Rexroth
Bosch Group

Drive & Control Academy

DS4NA Fluid Power Training System

The data specified herein only serves to describe the product. No statements concerning a certain condition or suitability for a certain application can be derived from our information. The information given does not release the user from the obligation of their own judgment and verification. It must be remembered that our products are subject to a natural process of wear and aging.

Drive & Control Academy

Knowledge – the decisive competitive advantage

Bosch Rexroth is one of the global leading specialists in drive and control technology and has unique technological know-how. This knowledge is passed on by the Drive & Control Academy and supports the customized training and further development as well as the qualification of technical experts.

Knowledge is everything
Technical knowledge and competence of its employees provides a company with a decisive advantage in global competition. Under the umbrella of the Drive & Control Academy, Rexroth offers an extensive portfolio of products in the area of drive and control technologies knowledge transfer. These products are continuously updated to follow industry standards and best practices. The Drive & Control Academy are specialists in the transfer of specialized and integrated know-how for customers and employees and are able to provide training hardware for all levels of learning. With regards to this our product portfolio has been developed with the following points in mind:
►Practical equipment focusing on the latest state of the art technology
►Training targeted towards specific user requirements
►Training utilizing the most up to date methods

Training
New training offerings and continuous improvement of the training seminars guarantee that the conveyed knowledge is always state of the art. The methodical scope of supply comprises instructor led training, eLearning, practical training and blended learning. Additionally the advantages of both instructor led training and eLearning can be combined for an extremely effective training solution. When training customers we believe that the customer proximity principle is paramount.

Training systems
The training systems provide newcomers and advanced users with practical hands on learning in the areas hydraulics, pneumatics, electric drive and control technology, mechatronics and automation. These systems comprise standard industrial components and follow internationally standardized programming languages with open interfaces.

Media
Rexroth's software-based teaching and study media are distinguished by their technical accuracy and are specifically targeted to the training seminars and training systems.
They comprise eLearning modules, technology and application trainers, animations of components and systems as well as simulation-supported training units.
This is completed by dictionaries, specialist books, manuals for trainers and trainees as well as for work equipment.

Knowledge Portal
The Knowledge Portal will develop into the multimedia contact point for all drive, control and motion technology topics in the industrial and academic training sectors and further education as well as qualification.
This unique contact point in the Internet will give the users access to high-quality information and allow for a structured exchange of knowledge and experience.




DS4NA Fluid Power Training System

Rexroth's technical know-how and solution competence in the area of industrial applications are smoothly integrated into the modularly structured training systems - in this way, they perfectly satisfy the quality levels demanded by industry.

Rexroth training systems
Bosch Rexroth training systems are based on standard components from different Bosch Rexroth product areas. A training system consists of the hardware and the training and project manuals for trainers and trainees. By means of the training systems, both newcomers and advanced users work out practical exercises and gain technical specialized knowledge step-by-step. The trainees will discover the industry standard components used in the training system in machines and systems again in their professional career. Apart from the hydraulic/pneumatic training system described here in the catalog, Bosch Rexroth also offers training systems in the technology areas of Sensors, PLC and Mechatronics. Information on suitable training aides and all other offers of the Drive & Control Academy is available on the Bosch Rexroth website at the address: www.boschrexroth.com

DS4NA Fluid Power Training System
The DS4 training system allows for the transfer of knowledge in both industrial and mobile hydraulics as well as pneumatic technology training. It offers a complete solution for teaching and demonstration of the operation of modern hydraulic and pneumatic circuits and prepares the trainees for their work in the industry. Thanks to the configuration options, the training system can be perfectly adapted to the relevant topic and extended for the use in further trainings. Due to the use of a load sensing piston pump hydraulic unit, the DS4NA is also perfectly suited for mobile hydraulics training and is capable of demonstrating the concepts particular to mobile hydraulics using a hands-on practical approach. The device sets and the associated training manuals for the various study topics prepare the trainees for the tasks and requirements of their later professional life.

Equipment
The DS4NA fluid power training system can be configured and extended and can grow with changes and additions to your curriculum.
Its essential components are:
►Hydraulic power unit
►TÜV-tested safety valves
►Industry standard size 6 valving
►Control blocks for the mobile application area
►Cylinders with special protective covers to ensure student safety
►Storage and mounting rack for electrical components
►Ample built-in equipment storage
►Grooved plate and grid for mounting hydraulic and/or pneumatic components and circuits
►Measuring glass
►Load unit
►Integrated hose storage
The DS4NA is delivered in a completely assembled and tested condition.

Configured to match your training requirement
Based on your requirements you can choose between the following configurations:

Hydraulics
Two independent work stations are possible by mounting a grid on each side.
Pneumatics
Two independent work stations are possible via a central pneumatic mounting panel.
Hydraulics/pneumatics combined
It is easy to mount one or two grids with the central mounting panel in place which allows for maximum flexibility. This way training in either or both of these disciplines is possible
Expandable for additional study topics
In order to achieve your training targets, you can individually adjust your training system to your requirements. You can therefore realize training on the following topics:

- ►On/off hydraulics
- ►Proportional valve technology
- ►Mobile hydraulics
- ►Pneumatics
- ►Electro-pneumatics
- ►Sensor and PLC technology

Safety
The DS4NA training system had been designed with student safety in mind and conforms to all local safety specifications.

Configuration
Adapt your DS4NA training system exactly to your requirements. We will support you in equipping your fluid power training system to meet your specific needs. Contact us!

Notes

Work stations

Table of Contents

Contents

Fluid power training system - system description

The hydraulic/pneumatic training system for basic and advanced training was developed to meet the increasing requirements in the field of fluid power technology.

The basic training system consists of a base frame with swiveling, lockable castors to allow for easy movement. Each side of the stand has a drip tray/working area complete with integrated component storage station and a 2-drawer heavy duty tool box. Mounting of the training componentry is via either a central grooved panel for pneumatic componentry or a wire grid frame for hydraulic componentry.

When configured as a pneumatic trainer a central grooved panel is fitted which allows mounting and connection of pneumatic and electrical components on either side of the training stand. Two groups of students may therefore work on opposite sides of the trainer. As a hydraulic trainer the exercises are set up on grid frames and then connected by hoses. Low leak quick-disconnect couplings of the hydraulic hoses allow the training exercises to be carried out quickly and safely. Both mounting systems can be used and very easily interchanged allowing for training in both pneumatics and hydraulics.

A load simulator and numerous component sets are available thus enabling the training stand to be used for the complete spectrum of pneumatic and hydraulic technology training, which guarantees your training success.

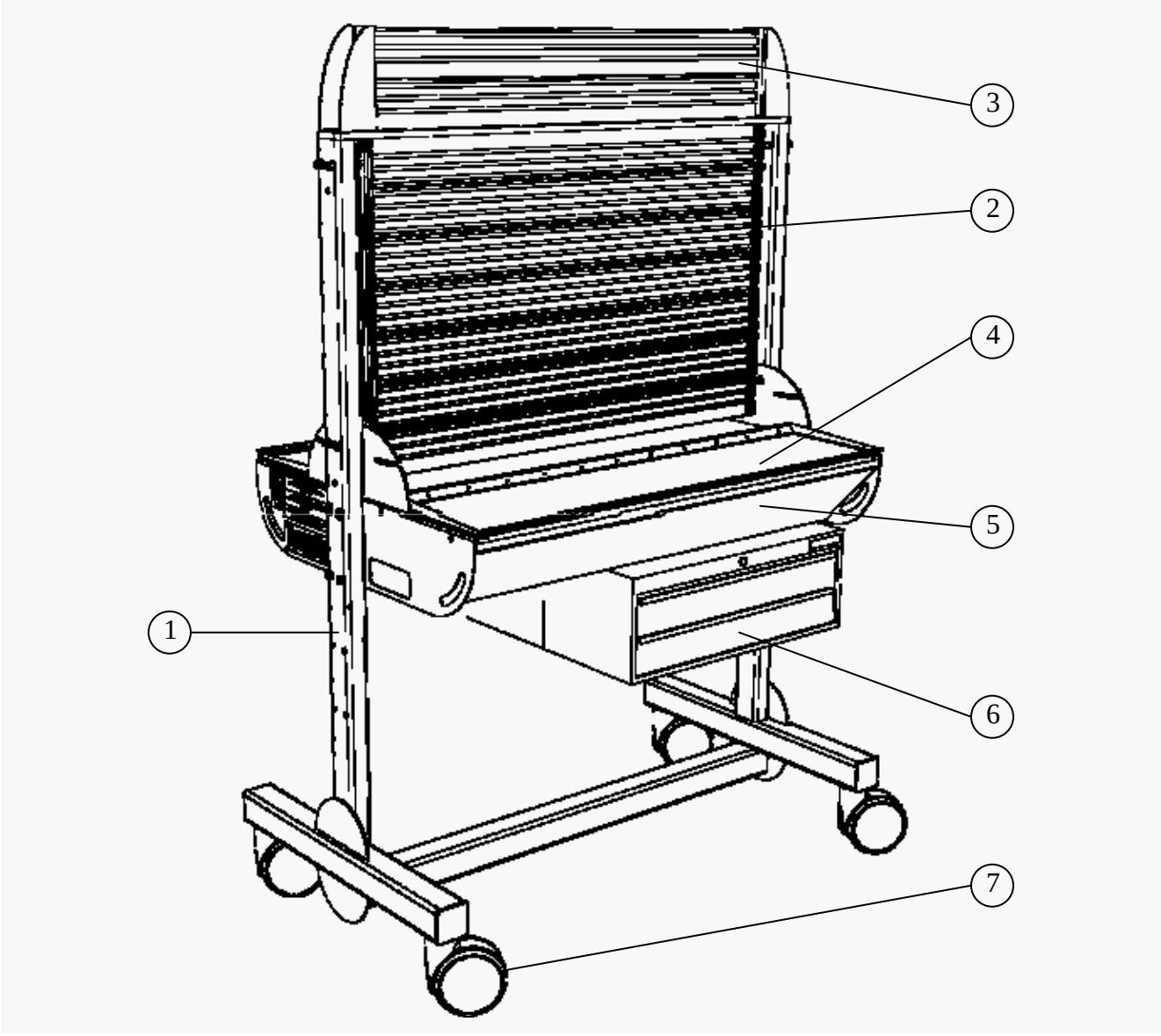
Features

- Training system for basic and advanced training in accordance with practical needs
- Suitable for holding training courses according to the recommendations by BiBB
- Rugged and stable design
- Low operating noise
- Powered by standard 110Volt/15Amp wall outlet
- Movable via stable, swivel, lockable castors
- Modular structure for ease of expansion
- Use of size 6 standard components of Rexroth's industrial valve product range
- Clearly arranged and carefully thought-out design
- Extensive selection of component sets
  - basic pneumatics
  - electro-pneumatics
  - sensor technology
  - lever operated hydraulics and electro-hydraulics
  - proportional hydraulics
  - mobile hydraulics
  - open and closed loop axis control
- With detailed and clearly structured trainee's and instructor's training manuals.

Training Stand – Typical Variations

DS4NA training system with provision for 2 electro-pneumatic stations

Model:
TS-DS4NA-1X/NUN0V0A5M0L0



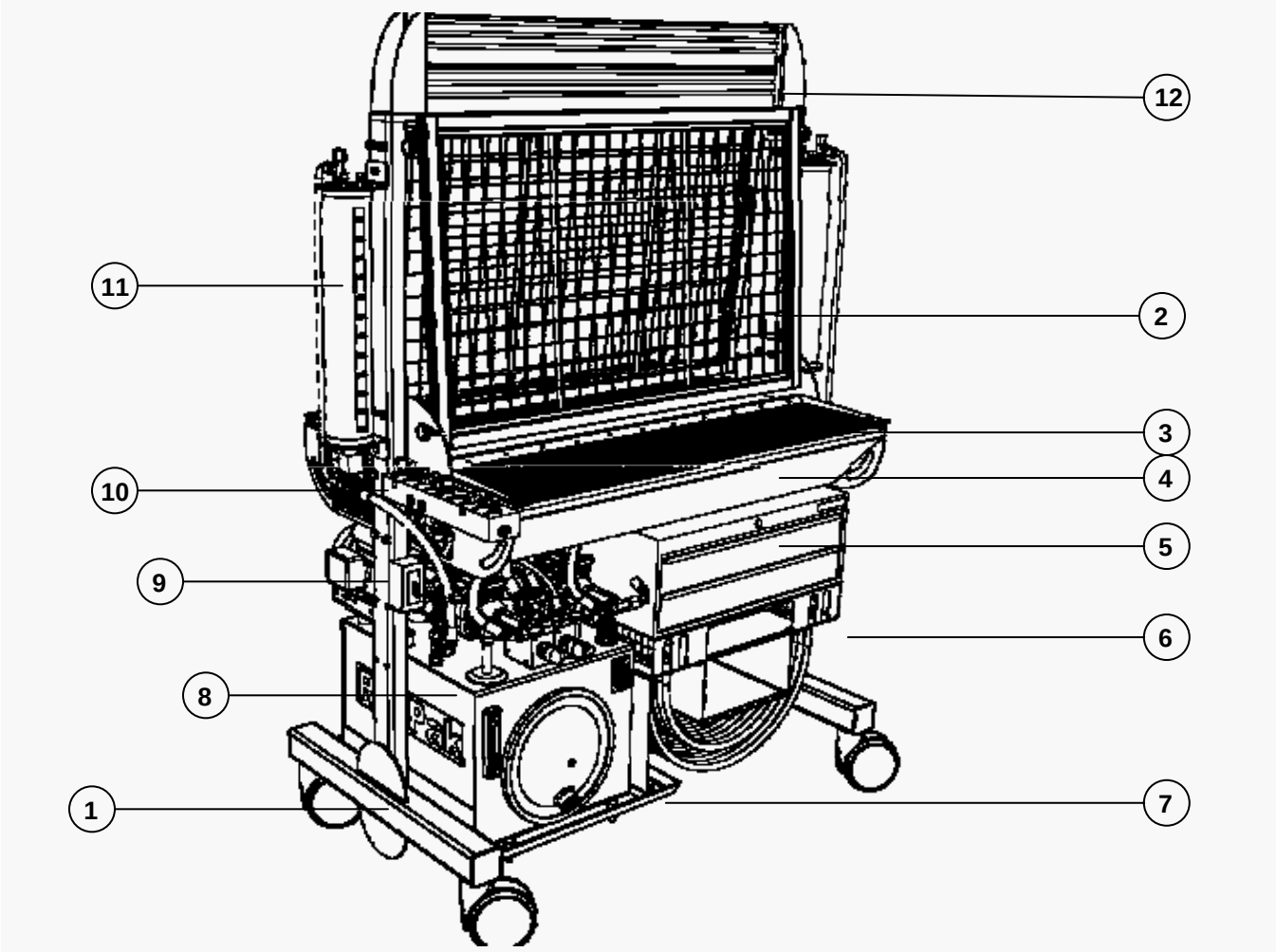
1 Base frame with castors
2 Double sided central panel for pneumatic component mounting
3 Double sided mounting surface for additional electrical devices
4 2x working/writing surface
5 2x integrated lockable component storage area
6 2x lockable heavy duty 2-drawer tool box
7 Heavy duty locking swivel casters

Dimensions:
1545mm x 1827mm x 856mm
Weight :
80 kg dry

Training Stand – Typical Variations

DS4NA training system with provision for 2 electro-hydraulic stations

Model:
TS-DS4NA-1X/G2UN2V6A5M2L0



1 Base frame with heavy duty castors
2 2x grid for hydraulic component mounting
3 2x oil drip tray/working surface
4 2x integrated lockable component storage area
5 2x heavy duty lockable 2-drawer tool box
6 Double sided hose storage area
7 Oil drip tray
8 Hydraulic power unit with two pump/motor groups
9 2x ON/OFF switch with integrated overload protection
10 2x P/T connection block with “load sensing” function
11 2x measuring glass
12 Double sided mounting surface for electrical devices

Dimensions:
1545mm x 1827mm x 856mm
Weight :
300 kg dry

Training Stand – Model Code

Configure the training stand to your needs

Field:	1	2	3	4	5	6	7	8	9
Field details:	**TS-DS4NA**	+	**1X**	/					

Product division
Training system based on DS4 design

Series
Series code (10 to 19 no external changes)

Hydraulic/Pneumatic component mounting

w/o hydraulic grid, w/o pneumatic panel	**G0**
hydraulic grid on one side	**G1**
hydraulic grid on two sides	**G2**
central pneumatic panel	**N**
central pneumatic panel +1 hyd. grid	**GN**
central pneumatic panel +2 hyd. grids	**G2N**

Hydraulic supply

No hydraulic unit, no hose storage	**UN0**
120V/60 Hz supply power	
Hydraulic unit c/w 1 pump + hose storage	**UN1**
Hydraulic unit c/w 2 pumps + hose storage	**UN2**
Other voltages on request	

Hydraulic connection block

w/o connection blocks	**V0**
1 P/T connection block with load sense function	**V5**
2 P/T connection blocks with load sense function	**V6**

Electrical device mounting

W/O central mounting panel	**A0**
C/W central mounting panel for direct mounting of electro-pneumatics and electro-hydraulic single and double row racks	**A5**

Electrical device mounting for electro-hydraulics

Central mounting panel + single row rack on one side	**A5+A1**
Central mounting panel + double row rack on one side	**A5+A2**
Central mounting panel + single row rack on two sides	**A5+A3**
Central mounting panel + double row rack on two sides	**A5+A4**

Measuring glass

w/o measuring glass	**M0**
1 measuring glass	**M1**
2 measuring glass'	**M2**

Load simulator

w/o rotating load simulator	**L0**
1 load simulator	**L3**
2 load simulator	**L4**

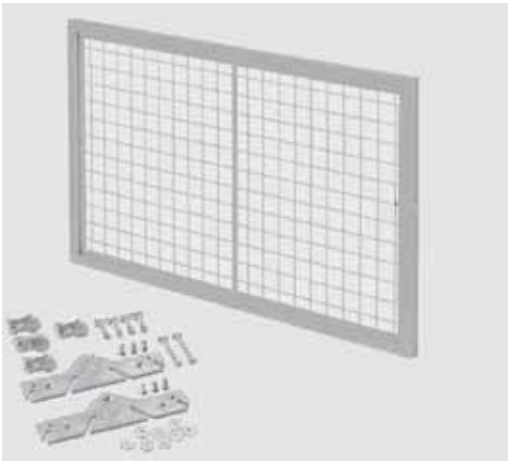
Further details in clear text

Training Stand – Individual assemblies

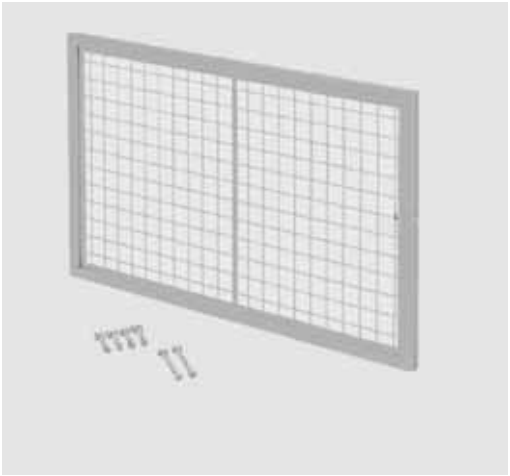
Component mounting surfaces
Individual assembly with reference to model code field 3

Model code designation	Option consisting of:		
	Hydraulic grid assembly	Hydraulic grid	Pneumatic panel assembly
G0–No mounting surfaces	-	-	-
G1–Single sided hydraulic	1x	-	-
G2–Double sided hydraulic	1x	1x	-
N2–Double sided pneumatic	-	-	1x
GN–Single sided pneumatic, single sided hydraulic	1x	-	1x
G2N–Double sided pneumatic, double sided hydraulic	1x	1x	1x

Hydraulic grid assembly for mounting on DS4NA		
Part no.		
Reinforced grid for mounting hydraulic componentry c/w mounting hardware and brackets to attach to DS4NA training stand As supplied on single sided hydraulic trainer		
Dimensions	mm	1150 x 700 x 30
Weight	kg	13
Material		Steel, aluminum profile
Grid spacing	mm	50 x 50
Delivery form		Grid c/w brackets and all necessary installation hardware



Hydraulic grid for mounting on DS4NA		
Part no.		
Reinforced grid for mounting hydraulic componentry c/w mounting hardware to attach to grid assembly mounting brackets Second grid for double sided hydraulic trainer		
Dimensions	mm	1150 x 700 x 30
Weight	kg	12
Material		Steel, aluminum profile
Grid spacing	mm	50 x 50
Delivery form		Grid c/w all necessary installation hardware (cannot be installed as a single grid)



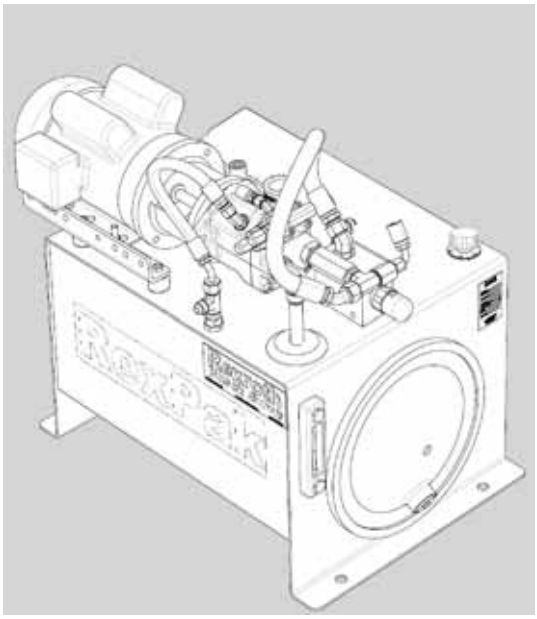
Training Stand – Individual assemblies

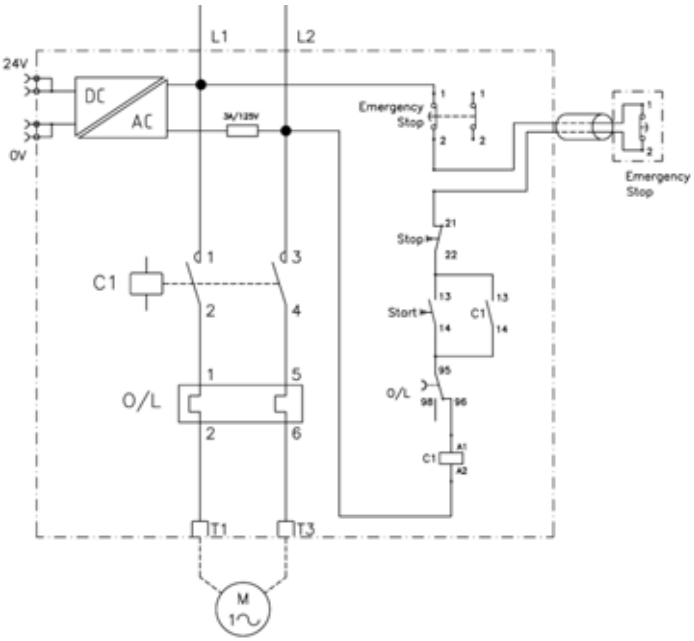
Central Pneumatic Panel assembly		
Part no.		
For central installation to allow pneumatic componentry to be mounted on one or both sides. The grids may still be used for hydraulic training		
Dimensions	mm	1130 x 700 x 30
Weight	kg	24.3
Material		Aluminum profile
Delivery form		Panel c/w all necessary installation hardware

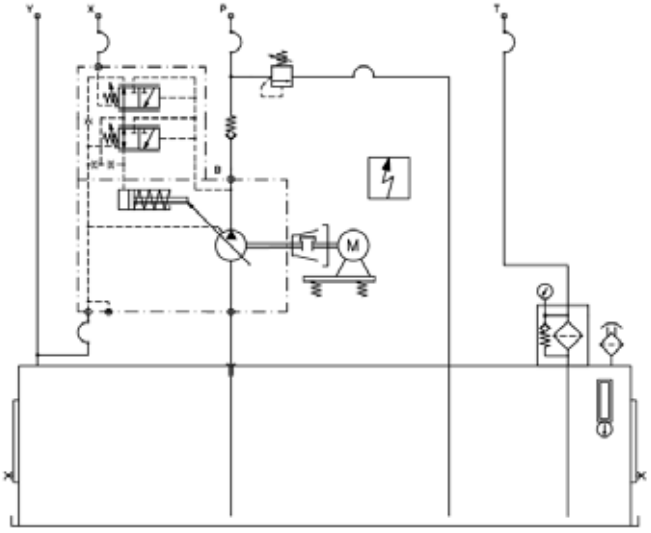
Training stand – Individual assemblies

Hydraulic power unit
Individual assembly with reference to model code field 4

Load sensing Hydraulic supply with one pump 120V/60Hz; 1 HP		
Part no.		
Hydraulic unit with pressure compensated, load sense piston pump for supplying one work station c/w: -electrical starter c/w 24VDC, 5A power supply -oil drip tray, hose rack, hoses for connection to P/T connection block -all hardware required to mount to DS4NA trainer		
HPU Dimensions	mm	510 x 685 x 710
Weight	kg	33
Coating		Blue powder coated
Compensator press.	bar	50
Standby press.	bar	15
Safety press.	bar	70
Flow rate	l/min	8
Reservoir volume	l	40
Voltage	V	120 (other voltages on request)
Frequency	Hz	60 (50 Hz available on request)
Power	kW	.78
Protective motor switch A		12 - 17

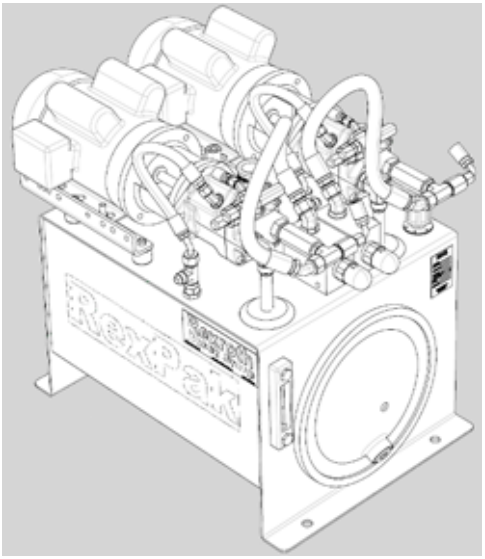


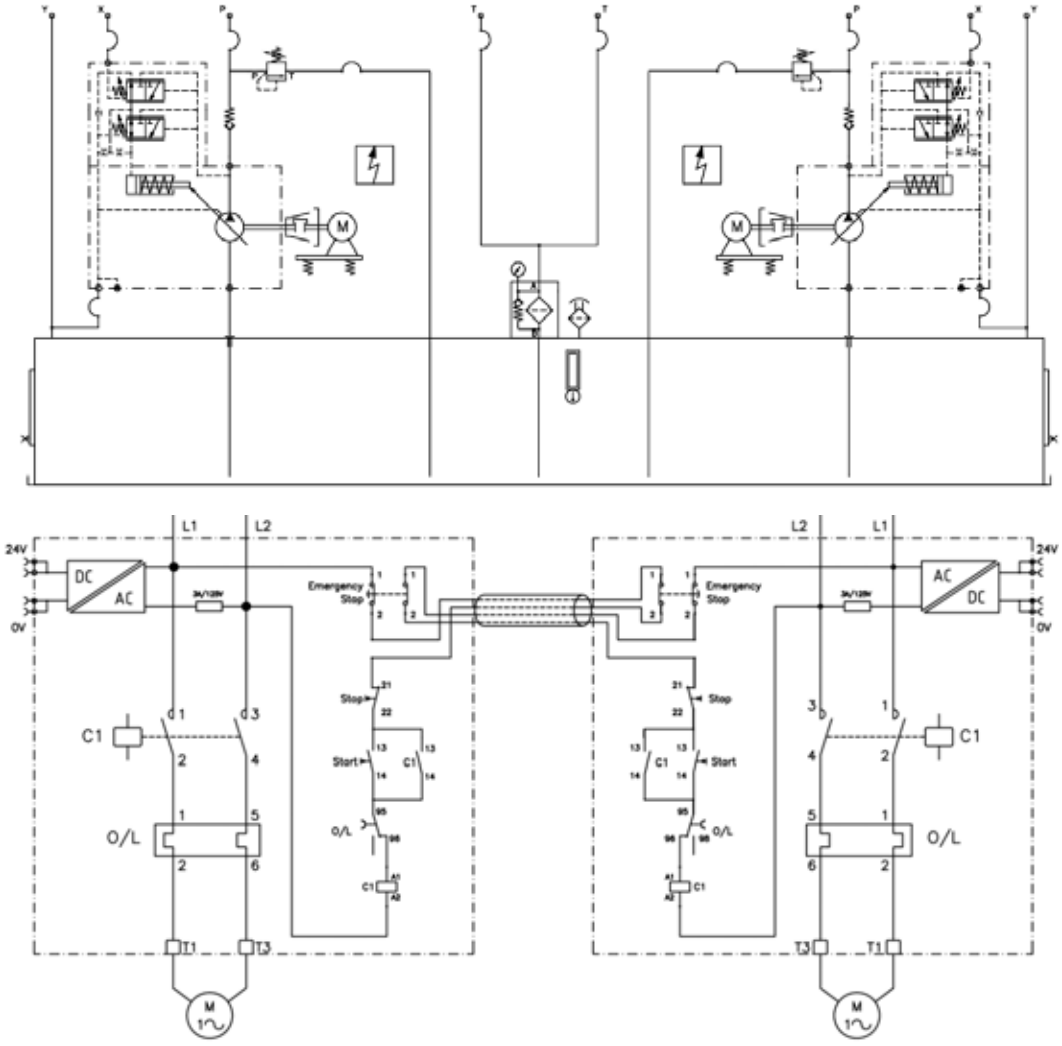




Training Stand – Individual assemblies

Load sensing Hydraulic supply with two pumps 120V/60Hz; 1 HP		
Part no.		
Hydraulic unit with two pressure compensated, load sense piston pumps for supplying two work stations c/w: -2X electrical starter c/w 24VDC, 5A power supply -oil drip tray, hose rack, hoses for connection to P/T connection blocks -all hardware required to mount to DS4NA trainer		
HPU Dimensions	mm	510 x 685 x 710
Weight	kg	45
Coating		Blue powder coated
Compensator press.	bar	50
Standby press.	bar	15
Safety press.	bar	70
Flow rate	l/min	8
Reservoir volume	l	40
Voltage	V	120 (other voltages on request)
Frequency	Hz	60 (50 Hz available on request)
Power	kW	.78 (2x)
Protective motor switch A		12 - 17

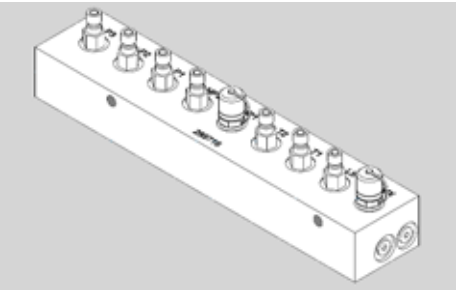


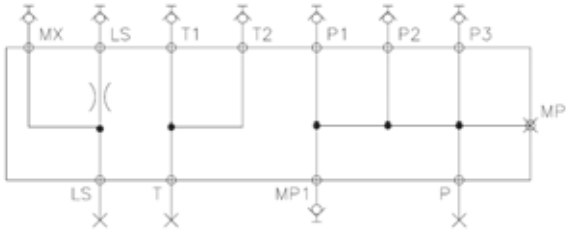


Training Stand – Individual assemblies

Hydraulic connection block
Individual assembly with reference to model code field 5

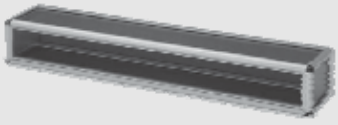
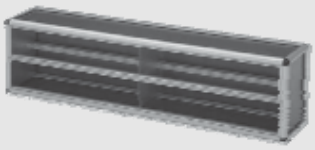
P/T/X connection block for mounting on DS4NA	
Part no.	
For attaching to DS4NA trainer. Supplied c/w all mounting hardware	
Dimensions mm	380 x 80 x 76
Weight kg	4
Material	Steel
Coating	Black oxide





Electrical control mounting
Individual assembly with reference to model code field 6

Model code designation	Option consisting of:		
	R961000167 Single row rack	R961000168 Double row rack	Central mounting panel
A5			1x
A5+A1	1x		1x
A5+A2		1x	1x
A5+A3	2x		1x
A5+A4		2x	1x

	Single row rack	Double row rack	Central panel
Rack type			
Part number	R961000167	R961000166	
Description	210TE; 3HE for DS4	210TE; 3HE for DS4	Central mounting panel
Dimensions mm	W 1130 x H 173 x D 200	W 1130 x H 306 x D 200	W 1130 x H 170 x D 30
Weight kg	7.9	11.6	3.7
Material	Aluminum profile, powder coated steel	Aluminum profile, powder coated steel	Aluminum profile, powder coated steel

Training Stand – Individual assemblies

Measuring glass
Individual assembly with reference to model code field 7

Measuring glass 2.5 l		
Part no.		
With scale, bleed valve overflow protection and ball valve (c/w mounting hardware and return hose for connection to the reservoir) This is not a pressure vessel		
Dimensions	mm	160 x 700 x 200
Weight	kg	4
Material		Acrylic glass Steel tube PVC hose (3m long)

Load simulator
Individual assembly with reference to model code field 8

Load simulator 15 kg rotatable		
Part no.		
For mounting on DS4NA base frame by means of brackets (included in supply). Incl. 2 hose lines with 90^0 angle connectors 2m long		
Dimensions	mm	250 x 1000 x 250
Weight	kg	30
Material		Steel, acrylic glass
Moving mass	kg	15
Cylinder dimensions	mm	26/16 x 200
Load direction		Compressive or overrunning

Training stand - Accessories

Component rack

The self standing component rack is manufactured to compliment the DS4 training system. It is mounted on lockable casters similar to those of the training stand and is used to store extra hydraulic or pneumatic component sets.
Does not include componentry.

Component rack – Model Code

Field:	1	2	3	4
Field details:	**CR-DS4NA**	**– 1X**	**/**	

Product division
Training system based on DS4 base frame

Series
Series code (10 to 19 no external changes)

Upper storage area

w/o grid, w/o grooved panel	**G0**
mounting grid on one side	**G1**
mounting grid on two sides	**G2**
central grooved panel	**N2**
central grooved panel, 1 grid	**GN**
central grooved panel, 2 grids	**GN2**

Lower storage area

w/o grid, w/o grooved panel	**G0**
mounting grid on one side	**G1**
mounting grid on two sides	**G2**
central grooved panel	**N2**
central grooved panel, 1 grid	**GN**
central grooved panel, 2 grids	**GN2**

Notes

Study Topics

The DS4NA training system is designed first and foremost with ease of use and flexibility in mind.
The stand can be modified to numerous configurations to allow training on a broad spectrum of topics including:

Hydraulics
Training is possible in on/off manual or electro-hydraulics, proportional open and closed loop, mobile hydraulics and troubleshooting

Pneumatics
A wide variety of pneumatic control valves, actuators and sensors allow the entire spectrum of pneumatic technology to be covered. Additional PLC control is also possible

Expandable for additional study topics
In order to achieve your training targets, you can individually adjust your training system to your requirements. You can therefore realize training on the following topics:

- ►On/off hydraulics
- ►Proportional valve technology
- ►Mobile hydraulics
- ►Pneumatics
- ►Electro-pneumatics
- ►Sensor and PLC technology

The following section gives a general overview of some of the component sets which are available.
All study topics have training manuals for both student and teacher
For more details or for additional/individual components please contact us.

Study Topic – On/off hydraulics

Project manuals for industrial hydraulics

Training manuals for teachers and students:
The industrial hydraulics project manual can be used by trainers and instructors for teaching in the area of hydraulic control technology. The structure of the project exercises is such that the student begins with a defined requirement and must work through a problem and achieve a solution via an application. The student manual contains all of the chart and graph information for entering the recorded data. Each section contains questions to confirm the correct understanding of the material presented. Each exercise deals with one topic and is related directly to an example which would typically be found in industry

Project exercises and relevant topics			
01	Hydraulic power unit	12	Pressure relief valve, direct operated
02	Characteristic curve of a variable pump	13	Pressure control
03	Single rod cylinder – pressure intensification	14	Pressure reducing valve
04	Single rod cylinder - flow	15	Pressure switches
05	Cylinders, load pressure	16	Pressure switches, hysteresis
06	Adjusting the cylinder velocity	17	Hydraulic accumulators
07	Check valve	18	Regenerative circuit
08	Check valve, pilot operated	19	Fast advance-working speed motion control
09	Throttle valve, adjustable	20	Pump unloading circuit
10	Throttle check valve	21	Commissioning, maintenance, troubleshooting, repair
11	Flow control valve		

These component sets can be used to teach all of the basic hydraulic principles. All of the components utilized are industry standard size 6 from the industrial hydraulic program and have been prepared for the use in the field of training.

Hydraulic device set for manually operated valves

Hydraulic device set for electrically operated valves

Study Topic – Proportional valve technology

Proportional control

Hydraulic device set for proportional valve technology

The exercises are designed so that the trainees work independently and hands-on in order to learn and understand the over-all operation of this technology. To encourage this, the relevant information is imparted via independent planning, implementing and control, all via practical project tasks.

Position control

Hydraulic device set for analog position control

The exercises provide the introduction into the practical element of axis control technology. The topics are addressed such that the student first deals with the problem of keeping actuator position with different loads with an open loop control system. As a result of their findings the advantages of closed control loop are identified. Once this requirement is identified, the components of the electro-hydraulic closed loop control are presented.

Electrical/electronic device sets

Electrical device sets accompany all conventional and proportional control electro-hydraulic sets. These devices mount and store in the electrical component rack at the top of each side of the training stand which allows easy access for connection and adjustments but at the same time keeps the electrical devices out of “harms way”.

Electrical device set – electrically operated on/off hydraulics

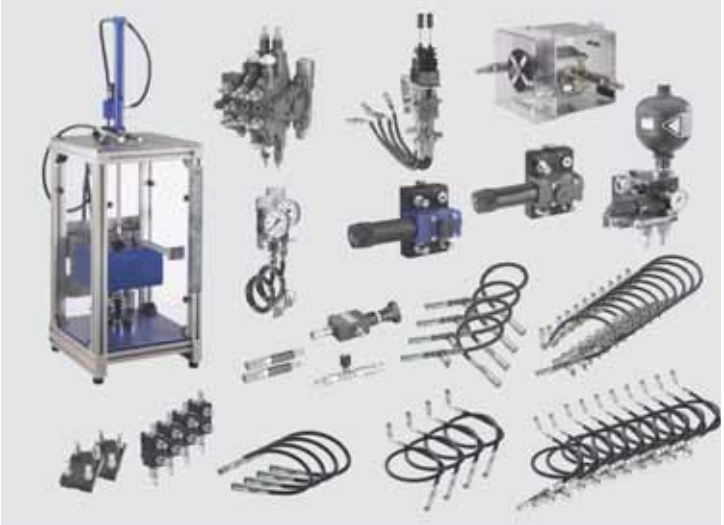
Electrical device set – proportional valve technology

Study topic - Mobile hydraulics

Throttle control – open centre

Load sensing control

Anti-saturation control



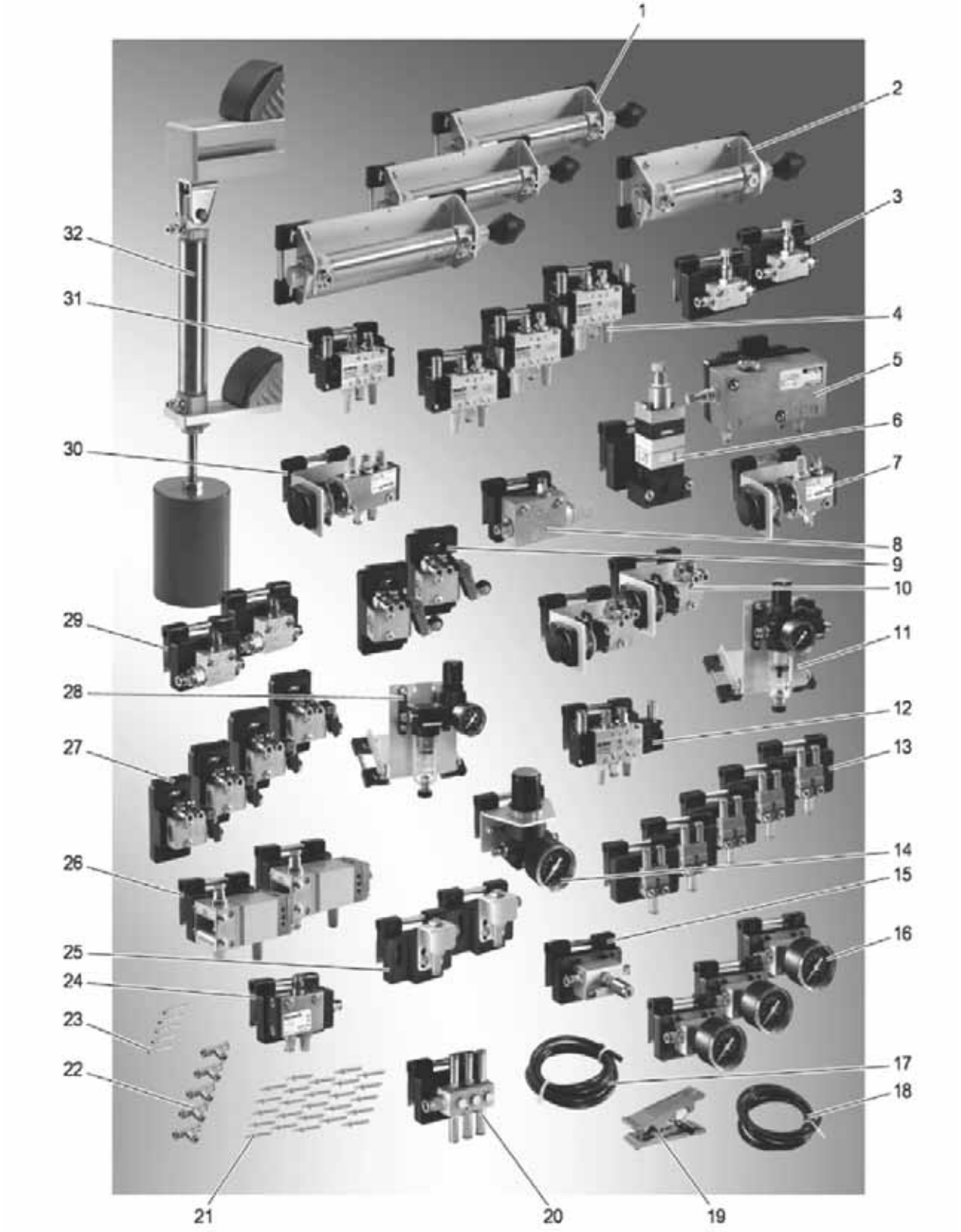
Teacher and student manuals

All of the components used in the exercises are standard equipment form the Rexroth mobile hydraulic product range and are optimized for the use with the DS4NA training system.
The following valving is investigated:
Open centre: 3SM-12
Load sensing: 2M4-12
Anti-saturation: 2SX-12

Teacher and student manuals cover a progression of information for each topic beginning with the historical development of mobile hydraulics and working through to the particular control technology level. The operation, set-up and functionality relevant to the individual control type is covered in practical exercises

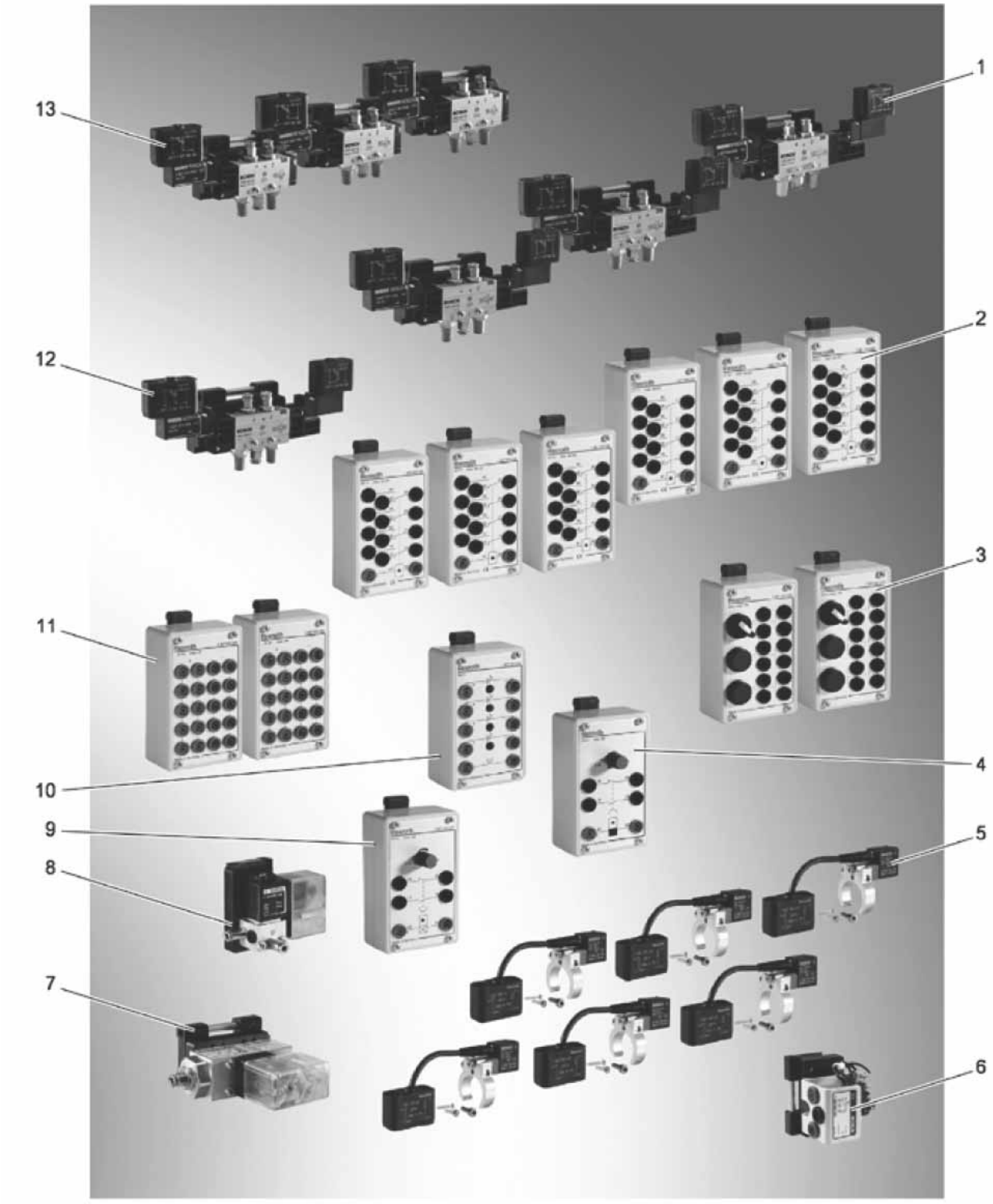
Study topic – Pneumatics

Basic pneumatic kit, according to BiBB



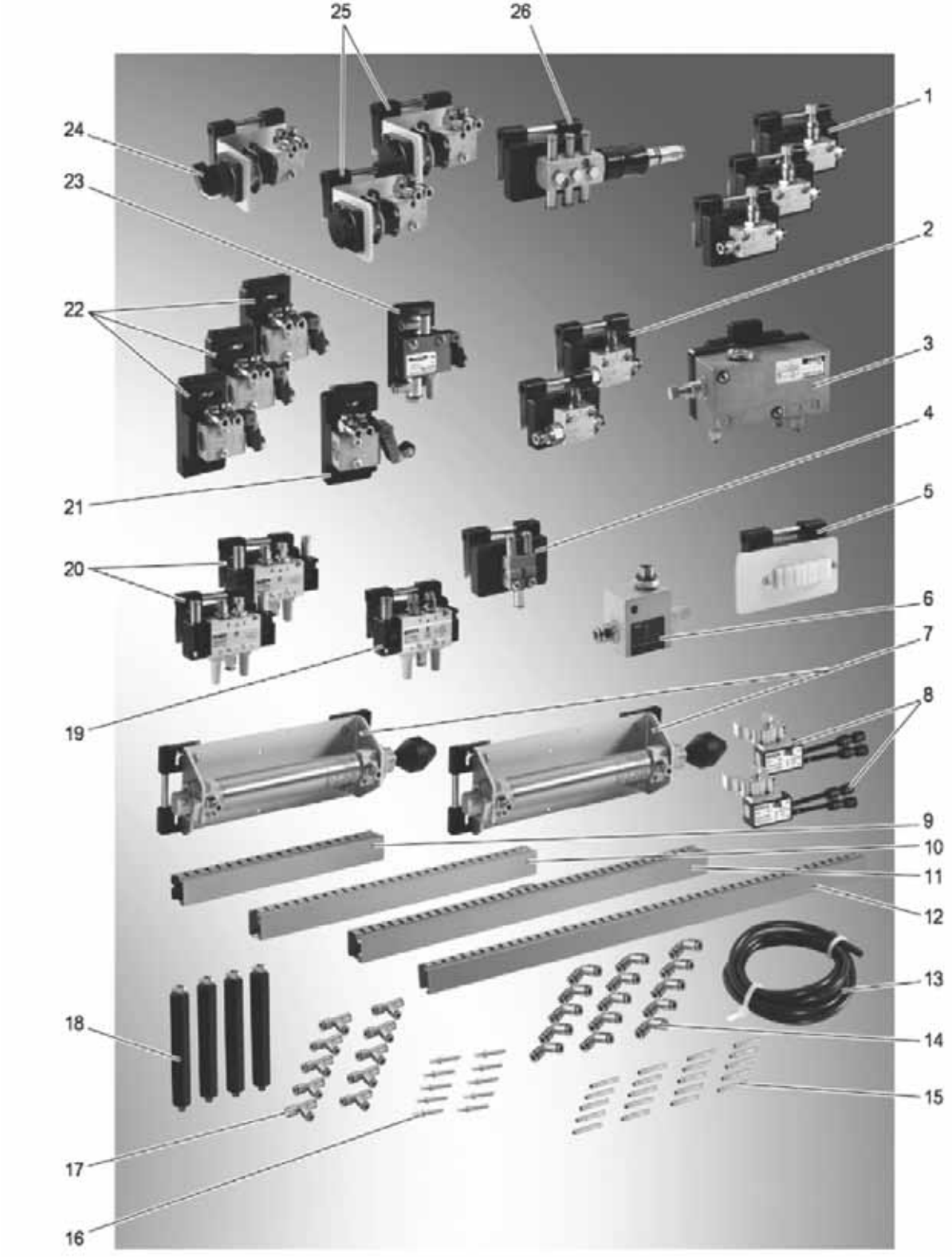
Study topic – pneumatics

Electrical extension kit according to BiBB



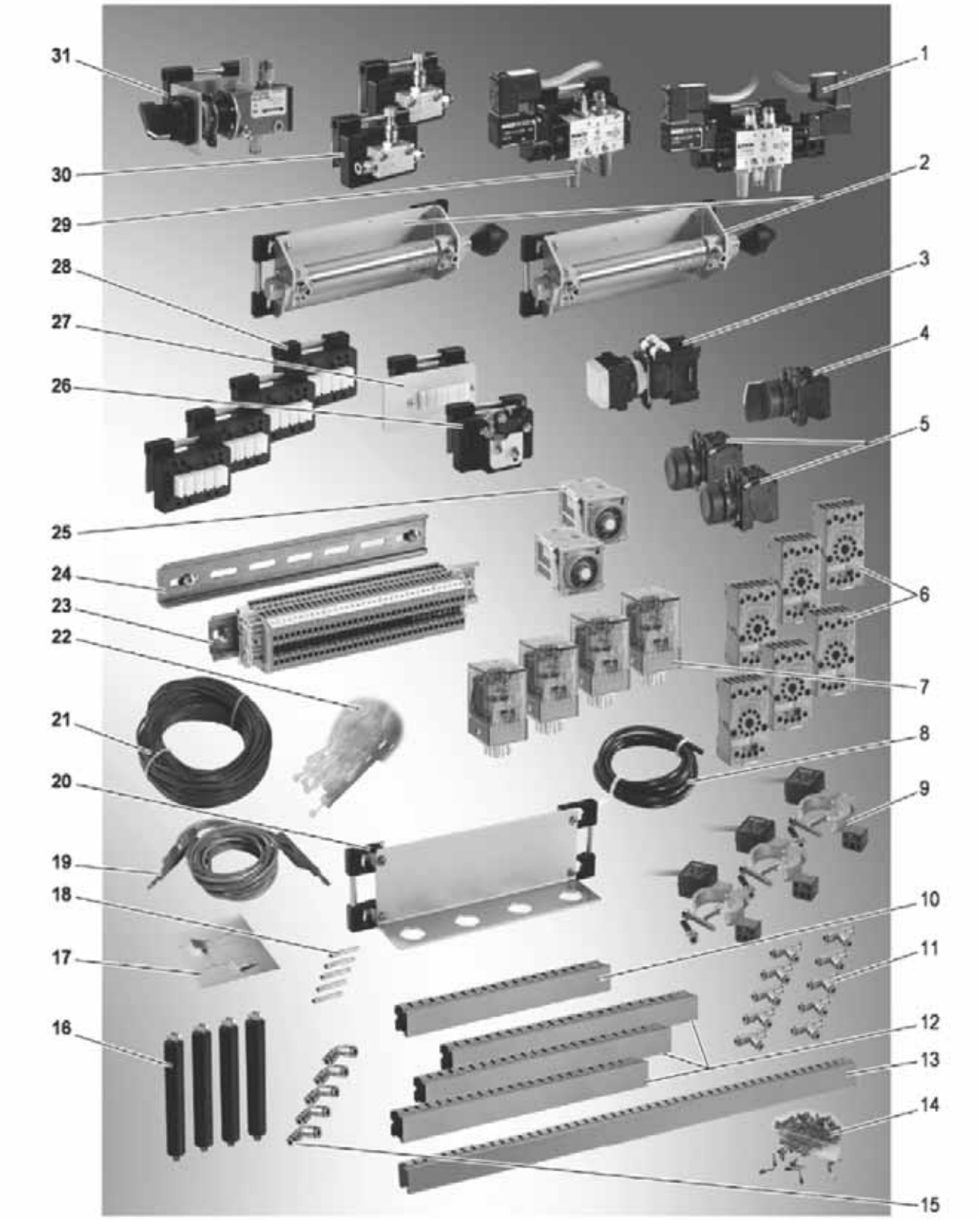
Study topic – pneumatics

Basic pneumatic kit, according to PAL



Study topic – pneumatics

Electrical extension kit according to PAL



Also available (contact us for more information)

Sensor technology

Training seminars

PLC technology

On-line training courses

Mechatronic systems

Training aides

Notes

Bosch Rexroth Canada Corp.
Training department
490 Prince Charles Drive S.
Welland, ON, Canada L3B 5X7
Tel (905) 735-0510 (5150)
Fax (905) 788-3584
training@boschrexroth.ca
www.boschrexroth.ca