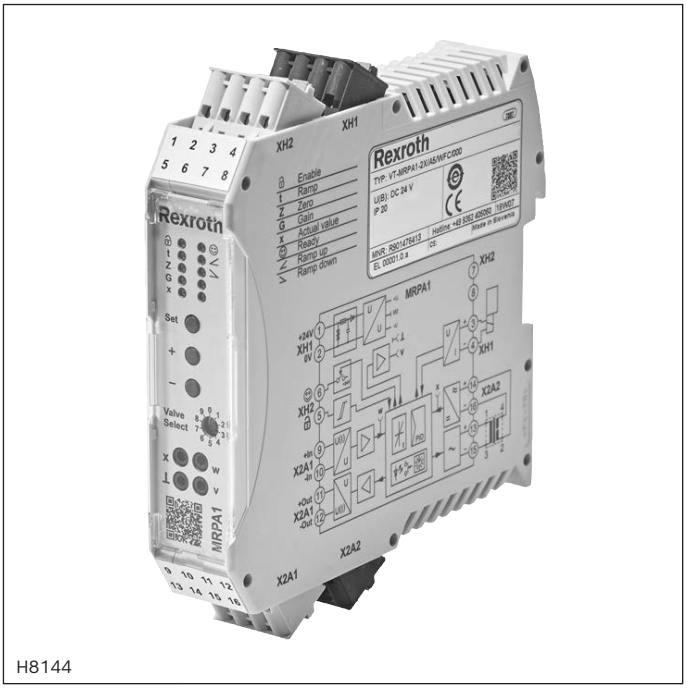
RE 30220
Edition: 2022-10
Replaces: 2019-05

rexroth
A Bosch Company

Valve amplifier for proportional directional cartridge valve of type 2WFC

Type VT-MRPA1...WFC



H8144

- Component series 2X
- To control the pilot-operated proportional directional cartridge valve type 2WFC
- One amplifier for all valves of type 2WFC
- Easy selection of the valves to be controlled according to sizes
- Characteristic curves of the valves stored in the device
- Valve optimization via push-buttons

Features

- Command value input 0 ... +10 V or 4 ... 20 mA
- Reverse polarity protection of the operating voltage
- Ramp generator up and down is separately adjustable
- Zero point setting
- Command value adjustment
- Position control
- Clocked power output stage
- Output short-circuit-proof
- LED status displays
- Measuring sockets for position actual value, internal command value and parameters to be set

Contents

Ordering code

01	02	03	04	05	06	07
VT-MRPA	**1**	**–**	**2X**	**/**	**/**	**WFC**	**/**	**000**	*****

01	Valve amplifiers	**VT–MRPA**
02	For proportional directional cartridge valves with 1 solenoid	**1**
03	Component series 20 ... 29 (20 ... 29: unchanged technical data and connections)	**2X**
04	Voltage command value (0 ... +10V)	**A5**
	Command value current (4 ... 20mA)	**F5**
05	Valve amplifier for proportional directional cartridge valve of type 2WFC	**WFC**
06	Standard	**000**
07	For further information, see the plain text	*****

Available variants

Type	Material no.
VT-MRPA1-2X/A5/WFC/000	R901476413
VT-MRPA1-2X/F5/WFC/000	R901476414

Function

General
The amplifier module is intended for the assembly on top hat rails. The electrical connection is established via 4 tension spring plug-in connectors. The supply voltage is 24 VDC.

Power supply unit (1)
The internal power supply unit has a making current limiter to prevent current peaks. Additionally, inverse-polarity protection is integrated.

Command value, command value summing device (3)
The "internal command value" comprises:
- "External command value", connected at the input of the differential amplifier (2)
- Zero point offset (4), "Z" adjustable in standard setup

The "internal command value" can be measured at the "w" measuring socket and, in normal operation, at the "v" measuring socket.

Ramps
Ramps limit the incline of the command values.
You can choose between a single ramp (5) (one time for all ramps, default value) and a 2-quadrant ramp (2Q) (6) (different times for the ramps up and down).
The 2Q ramp times are set in the expert setup.

Command value attenuator "G" (7)
By means of the command value attenuator, the command value can be reduced.

Position controller (8)
The valve position is recorded, compared to the command value in the current controller and the difference is compensated.

Power output stage (9)
The power output stage creates the clocked solenoid current for the directional control valve. The solenoid current is limited to the maximum admissible current, depending on the set valve size. The output stage is short-circuit-proof. With an internal interference signal or in case enable is missing, the output stage will be switched off.

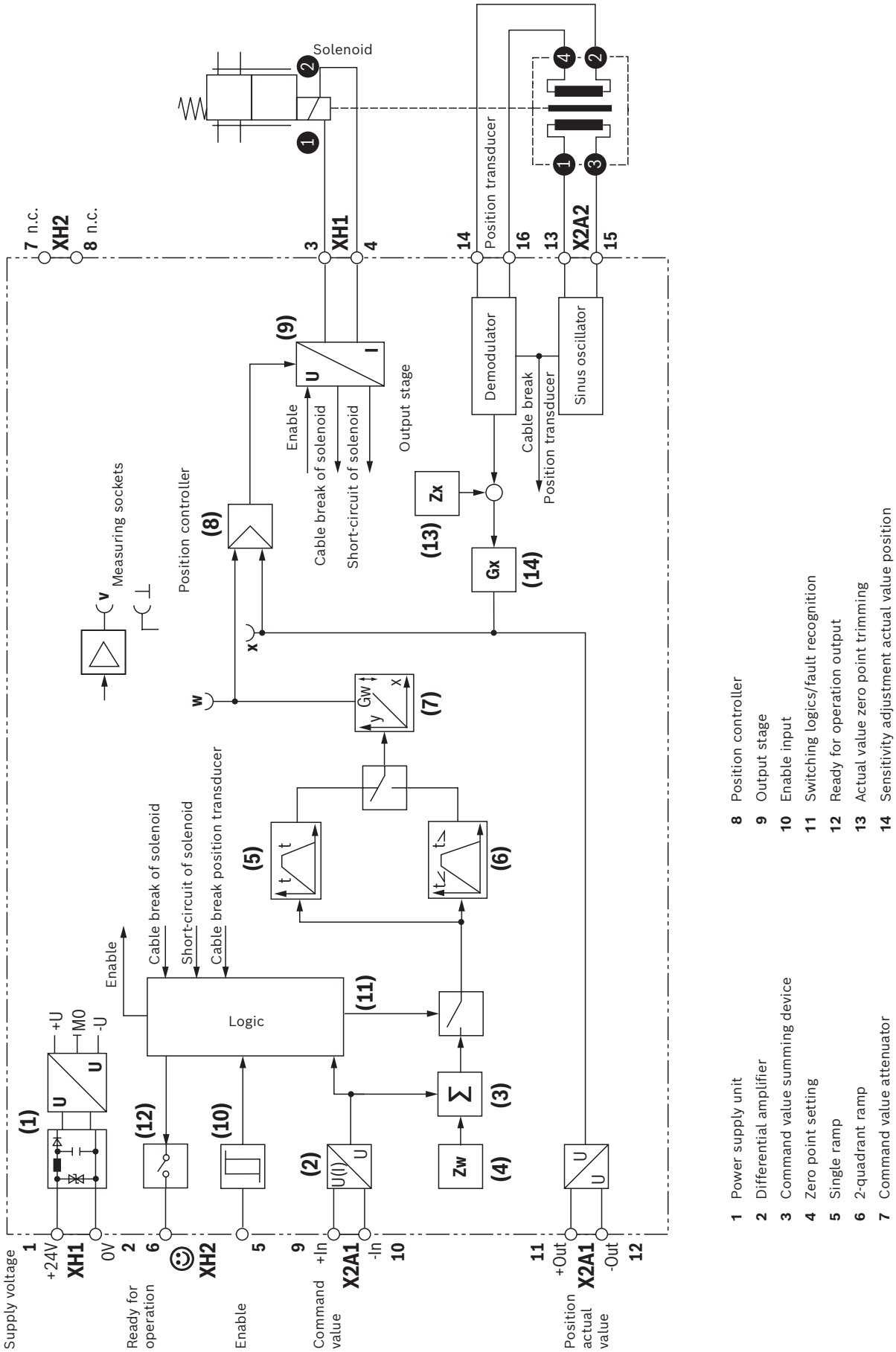
Enable input (10)
The enable input enables the output stage.
The terminal has to be connected. Pilot oil must be present when switching on.

Logic (11)
Internal logic to enable output stage, internal command value and ready for operation output.

Ready for operation output (12)
Device notifies ready for operation if there is no cable break, no internal error and $U_B \geq U_{B\,min}$.

See also "block diagram" on page 3.

Block diagram



1 Power supply unit
2 Differential amplifier
3 Command value summing device
4 Zero point setting
5 Single ramp
6 2-quadrant ramp
7 Command value attenuator
8 Position controller
9 Output stage
10 Enable input
11 Switching logics/fault recognition
12 Ready for operation output
13 Actual value zero point trimming
14 Sensitivity adjustment actual value position

See also "Function" on page 2.

Technical data

General			
Design			Module
Type of connection			16 spring-type terminals, detachable
Weight		kg	0.14
Installation position			Vertical. For the breathing of the assembly, the ventilation slots of the top and bottom side must be at least 2 cm away from covers, walls, etc. With an ambient temperature of more than 50 °C, the clearance to the next assembly must be 1 cm.
Ambient temperature range		°C	0 ... +60
Storage temperature range (with UV protection)		°C	+5 ... +40
Transport temperature range		°C	–40 ... +70
Relative humidity range (no condensation)		%	10 ... 95
Protection class according to EN 60529			IP20
Sine test according to DIN EN 60068-2-6		Hz	10 ... 500 / maximum 2 g / 10 cycles / 3 axes
Noise test according to DIN EN 60068-2-64		Hz	20 ... 500 / 2.2 g_{RMS} / 6.6 g peak / 30 minutes / 3 axes
Transport shock according to DIN EN 60068-2-27			15 g / 11 ms / 3 axes
Conformity	▶ CE according to EMC directive 2014/30/EU, tested according to		EN 61000-6-2 and EN 61000-6-3
	▶ UKCA according to EMC directive SI 2016/1091, tested according to		EN 61000-6-2 and EN 61000-6-3
	▶ RoHS directive		2011/65/EU [1]
Start-up time		s	< 1
Maximum admissible temperature change		°C/min	5
Maximum altitude for use		m	2000
UV resistance			Housing is only partly UV resistant. Extended exposure to radiation may cause color changes.
Free fall (in original packaging)		m	1
Top hat rail assembly			TH35-7.5 or TH35-15 according to EN 60715
Housing material			Glass-fiber reinforced polyamide plastic
Resistance against aggressive media			Contact with conductive dusts is not admissible. Avoid contact with hydraulic fluids.
Electro-magnetic compatibility (EMC)	▶ EN 61000-6-2		
	– EN 61000-4-2 ESD	kV	4 kV CD / 8 kV AD with evaluation criterion (BWK) B
	– EN 61000-4-3 HF radiated	V/m	10 (80 ... 6000 MHz) with BWK A
	– EN 61000-4-4 Burst	kV	2 (5 kHz and 100 kHz) with BWK B
	– EN 61000-4-5 Surge	kV	0.5 (2 Ω/12 Ω) to operating voltage, 1 kV (42 Ω) to signal with BWK B
	– EN 61000-4-6 HF conducted	V_{eff}	10 (150 kHz ... 80 MHz) with BWK A
	– EN 61000-4-8 Magnetic field 50/60 Hz	A/m	100 with BWK A
	▶ EN 61000-6-3 / EN 61000-6-4		
	– EN 55016-2-1 Interference voltage	MHz	0.15 ... 30 (class A, EN 55022)
	– EN 55016-2-3 Radio interference field strength	MHz	30 ... 6000 (class B, EN 55022)

[1] The product fulfills the substance requirements of the RoHS directive 2011/65/EU.

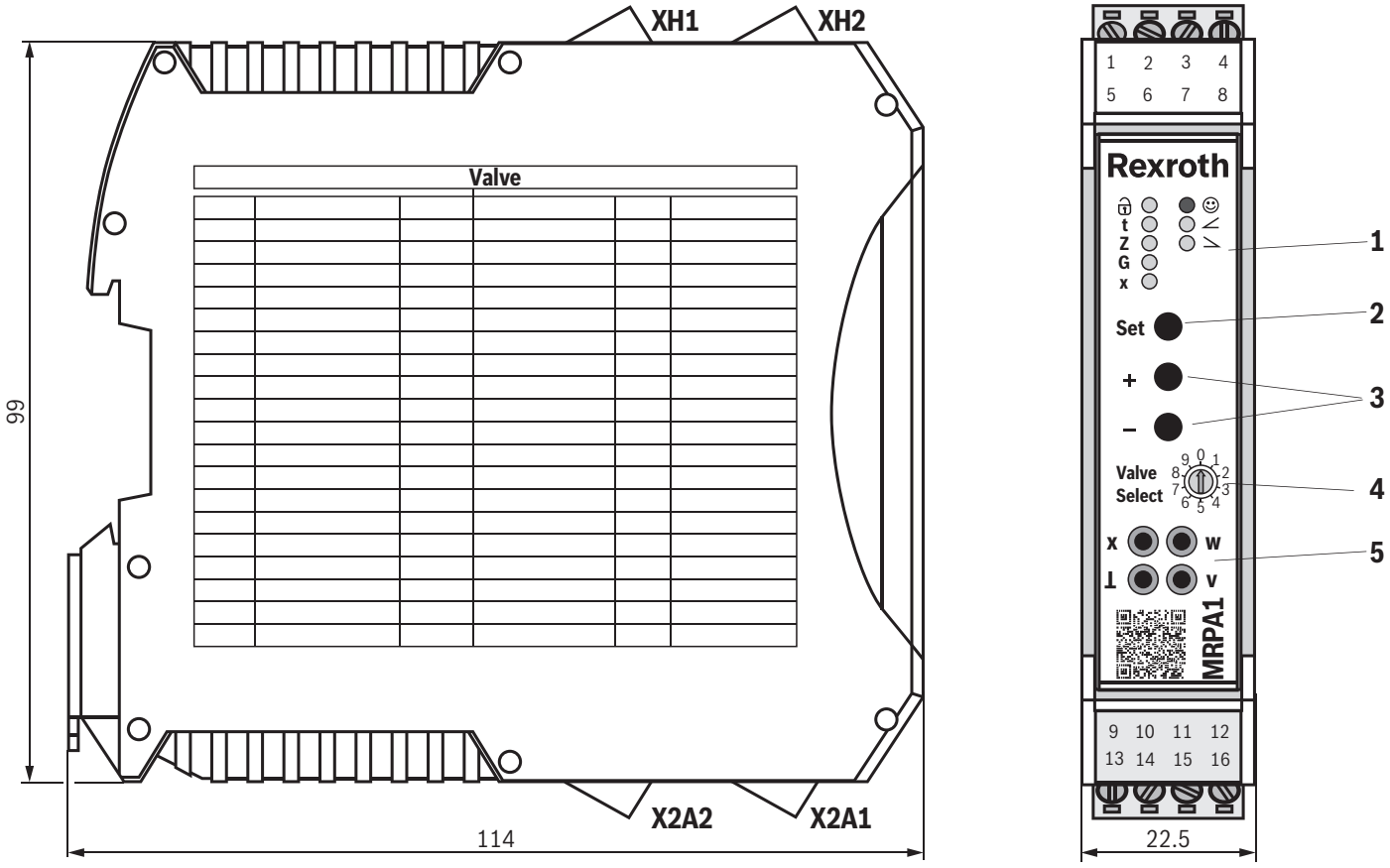
Technical data

Electrical			
Supply voltage	▶ Nominal value	V	24
	▶ Minimum [2]	V	18
	▶ Maximum	V	28
	▶ Maximum residual ripple (40 ... 400 Hz)	Vpp	2.5 (observe the admissible limits)
	▶ Maximum power consumption	W	< 48
	▶ Maximum current consumption	A	< 2
	▶ Maximum switch-on current	A	< 4
	▶ Fuse protection, external	A	3.15 (time-lag)
Analog input			
Command value	▶ Voltage (differential input) "A5"	V	0 ... +10
		kΩ	200 (input resistance)
	▶ Current input "F5"	mA	4 ... 20
		Ω	100 (load resistance, with overload protection)
Analog output			
Position actual value	▶ Output range		
	– Enable set	V	0 ... +10
	– Without enable	V	±10
	▶ Minimum load impedance	Ω	1000
Digital input			
Enable	▶ On (active) [2]	V	11 ... U_B
	▶ Off (inactive)	V	-3 ... 5
Solenoid outputs			
Maximum solenoid current		A	2.7
Other properties, solenoid output			Short-circuit-proof, clocked
Cable length for 1.5 mm²		m	50
Adjustment options			
Zero point calibration		%	±10
Command value attenuator [3]		%	70 ... 110
Ramp time up / down		s	0.01 ... 30
Measuring sockets			
Actual value	▶ "x"	V	±10
Command value	▶ "w"	V	0 ... 10
Edition	▶ "v"	V	±10
Reference potential	▶ "⊥"		

[2] R_E > 50 kΩ

[3] At command value 100%

Dimensions
(dimensions in mm)



1 Status LEDs
Display the current operating state, menu levels and error conditions

2 SET key
Editing the selected parameters, selection of work operation, selection of the "expert mode"

3 +/– keys
Selection of the parameters and adjustment of the parameter values

4 Rotary switch
Selection of the valve sizes

5 Measuring sockets
for connecting a measuring instrument

Assignment: Switch position/size

Switch position	Valve type/size
0	No valve
1	2WFC 16 ...-1X
2	2WFC 25 ...-1X
3	2WFC 32 ...-1X
4	2WFC 40 ...-1X
5	2WFC 50 ...-1X

Terminal assignment

Assignment		Connector	Terminal
Operating voltage	$+U_B$	XH1	1
	0 V	XH1	2
+ Solenoid B		XH1	3
– Solenoid B		XH1	4
Enable		XH2	5
Ready		XH2	6
n.c.		XH2	7
n.c.		XH2	8
+ Command value		X2A1	9
– Command value		X2A1	10
+ Actual value		X2A1	11
– Actual value		X2A1	12
+ OSC		X2A2	13
+ SIG		X2A2	14
– OSC		X2A2	15
– SIG		X2A2	16

Status description LEDs

Indicator light	Operating state	Display mode	Meaning
"Enable" LED (yellow)	Normal operation	Permanent light on/off	Enable input status
	Setup	Flashing	Standard setup active
	Setup	Off	Expert setup active
"Ready" LED (red/green)	Normal operation	Permanent light, green	Module ready for operation
	Normal operation	Permanent light, red	Error
	Normal operation and setup	Flashing light, red-green	Valve setting changed
	Normal operation and setup	Flashing light, red	Inadmissible valve number
	Normal operation	Off	Module not ready for operation
	Setup	Flashing light, green	Expert setup active

Description of the LED display [1)]

	Enable
t	Ramp
Z/B	Zero point / pilot current
G	Command value attenuator
x	Actual value
	Ready for operation
	1st quadrant (positive command value rising)
	2nd quadrant (positive command value falling)

1) A detailed description is contained in the operating instructions 30220-B

Accessories (separate order)

	Material no.
Shield set for the installation with shielded lines	**R961011117**

Project planning and maintenance instructions

☞ **Maintenance instructions:**

- The devices have been tested in the plant and are supplied with default settings.
- Only complete devices can be repaired.
- Repaired devices are returned with default settings. User-specific settings must be made by the machine end-user once again.

☞ **Notice:**

- In especially EMC-sensitive environments, additional measures must be taken (depending on the application, e.g. shielding, filtration)
- **Wiring information**
  - Maximum possible spatial separation between signal and load lines.
  - Do not lead signal lines through magnetic fields.
  - If possible, install signal lines without intermediate terminals.
  - Do not install signal lines in parallel to the load lines.
  - Connect cable shields (see operating instructions 30220-B)
  - Lines for digital inputs and outputs can be laid in an unshielded manner.
  - Lines for command and actual values as well as the solenoid conductors must generally be laid in a shielded and/or twisted shielded manner.
  - The distance to radios must be sufficient (> 1 m).
  - With a strongly fluctuating operating voltage, in individual cases, it may be necessary to use an external smoothing capacitor with a capacity of at least 2200 µF.
- Recommendation: Capacitor module VT 11110 (see data sheet 30750); sufficient for up to 3 amplifier modules.
- The upper and lower ventilation slots must not be concealed by adjacent devices in order to provide for sufficient cooling.

Further information

▶ Valve amplifier for proportional directional cartridge valve of type 2WFC	Operating instructions 30220-B
▶ CE Declaration of Conformity	Upon request
▶ Installation, commissioning and maintenance of proportional valves	Data sheet 07800
▶ Assembly, commissioning and maintenance of hydraulic systems	Data sheet 07900

Bosch Rexroth AG
Industrial Hydraulics
Zum Eisengießer 1
97816 Lohr am Main, Germany
Phone +49 (0) 93 52/40 30 20
my.support@boschrexroth.de
www.boschrexroth.de