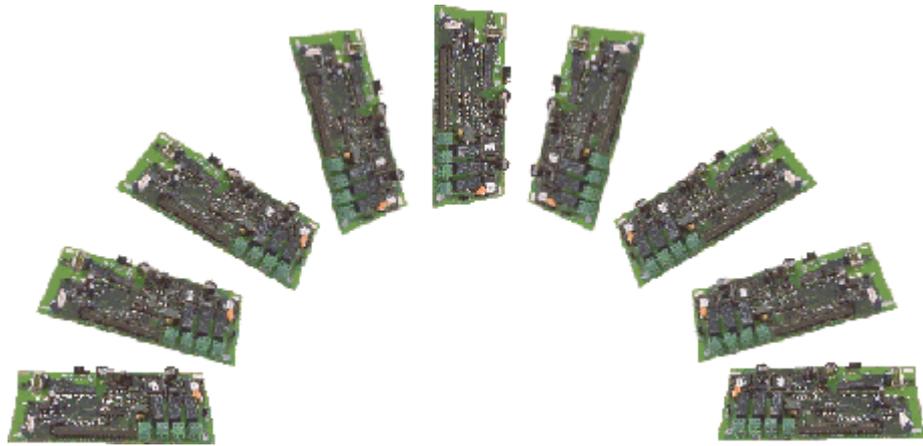


VACON
CX / CXL / CXS
FREQUENCY CONVERTERS



***I/O-expander board
installation manual
(Vacon CX/CXL-range)***

Subject to changes without notice.

FOR SMOOTH CONTROL



vacon

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1 GENERAL

1.1 Vacon CX100OPT

The available I/O can be increased by using the Vacon CX100OPT I/O-expander board:

- 5 digital inputs (standard signals)
- 2 analogue inputs (standard signals)
- 3 relay outputs (standard signals)
- analogue output (programmable in "Five in One+" Application)
- thermistor input (can be directly connected to the motor thermistors to monitor the motor temperature)
- encoder input

Typical use: Closed Loop Vector Control

1.2 Vacon CX101OPT

The available I/O can be increased by using the Vacon CX101OPT I/O-expander board:

- 5 digital inputs (standard signals)
- relay output (standard signal)
- thermistor input (can be directly connected to the motor thermistors to monitor the motor temperature)

Typical use: thermistor input required

1.3 Vacon CX102OPT

The available I/O can be increased by using the Vacon CX102OPT I/O-expander board:

- 5 digital inputs (standard signals)
- 2 analogue inputs (standard signals)
- 3 relay outputs (standard signals)
- analogue output (programmable in "Five in One+" Application)
- thermistor input (can be directly connected to the motor thermistors to monitor the motor temperature)
- encoder input

Typical use: Closed Loop Vector Control

1.4 Vacon CX103OPT

The available I/O can be increased by using the Vacon CX103OPT I/O-expander board:

- 5 digital inputs (standard signals)
- 3 relay outputs (standard signals)
- analogue output (programmable in "Five in One+" Application)
- thermistor input (can be directly connected to the motor thermistors to monitor the motor temperature)

Typical use: thermistor input and additional analogue output required

1.5 Vacon fieldbus boards

Vacon fieldbus boards can be installed in the CX/CXL range frequency converters like the I/O-expander boards, except the LonWorks board. The needed information to install/commission fieldbus boards can be found in the respective fieldbus manual.

- Vacon CX 200OPT (Interbus-S)
- Vacon CX 201OPT (Modbus)
- Vacon CX 202OPT (Profibus-DP)
- Vacon CX 203OPT (LonWorks)

The LonWorks fieldbus board (Vacon CX 203OPT) must be installed in a separate external option board box. More information can be found in the I/O-expander board installation manual for CXS range.

2 SPECIFICATIONS

Safety		Fulfills EN50178, C-UL and EN60204-1 standards
Control connections	Analogue voltage, input	0—± 10 V, $R_i \geq 200 \text{ k}\Omega$
	Analogue current, input	0(4)—20 mA, $R_i = 250 \Omega$
	Digital input	24 V: "0" $\leq 10 \text{ V}$, "1" $\geq 18 \text{ V}$, $R_i > 5 \text{ k}\Omega$
	Aux. voltage	24 V ($\pm 20\%$), max. 50 mA
	Reference voltage	10 V $\pm 3 \%$, max. 10 mA
	Analogue current, output	0(4)—20 mA, $R_l = 500 \Omega$, resolution 10 bit, accuracy $\leq \pm 2\%$
	Analogue voltage, output	0(2)—10 V, $R_l \geq 1 \text{ k}\Omega$, resolution 10 bit, accuracy $\leq \pm 2\%$
	Relay output	Max. switching voltage: 300 V DC, 250 V AC Max. switching load: 8A / 24 V DC 0,4 A / 300 V DC 2 kVA / 250 V AC Max. continuous load: 2 A rms
	Thermistor input	$R_{trip} = 4.7 \text{ k}\Omega$
	Encoder input	24 V: "0" $\leq 10 \text{ V}$, "1" $\geq 18 \text{ V}$, $R_i = 2.2 \text{ k}\Omega$ 5 V: "0" $\leq 2 \text{ V}$, "1" $\geq 3 \text{ V}$, $R_i = 330 \Omega$

Table 2-1 Specifications.

(All the control connections are not found on every I/O-expander board, for more specific information see Chapters 1 and 4.)

The control connections are isolated from the mains potential and the I/O ground is connected to the frame of the inverter via a 1-M Ω resistor and 4,7-nF capacitor*). The control I/O ground can be connected directly to the frame of the inverter by changing the position of jumper X4 (GND ON/OFF) to ON-position. Digital inputs and relay outputs are also isolated from the I/O ground.

*) Default value (X4 is GND OFF- position).

<p>NOTE!</p> 	<p><i>Internal components and circuit boards (except for the isolated I/O terminals) are at mains potential when the frequency converter is connected to the mains. This voltage is extremely dangerous and may cause death or severe injury if you come in contact with it.</i></p>
	<p><i>The control I/O terminals are isolated from the mains potential, but the relay outputs and other I/O's may have a dangerous voltage connected even if the power is disconnected from the frequency converter.</i></p>

3 INSTALLATION

3.1. General

Check that you have received all the required parts (figure 3-1):

- I/O-expander board (1) (check that the typecode corresponds to your order)
- protection foil (2)
- power cable (3) (4-pole)
- data cable (4) (10-pole)
- 20-pole I/O-wire (grey wire) (6)
- 2 to 8 black wires depending on I/O-expander board and application (7)
- terminal strips: 2 times 4-pole, 2 times 12-pole and 2 cable ends (8)
- stickers for I/O-terminal, I/O-board and I/O-expander board (8)
- screw (5) (for earthing), cable ties (9)

Note: The I/O-expander board package includes parts 1 - 5 for the power sizes Vacon 2.2 CX_ /CXL_ - Vacon 90 CX_ /CXL_.

For the bigger power sizes the parts 6 - 9 need to be ordered separately (type code MOCXM8M12KIT).

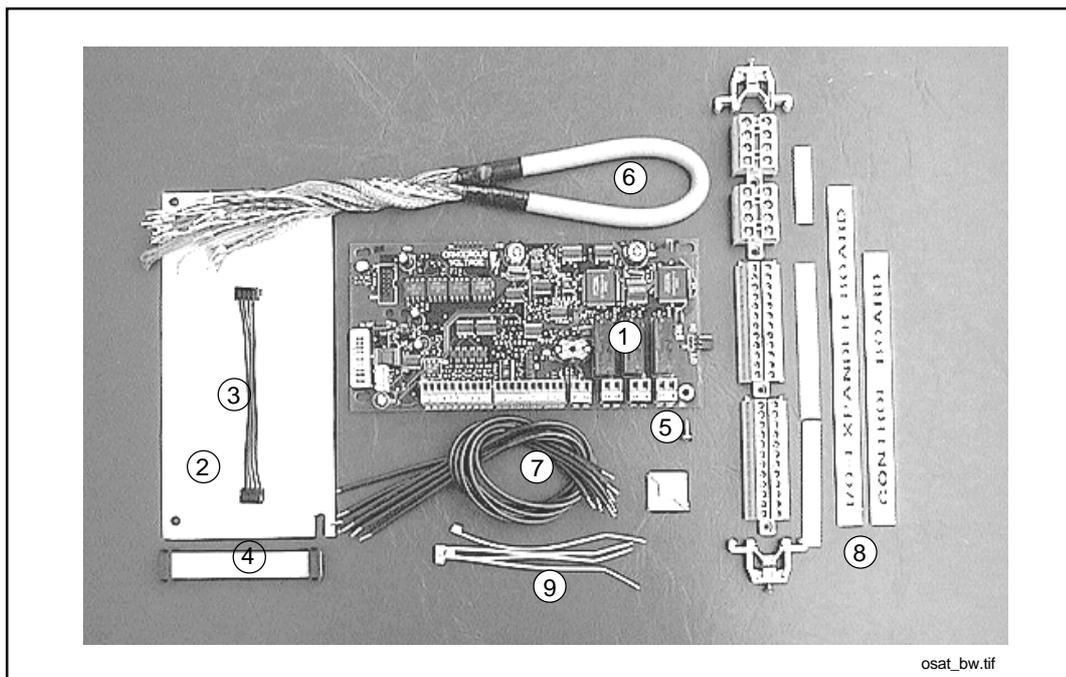


Figure 3-1. I/O-expander board parts.

If the delivery does not match your order, please contact your supplier immediately.

Before doing any commissioning carefully read the safety instructions in "USER'S MANUAL VACON CX/CXL/CXS Frequency converters", Chapter 1, SAFETY.



Disconnect the frequency converter from the mains. NOTE: also the control circuits! Wait further 5 minutes before opening the cover of the frequency converter. Verify by measuring that the frequency converter is safe to touch.

3.2 INSTALLATION

The I/O-expander board should be installed above the existing control board location inside the frequency converter (see table 3-2) as described below:

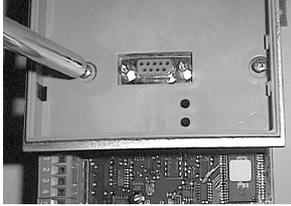
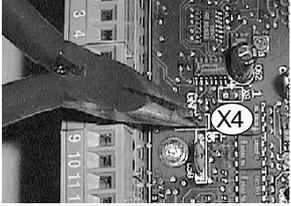
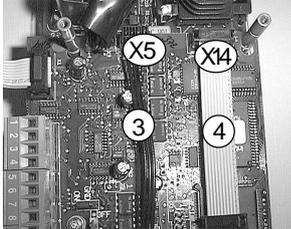
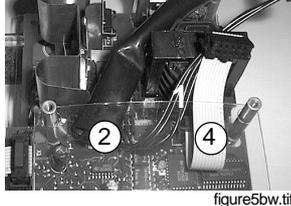
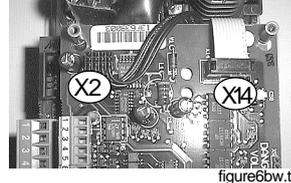
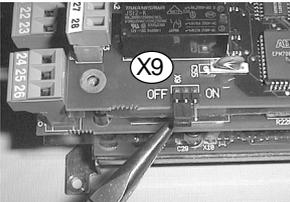
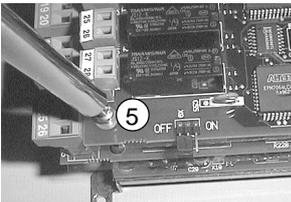
<p>1</p>	<p>Remove the control panel, control panel base (4 screws) and the jumper X4 from the control board.</p>    <p style="text-align: center;"> figure2bw.tif figure3bw.tif </p>
<p>2</p>	<p>Connect the power cable (3) to control board terminal X5. (The power cable can also be connected to terminal X6 terminal, if the power cable from the power board is connected to terminal X5.)</p>
<p>3</p>	<p>Connect the data cable (4) to control board terminal X14. Bend the data cable into an "S-curve" as far as possible from the power board.</p>  <p style="text-align: center;">figure4bw.tif</p>
<p>4</p>	<p>Remove the protection foil (2) of the plastic board and mount the plastic board above the control board. Make sure that the plastic board is correctly placed.</p>  <p style="text-align: center;">figure5bw.tif</p>
<p>5</p>	<p>Mount the I/O-expander board on the plastic board by the larger holes and "push" it into the right position in the narrow position of the holes. Check that the I/O-expander board is installed correctly. If you have difficulties mounting the plastic board and I/O-expander board, slightly bend the regulator A4 and capacitor C59 of the control board.</p>
<p>6</p>	<p>Connect the power cable to I/O-expander board terminal X2 and data cable to terminal X14.</p>  <p style="text-align: center;">figure6bw.tif</p>
<p>7</p>	<p>Install the jumper removed from terminal X4 of the control board on terminal X9 of the I/O-expander board. Note: the jumper can be connected in ON or OFF position, see Vacon CX/CXL/CXS User's Manual, Chapter 6.2.2. Tighten up the earthing screw (5).</p>   <p style="text-align: center;"> figure7bw.tif figure8bw.tif </p>

Table 3-2. I/O-expander board installation (continues ...).

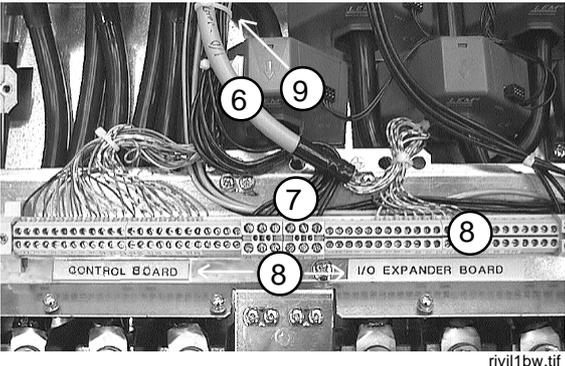
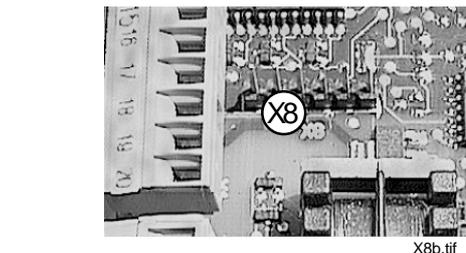
8	<p>Mount the terminal strip (8) on the same bus bar as the control strip according to the figure on the right. Tighten the strip into the correct position using the gable ends.</p>	
9	<p>Glue the I/O-terminal, I/O-EXPANDER BOARD and I/O-CONTROL BOARD stickers (8) on the base of the terminal strip.</p>	
10	<p>Connect the grey I/O-wires (6) from the I/O-board terminals 201-220 to the corresponding terminals of the terminal strip. Note: Also connect the control cable shield.</p>	
11	<p>Connect the separate wires (7) (2-8 pieces depending on application) from I/O-expander board terminals 221-228 to the corresponding terminals of the terminal strip. Bind the I/O-cable and separate wires together with the cable ties (9). Tie the bunch to the control cable.</p>	
12	<p>Place the control panel and connect the necessary control signals.</p> <p>If an encoder input (closed loop control) is to be used and the encoder works at a 5V level, move three jumpers from terminal X5 to terminal X8. If the encoder works at 24V, then X8-terminal can be left free.</p>	
13	<p>Check the connections and make sure that there are no foreign objects inside the frequency converter.</p> <p>Before connecting the mains make sure that the cover of the frequency converter is closed.</p>	
14	<p>Set the parameters of I/O-expander board according to the "Five in One+" -Applications manual (parameter group 3)</p>	

Table 3-2. I/O-expander board installation.

4 CONTROL CONNECTIONS

4.1 Vacon CX100OPT

Terminal	Signal	Description
201	+10V _{ref}	Reference output Voltage for a potentiometer, etc.
202	U _{in+}	Analogue input, voltage range 0—10 V DC Not in use
203	GND	I/O ground Ground for reference and controls
204	I _{in+}	Analogue input, current range 0—20 mA Not in use
205	I _{in-}	
206	+24V	Control voltage output Voltage for switches, etc. max. 50 mA
207	GND	I/O ground Ground for reference and controls
208	CMC	Common for DIC1-DIC5 Connect to GND or + 24 V
209	DIC1	External fault (closing contact) Contact open = no fault Contact closed = fault
210	DIC2	Run disable Cont. open = start of motor enabled Cont. closed = start of motor disabled
211	DIC3	Acceler. / Decel. time selection Contact open = time 1 selected Contact closed = time 2 selected
212	DIC4	Jogging speed selection Contact open = no action Contact closed = jogging speed
213	DIC5	Fault reset Contact open = no action Contact closed = fault reset
214	DI6A+	Pulse input A (differential input)
215	DI6A-	
216	DI7B+	Pulse input B (differential input) 90 degrees phase shift compared to pulse input A
217	DI7B-	
218	DI8Z+	Pulse input C (differential input) one pulse per one revolution
219	DI8Z-	
220	I _{out+}	Analogue output 0—20 mA/R _L max. 500 Ω Programmable (Motor current as default value)
221	TI+	Thermistor input
222	TI-	
223	RO3/1	Relay output 3 READY
224	RO3/2	
225	RO4/1	Relay output 4 RUN
226	RO4/2	
227	RO5/1	Relay output 5 FAULT
228	RO5/2	

Figure 4-1 Control connections of Vacon CX100OPT.

*) **NOTE!** Thermistor input (terminals 221 and 222) must be shorted if not used.

4.2 Vacon CX101OPT

Terminal	Signal	Description
206	+24V	Control voltage output Voltage for switches, etc. max. 50 mA
207	GND	I/O ground Ground for reference and controls
208	CMC	Common for DIC1-DIC5 Connect to GND or + 24 V
209	DIC1	External fault (closing contact) Contact open = no fault Contact closed = fault
210	DIC2	Run disable Cont. open = start of motor enabled Cont. closed = start of motor disabled
211	DIC3	Acceler. / Decel. time selection Contact open = time 1 selected Contact closed = time 2 selected
212	DIC4	logging speed selection Contact open = no action Contact closed = jogging speed
213	DIC5	Fault reset Contact open = no action Contact closed = fault reset
214	N.C.	Not connected
215	N.C.	Not connected
221	TI+	Thermistor input
222	TI+	
225	RO4/1	Relay output 4 RUN
226	RO4/2	

Figure 4-2 Control connections of Vacon CX101OPT.

*) **NOTE!** Thermistor input (terminals 221 and 222) must be shorted if not used.

4.3 Vacon CX102OPT

Terminal	Signal	Description
201	+10V _{ref}	Reference output Voltage for a potentiometer, etc.
202	U _{in} +	Analogue input, voltage range 0—10 V DC Not in use
203	GND	I/O ground Ground for reference and controls
204	U _{in} +	Analogue input, voltage range 0—10 V DC Not in use
205	U _{in} -	
206	+24V	Control voltage output Voltage for switches, etc. max. 50 mA
207	GND	I/O ground Ground for reference and controls
208	CMC	Common for DIC1-DIC5 Connect to GND or + 24 V
209	DIC1	External fault (closing contact) Contact open = no fault Contact closed = fault
210	DIC2	Run disable Cont. open = start of motor enabled Cont. closed= start of motor disabled
211	DIC3	Acceler. / Decel. time selection Contact open = time 1 selected Contact closed = time 2 selected
212	DIC4	Jogging speed selection Contact open = no action Contact closed = jogging speed
213	DIC5	Fault reset Contact open = no action Contact closed = fault reset
214	DI6A+	Pulse input A (differential input)
215	DI6A-	
216	DI7B+	Pulse input B (differential input) 90 degrees phase shift compared to pulse input A
217	DI7B-	
218	DO1	Encoder direction output
219	DO2	Encoder divider 1/64 output
220	U _{out} +	Analogue output 0—10 V DC/R _L ≥ 1 kΩ Programmable (Motor voltage as default value)
221	TI+	Thermistor input
222	TI-	
223	RO3/1	Relay output 3 READY
224	RO3/2	
225	RO4/1	Relay output 4 RUN
226	RO4/2	
227	RO5/1	Relay output 5 FAULT
228	RO5/2	

Figure 4-3 Control connections of Vacon CX102OPT.

*) **NOTE!** Thermistor input (terminals 221 and 222) must be shorted if not used.

4.4 Vacon CX103OPT

Terminal	Signal	Description
206	+24V	Control voltage output Voltage for switches, etc. max. 50 mA
207	GND	I/O ground Ground for reference and controls
208	CMC	Common for DIC1-DIC5 Connect to GND or + 24 V
209	DIC1	External fault (closing contact) Contact open = no fault Contact closed = fault
210	DIC2	Run disable Cont. open = start of motor enabled Cont. closed= start of motor disabled
211	DIC3	Acceler. / Decel. time selection Contact open = time 1 selected Contact closed = time 2 selected
212	DIC4	logging speed selection Contact open = no action Contact closed = jogging speed
213	DIC5	Fault reset Contact open = no action Contact closed = fault reset
214	GND	I/O ground
215	I _{out} +	Analogue output 0—20 mA/R _L max. 500 Ω Programmable (Motor current as default value)
221	TI+	Thermistor input
222	TI-	
223	RO3/1	Relay output 3 READY
224	RO3/2	
225	RO4/1	Relay output 4 RUN
226	RO4/2	
227	RO5/1	Relay output 5 FAULT
228	RO5/2	

Figure 4-3 Control connections of Vacon CX103OPT.

*) **NOTE!** Thermistor input (terminals 221 and 222) must be shorted if not used.

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