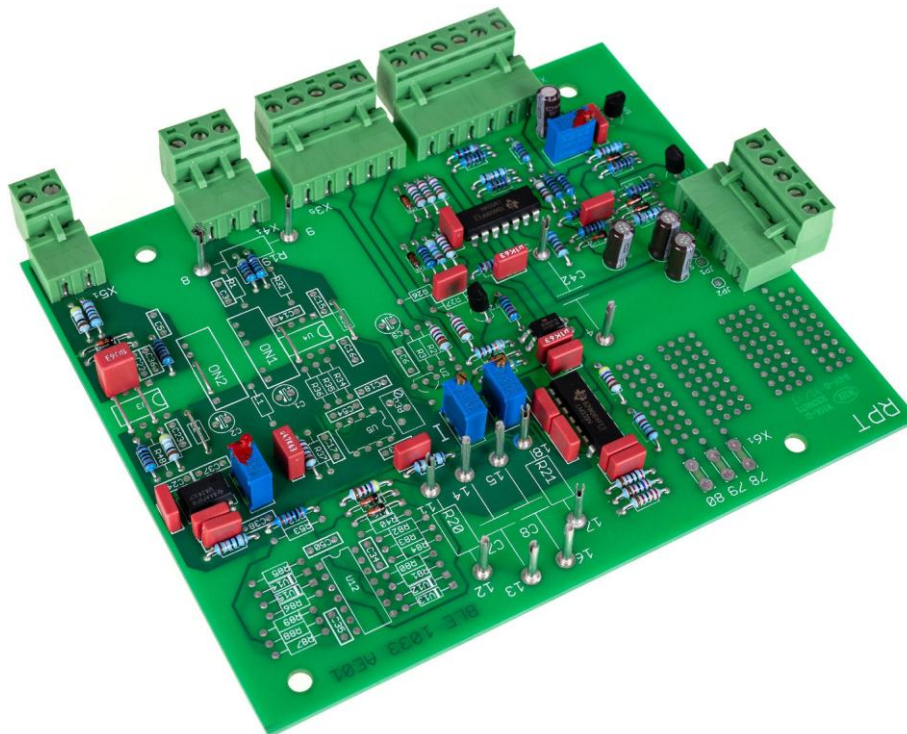


# Datasheet

## Controller RP01B / RPT01B / RPT02B

Art.-Nr.: 9533



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## 1. Special Features

The RP01B controller (RPT01B/02B) enables voltage and current regulation in all types of rectifier circuits. Start-up and ramp-up stages ensure smooth power-on behavior. A built-in reference voltage of 10.00 V or external control signals serve as setpoint sources for voltage and current regulation.

Different device supply voltages can be adapted using evaluation resistors. For current sensing, a 60 mV shunt resistor according to DIN 43703 is required, allowing only fine adjustment via a potentiometer.

The controllers can be freely configured using resistor-capacitor (RC) combinations. Parallel operation of multiple controllers is possible without mutual interference.

## 2. Technical Data

### 2.1 Input Parameters

<b>Supply Voltage</b>	+ 15 V / GND / - 15 V
<b>Supply Current</b>	+ 20 mA / - 10 mA (RP01B) + 45 mA / - 35 mA (RPT02B)
<b>Setpoint Signals for Voltage and Current</b>	10,0 V
<b>Adjustment Range for Voltage and Current</b>	0... 100 %
<b>Deviation between setpoint and output values</b>	< 1 %
<b>Control Accuracy</b>	< 0,5 %

Voltage evaluation via R19 at soldering points 8 and 9:

<b>U<sub>out</sub>:</b>	6	10	12	15	20	24	30	48	60	80	100	120	150	V
<b>R19 (0207 0,5W):</b>	100R	3,3	5,6	8,2	12	15	22	39	56	82	100	120	150	k

For higher voltages, use a voltage divider or provide an additional isolation amplifier.

<b>Current Sensing</b>	60 mV- Shunt
<b>Adjustment Range</b>	48 - 66 mV
<b>Isolation Amplifier</b>	
<b>Test Voltage</b>	4 kV DC
<b>Clearances and Creepage Distances</b>	6 mm

### 2.2 Output Parameters

<b>Power-On Delay or Lag Time after Pulse Inhibition</b>	tv < 250 ms
<b>Ramp-Up Time of the Setpoint Integrator (max. 60 sec with C42 = 6.8 µF)</b>	ti < 1 s
<b>Internal Reference Voltage</b>	+ 10,00 V
<b>Temperature Stability</b>	< 1m V / °C
<b>Load Capacity</b>	10 mA (short-circuit proof)
<b>Controller Output Voltage</b>	0... 10 V
<b>Controller Output Current</b>	1 mA

## 2.3 Physical Data

<b>W x D x H</b>	145 x 120 x 22 mm
<b>Weight</b>	100 g
<b>Ambient Temperature</b>	- 20°... + 65° C
<b>Printed Circuit Board FR4</b>	70 µ- Cu double-sided, through-plated.

## 3. Electrical Function

Figure 3.2.4 shows the basic circuit diagram. The controllers RP 01B and RPT 01B / 02B share the same pin configuration. The controllers RPT 01B and RPT 02B include additional isolation amplifiers.

### 3.1 Power-On Delay

The power-on delay stage ensures reliable blocking of output pulses at the control unit. Terminal X1.5 is set to "0" for approximately 250 ms, so that no control current is available to the output transistors during the critical power-on phase. The pulse inhibition can be activated at any time via a contact between terminals X2.2 and X2.4 (GND).

### 3.2 Controller Inhibition / Setpoint Integrator

Immediately after pulse release, the controller inhibition is lifted, which also starts the setpoint integrator. The factory default ramp-up time is 1 second. By soldering an additional film capacitor across soldering points 3 and 4 in parallel with C4, the ramp-up time can be extended to approximately 60 seconds (with C42 = 6.8 µF).

The controller inhibition can be activated at any time via a normally closed contact between terminals X2.1 and X2.3 (GND).

Under normal conditions, the output of the reference voltage  $U_{ref} = 10.00\text{ V}$  (terminal X2.5 / X2.6) is connected to the input of the setpoint integrator at X3.2. At output X3.4, the same voltage is available—ramping from 0 V to 10 V within 1 second (integrator gain: 0.980 to 0.995). This voltage at X3.4 is then applied to input X3.1 (U setpoint).

The reference voltage at X3.5 is fed directly to the current controller. This configuration ensures that an unloaded rectifier ramps up continuously. Other combinations are possible depending on the respective positive control variables.

### 3.3 Voltage Regulator and Isolation Amplifier

The rectifier output voltage  $+U_a$  is fed through resistor R19 to soldering points 8 and 9 and applied to the voltage regulator, in accordance with Table 1 of the technical data (Section 2.1). It is compared with the setpoint at terminal X3.1. Fine adjustment of the output voltage is possible via potentiometer U.

An RC combination consisting of R20 and C7, connected to soldering points 11 to 14, must be soldered in as a PI controller configuration adapted to the control loop.

For controllers RPT 01B and RPT 02B, the "–" terminal of the rectifier unit must also be connected to terminal X4.3!

### 3.4 Current Controller and Isolation Amplifier

The output current of the rectifier is measured via a 60 mV shunt according to DIN 43 703. This current-proportional voltage is fed to the current controller through an (isolation) amplifier and compared with the current setpoint at terminal X3.5. Fine adjustment of the current via potentiometer I is possible within a range of 48 to 66 mV.

An RC combination consisting of R21 and C8, connected to soldering points 15 to 18, must be soldered in as a PI controller configuration adapted to the control loop.

For controllers RPT 01B / 02B, the "–" terminal of the rectifier must also be connected to terminal X4.3.

### 3.5 Return Circuitry

Normally, an interruption in the shunt lines of the rectifier unit has catastrophic consequences, as the current limiting function is disabled.

A monitoring system, the return circuitry, ensures that in such a fault condition, the output values are driven toward "0".

For comparison, the pin assignments of the older controllers RPT01 and RP01 are listed here. To simplify replacement, the new controllers RP 01B, RPT 01B, and RPT 02B are equipped with Phoenix "Combicon" sockets and connectors.

#### Pin Assignment

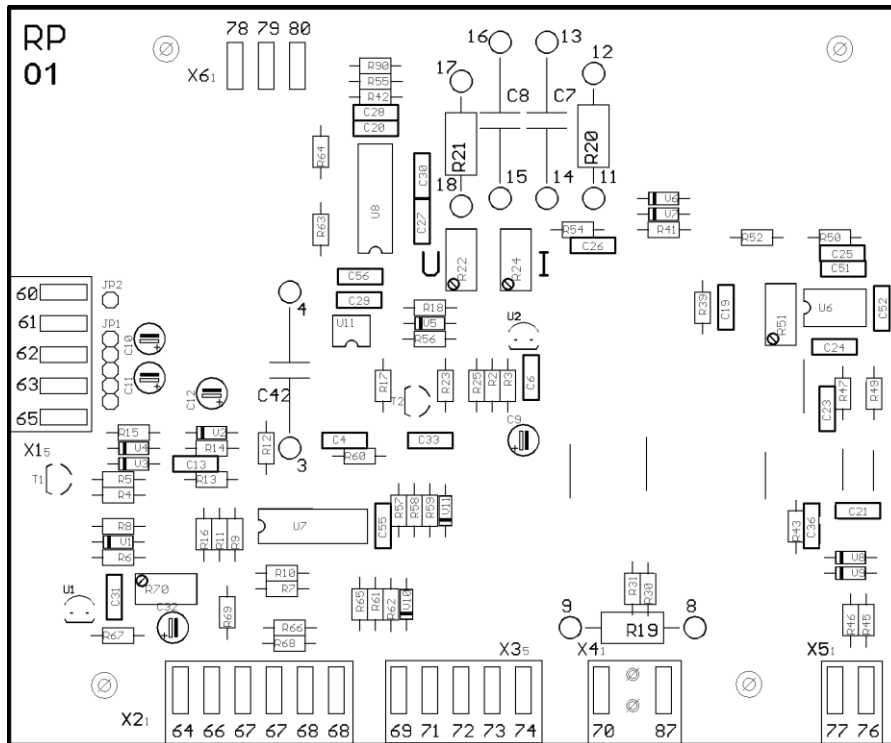
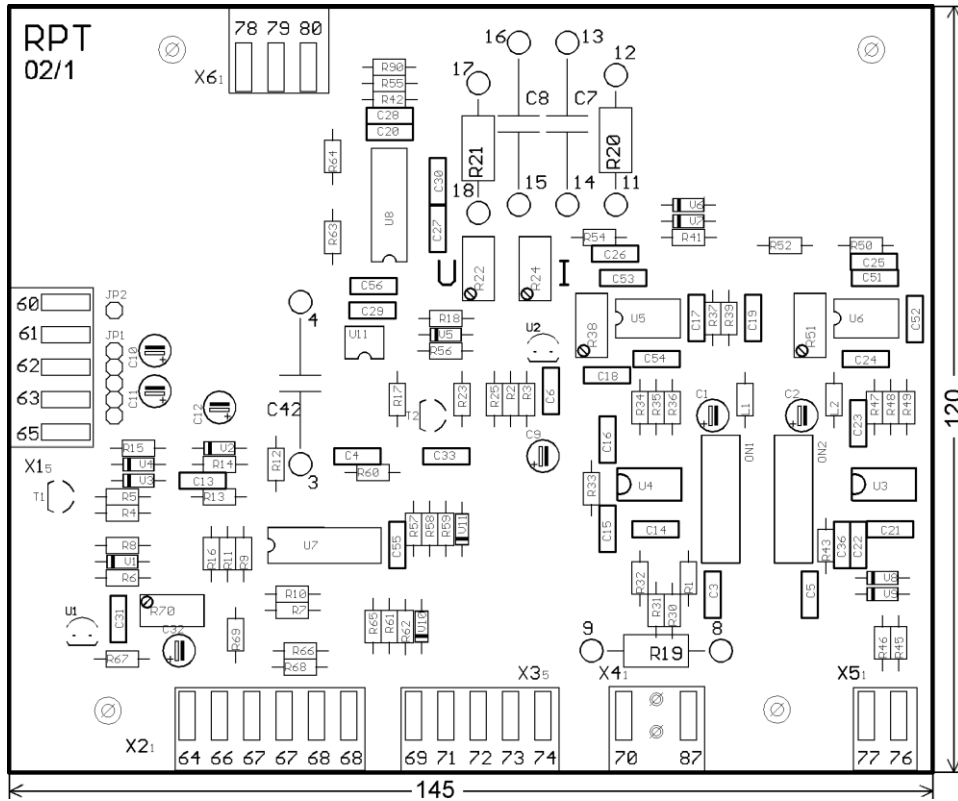
old	new	Function
60	X1/1	free
61	X1/2	+ 15V
62	X1/3	- 15V
63	X1/4	0 V - Gnd
65	X1/5	Inhibit Output of the Control Unit
64	X2/1	Controller Inhibit Input
66	X2/2	Pulse Inhibit Input
67	X2/3	Reference Potential
67	X2/4	Reference Potential
68	X2/5	+ 10V Uref
68	X2/6	+ 10V Uref
69	X3/1	Input: Reference Variable U
71	X3/2	Input: Setpoint Integrator
72	X3/3	Controller Output
73	X3/4	Output: Setpoint Integrator.
74	X3/5	Input: Reference Variable I
70	X4/1	Voltage Input – Actual Value +
-	X4/2	free
87	X4/3	Voltage Input – Actual Value –
77	X5/1	Current Input – Actual Value +
76	X5/2	Current Input – Actual Value –
78	X6/1	Unused – Custom Use Possible
79	X6/2	„
80	X6/3	„

On RPT02B, terminals X4/3 and X5/1 are not connected to reference potential.

On RPT01B, only X5/1 is not connected to reference potential.

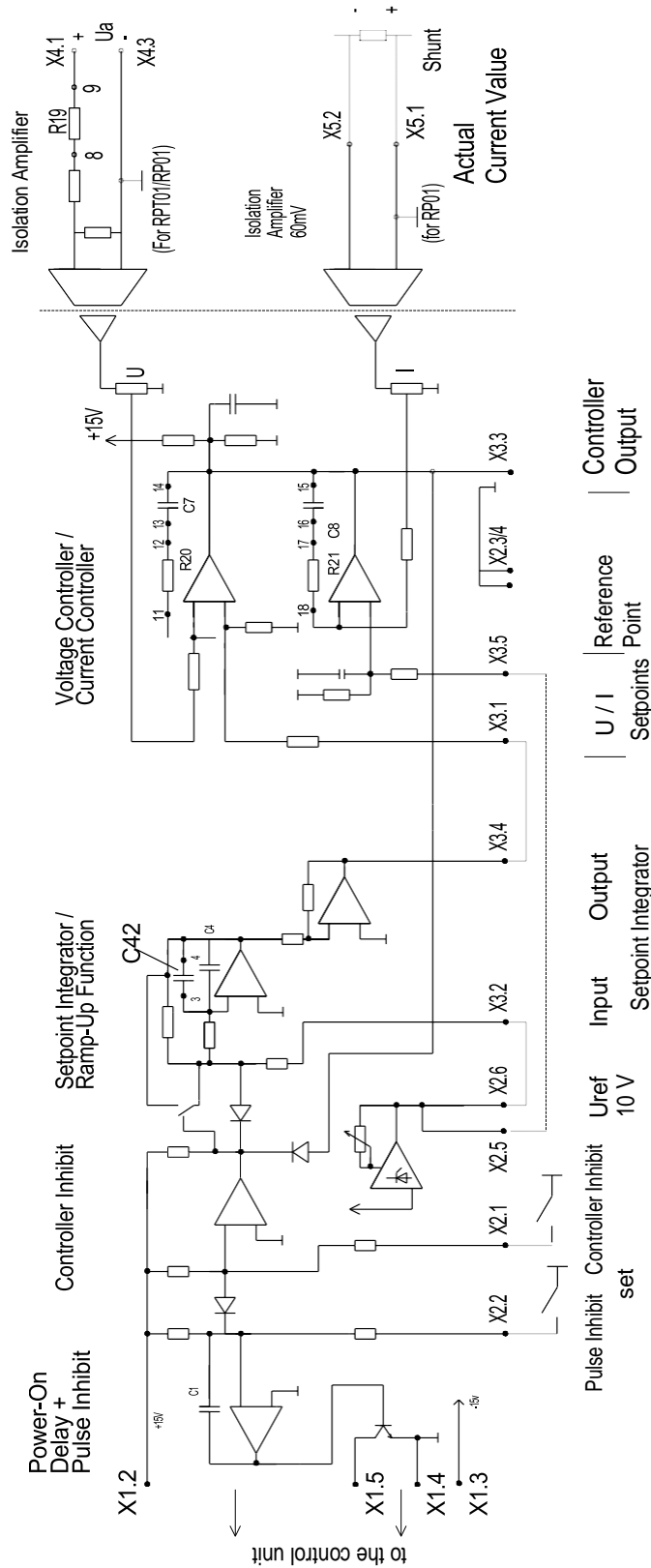
On RP01B, terminals X2/3, X2/4, X4/3, and X5/1 share the same potential.

4. Connection and Circuit Examples



3.2 Basic Controllers RP01B / RPT01B / RPT02B

4 Block Diagram



RPT02B.SKF

Example 4: Controller in the W3C Circuit

