

# Function Description

## Digital inputs/outputs

**APCLe-1711, CPCIs-1711, APCI-1710 and CPCI-1710**

Multifunction counter board, optically isolated



### Product information

This manual contains the technical installation and important instructions for correct commissioning and usage, as well as production information according to the current state before printing.

The content of this manual and the technical product data may be changed without prior notice.

ADDI-DATA GmbH reserves the right to make changes to the technical data and the materials included herein.

### Warranty and liability

The user is not authorised to make changes to the product beyond the intended use, or to interfere with the product in any other way.

ADDI-DATA shall not be liable for obvious printing and phrasing errors.

In addition, ADDI DATA, if legally permissible, shall not be liable for personal injury or damage to materials caused by improper installation and/or commissioning of the product by the user or improper use; for example, if the product is operated despite faulty safety and protection devices, or if notes in the operating instructions regarding transport, storage, installation, commissioning, operation, limit values, etc. are not taken into consideration.

Liability is further excluded if the operator changes the product or the source code files without authorisation and/or if the operator is guilty of not monitoring the permanent operational capability of working parts and this has led to damage.

### Copyright

This manual, which is intended for the operator and its staff only, is protected by copyright.

Duplication of the information contained in the operating instructions and of any other product information, or disclosure of this information for use by third parties, is not permitted, unless this right has been granted by the product licence issued. Non-compliance with this could lead to civil and criminal proceedings.

### ADDI-DATA software product licence

Please read this licence carefully before using the standard software! The customer is only granted the right to use this software if he/she agrees with the conditions of this licence.

The software may only be used to set up the ADDI-DATA products.

Reproduction of the software is forbidden (except for back-up and for exchange of faulty data carriers). Disassembly, decompilation, decryption and reverse engineering of the software are forbidden. This licence and the software may be transferred to a third party if this party has acquired a product by purchase, has agreed to all the conditions in this licence contract and the original owner does not keep any copies of the software.

### Trademarks

- ADDI-DATA, APCI-1500, MSX-Box and MSX-E are registered trademarks of ADDI-DATA GmbH.
- Turbo Pascal, Delphi, Borland C, Borland C++ are registered trademarks of Borland Software Corporation.
- Microsoft .NET, Microsoft C, Visual C++, MS-DOS, Windows 7, Windows 10, Windows Server 2000, Windows Server 2003, Windows Embedded and Internet Explorer are registered trademarks of Microsoft Corporation.
- Linux is a registered trademark of Linus Torvalds.
- LabVIEW, LabWindows/CVI, DASyLab, DIAdem are registered trademarks of National Instruments Corporation.
- CompactPCI is a registered trademark of PCI Industrial Computer Manufacturers Group.
- VxWorks is a registered trademark of Wind River Systems, Inc.
- RTX is a registered trademark of IntervalZero.



## Warning!

The following risks result from the improper implementation of the board and from use contrary to the regulations:



**Personal injury**



**Damage to the board, the PC and peripherals**



**Pollution of the environment.**

- Protect yourself, others and the environment!
- Read the safety precautions (yellow leaflet) carefully!  
If this leaflet is not enclosed with the documentation, please contact us and ask for it.
- Observe the instructions of this manual!  
Make sure that you do not forget or skip any step!  
We are not liable for damages resulting from the wrong use of the board.
- Pay attention to the following symbols:



### NOTICE!

Designates hints and other useful information.



### NOTICE!

Designates a possibly dangerous situation.

If the instructions are ignored, the board, the PC and/or peripherals may be **destroyed**.



### WARNING!

Designates a possibly dangerous situation.

If the instructions are ignored, the board, the PC and/or peripherals may be **destroyed** and persons may be **endangered**.

## Contents

<b>Warning!</b>	<b>3</b>
<b>Chapter overview</b>	<b>5</b>
<b>1 Function description</b>	<b>6</b>
1.1 Board versions with "Digital I/O" function	6
1.2 Block diagram	7
1.3 Used signals	8
1.4 Pin assignment: Function modules	9
1.5 Connecting the signal generators	10
1.5.1 Connection to the screw terminal panel	10
1.6 Connection example	12
1.7 Procedure for using the "Digital I/O" function	12
<b>2 Standard software</b>	<b>13</b>
<b>3 Appendix</b>	<b>14</b>
3.1 Index	14
<b>4 Contact and support</b>	<b>15</b>

## Figures

Fig. 1-1: Block diagram: "Digital I/O" function	7
Fig. 1-2: Pin assignment: 50-pin D-Sub male connector (4 digital I/O modules)	9
Fig. 1-3: Pin assignment: 78-pin D-Sub female connector (APCLe-1711 and CPCIs-1711)	10
Fig. 1-4: Digital I/O connection example	12

## Tables

Table 1-1: Board versions with "Digital I/O" function	6
Table 1-2: Used signals	8
Table 1-3: Connection of the signal generators to the screw terminal panel	11

## Chapter overview

In this function manual, you will find the following information:

Chapter	Content
1	Function description including block diagram and pin assignment
2	Standard software: Information on the API software functions
3	Appendix with index
4	Contact and support address

This document solely describes the function "Digital I/O".

For general information on the **APCLe-/CPCIs-1711** or **APCI-/CPCI-1710**, please read the respective Technical Description of these boards (see PDF links). It contains, for example, the chapter "Inserting and installing the board" that supports you in commissioning.

# 1 Function description

The function “Digital I/O” allows for an easy control or monitoring of single differential, TTL or 24 V signals.

A function module with this function has:

- 2 differential RS422 inputs or outputs (software-selectable), can also be used as TTL inputs or outputs
- 2 differential RS422 inputs (software-selectable), can also be used as TTL inputs
- 3 GND-related 24 V inputs, optional 5 V
- 1 digital 24 V output, load to GND (**APCLe-/CPCIs-1711**: 5-36 V, **APCI-/CPCI-1710**: 10-36 V / 500 mA)

## Features:

- 4 function modules per board
- Optical isolation of the inputs and outputs through opto-couplers to prevent ground loops

## 1.1 Board versions with “Digital I/O” function



### NOTICE!

With the 24 V version of the **APCLe-1711**, **CPCIs-1711** or **APCI-1710**, the “Digital I/O” function can be used only to a limited extent.

Table 1-1: Board versions with “Digital I/O” function

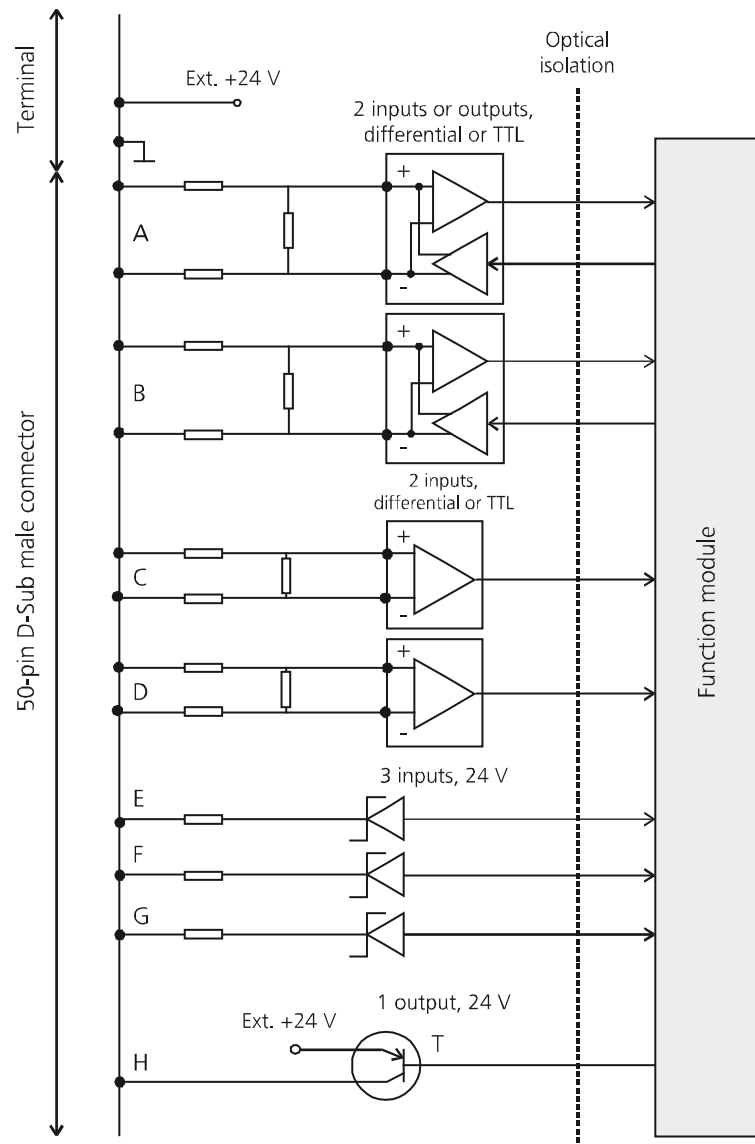
Board version	“Digital I/O” function
<b>APCLe-1711</b>	x
<b>APCLe-1711-24V</b>	x*
<b>APCLe-1711-5V-I</b>	x
<b>CPCIs-1711</b>	x
<b>CPCIs-1711-24V</b>	x*
<b>CPCIs-1711-5V-I</b>	x
<b>APCI-1710</b>	x
<b>APCI-1710-24V</b>	x*
<b>APCI-1710-5V-I</b>	x
<b>APCI-1710-5V-I-O</b>	x
<b>CPCI-1710</b>	x

\* Pin Ax or Bx: Only the 24 V input can be used and not the 24 V output.

The I/O specifications of the different board versions are available in the Technical Description of the **APC1e-/CPC1s-1711** or **APCI-/CPCI-1710** (see PDF links).

## 1.2 Block diagram

**Fig. 1-1: Block diagram: “Digital I/O” function**



### 1.3 Used signals

If the "Digital I/O" function is implemented on all four function modules, a total of 32 channels are available, of which a maximum of 28 can be used as digital inputs (A to G) or a maximum of 12 as digital outputs (A, B and H).

**Table 1-2: Used signals**

Signal name	Pin name	Signal type	Function
DIG_IO_Ax+/-	Ax+/-	Differential/TTL/ 24 V*	Digital input/output (only input with 24 V*)
DIG_IO_Bx+/-	Bx+/-	Differential/TTL/ 24 V*	Digital input/output (only input with 24 V*)
DIG_IN_Cx+/-	Cx+/-	Differential/TTL/ 24 V*	Digital input
DIG_IN_Dx+/-	Dx+/-	Differential/TTL/ 24 V*	Digital input
DIG_IN_Ex	Ex	24 V / optional 5 V	Digital input
DIG_IN_Fx	Fx	24 V / optional 5 V	Digital input
DIG_IN_Gx	Gx	24 V / optional 5 V	Digital input
DIG_OUT_Hx	Hx	24 V**	Digital output

x = Number of the function module (0-3)

\* 24 V with 24 V board version

\*\* **APC1e-/CPC1s-1711**: 5-36 V, **APCI-/CPCI-1710** 10-36 V



## 1.4 Pin assignment: Function modules

**Fig. 1-2: Pin assignment: 50-pin D-Sub male connector (4 digital I/O modules)**

Pin		Pin				Pin	
34	+24 V / U <sub>Ref</sub> *						
35	FM0: DIG_OUT_H0	18	FM2: DIG_IO_A2+	34	●	1	GND
36	FM1: DIG_OUT_H1	19	FM2: DIG_IO_A2-	35	●	2	FM0: DIG_IO_A0+
37	FM2: DIG_OUT_H2	20	FM2: DIG_IO_B2+	36	●	3	FM0: DIG_IO_A0-
38	FM3: DIG_OUT_H3	21	FM2: DIG_IO_B2-	37	●	4	FM0: DIG_IO_B0+
39	FM0: DIG_IN_E0	22	FM2: DIG_IN_C2+	38	●	5	FM0: DIG_IO_B0-
40	FM1: DIG_IN_E1	23	FM2: DIG_IN_C2-	39	●	6	FM0: DIG_IN_C0+
41	FM2: DIG_IN_E2	24	FM2: DIG_IN_D2+	40	●	7	FM0: DIG_IN_C0-
42	FM3: DIG_IN_E3	25	FM2: DIG_IN_D2-	41	●	8	FM0: DIG_IN_D0+
43	FM0: DIG_IN_F0	26	FM3: DIG_IO_A3+	42	●	9	FM0: DIG_IN_D0-
44	FM1: DIG_IN_F1	27	FM3: DIG_IO_A3-	43	●	10	FM1: DIG_IO_A1+
45	FM2: DIG_IN_F2	28	FM3: DIG_IO_B3+	44	●	11	FM1: DIG_IO_A1-
46	FM3: DIG_IN_F3	29	FM3: DIG_IO_B3-	45	●	12	FM1: DIG_IO_B1+
47	FM0: DIG_IN_G0	30	FM3: DIG_IN_C3+	46	●	13	FM1: DIG_IO_B1-
48	FM1: DIG_IN_G1	31	FM3: DIG_IN_C3-	47	●	14	FM1: DIG_IN_C1+
49	FM2: DIG_IN_G2	32	FM3: DIG_IN_D3+	48	●	15	FM1: DIG_IN_C1-
50	FM3: DIG_IN_G3	33	FM3: DIG_IN_D3-	49	●	16	FM1: DIG_IN_D1+
				50	●	17	FM1: DIG_IN_D1-

Pin 34: see Technical Description of the board

This pin assignment also applies to the **APC1e-1711** or **CPC1s-1711** if the cable **ST1711-50** is connected to the 78-pin D-Sub female connector of the board. For further information on this, please refer to the Technical Description of the **APC1e-1711** and **CPC1s-1711** (see PDF link).

**Fig. 1-3: Pin assignment: 78-pin D-Sub female connector (APCle-1711 and CPCIs-1711)**

Pin		Pin		Pin		Pin	
78		59				39	20
77		58				38	19
76		57				37	18
75		56				36	17
74		55				35	16
73		54				34	15
72	+24 V / U <sub>Ref</sub> *	53				33	14
71	FM3: DIG_OUT_H3	52	U <sub>Ref</sub> *		GND	32	FM3: DIG_IN_E3
70	FM3: DIG_IN_D3-	51	FM3: DIG_IN_G3		FM3: DIG_IN_F3	31	FM3: DIG_IO_A3-
69	FM3: DIG_IN_D3+	50	FM3: DIG_IN_C3-		FM3: DIG_IO_B3-	30	FM3: DIG_IO_A3+
68	FM2: DIG_OUT_H2	49	FM3: DIG_IN_C3+		FM3: DIG_IO_B3+	29	FM2: DIG_IN_E2
67	FM2: DIG_IN_D2-	48	FM2: DIG_IN_G2		FM2: DIG_IN_F2	28	FM2: DIG_IO_A2-
66	FM2: DIG_IN_D2+	47	FM2: DIG_IN_C2-		FM2: DIG_IO_B2-	27	FM2: DIG_IO_A2+
65	FM1: DIG_OUT_H1	46	FM2: DIG_IN_C2+		FM2: DIG_IO_B2+	26	FM1: DIG_IN_E1
64	FM1: DIG_IN_D1-	45	FM1: DIG_IN_G1		FM1: DIG_IN_F1	25	FM1: DIG_IO_A1-
63	FM1: DIG_IN_D1+	44	FM1: DIG_IN_C1-		FM1: DIG_IO_B1-	24	FM1: DIG_IO_A1+
62	FM0: DIG_OUT_H0	43	FM1: DIG_IN_C1+		FM1: DIG_IO_B1+	23	FM0: DIG_IN_E0
61	FM0: DIG_IN_D0-	42	FM0: DIG_IN_G0		FM0: DIG_IN_F0	22	FM0: DIG_IO_A0-
60	FM0: DIG_IN_D0+	41	FM0: DIG_IN_C0-		FM0: DIG_IO_B0-	21	FM0: DIG_IO_A0+
		40	FM0: DIG_IN_C0+		FM0: DIG_IO_B0+		GND

FM = Function module

\* Pins 52 and 72: see Technical Description of the board

## 1.5 Connecting the signal generators

### 1.5.1 Connection to the screw terminal panel

On the screw terminal panel **PX8001**, the pins of the 50 pin D-Sub female connector and the terminals connected to them are numbered in the same way. Thus, the terminal assignment of the screw terminal panel is identical with the pin assignment of the 50-pin D-Sub male connector of the **APCI-/CPCI-1710** or with that of the 50-pin D-Sub male connector on the **ST1711-50** cable (**APCLe-/CPCIs-1711**).

The following table is to serve as a help for you when connecting the signal generators to the screw terminal panel. The blank fields in the "Signal generator" column can be filled in on the basis of the selected signal generator type.

Table 1-3: Connection of the signal generators to the screw terminal panel

Signal generator			Screw terminal panel PX8001 (50-pin)							
Pin No.	Pin name	Lead colour (cable)	Signal name	Terminal name	Signal type	Terminal No.				Terminal function
						FM0	FM1	FM2	FM3	
	+24 V / U <sub>Ref</sub>		+24 V / U <sub>Ref</sub>	+24 V / U <sub>Ref</sub>	-	34	34	34	34	see Technical Description of the board
	GND		GND	GND	-	1	1	1	1	Ground
			DIG_IO_Ax+	Ax+	Diff./TTL/24 V*	2	10	18	26	Digital input/output (only input with 24 V*)
			DIG_IO_Ax-	Ax-	Diff./TTL/24 V*	3	11	19	27	
			DIG_IO_Bx+	Bx+	Diff./TTL/24 V*	4	12	20	28	Digital input/output (only input with 24 V*)
			DIG_IO_Bx-	Bx-	Diff./TTL/24 V*	5	13	21	29	
			DIG_IN_Cx+	Cx+	Diff./TTL/24 V*	6	14	22	30	Digital input
			DIG_IN_Cx-	Cx-	Diff./TTL/24 V*	7	15	23	31	
			DIG_IN_Dx+	Dx+	Diff./TTL/24 V*	8	16	24	32	Digital input
			DIG_IN_Dx-	Dx-	Diff./TTL/24 V*	9	17	25	33	
			DIG_IN_Ex	Ex	24 V / opt. 5 V	39	40	41	42	Digital input
			DIG_IN_Fx	Fx	24 V / opt. 5 V	43	44	45	46	Digital input
			DIG_IN_Gx	Gx	24 V / opt. 5 V	47	48	49	50	Digital input
			DIG_OUT_Hx	Hx	24 V**	35	36	37	38	Digital output
			-	-	-	-	-	-	-	-
			-	-	-	-	-	-	-	-
			-	-	-	-	-	-	-	-
			-	-	-	-	-	-	-	-

x = Number of the function module (0-3)

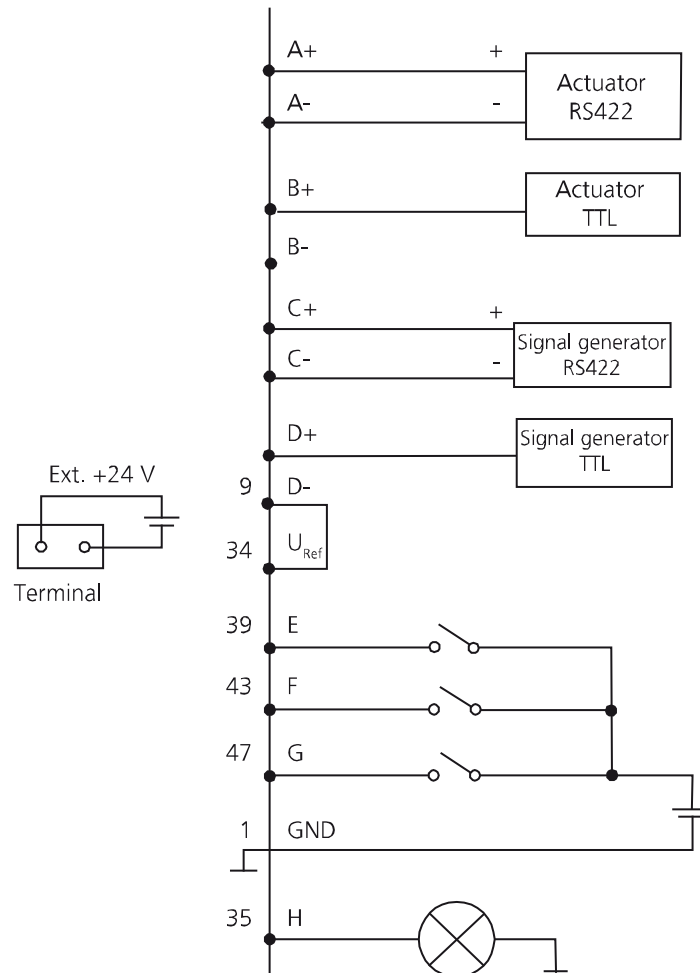
\*\* **APCle-/CPCIs-1711**: 5-36 V, **APCI-/CPCI-1710** 10-36 V

\* 24 V with 24 V board version

## 1.6 Connection example

Programming (Function module 1): A = output, B = input

**Fig. 1-4: Digital I/O connection example**



## 1.7 Procedure for using the “Digital I/O” function

In order to use the “Digital I/O” function, the following steps need to be performed:

1. Select the function module(s).
2. Select the channels.
3. Connect the signals.
4. Initialise the A and B channels as inputs or outputs.
5. Control the outputs.
6. Read the inputs.

## 2 Standard software

The API software functions supported by the board are listed in an HTML document. A description of how to access the respective file can be found in the document "Quick installation PC boards" (see PDF link), in the chapter "Standard software".

## 3 Appendix

### 3.1 Index

Block diagram 7  
Board versions 6  
Connection  
    Signal generators 10  
Connection example 12

Pin assignment 9  
Signals 8  
Standard software 13

## 4 Contact and support

### **Do you have any questions? Write or call us:**

Address: ADDI-DATA GmbH  
Airpark Business Center  
Airport Boulevard B210  
77836 Rheinmünster  
Germany

Phone: +49 7229 1847-0

Fax: +49 7229 1847-222

E-mail: [info@addi-data.com](mailto:info@addi-data.com)

### **Manual and software download from the Internet:**

<https://drivers.addi-data.com>