy-saving motion control or system pressure control is required in hydraulic systems.

A servo pump could be used for the following applications, for example.

- Presses
- Punches
- Plastics machinery
- Wood processing machinery
- Test benches
- And many more …

1.1.2 Benefits of the DVA-Servo-Kit

- Easy project planning
- Plug & play (simple integration thanks to pre-assembled lines & complete software modules)
- Safety function: Safe torque off STO, PLe included as standard
- Can be combined with an accumulator for additional functions
- Motor can be switched on and off dynamically as often as required, even at higher performance levels
- Soft motor start-up in every performance class without special motor starting circuits
- Low noise level
- Using a servo pump makes it possible to reduce the power output and installation space of the whole system
- Basis for every energy-efficient hydraulic solution

For more information about displacement control vs. resistance control and how to switch to a variable-speed hydraulic design/layout, for example, at no extra cost, please contact us at the following e-mail address: kinesys@hydac.com

1.2 DVA-Servo-Kit

The DVA-Servo-Kit is a drive package consisting of a servo motor, hydraulic pump, drive controller and sensors. The package is assembled, preset and synchronised and aligned with all associated electrical components, such as sensors. The drive package can be integrated into your system as a plug & play solution.

Communication takes place via defined fieldbus interfaces, allowing you to easily integrate the drive controller into any machine control system without additional software. The sensors required to operate the servo pump, such as a pressure sensor, are connected directly to the drive controller. No further implementation process is required in the machine control system.

In principle, it is also possible to communicate without a fieldbus using digital and analogue signals.

All connection cables, both for power and signals, are pre-assembled with plugs and are thus prepared for direct connection.

1.2.1 Functions

The servo DVA kit can be controlled in the following operating modes:

- Speed control
- Pressure control

Additional functions can also be provided by a system solution.

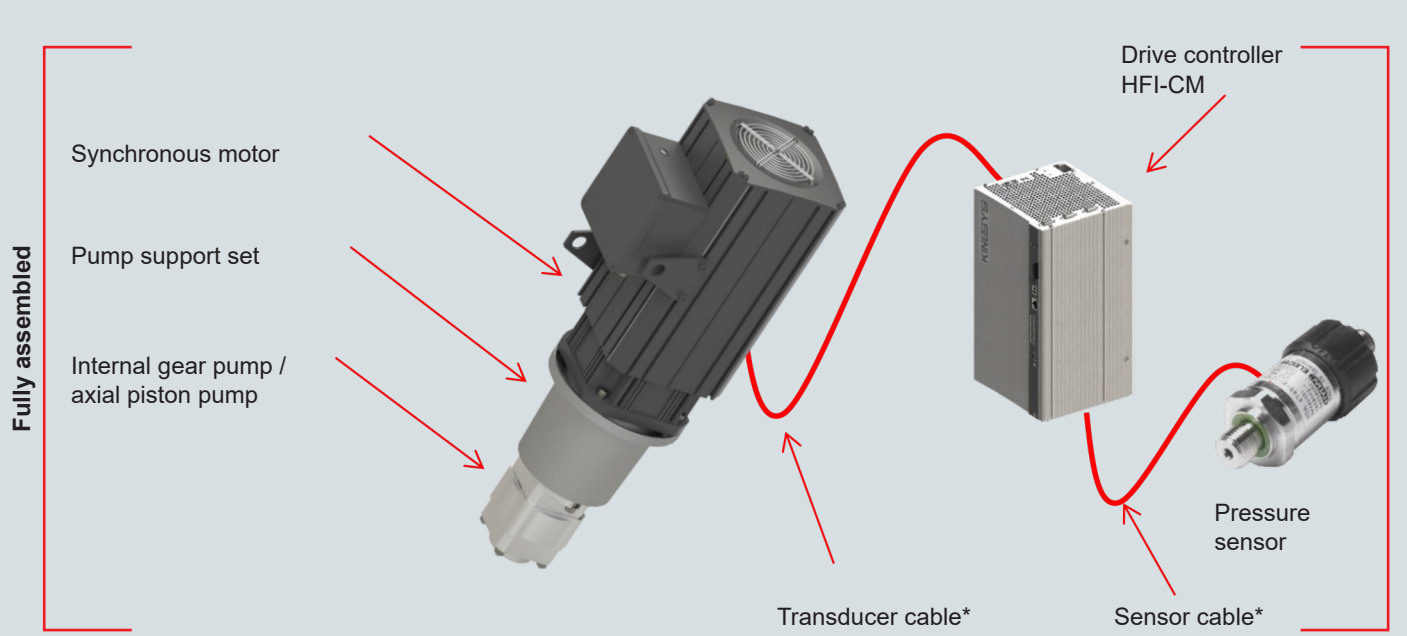
This includes the following functions, for example:

- Positioning
- Pressure maintenance without a decrease in flow rate
- Force control
- Speed control
- Output control
- Safety functions

Get in touch with your contact at HYDAC for more information.

1.2.2 Components & scope of delivery

- Pump
- Synchronous motor
- Drive controller (control cabinet integration)
- The necessary peripheral equipment is included (mains filter, mains choke…)
- Transducer cable
- Pressure sensor
- Sensor cable (in standard lengths)



* Pre-assembled
Length can be selected in standard sizes

The scope of delivery does not include the following components. These components must be provided by the customer:

- Motor cable
- Cable gland for feeding the motor cable into the motor terminal box (for dimensions, see the chapter on motor technical data)

1.2.3 Description of the components used

Pumps

Depending on the application, two different pump designs are used in the HYDAC DVA-Servo-Kit.

The HYDAC internal gear pump is used for applications with low to medium flow rates. For technical reasons, this means that noise emissions are lower and the design of the DVA-Servo-Kit is more compact.

The HYDAC axial piston pump can be used in applications that require rapid movements and therefore great movement forces. The low-pulsation pump has two fixed displacement levels. These are controlled via the drive controller. The electro-hydraulic drive unit is very compact thanks to the combination of a wide usable speed range and the two displacement volumes.

Motors

The HYDAC HSM servo motors offer a wide range of applications and are optimally adapted to the hydraulic pump and drive controller. Using neodymium-iron-boron magnets results in a high specific output, which does not give rise to any risk of demagnetisation under high load. The torque ripple is very low. Suitable resolver cables with pre-assembled plugs are supplied as appropriate for the drive controller.

Drive controllers

HYDAC HFI-CM drive controllers are very flexible and can be optimally configured for the hydraulic application.
You can control and monitor different operating states of the motor pump combination. Each physical limiting variable (e.g. acceleration ramps) is stored for the drive package and, depending on the application, higher-level functionalities can also be implemented to further increase system automation. Depending on requirements, a mains filter and mains choke are supplied as appropriate for the drive controller.

The STO (Safe Torque Off) safety function is integrated in all drive controllers as standard.

We archive the settings in the software on delivery. These can be requested at any time should you wish to reset the DVA-Servo-Kit to the delivery state.

Sensors

The HYDAC pressure transmitter has a highly precise and robust sensor cell with a thin-film strain gauge on a stainless steel membrane. The sensor is optimised for use in the hydraulic circuit and can be connected directly to the drive controller. The signal is used to determine and evaluate the current pressure. In systems with pressure control, the data is processed in the drive controller and the required pressure is set precisely via the speed.

1.3 Commissioning

The DVA-Servo-Kit product range is characterised by its perfectly harmonised and pre-set components.

The motor and pump are mechanically coupled, tested to ensure correct operation and documented in a test report.

The motor is electrically trained to the drive controller and the sensors, such as the pressure sensor, are parametrised accordingly.

This means that the pressure sensor is appropriately coded for the drive controller in terms of its pressure range, electrical signal level and input interface.

The various controllers (e.g. speed controller and pressure controller) are preset to the motor/pump combination to enable immediate operation. On-site adjustments to take account of the complete controlled system (to enhance performance) can be carried out remotely by our experienced application engineers.

All required connection cables are pre-assembled and labelled. This means that incorrect wiring is virtually impossible.

The cable lengths can be selected according to the model code.

For commissioning, we supply detailed step-by-step instructions in the form of commissioning documentation.

1.3.1 Installing the DVA-Servo-Kit

1.3.1.1 Mechanical system and hydraulic system

The motor/pump unit can be installed either horizontally or vertically.

The suction line and pressure line must be connected to the pump and routed to the hydraulic system connection point.

The pressure sensor must be installed in the hydraulic system near the feed point.

1.3.1.2 Electric system

The drive controller is integrated into the control cabinet. The peripheral equipment required depending on the application, such as a mains choke or mains filter, is also installed there.

The motor and transducer cable must be connected to the drive controller and the motor. A motor cable and a suitable cable gland must be provided by the customer. The transducer cable is included in the scope of delivery. You will be asked to specify the length you require when placing your order.

The signal cable for the pressure sensor is included in the scope of delivery (same length as the transducer cable) and must be connected to the appropriate input interface on the drive controller. This is described in the commissioning documentation supplied.

On the sensor side, the signal cable must be installed on the pressure sensor using an M12 threaded connector.

1.3.1.3 Controlling and operating the servo pump

The drive controller is used to control the servo pump. For this purpose, we supply a defined fieldbus interface with status and control words, as well as the relevant process data.

You do not need any in-depth knowledge of our drive controller. You only communicate with our drive via the predefined fieldbus interface.

Standard version – Profinet

In principle, you can also use digital and analogue signals for control purposes. This limits the range of functions, however.

1.3.1.4 Safety functions

If you require safety functions for your application, you can make use of the interfaces for STO (Safe Torque Off) included in the drive controller without any additional effort and integrate them into your control system.

2 Selecting the right servo pump

2.1 Model code

Designation	Pump type	VG_1	VG_2	M_n	n_n	I_n	L	Fieldbus	Installation
DVA-Servo-Kit	I = Internal gear pump	05	XX	25	3000	4	5	7 = Profinet	V
	A = Axial piston pump	45	11	50	2000	16	10	7 = Profinet	H

Example: DVA-Servo-Kit-I-05-XX-19,5-3000-4-5-7-H

VG_1 = Displacement max in cm^3

VG_2 = Displacement min in cm^3 (axial piston pump only, otherwise XX)

M_n = Nominal torque of the motor in Nm

n_n = Nominal speed of the motor in rpm

L = Length of the transducer cable in m

H = Horizontal installation of the motor/pump combination

V = Vertical installation of the motor/pump combination

IZP = Internal gear pump

AKP = Axial piston pump

2.2 | Selection table

Motor series HSMV7 (Nominal speed: 3000 min^{-1})

		HSMV73304	HSMV74304	HSMV77304
		p_n [kW]	p_n [kW]	p_n [kW]
		6.1	7.5	11.3
Pump	Q_{max} [l/min]	p_n (p_{max}) [bar]	p_n (p_{max}) [bar]	p_n (p_{max}) [bar]
PGI102-2-005	15	204 (330)	251 (330)	330 (330)
PGI102-2-008	21	140 (272)	172 (330)	258 (330)
PGI102-2-011	29		125 (310)	187 (330)

Motor series HSMV8 (Nominal speed: 3000 min^{-1})

		HSMV82304	HSMV84304	HSMV86304
		p_n [kW]	p_n [kW]	p_n [kW]
		13.5	25.1	34.9
Pump	Q_{max} [l/min]	p_n (p_{max}) [bar]	p_n (p_{max}) [bar]	p_n (p_{max}) [bar]
PGI102-2-008	21	308 (330)		
PGI102-2-011	29	223 (330)	330 (330)	
PGI102-3-014	39	166 (330)	310 (330)	330 (330)
PGI102-3-020	54	122 (283)	226 (330)	314 (330)
PGI102-3-025	67		182 (330)	253 (330)
PGI102-3-032	87		140 (330)	195 (330)
K3VL45: 11 ccm	27		320 (320)	320 (320)
45 ccm	109		100 (274)	140 (320)
K3VL80: 20 ccm	43			314 (320)
80 ccm	173			78 (212)

Motor series HSMV9 (Nominal speed: 2800 min^{-1})

		HSMV94304	HSMV96304	HSMV98304
		p_n [kW]	p_n [kW]	p_n [kW]
		67.4	88	93.8
Pump	Q_{max} [l/min]	p_n (p_{max}) [bar]	p_n (p_{max}) [bar]	p_n (p_{max}) [bar]
PGI102-3-032	87	330 (330)		
PGI102-6-040	88	315 (330)	330 (330)	
PGI102-6-050	109	254 (330)	330 (330)	330 (330)
PGI102-6-064	141	197 (315)	257 (315)	274 (315)
PGI102-6-080	158	162 (300)	212 (300)	226 (300)
PGI102-6-100	200	128 (300)	167 (300)	179 (300)
K3VL80: 20 ccm	43	320 (320)	320 (320)	320 (320)
80 ccm	173	162 (320)	212 (320)	226 (320)
K3VL140: 35 ccm	69	320 (320)	320 (320)	320 (320)
140 ccm	277	93 (242)	121 (303)	130 (320)
K3VL200: 50 ccm	69		320 (320)	320 (320)
200 ccm	342		85 (212)	90 (250)

3 Itemisation with technical data for motors, pumps and converters

Pumps (PGI)

	Unit	PGI102-2-005	PGI102-2-008	PGI102-2-011	PGI102-3-014
Geometric displacement	[cm³/rev]	5.4	7.9	10.9	14.6
Nominal pressure	[bar]	330	330	330	330
Peak pressure	[bar]	400	400	400	400
		PGI102-3-020	PGI102-3-025	PGI102-3-032	PGI102-6-040
Geometric displacement	[cm³/rev]	20.0	24.8	32.1	40.8
Nominal pressure	[bar]	330	330	330	330
Peak pressure	[bar]	400	400	400	350
		PGI102-6-050	PGI102-6-064	PGI102-6-080	PGI102-6-100
Geometric displacement	[cm³/rev]	50.6	65.3	80.0	101.2
Nominal pressure	[bar]	330	315	300	300
Peak pressure	[bar]	350	340	340	340

Axial piston pumps

	Unit	K3VL45	K3VL80	K3VL140	K3VL200
Geometric displacement VG1 (as per model code)	[cm³/rev]	45	80	140	200
Geometric displacement VG2 (as per model code)	[cm³/rev]	11	20	35	50
Nominal pressure	[bar]	320	320	320	320
Peak pressure	[bar]	350	350	350	350

Motor series HSMV7 (Nominal speed: 3000 min^{-1})

	Unit	HSMV73304	HSMV74304	HSMV77304
Nominal power	P_n [W]	6126	7540	11310
Standstill torque	Ton [Nm]	23	31	48
Nominal torque	Tn [Nm]	19.5	24	36
Peak torque	Tpk [Nm]	45	60	66
Torque constant	Kt [Nm/A]	1.75	1.75	1.73
Weight	m [kg]	16.7	19.1	27.1
Terminal box Connection Motor cable		M40 x 1.5	M40 x 1.5	M40 x 1.5

Motor series HSMV8 (Nominal speed: 3000 min^{-1})

	Unit	HSMV82304	HSMV84304	HSMV86304
Nominal power	P_n [W]	13509	25133	3487
Standstill torque	Ton [Nm]	45	89	130
Nominal torque	Tn [Nm]	43	80	111
Peak torque	Tpk [Nm]	100	218	300
Torque constant	Kt [Nm/A]	1.68	1.52	1.83
Weight	m [kg]	37	49	64
Terminal box Connection Motor cable	Through hole [mm]	50.5	50.5	50.5

Motor series HSMV9 (Nominal speed: 2800 min^{-1})

	Unit	HSMV94284	HSMV96284	HSMV98284
Nominal power	P_n [W]	67440	87965	93829
Standstill torque	Ton [Nm]	300	440	580
Nominal torque	Tn [Nm]	230	300	320
Peak torque	Tpk [Nm]	600	750	880
Torque constant	Kt [Nm/A]	1.96	1.96	1.96
Weight	m [kg]	126	164	203
Terminal box Connection Motor cable	Through hole [mm]	63.5	63.5	63.5

Drive controller

Type	Nominal current I_N [A_{eff}] at 400 VAC [A_{eff}]	Peak current [I_{max}]	
		Current [A]	Time [s]
HFI-CM-24.016	16	32	10
HFI-CM-84-024	24	48	10
HFI-CM-84-032	32	64	10
HFI-CM-84-045	45	90	10
HFI-CM-84-072	72	144	10
HFI-CM-84-110	110	165	30
HFI-CM-84-170	170	220	10
HFI-CM-84-250	250	375	150

Notes:

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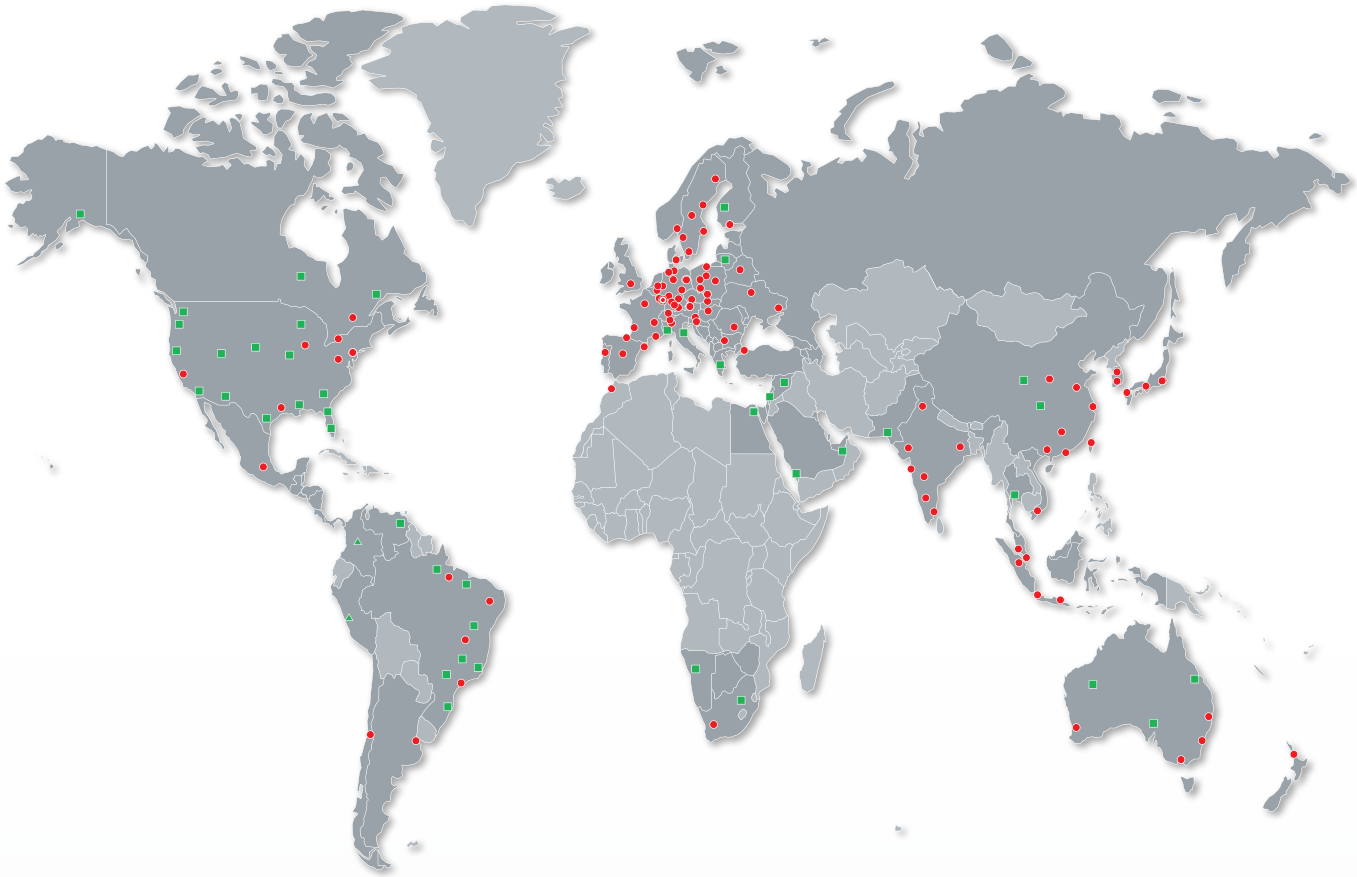

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EN 10.146.14.0/04.24