

**B&R PLC PP15 for use with the  
d&b Remote network  
Reference manual (1.1 EN)**

### **General information**

B&R PLC PP15 for use with the  
d&b Remote network, Reference manual

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# 1. Introduction

This documentation refers to the **Programmable Logic Controller (PLC)** PP15 manufactured by B&R for use with the d&b Remote network.

## 1.1 PP15 concept

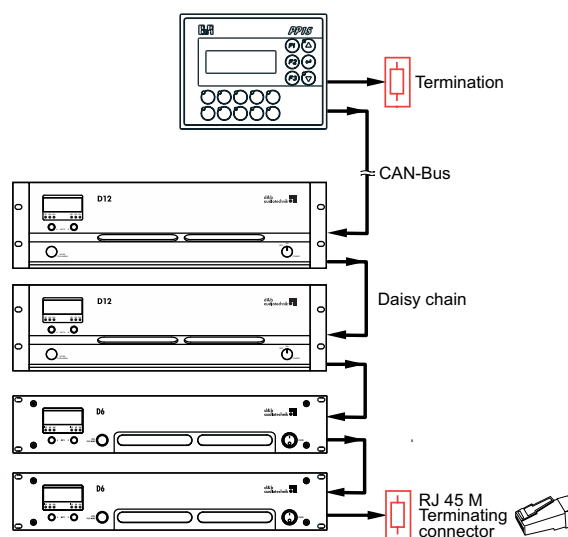


**Fig. 1: B&R PP15 PLC**

The PP15 concept allows reliable monitoring and control of the functions of a d&b sound reinforcement system. The operation does not require in-depth technical knowledge.

The monitoring function is particularly important when the system is used in accordance with IEC 60849 'Sound Systems for Emergency Purposes'.

Up to 255 d&b amplifiers can be controlled and monitored via the d&b remote network using the PP15 PLC.



**Fig. 2: PP15 application example**

## 2. Remote control of d&b amplifiers

The PP15 allows remote control of the following objects by recalling a dedicated preset.

- AmpPresets
- Standby mode
- Mute
- Level control from -57.5 dB to +6 dB with 0.5 dB detents
- Delay ON/OFF
- Delay settings
- Filter (CUT, HFA, ...)
- Equalizer ON/OFF
- Locking "Secondary Masters" (e.g. PC with R1 Remote control software)

### 2.1 Error monitoring

The PP15 polls all registered amplifiers for errors at cyclical intervals. If an error occurs in one of the devices, it is displayed on the error page of the PP15 with an error number and indicated as a general error message at the "Error" digital output. In addition an error description in plain text can be requested. If an amplifier does not respond to the periodic polls, a "PWR/Comm. Loss" error is displayed and also indicated as a general error message at the "Error" digital output.

#### 2.1.1 Error numbers for D12, D6, and E-PAC

##### Device Errors

No	Remark
0	OK
1	System Error
2	Program Error
3	PS Overtemp.
4	PS Overvoltage
5	PS Undervoltage
6	PS Temp. Warn.
7	PS Error
8	DSP Error
9	Remote Error

### Channel Errors

No	Remark
0	OK
1	Amp. Error
2	Amp. Protect
3	Amp. Overtemp.
4	Invalid DSP Program
5	Invalid Speaker Data
6	DSP Error
7	Top/Sub Mismatch
8	Spkr. Fault
9	Spkr. Fault HF
10	Spkr. Fault LF
11	Input Monitoring Fault
12	Amp. Temp. Warning

**Tab. 1: D12, D6, and E-PAC error numbers**

For further information on the error messages, please refer to the respective amplifier software manual.

## 2.2 Controls and indicators

### 2.2.1 Control panel

#### LC Display [1]

Acts as a user interface and displays all errors present.

#### Function keys [2]

Toggle between different menu pages. The user is guided by the display.

#### Up/Down keys [3]

Select menu items and/or browse through the error message list.

#### Enter key [4]

Confirms menu items and/or requests detailed cause of error.

**Notes:** To access the respective options or error entries move them to the first line behind the cursor using the Up/Down keys.

The "PWR/Comm. Loss" error message cannot be detailed.

#### Preset keys with LED display [5]

Recalls the amplifier settings (Preset) assigned to a particular key via the d&b Remote Network (CAN-Bus).

The following functions can be set using the d&b configuration tool:

- The LED related to the selected key lights up. If there is no preset assigned to the key, the LED key does not light up.
- In case of an alarm (alarm contact activated) all LEDs flash.

### 2.2.2 External displays and switches (keys)

It is possible to extend the functional range of the PP15 by external wiring. Refer to section 2.3.3 Digital inputs (DI) on page 10 and section 2.3.4 Digital outputs (DO) on page 11.

**Important!** If no external wiring is required, configure the "Alarm contact" (digital input DI 16) as high-active N/O contact (normally open contact).

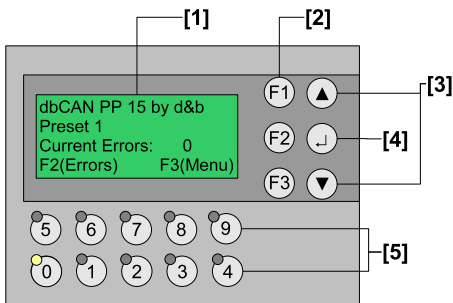


Fig. 3: Controls and indicators



Fig. 4: Option/Error entry position for access

```
dbCAN PP 15 by d&b
Preset 0
Current Errors:      4
F2(Errors)         F3(Menu)
```

**Fig. 5: Start page**

```
>0.01 Error 11
0.02 PWR/Comm. loss
0.16 PWR/Comm. loss
F2(Errors)         F3(Menu)
```

**Fig. 6: Error page**

```
>0.01 Error
Input
Monitoring Fault
F2(Errors)         F3(Menu)
```

**Fig. 7: Error message details**

```
>Reset Buzzer
Support Hotline
Battery State
F2(Errors)         F3(Menu)
```

**Fig. 8: Menu page**

### 2.2.3 User interface

The bottom display line indicates how to get to the different display pages.

Figure 5 shows the Start page. Line 2 displays a text stored with the preset, and line 3 shows the number of currently reported errors.

Press F2 to access a page containing the detailed error description as shown in Figure 6.

If more than 3 errors are reported, you can scroll up/down using the Up/Down keys [3].

#### Error message details:

The dbCAN-ID of the reporting amplifier is displayed.

The dbCAN-ID consists of the subnetwork (in this case 0), followed by the device ID (in this case 01). Instead of the dbCAN-ID a device name can be displayed (max. 5 characters).

The entry behind the dbCAN-ID is either "Error xx" or "PWR/Comm. loss".

When "Error xx" is displayed and the message is in the top line, press the Enter key [4] to request a detailed error description from the amplifier.

"PWR/Comm. loss" indicates that communication with the amplifier is not possible. Possible reasons are:

- The amplifier is faulty or disconnected from the mains.
- The network connection is interrupted.

#### Extended functions:

Press F3 to access the page that provides several extended functions. Scroll up/down using the the Up/Down keys [3] to place the requested function into the top line and press the Enter key [4] to execute it.

The following functions are available:

**Reset Buzzer:** Resets the Buzzer digital output. The Buzzer indicates that an error has occurred. The respective digital output carries a periodic 0.5 s high and 4.5 s low signal. The "Reset Buzzer" function acts as temporary acknowledgment to switch the Buzzer off. A new error reactivates the Buzzer signal.

**Support Hotline:** A support or service contact and telephone number can be stored.

**Battery State:** Reports the state of the PP15 battery. If the message "> Change Battery" appears, call the Service department. An empty battery results in loss of data.

**Note:** This is a maintenance issue that must be included in the service routine. Refer to the section "Changing the battery" in the B&R manual.

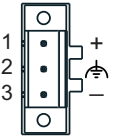
**Reset Power Panel:** Performs a restart of the PP15.



## 2.3 Pin assignment

### 2.3.1 Power supply

The PP15 requires an external 24 VDC power supply. The input current at the nominal voltage is about 10 mA.

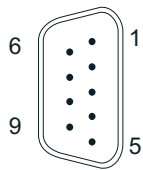
PP15 Power supply connector		
	Pin	Description
	1	nom. + 24 VDC / max 30 VDC
	2	Protective Earth
	3	GND

Tab. 2: PP15 Power supply connector

### 2.3.2 Data ports

The PP15 is equipped with two data ports

- CAN
- RS232 (for service purposes and/or software upload)

PP15 Data port connectors				
	CAN isolated CiA DS 102-1 [CiA]		RS232 up to 115 kBaud	
	Pin	Description	Pin	Description
		1	n.c.	1
	2	CAN_L	2	RXD
	3	CAN_GND	3	TXD
	4	n.c.	4	n.c.
	5	n.c.	5	GND
	6	reserved	6	n.c.
	7	CAN_H	7	RTS
	8	n.c.	8	CTS
	9	n.c.	9	n.c.

Tab. 3: PP15 Data port connectors (CAN / RS232)

### 2.3.3 Digital inputs (DI)

The PP15 is equipped with 16 software-configurable digital inputs to allow different functions to be triggered within the PP15.

The current drawn at 24 VDC is approx. 4.2 mA for each input.

Inputs DI 1-DI 10 can be used as push buttons in parallel to the keys 0-9 on the front panel. This allows the presets to be remote controlled.

Alternatively, inputs DI 1-DI 12 can be designed as switches (zone call function). In this configuration, the assigned preset is active as long as the switch is closed. After that, the last preset selected using the keys on the front panel is recalled.

Input DI 15 (Poll on/off) can be used to disable continuous monitoring of the connected amplifiers. This may be necessary if the amplifiers are temporarily disconnected from the network (CAN-Bus) or the mains.

Input DI 16 (alarm contact) is the input (Preset) with the highest priority.

**Note:** If no external wiring is required, configure the "Alarm contact" digital input as high-active N/O contact (normally open contact).

Terminal block connections - X1 Digital Inputs (DI)		
Pin	Description	
1	COM si	GND in sink operation, +24 VDC in source operation (1*)
2	COM so	+24 VDC in sink operation, GND in source operation. (For further details refer to the B&R manual)
3	DI 1	Preset1/ZoneCall1
4	DI 2	Preset2/ZoneCall2
5	DI 3	Preset2/ZoneCall3
6	DI 4	Preset2/ZoneCall4
7	DI 5	Preset2/ZoneCall5
8	DI 6	Preset2/ZoneCall6
9	DI 7	Preset2/ZoneCall7
10	DI 8	Preset2/ZoneCall8
11	DI 9	Preset2/ZoneCall9
12	DI 10	Preset2/ZoneCall10
13	DI 11	/ZoneCall11
14	DI 12	/ZoneCall12
15	DI 13	
16	DI 14	
17	DI 15	Poll off (high)/on (low)
18	DI 16	Alarm contact

Tab. 4: X1 Digital Inputs (DI)


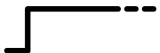

### 2.3.4 Digital outputs (DO)

There are 6 digital outputs to display system status or to drive external devices.

The maximum current drawn at 24 VDC is 500 mA.

Output DO 12 (Poll) indicates when connected amplifiers are checked for faults at periodic intervals (also refer to Digital Input DI 15).

Output DO 13 (Ready) indicates when the PP15 is initialized and ready to operate.

Logic signal	DO 12 Poll	DO 13 Ready
<b>Low</b> 	Registered amps are not monitored	PP15 not operating
<b>High</b> 	Registered amps are monitored	PP15 operating
<b>Blink (toggle)</b> 	No amps registered for monitoring	PP15 error

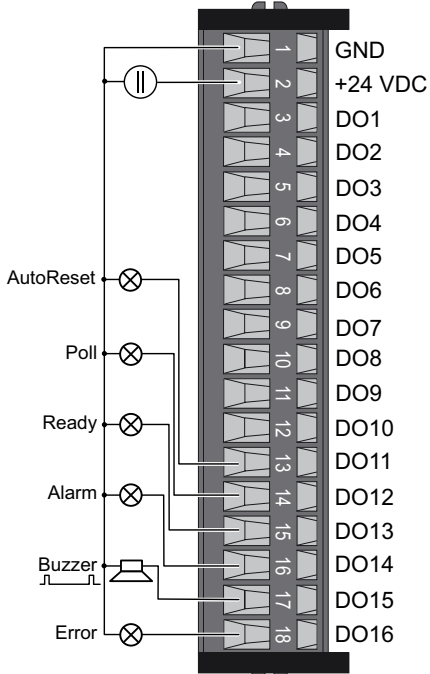
**Tab. 5: DO 12/13 logic signals**

Output DO 14 (Alarm) indicates when an alarm signal is applied to input DI 16.

An error message from a controlled amplifier is displayed at output DO 16 (Error). Simultaneously, output DO 15 (Buzzer) emits periodic impulses (0.5 s high, 4.5 s low). The Buzzer can be reset in the PP15 menu. If a new fault occurs, the Buzzer will be reactivated.

**Terminal block connections - X2 Digital Outputs (DO)**

Pin	Description
1	GND
2	+24 VDC
3	DO 1
4	DO 2
5	DO 3
6	DO 4
7	DO 5
8	DO 6
9	DO 7
10	DO 8
11	DO 9
12	DO 10
13	DO 11 AutoReset
14	DO 12 Poll
15	DO 13 Ready
16	DO 14 Alarm
17	DO 15 Buzzer
18	DO 16 Error



**Tab. 6: X2 Digital Outputs (DO)**

## 2.4 Uploading the d&b software routines to the PP15

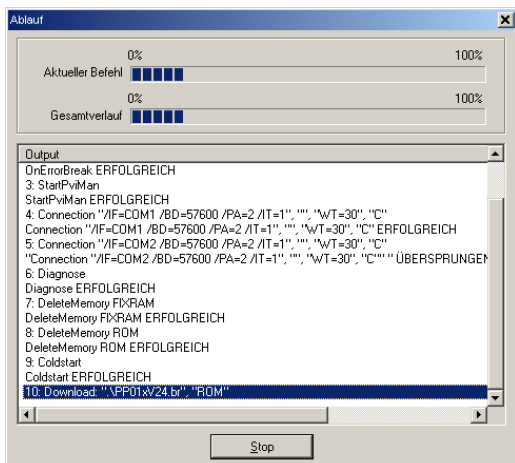


Fig. 9: PVI Transfer software

To implement the functionality explained above in the PP15, the d&b software routines have to be uploaded to the PP15.

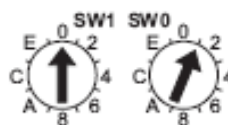
### Requirements:

- Computer equipped with a serial COM port 1, 2, 3 or 4 (RS 232)<sup>1</sup>
- Serial cross cable (null modem cable)

Pin connector 1	1 and 6	2	3	4	5	7	8	9
Pin connector 2	4	3	2	1 and 6	5	8	7	9

### Installation procedure:

1. Adjust the 2 hex switches on the rear panel of the PP15 to values ranging from 01 to FE (e.g. SW1 to 0 and SW0 to 1).



2. Connect the PP15 to COM1, 2, 3 or 4 of the computer using the serial cross cable and switch on the PP15.
3. Extract the d&b software routines (.zip) and double-click the "Start.bat" file.  
The PVI Transfer software starts. The upload script is displayed.

<sup>1</sup> This was also tested using an FTDI USB to serial adapter.

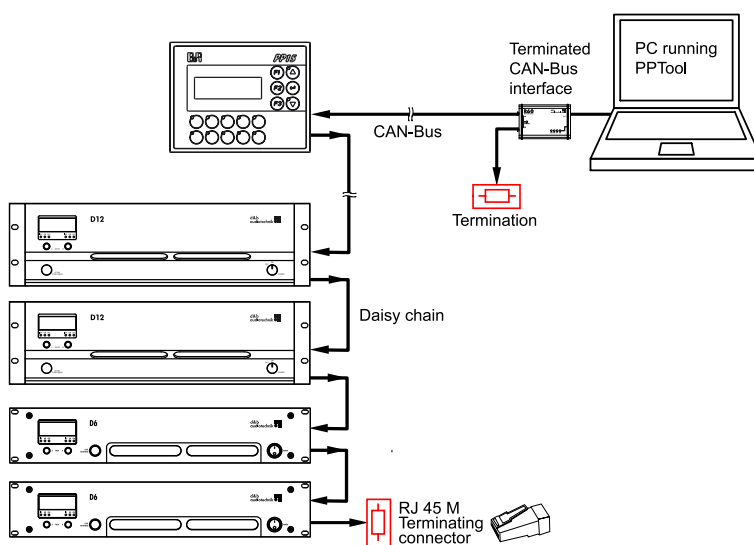
## 2.5 Configuration Tool (developer version)

The PP15 is configured with the help of the CAN-Bus using a PC and the PPTool program.

The PC which is equipped with a CAN interface (R60/R70) is connected to the PP15, no matter whether the amplifiers to be controlled are connected or not.

With the configuration tool the amplifiers to be controlled are registered in the PP15 (dbCAN-ID) and the presets assigned to the respective keys or inputs are stored.

For a detailed description of the configuration possibilities and the configuration tool, please contact d&b support at [software.support@dbaudio.com](mailto:software.support@dbaudio.com).



**Fig. 10: Model assembly/layout for configuration of PP15**

## **2.6 Monitoring according to IEC 60849**

The sound reinforcement system is monitored in the d&b amplifiers. Both the connected loudspeakers (Output loop  $\Rightarrow$  Load monitoring) and the incoming signal (Input loop  $\Rightarrow$  Input monitoring) are monitored. For further details, refer to the 'Load monitoring' and 'Input monitoring' sections in the respective amplifier software manuals.

In addition, the amplifier incorporates a permanent self-monitoring function.

The PP15 communicates with the amplifier via the CAN-Bus and displays error messages from the amplifier at a central location point (see 2.3.4 Digital outputs (DO) on page 11).

Since amplifier boot time and power-up time can take longer than 10 s, the power of the PP15 must be backed up by a UPS (uninterruptible power supply) to ensure the PP15 is ready for operation at all times.

Since the internal error logbook of the PP15 is restricted to 50 entries, the digital output "AutoReset" indicates whenever the PP15 was automatically reset and restarted.

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### 3.3 Sources and References

[EN 60849]	CENELEC, Sound Systems for Emergency Purposes, (IEC 60849:1998)
[EN 61131]	German Standard DIN EN 61131 Part 3, Programmable Logic Controller (PLC) – Programming languages, (IEC 1131-3:1993)

