

5.4 Expansion module IT42

Order No. 6DD1606-4AB0

Description The IT42 expansion module provides analog and binary inputs and outputs. The expansion module is inserted on a CPU module (PM5, PM6). A maximum of 2 expansion modules ITxx can be inserted on a CPU module. An ITxx occupies 1 slot (in addition to the mounting slot of the CPU module itself).

- Inputs and outputs**
- 4 analog outputs
 - 4 integrating, high-resolution analog inputs (V/fc voltage/frequency conversion)
 - 4 analog inputs (ADU)
 - 16 binary outputs
 - 16 binary inputs

Block diagram

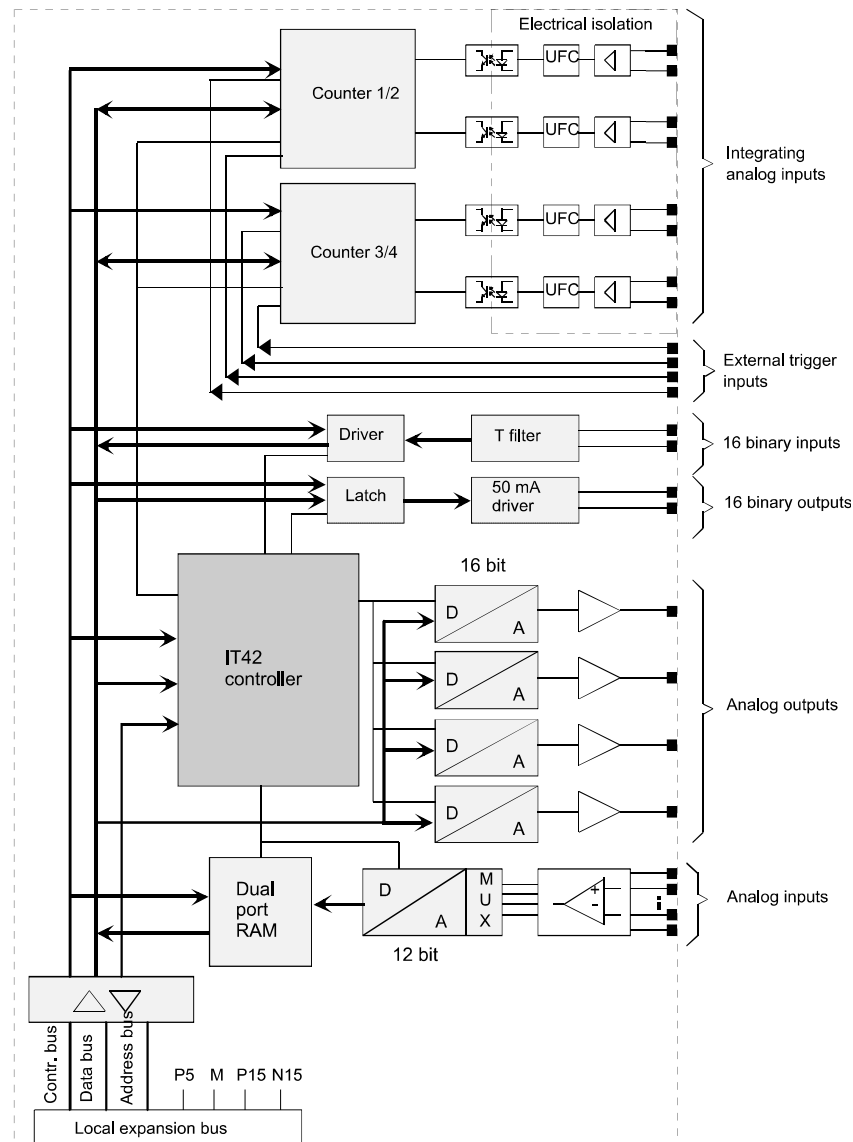


Fig. 5-8 Block diagram of IT42

5.4.1 Supplementary components

Interface modules with terminals

All of the cables for the input / output signals are not directly connected to the module, but are connected via interface modules. The interface modules serve as mechanical connection element (**screw/plug-in terminals**) and to electrically adapt the plant/system signals (optional).

Interface module	Function
SB10	Direct connection (1:1 connection) of 8 binary inputs/outputs, LED, no signal conversion
SB60	8 binary inputs , converted from 230V to 24V (signal level on the module), LED, electrical isolation (floating)
SB61	8 binary inputs , converted from 48V to 24V, LED, electrical isolation (floating)
SB70	8 binary outputs , converted from 24V to 230V (changeover relay), LED, electrical isolation (floating)
SB71	8 binary outputs , converted from 25V to 48V (transistor)
SU10	25 signals are directly connected, no signal conversion
SU12	10 signals are directly connected, no signal conversion

Table 5-26 Interface modules which can be connected to the module

Cables

The module is connected to the interface modules using the matching plug-in cables. The plug-in cables for large connectors have several cable ends, to which the appropriate number of matching interface modules can be connected.

Either interface modules with or without signal conversion (e. g. signal level conversion, electrical isolation) and LED display can be connected at connectors with binary inputs and outputs.

The selected cable depends on the type of interface module:

Connector IT42	Signals	Cable	Interface module
X6	Integrating analog inputs	SC50	SU10
X7	Analog outputs/inputs	SC51	SU10
X8	Binary outputs/inputs; trigger inputs for integrating analog inputs	SC49 or SC54	2 x SU10 or 5 x SB10 SB60 SB61 SB70 SB71 SU12

Table 5-27 Cables available for use with the module

5.4.2 Connector assignment X6

Connector X6 (15-pin, sub D) connects the signals for

- 4 integrating analog inputs

An **SU10** interface module can be connected via plug-in cable **SC50** ("1:1 connection from the module to the terminals:

Integrating analog inputs at X6 with SU10

IT42 X6	Significance	SU10	Connector designation when configuring
1	UFC analog input 1+	1	X6A
9	UFC analog input 1-	2	
2	Ground, input 1	3	
10	Ground, input 2	4	X6B
3	UFC analog input 2+	5	
11	UFC analog input 2-	6	
4	UFC analog input 3+	7	X6C
12	UFC analog input 3-	8	
5	Ground, input 3	9	
13	Ground, input 4	10	X6D
6	UFC analog input 4+	11	
14	UFC analog input 4-	12	
7	Not connected	13	
15	Not connected	14	
8	Not connected	15	
-	Not connected	16 - 26	

Table 5-28 Pin assignment IT42, connector X6 and terminal assignment SU10

5.4.3 Connector assignment X7

Connector X7 (25-pin, sub D) connects the signals for

- 4 analog outputs
- 4 analog inputs

An **SU10** interface module can be connected via plug-in cable **SC51**.

Analog inputs/outputs at X7 with SU10

IT42 X7	Significance	SU10	Connector designation when configuring
1	ADU analog input 1+	1	X7A
14	ADU analog input 1-	2	
2	ADU analog input 2+	3	X7B
15	ADU analog input 2-	4	
3	ADU analog input 3+	5	X7C
16	ADU analog input 3-	6	
4	ADU analog input 4+	7	X7D
17	ADU analog input 4-	8	
5	Reference ground for differential ADU analog inputs (due to push-pull)	9	
18	Reference ground for differential ADU analog inputs (due to push-pull)	10	
6	Analog output 1+	11	X7E
19	Ground, inductively de-coupled	12	
7	Analog output 2+	13	X7F
20	Ground, inductively de-coupled	14	
8	Analog output 3+	15	X7G
21	Ground, inductively de-coupled	16	
9	Analog output 4+	17	X7H
22	Ground, inductively de-coupled	18	
10	Ground	19	
23	Ground	20	
11	Not connected	21	
12	Not connected	22	
13	Not connected	23	
24	Not connected	24	
25	Not connected	25	
-	Not connected	26	

Table 5-29 Pin assignment IT42, connector X7 and terminal assignment SU10

5.4.4 Connector assignment X8

Connector X8 (50 pin, sub D) connects the signals for:

- 2*8 binary inputs and 2*8 binary outputs
- 4 trigger signals for integrating analog inputs

The assignment of the 16 binary inputs and outputs corresponds to those of **IT41**, connector X7.

5.4.4.1 Connector assignment X8 for SC49

SU10 terminal assignment at SC49, end A

IT42 X8	Significance	SU10 at SC49, cable end A	Connector designation when configuring
1	Binary output 1	1	X8A
34	Binary output 2	2	
18	Binary output 3	3	
2	Binary output 4	4	
35	Binary output 5	5	
19	Binary output 6	6	
3	Binary output 7	7	
36	Binary output 8	8	
20	External P24 voltage	9	
4	External ground	10	
37	Binary output 9	11	X8B
21	Binary output 10	12	
5	Binary output 11	13	
38	Binary output 12	14	
22	Binary output 13	15	
6	Binary output 14	16	
39	Binary output 15	17	
23	Binary output 16	18	
7	External P24 voltage	19	
40	External ground	20	
24	Binary input 1	21	X8C
8	Binary input 2	22	
41	Binary input 3	23	
25	Binary input 4	24	
9	Binary input 5	25	

Table 5-30 SU10 terminal assignment for SC49, cable end A

**SU10 terminal
assignment at
SC49, end B**

IT42 X8	Significance	SU10 at SC49, cable end B	Connector designation when configuring
42	Binary input 6	1	X8C
26	Binary input 7	2	
10	Binary input 8	3	
43	External P24 voltage	4	
27	External ground	5	
11	Binary input 9	6	X8D
44	Binary input 10	7	
28	Binary input 11	8	
12	Binary input 12	9	
45	Binary input 13	10	
29	Binary input 14	11	
13	Binary input 15	12	
46	Binary input 16	13	
30	External P24 voltage	14	
14	External ground	15	
47	Trigger input 1	16	
31	Trigger input 2	17	
15	Trigger input 3	18	
48	Trigger input 4	19	
32	Not connected	20	
16	Not connected	21	
49	Not connected	22	
33	Not connected	23	
17	External P24 voltage	24	
50	External ground	25	

Table 5-31 SU10 terminal assignment for SC49, cable **end A**

5.4.4.2 Connector assignment X8 for SC54

Only certain signal types are available at the particular cable ends where only the matching interface modules can be used:

Terminal assignment, interface modules

Interface module	Screw terminal (x=1...8)	Significance
SB10	x 5x	1:1 screw terminal connection Signal Reference potential (ground or P24)
SB60	x1 x2 x4	Binary inputs 115/230 V Ground Binary input 115 V Binary input 230 V
SB61	x 1x 5x	Binary inputs 24/48 V Binary input 24 V Binary input 48 V Reference
SB70	x1 x2 x4	Binary outputs (relay) Common (center contact) NC contact NO contact
SB71	x 5x	Binary outputs (transistor) Signal Ground

Table 5-32 Terminal assignment of the interface modules

Terminal assignment at SC54, end A

IT42 X8	Significance X8A	SU12	SB10	SB60	SB61	SB70	SB71
1	Binary output 1	1	1/51			12/11/14	1/51
34	Binary output 2	2	2/52			22/21/24	2/52
18	Binary output 3	3	3/53			32/31/34	3/53
2	Binary output 4	4	4/54			42/41/44	4/54
35	Binary output 5	5	5/55			52/51/54	5/55
19	Binary output 6	6	6/56			62/61/64	6/56
3	Binary output 7	7	7/57			72/71/74	7/57
36	Binary output 8	8	8/58			81/82/84	8/58
20	External P24 voltage	9	1P			1P	1P
4	External ground	10	1M			1M	1M

Table 5-33 Terminal assignment, interface module at connector X8, SC54 - cable **end A**

Terminal assignment at SC54, end B

IT42 X8	Significance X8B	SU12	SB10	SB60	SB61	SB70	SB71
37	Binary output 9	1	1/51			12/11/14	1/51
21	Binary output 10	2	2/52			22/21/24	2/52
5	Binary output 11	3	3/53			32/31/34	3/53
38	Binary output 12	4	4/54			42/41/44	4/54
22	Binary output 13	5	5/55			52/51/54	5/55
6	Binary output 14	6	6/56			62/61/64	6/56
39	Binary output 15	7	7/57			72/71/74	7/57
23	Binary output 16	8	8/58			81/82/84	8/58
7	External P24 voltage	9	1P			1P	1P
40	External ground	10	1M			1M	1M

Table 5-34 Terminal assignment, interface module at connector X8, SC54 - cable **end B****Terminal assignment at SC54, end C**

IT42 X8	Significance X8C	SU12	SB10	SB60	SB61	SB70	SB71
24	Binary input 1	1	1/51	14,12/11	1,11/51		
8	Binary input 2	2	2/52	24,22/21	2,12/52		
41	Binary input 3	3	3/53	34,32/31	3,13/53		
25	Binary input 4	4	4/54	44,42/41	4,14/54		
9	Binary input 5	5	5/55	54,52/51	5,15/55		
42	Binary input 6	6	6/56	64,62/61	6,16/56		
26	Binary input 7	7	7/57	74,72/71	7,17/57		
10	Binary input 8	8	8/58	84,82/81	8,18/58		
43	External P24 voltage	9	1P	1P	1P		
27	External ground	10	1M	1M	1M		

Table 5-35 Terminal assignment, interface module at connector X8, SC54 - cable **end C****Terminal assignment at SC54, end D**

IT42 X8	Significance X8D	SU12	SB10	SB60	SB61	SB70	SB71
11	Binary input 9	1	1/51	14,12/11	1,11/51		
44	Binary input 10	2	2/52	24,22/21	2,12/52		
28	Binary input 11	3	3/53	34,32/31	3,13/53		
12	Binary input 12	4	4/54	44,42/41	4,14/54		
45	Binary input 13	5	5/55	54,52/51	5,15/55		
29	Binary input 14	6	6/56	64,62/61	6,16/56		
13	Binary input 15	7	7/57	74,72/71	7,17/57		
46	Binary input 16	8	8/58	84,82/81	8,18/58		
30	External P24 voltage	9	1P	1P	1P		
14	External ground	10	1M	1M	1M		

Table 5-36 Terminal assignment, interface module at connector X8, SC54 - cable **end D**

**Terminal
assignment at
SC54, end E**

IT42 X8	Significance X8E-X8H	SU12	SB10	SB60	SB61	SB70	SB71
47	Trigger input 1	1					
31	Trigger input 2	2					
15	Trigger input 3	3					
48	Trigger input 4	4					
32	Not connected	5					
16	Not connected	6					
49	Not connected	7					
33	Not connected	8					
17	External P24 voltage	9					
50	External ground	10					

Table 5-37 Terminal assignment, interface module at connector X8, SC54 - cable **end E**

5.4.5 Mounting

Distance pieces

The Itxx module is mounted outside the subrack on a PMx CPU module or is inserted on an Itxx module already mounted on a PMx (using the 96-pin plug connector on the module).

For the first ITxx

All of the modules must be bolted together using the distance pieces provided (3 are provided)!

The first ITxx, located directly on a CPU module, must be retained using the **metal distance pieces** (these are included in the scope of supply of the PMx). This establishes the electrical contact which is required to identify the first expansion board.

The metal distance pieces are first retained on the PM4 using the M3 screws, washers and spring washers supplied.

If only **one ITxx** module is used, then it is screwed to the metal distance pieces using the M4 nuts provided (and washers).

**For the second
ITxx**

If a second ITxx module is used, the first ITxx must be screwed using **plastic** distance pieces (these are included in the scope of supply of the ITxx modules).

The second ITxx module can then be inserted and retained using the M4 nuts provided (and washers).

The complete module assembly is then inserted in the subrack.

5.4.6 Application information and noise immunity

- operation **without fan** is possible
- noise-immune operation is only possible if the module is tightly screwed into the subrack

Other information

Further information on EMC and ambient conditions, refer to Section "General technical data"

5.4.7 Technical data

General data

No. of slots occupied	1
Dimensions W x H x D [mm]	20.14 x 233.4 x 220
Weight	Approx. 0.5 kg

Power supply

Rated voltage	min.	max.	Typ. current drain
+5 V	+4.75 V	+5.25 V	420 mA
+15 V	+14.4 V	+15.6 V	450 mA
-15 V	-15.6 V	-14.4 V	140 mA
24 V (external)	20 V	30 V	100 mA + binary output currents

Integrating analog inputs

No.	4
Integrating analog inputs	Differential inputs, floating, V/f conversion
Integration time	- sampling time of the AFC function block or - the time between 2 positive edges of the external trigger signal
Input voltage range	-10 V to +10 V
Input resistance	470 kOhm
Input filter	-3 dB transition frequency : 2 kHz
Resolution	Up to 17 bits, depending on the integration time:
	13 bits at 1 ms integration time
	15 bits at 4 ms integration time
	17 bits at 20 ms integration time
Relative accuracy	Typ. 14 bits

Sampling analog inputs

No.	4
Type	Differential inputs, non-floating
Input voltage range	-10 V to +10 V
Input resistance	470 kOhm
Input filter	-3 dB transition frequency : 1.5 kHz
Resolution	12 bits
Absolute accuracy	Typ. 10 bits over the complete temperature range
Max. conversion time	45 µs.

Analog outputs

No.	4
Type	Output with associated ground, non-floating
Output voltage range	-10 V to +10 V
Output current	+/- 10 mA
Resolution	16 bits
Monotony	14 bits over the complete temperature range
Absolute accuracy	Typ. 13 bits over the complete temperature range
Short-circuit protection to ground	Yes

Binary inputs

No.	16 non-floating
Input voltage	24 V DC rated voltage
for 0 signal	-1 V to +6 V or open-circuit inputs
for 1 signal	+13 V to +33 V
Input current	
for 0 signal	0 mA
for 1 signal	3 mA typ.
Delay time for +24 V input signal	50 µs

Binary outputs

No.	16, non-floating
Power supply voltage	From external
nominal value	24 V DC
perm. range	+20 V to 30 V including ripple
briefly	+35 V, max. 0.5 s
Output current for an 1 signal	
nominal current	50 mA (also corresponds to the max. value)
Short-circuit protection	Electronically and thermally
Limiting inductive switch-off voltages	Supply voltage + 1 V
Residual current	20 µA for 0 signal
Signal level	
for 0 signal	Max. 3 V
for 1 signal	Supply voltage - 2.5 V
Switching delay	Max. 15 µs

5.4.8 Connecting diagram

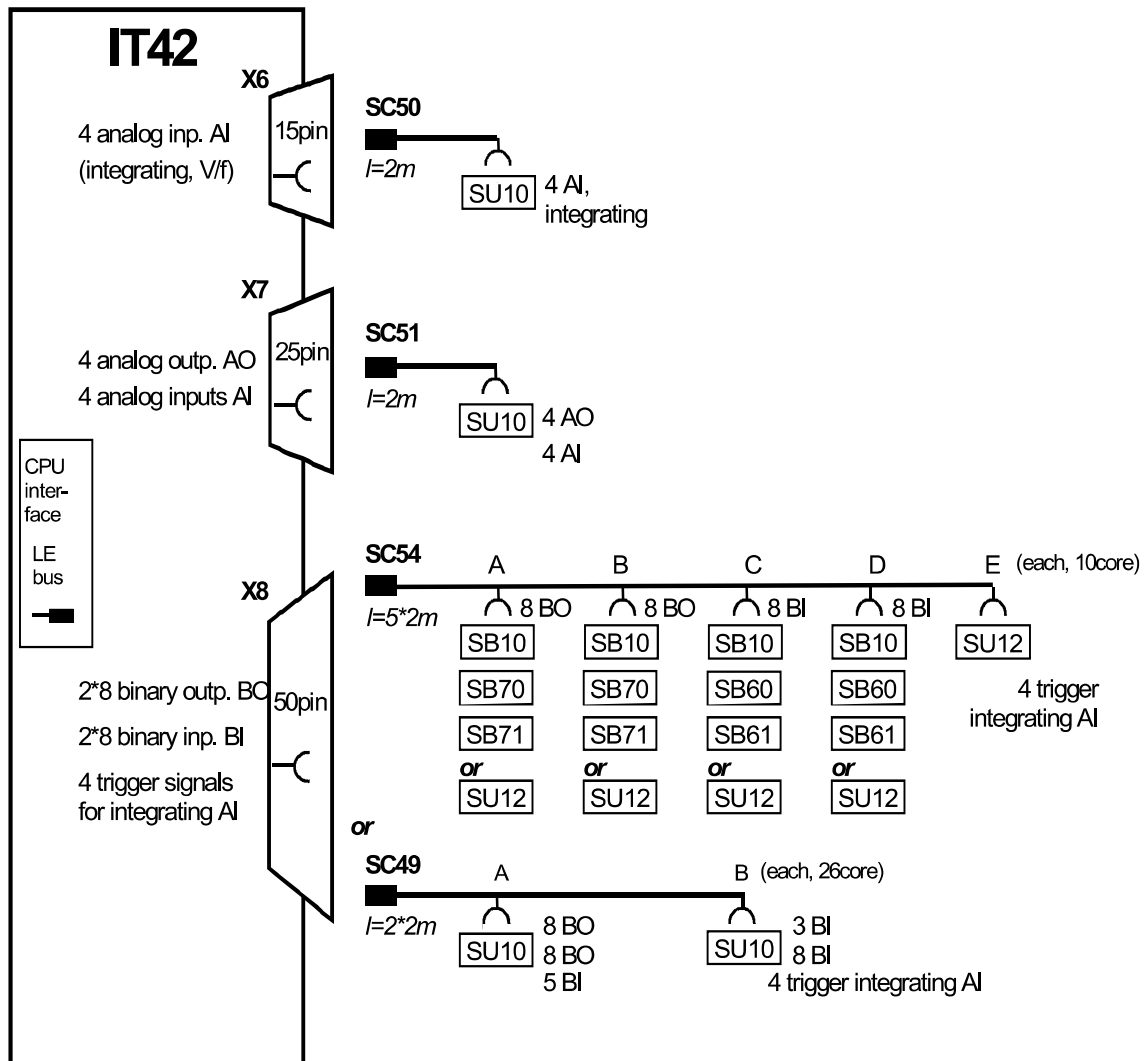


Fig. 5-9 Connecting cables and interface modules