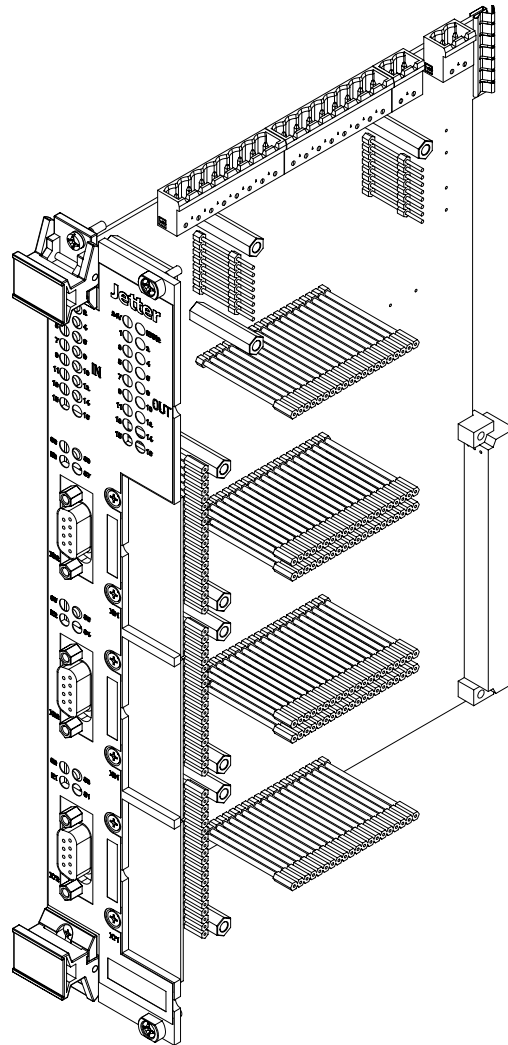


JX6-CON1 and JX6-CON+

Peripheral Module



Jet Web

Operator's Manual



Edition 1.04

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How to Contact us:

Jetter AG
Gräterstraße 2
D-71642 Ludwigsburg
Germany

Phone - Switchboard: ++49 7141/2550-0
Phone - Sales: ++49 7141/2550-433
Phone - Technical Hotline: ++49 7141/2550-444

Telefax: ++49 7141 2550 425
E-Mail - Sales: sales@jetter.de
E-Mail - Technical Hotline: hotline@jetter.de
Internet address: http://www.jetter.de

This Manual is an Integral Part of the JX6-CON1 or JX6-CON+ Module:

Type: _____
Serial #: _____
Year of construction: _____
Order #: _____



To be entered by the customer:

Inventory #: _____
Place of operation: _____

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Significance of this Operator's Manual

This manual is an integral part of the JX6-CON1 or JX6-CON+ module, and

- must be kept in a way that it is always at hand until the JX6-CON1 or JX6-CON+ module will be disposed of.
- If the JX6-CON1 or JX6-CON+ module is sold, alienated or loaned, this manual must be handed over.

In any case you encounter difficulties to clearly understand this operator's manual, please contact the manufacturer.

We would appreciate any suggestions and contributions on your part and would ask you to contact us. This will help us to produce manuals that are more user-friendly and to address your wishes and requirements.

This manual contains important information on how to transport, erect, install, operate, maintain and repair the JX6-CON1 or JX6-CON+ module. Therefore, this person must carefully read, understand and observe this manual, and especially the safety instructions.

Missing or inadequate knowledge of the manual results in the loss of any claim of liability on part of Jetter AG. Therefore, the operating company is recommended to have the instruction of the persons concerned confirmed in writing.

History

Revision	Comment
1.02	Changes cannot be traced back anymore
1.03	Changes cannot be traced back anymore
1.04	See "Recent Revisions" on page 52.

Description of Symbols



Warning

This sign is to indicate a possible impending danger of serious physical damage or death.



Caution

This sign is to indicate a possible impending danger of light physical damage. This sign is also to warn you of material damage.



Important

This sign is to indicate a possible impending situation which might bring damage to the product or to its surroundings. It also identifies requirements necessary to ensure faultless operation.



Note

You will be informed of various possible applications and will receive further useful suggestions. It also gives you words of advice on how to efficiently use hardware and software in order to avoid unnecessary efforts.



Enumerations are marked by full stops, strokes or scores.



Operating instructions are marked by this arrow.



Automatically running processes or results to be achieved are marked by this arrow.



PC and user interface keys.



This symbol informs you of additional references (data sheets, literature, etc.) associated with the given subject, product, etc. It also helps you to find your way around this manual.

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1 Safety Instructions

The module JX6-CON1, resp. JX6-CON+ complies with the safety regulations and standards in effect. Special emphasis was given to the safety of the users.

Of course, the user should adhere to the following regulations:

- relevant accident prevention regulations;
- accepted safety rules;
- EC guidelines and other country-specific regulations.

Usage as Agreed Upon

Usage as agreed upon includes operation in accordance with the operating instructions.

The module JX6-CON1, resp. JX6-CON+ is used to control machinery, such as conveyors, production machines, and handling machines.

The supply voltage of the JX6-CON1/JX6-CON+ module is 24 V DC. This operating voltage is classified as SELV (Safety Extra Low Voltage). The JX6-CON1/JX6-CON+ module is therefore not subject to the EU Low Voltage Directive.

The JX6-CON1/JX6-CON+ module can only be operated in conjunction with a controller, such as JC-647, installed together in the same rack.

The JX6-CON1/JX6-CON+ module may only be operated within the limits of the stated data.

Usage Other Than Agreed Upon

The JX6-CON1/JX6-CON+ module must not be used in technical systems which to a high degree have to be fail-save, e.g. ropeways and aeroplanes.

If the JX6-CON1/JX6-CON+ module is to be run under ambient conditions, which differ from the conditions mentioned in chapter 4: "Operating Conditions", page 19, the manufacturer is to be contacted beforehand.

Who is permitted to operate the JX6-CON1/JX6-CON+ Module?

Only instructed, trained and authorised persons are permitted to operate the JX6-CON1/JX6-CON+ module.

Transport:	Only by personnel with knowledge in handling electrostatically sensitive components.
Installation:	Only by specialists with training in electrical engineering.
Commissioning:	Only by specialists with extensive knowledge of, and experience with, electrical engineering / drive technology.

Modifications and Alterations to the Module

Due to safety reasons, no modifications and alterations to the JX6-CON1/JX6-CON+ module and its functions are allowed. Any modifications to the JX6-CON1/JX6-CON+ module not expressly authorised by the manufacturer will result in a loss of any liability claims to Jetter AG.

The original parts are specially designed for the JX6-CON1/JX6-CON+ module. Parts and equipment of other manufacturers are not tested on our part, and are, therefore, not released by us. The installation of such parts may impair the safety and the proper functioning of the JX6-CON1/JX6-CON+ module.

Any liability on the part of Jetter AG for any damages resulting from the use of non original parts and equipment is excluded.

Servicing the module JX6-CON1/JX6-CON+

The module JX6-CON1/JX6-CON+ is maintenance-free. Therefore, absolutely no inspection or maintenance works are required for the operation of the module.

Repairing the module JX6-CON1/JX6-CON+

The JX6-CON1/JX6-CON+ module must not be repaired by the operator. The JX6-CON1/JX6-CON+ module does not contain any parts which can be repaired by the operator.

If the JX6-CON1/JX6-CON+ module needs repairing, please send it to Jetter AG.

Decommissioning and Disposing of the module JX6-CON1/JX6-CON+

Decommissioning and disposal of the JX6-CON1/JX6-CON+ module are subject to the environmental legislation of the respective country in effect for the operator's premises.

1.1 Ensure Your Own Safety

- Disconnect the JX6-CON1/JX6-CON+ module from the mains to carry out maintenance work. By doing so, you will prevent accidents resulting from electric voltage and moving parts.
- Safety and protective devices, e.g. the barrier and cover of the terminal box must never be shunted or by-passed.
- Dismantled protective equipment must be reattached prior to commissioning and checked for proper functioning.

Malfunctions

- Malfunctions or other damages are to be reported to an authorised person at once.
- Safeguard the JX6-CON1/JX6-CON+ module against misuse or accidental use.

Information Signs and Labels

- Writings, information signs, and labels always have to be observed and kept readable.
- Damaged or unreadable information signs and labels are to be exchanged.

Earthing procedure

- Screw down the JX6 housing to a highly conductive and earthed mounting plate.
- On the top face of the rack an earth-terminal screw with a M4 thread is located.
This earthing screw must electrically be connected to a PE terminal in the electric cabinet by means of a PE conductor (conductor area: 1.5 mm², color: green-yellow) (refer to Fig. 1).

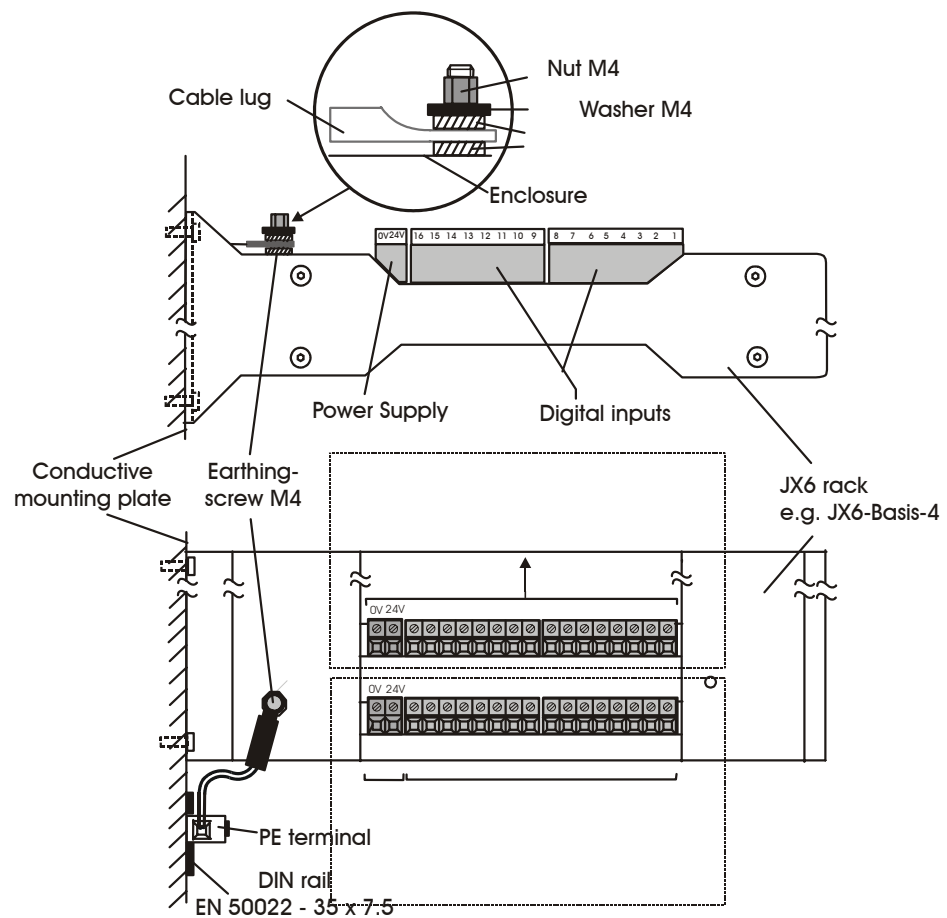


Fig. 1: Earthing - JX6 rack

1.2 Instructions on EMI

In terms of emitted interference the JX6-CON1/JX6-CON+ module is a product belonging to EMC class A. It may cause radio interferences when used in residential areas. It is operated at the operator's own risk.

The noise immunity of a system corresponds to the weakest component of the system. For this reason, correct wiring and shielding of cables is of paramount importance.



Important!

Measures for increasing immunity to interference:

- Attach the JX6-CON1/JX6-CON+ module firmly to the rack (see Fig. 13).
- Follow the instructions given in Application Note 016 "EMC-Compatible Installation of the Electric Cabinet" published by Jetter AG.

The following instructions are excerpts from Application Note 016:

- It is of great importance that the JX6 rack is screwed down to a highly conductive mounting plate.
- On principle, physical separation should be maintained between signal and voltage lines. We recommend spacings greater than 20 cm. Cables and lines should cross each other at an angle of 90°.
- Shield cables on both ends.
- Unshielded wire ends of shielded cables should be as short as possible.
- The entire shield must be drawn behind the isolation, and then be clamped under an earthed strain relief with the greatest possible surface area.
- It is of great importance that the rack is screwed down to a highly conductive mounting plate.
- Shield cables on both ends.
- The entire shield must be drawn behind the isolation, and then be clamped under an earthed strain relief with the greatest possible surface area.

When male connectors are used:

- Only use metallized connectors, e.g. SUB-D with metallized housing. Make sure that the strain relief is directly connected with the housing here as well (see Fig. 2).

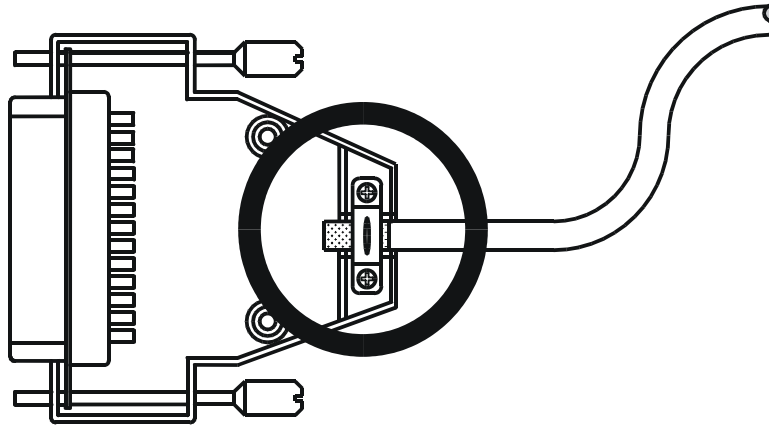


Fig. 2: Shielding of SUB-D connectors in conformity with EMC standards.



Important!

To avoid malfunctions the following must be ensured:

- Adhere to the measures for increasing immunity to interference. Compliance with these measures will also prevent malfunctions.

2 Description of Functions

2.1 JX6-CON1

Dynamic axes and digital controllers require a co-processor providing accurate closed-loop control. The JX6-CON1 module is equipped with such a co-processor. Besides these intelligent functions, the standard configuration of the JX6-CON1 module features 16 digital inputs. As an option, it can also be equipped with 16 digital outputs.

There are 3 sockets for submodules, such as analog inputs/outputs, counters, interfaces or axis interfaces.

Due to the fact that all these functions are integrated into one board, the co-processor is able to access different functions in best time.

The positive edge of a digital input, for example, will trigger a positioning process within one millisecond. Or an output is switched off immediately after a certain pressure, which is controlled by a PID controller, has been reached.

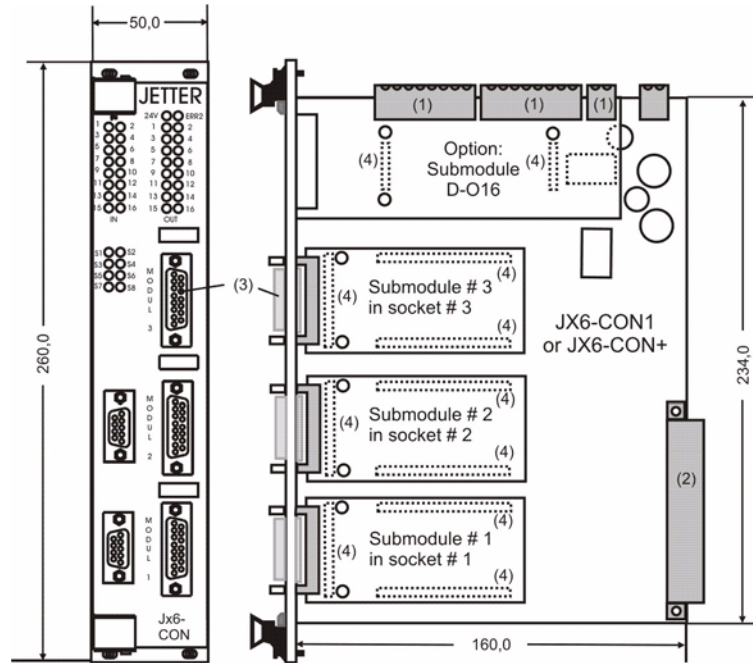
Interpolations must be run locally on the JX6-CON1 hardware. Thus, interpolations are limited to two drive axes.

2.2 JX6-CON+

During interpolation the module JX6-CON+ allows communication between 2, 3 or 4 JX6-CON+ modules via the internal bus of the JX6 controller. Therefore, interpolation is no longer limited to two drive axes. Communication is possible between slots # 2, 3, and 4, or between 5, 6, 7, and 8.

3 JX6-CON1 and JX6-CON+ Design

The design of the JX6-CON1 and JX6-CON+ modules is the same. However, they are equipped with different components.



- (1): Connector in the COMBICON terminal, RM 5.08
- (2): Multiple plug, type C, 96 pins
- (3): Sub-D connector
- (4): Male/female connector

Fig. 3: Front and side view of the module JX6-CON1/JX6-CON+

Design	
Dimensions (H x W x D in mm)	260 x 50 x 185
Components:	
JX6-CON1/JX6-CON+ with 16 digital inputs	This module can be plugged into slot # 2 to 8 of the JX6 rack.
Submodule 1	Can be plugged into socket 1 of the JX6-CON1/JX6-CON+ module (refer to Fig. 3)
Submodule 2	Can be plugged into socket 2 of the JX6-CON1/JX6-CON+ module (refer to Fig. 3)
Submodule 3	Can be plugged into socket 3 of the JX6-CON1/JX6-CON+ module (refer to Fig. 3)
Submodule D-O16 with 16 digital outputs	Can be plugged into the D-O16 socket of the JX6-CON1/JX6-CON+ module (refer to Fig. 3)

4 Operating Conditions

Operating Parameters of the JX6-CON1/JX6-CON+ module mounted in a JX6-Basis-x rack

Power Rating

Features	Value(s) (depending on the product)	Preferable reference standard(s) (depending on the product)
Power Supply Unit Requirements	DC 24 V (20 .. 30 V) Residual ripple < 5 % filtered	
Power consumption without optional components and digital outputs	approx. 10 .. 15 Watt depending on the number of plugged submodules	
Voltage dips	Duration of voltage dips <= 10 ms Severity level PS2	DIN EN 61131-2

Environment

Features	Value(s) (depending on the product)	Preferable reference standard(s) (depending on the product)
Operating Temperature Range	0 °C - +50 °C	-
Storage Temperature Range	-25 °C - +70 °C	DIN EN 61131-2 DIN EN 60068-2-1 DIN EN 60068-2-2
Air humidity	5 % - 95 %, No condensing	DIN EN 61131-2
Pollution Degree	2	DIN EN 61131-2
Corrosion immunity/ chemical resistance	No special protection against corrosion. Ambient air must be free from higher concentrations of acids, alkaline solutions, corrosive agents, salts, metal vapours, or other corrosive or electro-conductive contaminants	General specification
Atmospheric pressure	2000 m	DIN EN 61131-2

Mechanical Parameters

Features	Value(s) (depending on the product)	Preferable reference standard(s) (depending on the product)
Free Falls Withstanding Test	Height of fall (units within packing) 1 m	DIN EN 61131-2 DIN EN 60068-2-32
Vibration Resistance	10 Hz - 57 Hz: 0,0375 mm - continuous amplitude (0,075 mm peak amplitude) 57 Hz -150 Hz: 0.5 constant acceleration for continuous operation (1 g constant acceleration occasionally) 1 octave/minute, 10 frequency sweeps (sinusoidal), all 3 spatial axes	DIN EN 61131-2 DIN EN 60068-2-6
Shock Resistance	15 g occasionally, 11 ms, sinusoidal half-wave, 2 shocks in all three spatial axes	DIN EN 61131-2 DIN EN 60068-2-27
Class of Protection	When correctly installed in the rack: IP 20	DIN EN 60529
Mounting Position	generally vertically	

Electrical Safety

Features	Value(s) (depending on the product)	Preferable reference standard(s) (depending on the product)
Protection class	III	DIN EN 61131-2
Dielectric Test Voltage	Functional ground is connected to chassis ground internally.	DIN EN 61131-2
Overvoltage Category	II	DIN EN 61131-2

**EMC
Emitted interference**

Features	Value(s) (depending on the product)	Preferable reference standard(s) (depending on the product)
Enclosure	Frequency band 30 -230 MHz, limit 30 dB ($\mu\text{V/m}$) at 30 m Frequency band 230 -1000 MHz, limit 37 dB ($\mu\text{V/m}$) at 30 m (class A)	DIN EN 50081-2 DIN EN 55011

**EMC
Immunity to Interference: Rack**

Features	Value(s) (depending on the product)	Preferable reference standard(s) (depending on the product)
RF-Field, amplitude- modulated	Frequency band 26-1000 MHz Test field strength 10 V/m AM 80 % with 1 kHz Criterion A	DIN EN 61131-2 DIN EN 61000-6-2 DIN EN 61000-4-3
Electromagnetic RF-field, pulse- modulated	Frequency 900 +/-5 MHz Test field strength 10 V/m 50 % ON period Repetition rate 200 Hz criterion A	DIN EN 50082-2 DIN EN 61000-4-3
Magnetic Field with Mains Frequency	50 Hz 30 A/m	DIN EN 61000-6-2 DIN EN 61000-4-8
ESD	Discharge through air: Test peak voltage 8 kV Contact Discharge: Test peak voltage 4 kV Criterion A	DIN EN 61131-2 DIN EN 61000-6-2 DIN EN 61000-4-2

EMC
Immunity to interference
- Signal ports

Features	Value(s) (depending on the product)	Preferable reference standard(s) (depending on the product)
Asymmetric RF, amplitude-modulated	Frequency band 0.15 - 80 MHz Test voltage 10 V AM 80 % with 1 kHz Source impedance 150 ohms Criterion A	DIN EN 61000-6-2 DIN EN 61000-4-6
Burst (fast transients)	Test voltage 1 kV tr/tn 5/50 ns Repetition rate 5 kHz Criterion A	DIN EN 61000-6-2 DIN EN 61131-2 DIN EN 61000-4-4
Test with damped oscillation	Damped sinusoidal oscillation Frequency 1 Mhz Source impedance 200 ohms Repeat Factor 400/s Test voltage 1 kV	DIN EN 61131-2 DIN EN 61000-4-12
Surge voltages, asymmetrical (line to earth)	tr/tn 1.2/50 μ s No-load voltage 1 kV	DIN EN 61000-6-2 DIN EN 61000-4-5

EMC
Immunity to interference
- Process, measuring and control lines

Features	Value(s) (depending on the product)	Preferable reference standard(s) (depending on the product)
Asymmetric RF, amplitude-modulated	Frequency band 0.15 - 80 MHz Test voltage 10 V AM 80 % with 1 kHz Source impedance 150 ohms Criterion A	DIN EN 50082-2 DIN EN 61000-4-6
Burst (fast transients)	Test voltage 2 kV tr/tn 5/50 ns Repetition rate 5 kHz Criterion A	DIN EN 50082-2 DIN EN 61131-2 DIN EN 61000-4-4

EMC
Immunity to interference
- DC and AC power supply I/Os

Features	Value(s) (depending on the product)	Preferable reference standard(s) (depending on the product)
Asymmetric RF, amplitude-modulated	Frequency band 0.15 - 80 MHz Test voltage 10 V AM 80 % with 1 kHz Source impedance 150 ohms Criterion A	DIN EN 61000-6-2 DIN EN 61000-4-6
Burst (fast transients)	Test voltage 2 kV tr/tn 5/50 ns Repetition rate 5 kHz Criterion A	DIN EN 61000-6-2 DIN EN 61131-2 DIN EN 61000-4-4
Test with damped oscillation	Damped sinusoidal oscillation Frequency 1 Mhz Source impedance 200 ohms Repeat Factor 400/s Test voltage 1 kV	DIN EN 61131-2 DIN EN 61000-4-12
Surge voltages, asymmetrical (line to earth), symmetrical (line to line)	tr/tn 1.2/50 μ s No-load voltage 0.5 kV	DIN EN 61000-6-2 DIN EN 61000-4-5

EMC
Immunity to interference
Functional Earth Connections

Features	Value(s) (depending on the product)	Preferable reference standard(s) (depending on the product)
RF, asymmetric	Frequency band 0.15 - 80 MHz Test voltage 10 V AM 80 % with 1 kHz Source impedance 150 ohms Criterion A	DIN EN 61000-6-2 DIN EN 61000-4-6
Bursts	Test voltage 1 kV tr/tn 5/50 ns Repetition rate 5 kHz Criterion A	DIN EN 61000-6-2 DIN EN 61000-4-4

5 Possible Submodule Combinations

5.1 Submodule types

JX6-AD8	8 analog inputs
JX6-DA4	4 analog outputs
JX6-DIMA	2-axis controller for DIMA output stages
JX6-DIMA4	1-axis controller for DIMA FO output stages
JX6-SM	1-axis controller for stepper motor output stages
JX6-SV1	1-axis controller for servo amplifiers and incremental or absolute encoders

5.2 Submodules plugged into JX6-CON1

	Socket: 1	2	3	Function
1	JX6-AD8	empty	empty	8-channel AD
2	JX6-AD8	JX6-AD8	empty	16-channel AD
3	JX6-AD8	JX6-DA4	empty	4 PID controllers
4	JX6-AD8	JX6-AD8	JX6-AD8	24-channel AD
5	JX6-AD8	JX6-AD8	JX6-DA4	16-channel AD + 4-channel DA
6	JX6-AD8	JX6-DA4	JX6-DA4	8-channel AD +8-channel DA
7	JX6-DA4	JX6-DA4	empty	8-channel DA
8	JX6-DA4	JX6-DA4	JX6-DA4	12-channel DA; max. 10 current outputs possible
9	JX6-SV1	empty	empty	1-axis SV
10	JX6-SV1	empty	JX6-AD8	1-axis SV + 8-channel AD
11	JX6-SV1	empty	JX6-DA4	1-axis SV + 4-channel DA
12	JX6-SV1	JX6-SV1	empty	2-axis SV
13	JX6-SV1	JX6-SV1	JX6-AD8	2-axis SV + 8-channel AD
14	JX6-SV1	JX6-SV1	JX6-DA4	2-axis SV + 4-channel DA
15	JX6-SV1	JX6-SV1	JX6-SV1	2-axis SV + counter + analog output
16	JX6-DIMA		empty	1-axis or 2-axis DIMA

	Socket: 1	2	3	Function
17	JX6-DIMA		JX6-DA4	1-axis or 2-axis DIMA + 4-channel DA
18	JX6-DIMA		JX6-AD8	1-axis or 2-axis DIMA + 8-channel AD
19	JX6-DIMA		JX6-SV1	1-axis or 2-axis DIMA + counter + analog output
20	JX6-SM	JX6-SM	empty	2-axis stepper motor
21	JX6-SM	JX6-SM	JX6-AD8	2-axis stepper motor + 8-channel AD
22	JX6-SM	JX6-SM	JX6-DA4	2-axis stepper motor + 4-channel DA
23	JX6-SM	JX6-SM	JX6-SM	3-axis stepper motor
24	JX6-DIMA4	empty	empty	1-axis DIMA4-Hiperface
25	JX6-DIMA4	empty	JX6-AD8	1-axis DIMA4-Hiperface + 8-channel AD
26	JX6-DIMA4	JX6-DIMA4	empty	2-axis DIMA4-Hiperface
27	JX6-DIMA4	JX6-DIMA4	JX6-AD8	2-axis DIMA4-Hiperface + 8-channel AD
28	JX6-DIMA4	JX6-DIMA4	JX6-DA4	2-axis DIMA4-Hiperface + 4-channel DA
29	JX6-DIMA4	JX6-DIMA4	JX6-SV1	2-axis DIMA4-Hiperface + counter + analog output



Important!

Concerning the submodule JX6-DA4:

- Do not pick off voltage **and** current simultaneously at the same DA channel.



Important!

This issue concerns combinations 6, 7, 8:

- Use a JX6-CON1-15 module with a 15 W DC/DC converter. The standard model of the JX6-CON1 module is equipped with a 7.5 W DC/DC converter.

5.3 Submodules plugged into JX6-CON+

	Socket 1	Socket 2	Socket 3	Function
9	JX6-SV1	empty	empty	1-axis SV
10	JX6-SV1	empty	JX6-AD8	1-axis SV + 8-channel AD
11	JX6-SV1	empty	JX6-DA4	1-axis SV + 4-channel DA
12	JX6-SV1	JX6-SV1	empty	2-axis SV
13	JX6-SV1	JX6-SV1	JX6-AD8	2-axis SV + 8-channel AD
14	JX6-SV1	JX6-SV1	JX6-DA4	2-axis SV + 4-channel DA
15	JX6-SV1	JX6-SV1	JX6-SV1	2-axis SV + counter + analog output
16	JX6-DIMA		empty	1-axis or 2-axis DIMA
17	JX6-DIMA		JX6-DA4	1-axis or 2-axis DIMA + 4-channel DA
18	JX6-DIMA		JX6-AD8	1-axis or 2-axis DIMA + 8-channel AD
19	JX6-DIMA		JX6-SV1	1-axis or 2-axis DIMA + counter + analog output
20	JX6-SM	JX6-SM	empty	2-axis stepper motor
21	JX6-SM	JX6-SM	JX6-AD8	2-axis stepper motor + 8-channel AD
22	JX6-SM	JX6-SM	JX6-DA4	2-axis stepper motor + 4-channel DA
23	JX6-SM	JX6-SM	JX6-SM	3-axis stepper motor
24	JX6-DIMA4	empty	empty	1-axis DIMA4-Hiperface
25	JX6-DIMA4	empty	JX6-AD8	1-axis DIMA4-Hiperface + 8-channel AD
26	JX6-DIMA4	JX6-DIMA4	empty	2-axis DIMA4-Hiperface
27	JX6-DIMA4	JX6-DIMA4	JX6-AD8	2-axis DIMA4-Hiperface + 8-channel AD
28	JX6-DIMA4	JX6-DIMA4	JX6-DA4	2-axis DIMA4-Hiperface + 4-channel DA
29	JX6-DIMA4	JX6-DIMA4	JX6-SV1	2-axis DIMA4-Hiperface + counter + analog output



Important!

Concerning the submodule JX6-DA4:

- Do not pick off voltage **and** current simultaneously at the same DA channel.

6 Power Supply

6.1 Requirements

Power Supply Unit Requirements	
Voltage Range	DC 24 V (20 ... 30 V) Residual ripple < 5 % filtered
Power consumption	Depending on the number of attached submodules: approx. 10 ... 15 W

Important!



Caution

- The maximum supply voltage must not exceed DC 30 V since a higher supply voltage may cause damages to the JX6-CON1 module.
- If the JX6-CON1 module is not supplied with sufficient power (under-voltage), malfunctions may occur.

Note!



Protection against polarity reversal:

The JX6-CON1 and JX6-CON+ modules are protected against polarity reversal. For testing the module, a voltage of 24 volts with reversed polarity was applied for 10 s.

6.2 Description of Connections

Terminal Specifications

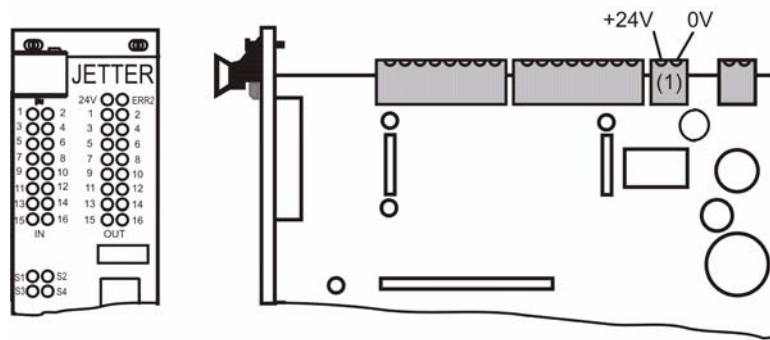
- 2-pole terminal block COMBICON RM 5.08 (for printed circuit boards)
- Cable cross-sectional area: 0.25 -2.5 mm²
- Bladed screw-driver: 0.6 x 3.5 x 100 mm

Connecting Cable Specifications

- Not needed

Cable Shielding

- Not needed



(1): Power supply terminal

Fig. 4: Connecting the power supply to a JX6-CON1/JX6-CON+ module

Pin Assignment of 2-pin Plug for Terminal Blocks			
View	Pin	Signal	Comment
	0 V	GND	
	+24 V	DC 24 V (20 ... 30 V)	

7 Digital Inputs

7.1 Technical Data

Digital inputs form an integral part of the JX6-CON1/JX6-CON+ module.

Functional Data	
Number of inputs	16 digital inputs
Rated voltage	DC 24 V

Electrical Data	
Voltage Range	15 ... DC 27 V
Signal voltage ON	min. 15 V
Signal voltage OFF	max. 10 V
Input current	approx. 8 mA
Input resistance	3.0 k Ω
Input delay time	approx. 3 ms
Electrical isolation	None

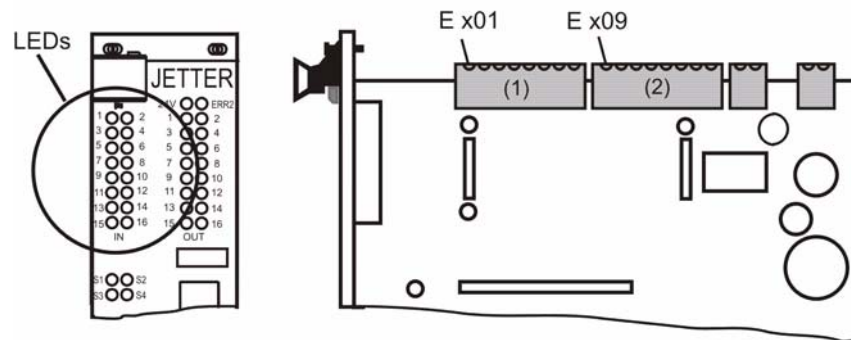


Caution

Important!

If a line with reverse polarity is connected to a digital input, the input will be destroyed.

7.2 Meaning of LEDs



(1): Terminal for digital inputs # 1 through 8

(2): Terminal for digital inputs # 9 through 16

Fig. 5: LEDs of the digital inputs of a JX6-CON1/JX6-CON+ module

LEDs of Digital Inputs		
Designation	Colour	Function
IN 1 ... 16	yellow	Digital input 1 through 16 ON: Signal voltage ON OFF: Signal voltage OFF

7.3 Description of Connections

Terminal Specifications

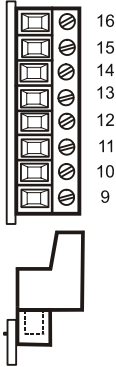
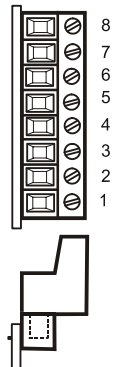
- 8-pole terminal block COMBICON RM 5.08 (for printed circuit boards)
- Cable cross-sectional area: 0.25 -2.5 mm²
- Bladed screw-driver: 0.6 x 3.5 x 100 mm

Connecting Cable Specifications

- Not needed

Cable Shielding

- Not needed

Pin Assignment of 8-pin Plug for Terminal Blocks			
View	Pin	Signal	Comment
	16	Digital input # 16	
	15	Digital input # 15	
	14	Digital input # 14	
	13	Digital input # 13	
	12	Digital input # 12	
	11	Digital input # 11	
	10	Digital input # 10	
	9	Digital input # 9	
	8	Digital input # 8	
	7	Digital input # 7	
	6	Digital input # 6	
	5	Digital input # 5	
	4	Digital input # 4	
	3	Digital input # 3	
	2	Digital input # 2	
	1	Digital input # 1	

Refer to Fig. 6 for the assignment of digital inputs of the JX6-CON1/JX6-CON+ module. Reference point is the 0 V terminal to which the 0 V signal is connected-up.

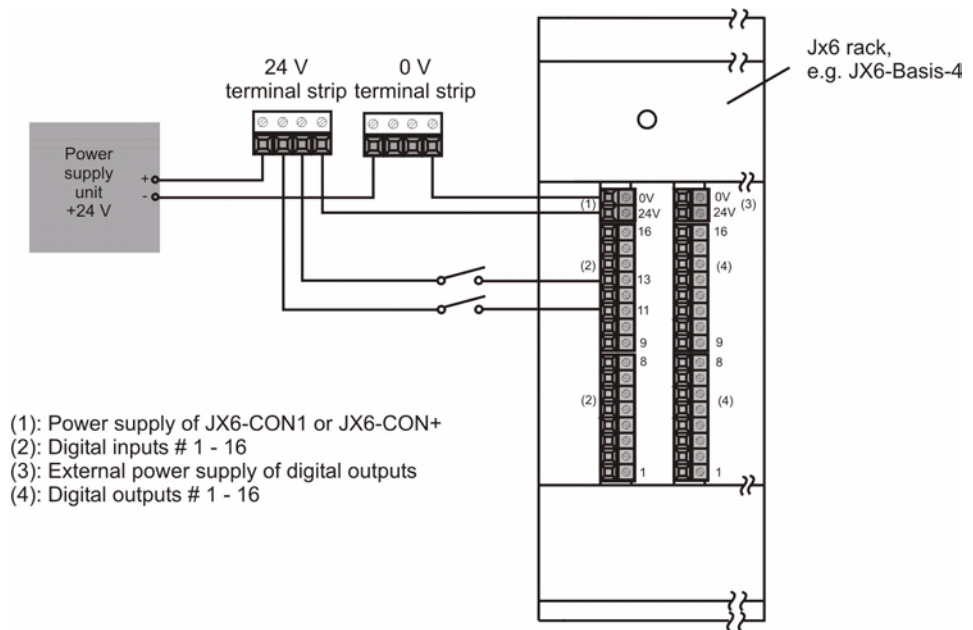


Fig. 6: External circuit of the digital inputs 11 and 13

7.4 Numbering System of Digital Inputs

Numbering System of Digital Inputs	
Digital input of JX6-CON	Module Position Number
Input # 1	Module position * 100 + 1
Input # 2	Module position * 100 + 2
...	...
Input # 16	Module position * 100 + 16

8 Digital Outputs

As an option, the JX6-CON1/JX6-CON+ module can be equipped with the submodule JX6-O16, which expands the functional range by 16 digital outputs.

8.1 Technical Data

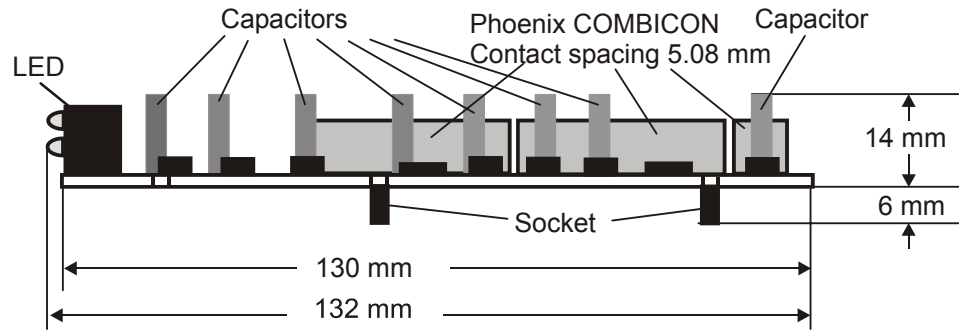


Fig. 7: Side View of the JX6-O16 Submodule

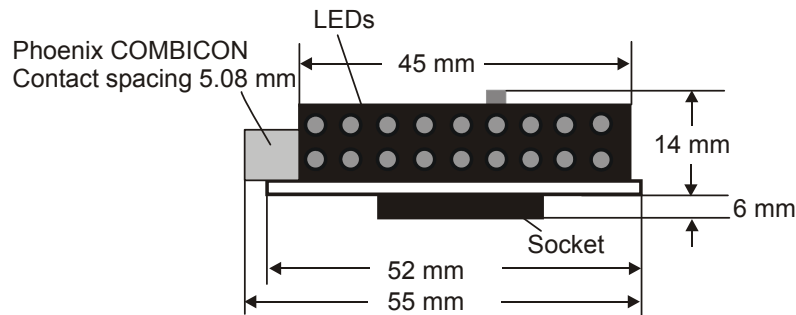


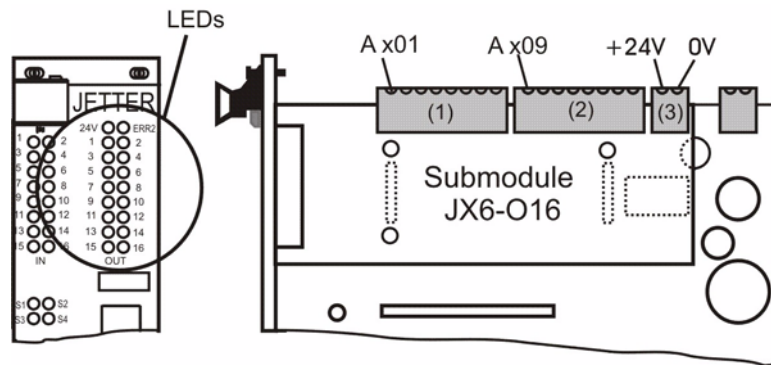
Fig. 8: Front View of the JX6-O16 Submodule

Design	
Dimensions (H x W x D in mm)	12.0 x 52.0 x 130.0
Installation	Can be plugged into the JX6-O16 socket of the JX6-CON1/JX6-CON+ module (refer to Fig. 3)
Type of outputs	Transistor, pnp

Functional Data	
Number of outputs	16 digital outputs
Rated voltage	DC 24 V
Type of outputs	Transistor, pnp

Electrical Data	
External power supply Voltage Range	required 20 ... 30 V DC
Signal voltage ON	typ. $V_{\text{supply}} - 0,5 \text{ V}$
Signal voltage OFF	typ. 0.8 V
Maximum load current	0,5 A / output
Electrical isolation	None
Protective circuit	Overload, overvoltage, overtemperature, indicated by the red LED ERR2
Protection against inductive loads	yes

8.2 Meaning of LEDs



- (1): Terminal for digital outputs # 1 through 8
- (2): Terminal for digital outputs # 9 through 16
- (3): External power supply for digital outputs

Fig. 9: LEDs of the digital outputs of a JX6-CON1/JX6-CON+ module

LEDs of the Digital Outputs		
Designation	Colour	Function
OUT 1 ... 16	yellow	Digital output 1 through 16 ON: Signal voltage ON OFF: Signal voltage OFF
ERR2	red	ON: Overload, overtemperature, cable breakage of one or more outputs (< 10 mA)
24V	green	ON: External voltage supply of the digital outputs is provided

8.3 Description of Connections

Terminal Specifications

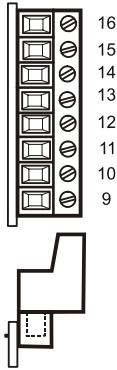
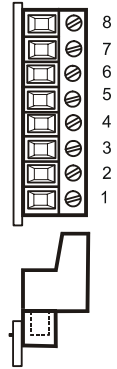
- 8-pin terminal block COMBICON RM 5.08 (for printed circuit boards) or 2-pin terminal block COMBICON RM 5.08 (for printed circuit boards)
- Cable cross-sectional area: 0.25 -2.5 mm²
- Bladed screw-driver: 0.6 x 3.5 x 100 mm

Connecting Cable Specifications

- Not needed

Cable Shielding

- Not needed

Pin Assignment of 8-pin Plug for Terminal Blocks			
View	Pin	Signal	Comment
	16	Digital Output # 16	
	15	Digital Output # 15	
	14	Digital Output # 14	
	13	Digital Output # 13	
	12	Digital Output # 12	
	11	Digital Output # 11	
	10	Digital Output # 10	
	9	Digital Output # 9	
	8	Digital Output # 8	
	7	Digital Output # 7	
	6	Digital Output # 6	
	5	Digital Output # 5	
	4	Digital Output # 4	
	3	Digital Output # 3	
	2	Digital Output # 2	
	1	Digital Output # 1	

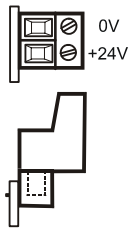
Pin Assignment of 2-pin Plug for Terminal Blocks			
View	Pin	Signal	Comment
	0 V	GND	
	24 V	External power supply of digital outputs (+24 volts)	

Fig. 10 shows the connection of the digital outputs of the JX6-O16. The 0 V terminal strip to which the 0 V signal is applied is located in the switch cabinet.

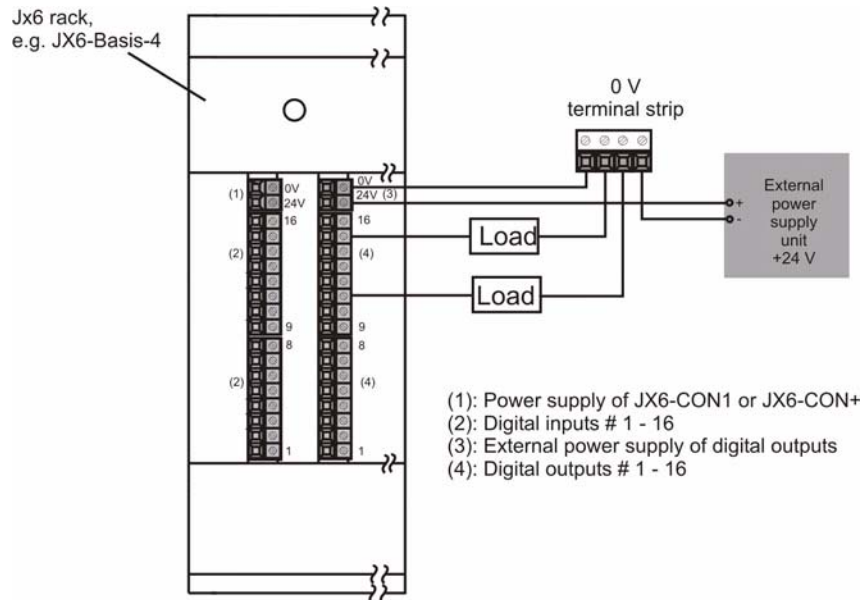


Fig. 10: External circuit of the digital outputs 11 and 15

8.4 Accessing Digital Outputs

8.4.1 Global Access by the Controller

Using the JetSym instruction "output number" the digital output is directly set or reset.

This, however, requires that global access to these digital outputs has been granted (refer to chapter 8.4.3 "Access permission" on page 40).

Numbering system of digital outputs	
Digital output JX6-O16	Module Position Number
Output 1	Module position * 100 +1
Output 2	Module position * 100 +2
...	...
Output 16	Module position * 100 +16

8.4.2 Local access to JX6-CON1 or JX6-CON+

Depending on the function of the JX6-CON1/JX6-CON+ module, local access to the digital outputs of the JX6-O16 might be required.

8.4.3 Access permission

Local access permission is granted through register $1x1124$ (x: Number of module slot). This register is bit-coded. By setting bits 0 through 15 access to the digital outputs is enabled. By resetting bits 0 through 15 access to the digital outputs is disabled. The function of bits 0 and 1 is shown in Fig. 11.

If a digital output is to be set or reset by the controller, global access to the digital outputs must be enabled.

Global access permission is granted through register $1x1126$ (x: Number of module slot). This register is bit-coded. By setting bits 0 through 15 global access to the digital outputs is enabled. By resetting bits 0 through 15 access to the digital outputs is disabled. The function of bits 0 and 1 is shown in Fig. 11.

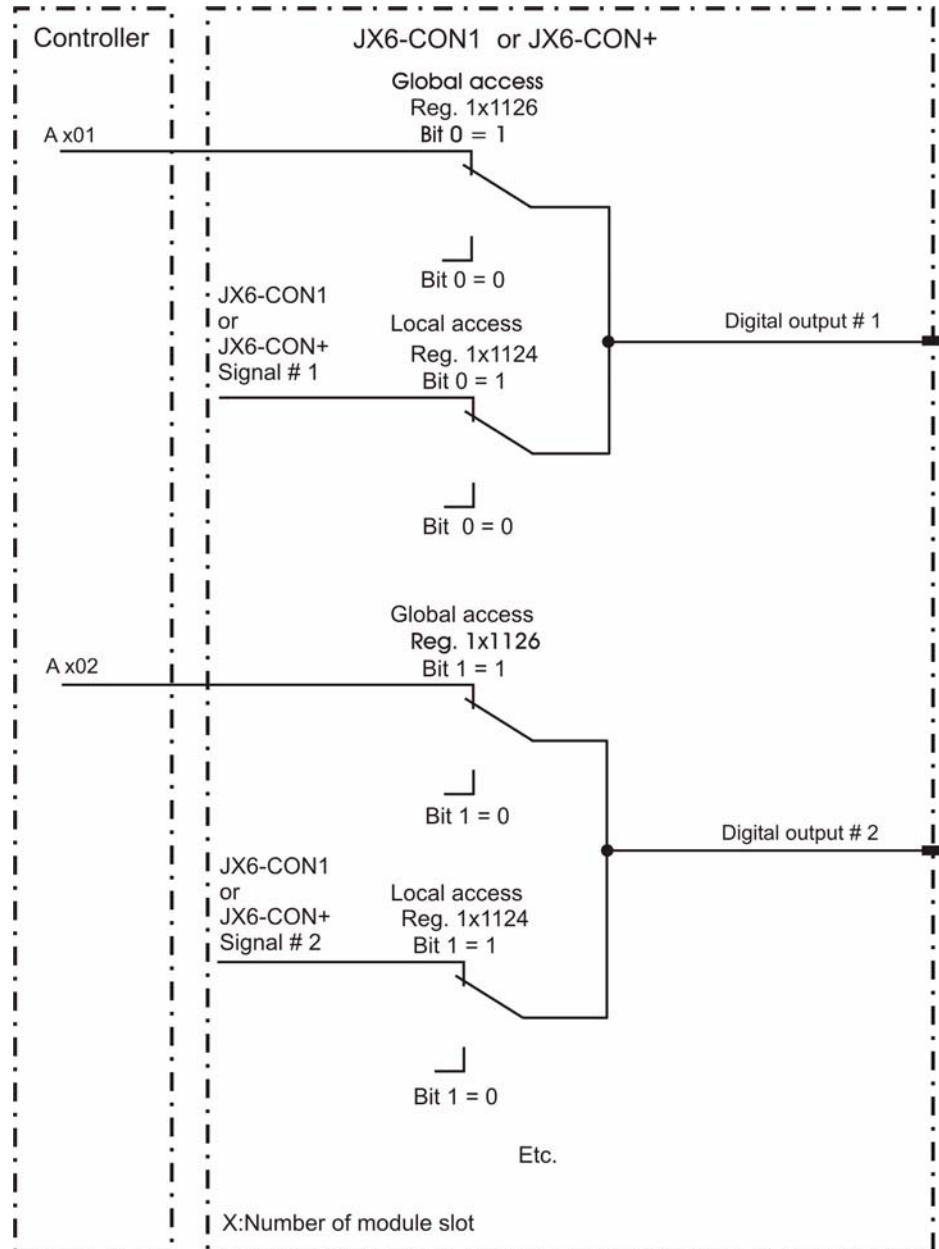


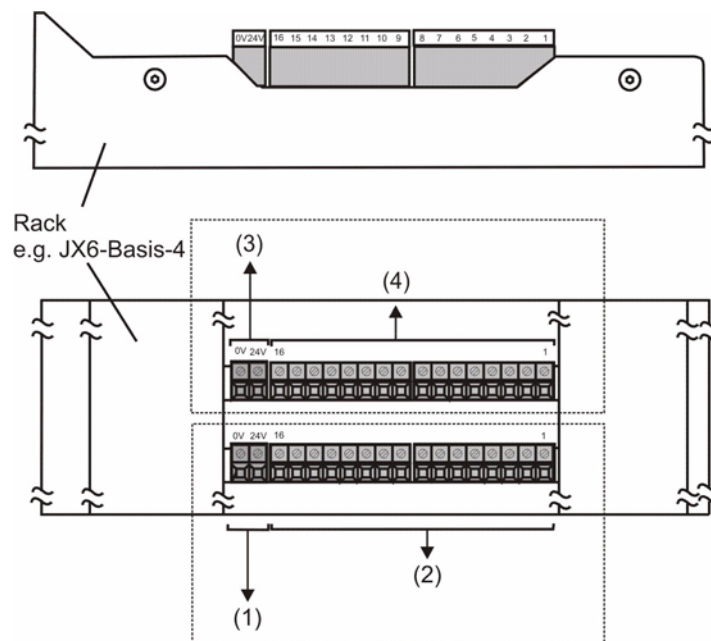
Fig. 11: Global and local access to digital outputs

9 Installation Guide

9.1 Removing the JX6-CON1/JX6-CON+ module

Procedure

- Switch off the power supply.
- Remove the 2-pin terminal (1) of the power supply for the JX6-CON1/JX6-CON+ module (see Fig. 12).
- Remove the two 8-pin terminals (2) of the digital inputs 1 through 16 on the JX6-CON1/JX6-CON+ module (see Fig. 12).
- If applicable:
Remove the 2-pin terminal block (3) of the external voltage supply of the outputs and the two 8-pin terminal blocks (4) of the digital outputs 1 to 16 (refer to Fig. 12).



- (1): Power supply terminal of JX6-CON1 or JX6-CON+
- (2): Digital inputs # 1 - 16
- (3): Ext. power supply of digital inputs
- (4): Digital outputs # 1 - 16

Fig. 12: Top and Side Views of the JX6 Rack

- Remove all Sub-D connectors plugged into the JX6-CON1/JX6-CON+ module. These connectors are located on the front side of the controller module.
- Use a screwdriver to loosen the four screws (5) connecting the JX6-CON1/JX6-CON+ module with the JX6 rack (refer to Fig. 13).
- Pull the JX6-CON1/JX6-CON+ module out of the JX6 rack using the handles (6) (refer to Fig. 13).

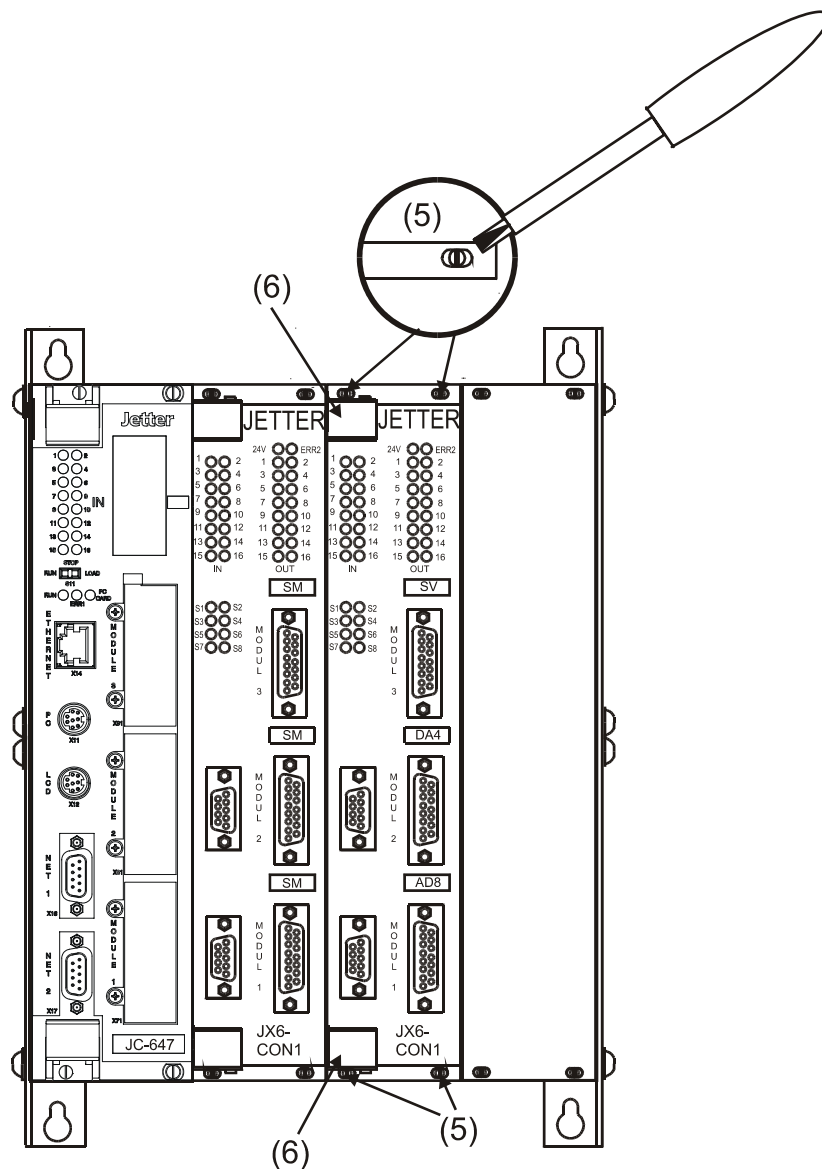


Fig. 13: Front View of the JX6 Rack with Modules

9.2 Installing the JX6-CON1/JX6-CON+ module

Procedure:

Install in reverse order of deinstallation.



Important!

Be sure to plug the green screw plug connectors into the correct receptacles. Connectors plugged into the wrong socket may cause malfunctions and even may destroy the control system.

Connectors are easily plugged into the wrong sockets by mistake especially if they are located close to each other.

To avoid this, Jetter AG provides a package of keying pins as standard with each control system. When properly installed, these keying pins prevent from plugging connectors incorrectly.

A suggestion for inserting the keying pins is described in chapter 9.3 "Correct Usage of Keying Pins" on page 46.



Important!

Be sure to supply the JX6-CON1/CON+ module with voltage after its installation in the JX6 rack.

Otherwise, the control system will not be ready for operation.

9.3 Correct Usage of Keying Pins

A package of keying pins is provided with the control system. These keying pins are intended to prevent from incorrect plugging of screw terminals.



Important!

Screw terminals plugged into the wrong socket may result in malfunctions and even may destroy the control system.

The proper usage of keying pins is described below.

Appearance

The keying pin consists of two parts, For an illustration of these two parts see Fig. 14.

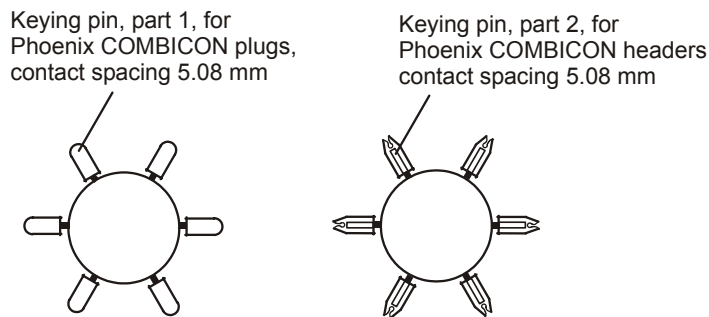


Fig. 14: Wheel of keying pins provided with the control system

Coding a plug connector

Fig. 15 gives an example of the keying procedure.

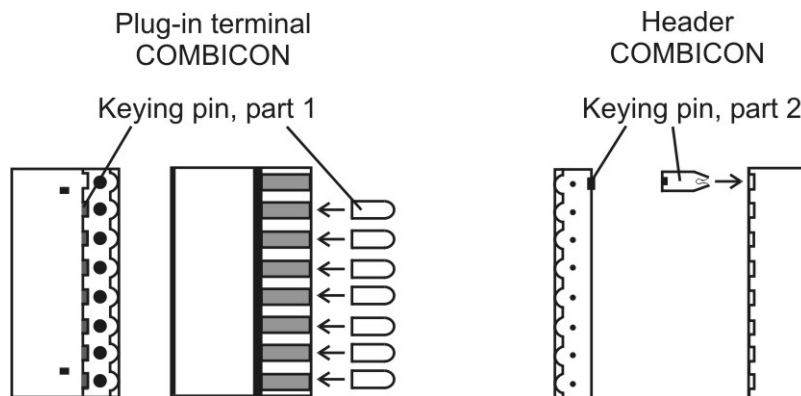


Fig. 15: Usage of keying pins

Suggestion for keying

Fig. 16 shows a suggestion for the keying of plug connectors.

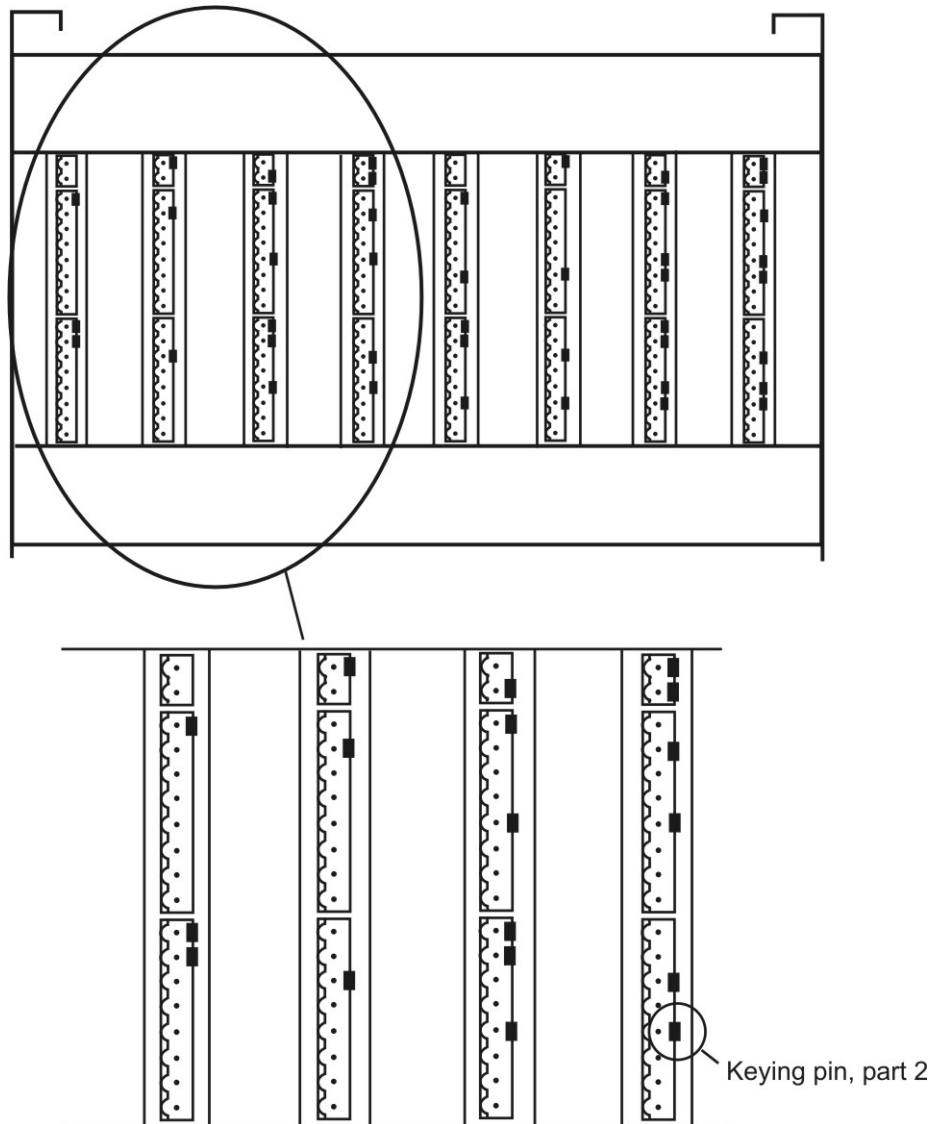


Fig. 16: Top view of the JX6-Basis-4 Rack with Keyed Connectors.

10 Downloading the Operating System

10.1 From JetSym

In the menu item "Build" of the JetSym programming interface the operating system can be updated.

For this purpose, operating system files (*.OS) are made available on the Internet (<http://www.jetter.de>) by JETTER AG.

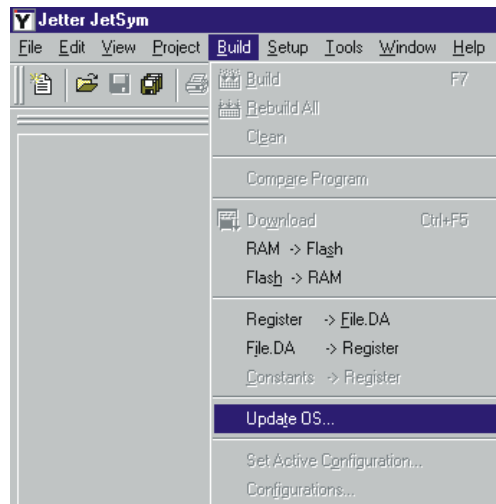


Fig. 17: Updating the OS File



For downloading an OS update, time-out must be set to 4000 ms in the JetSym menu "Project / Settings..." on the tab "Controller". This is the default setting.



In addition to this, the application program must be stopped during download of an OS update (by sliding the START/STOP switch in STOP position).

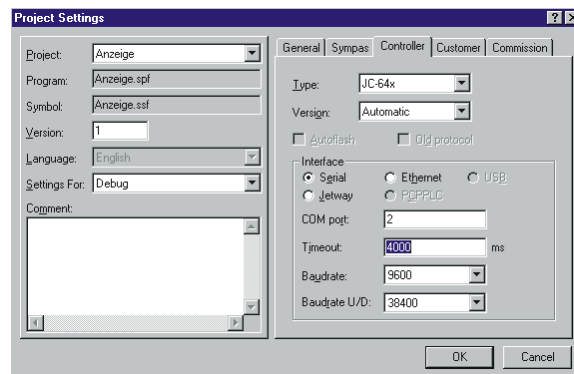


Fig. 18: JetSym Menu Project Settings

10.2 Operating System Release

In register 1x1099^{*)} the version number of the operating system of the JX6-CON1/ JX6-CON+ module is stored.

*) : x = Module slot

Register 1x1099: Operating System Release	
Function	Description
Read	Operating System Release
Write	Illegal
Value range	0 through +8388607
Value after reset	Present version * 1000

Example:

Version 2.050 of the operating system is loaded.

<Reg. 1x1099> = 2050



Note!

When submitting technical support queries, the version number must be specified.

Appendices

Appendix A: Recent Revisions

Chapter	Comment	Revised	Added	Deleted
Introduction	Word of advise on this manual	✓		
	Revision history		✓	
	Description of Symbols		✓	
Chapter 1	Who is permitted to operate ...	✓		
	Repair and maintenance	✓		
	Description of Symbols			✓
Chapter 1.1	Malfunctions	✓		
Chapter 1.3	Instructions on EMI	✓		
Addresses		✓		

Appendix B: Glossary

Analog	A parameter, e.g. voltage, which can be adjusted steplessly. In contrast to digital.
Bit-coded register	A register the individual bits of which can be set or reset.
Contact spacing	Standardized spacing between two contacts of a connector (male/female) adjacent to each other.
Co-processor	A processor which supports the CPU
Counter	A counter acquires the changes of state (edge) of a digital signal. At each change of state, the counter will increment (increase) or decrement (decrease) a register value, which then will be evaluated by the process controller.
DC/DC converter	A DC to DC converter is a circuit which converts DC power from one voltage to a another. It is a special class of power converter. A DC/DC converter is used if, for example, the board requires 5 volts and the control system is supplied by a 24 V power supply unit.
Digital	Binary presentation of a parameter, e.g. time. This parameter in digital representation can be changed in given steps only, that is in binary mode. Contrasted with analog.
Digital closed-loop controller	The controlled variable (actual value) is picked up at regular intervals (sampling interval) and compared with the setpoint. If there is a difference, the processor calculates with the help of a programmed control algorithm a sequence of manipulated values which are output at regular intervals.
Dynamic axes	Moving axes the positions of which are interdependent.
EC Low Voltage Directive	To be considered when using electric devices of a rated voltage between AC 50 and 1000 V and between DC 75 and 1500 V.
Electrical isolation	With electrical separation, the sensor ground is electrically isolated from the internal ground (GND) of the controller.
Electro-Magnetic Compatibility	Definition according to the EMC regulations: "EMC is the ability of a device to function in a satisfactory way in an electro-magnetic environment without causing electromagnetic disturbances itself, which would be unbearable for other devices in this environment."
Feedback Controllers	A controller serves the following basic purposes: <ul style="list-style-type: none"> – It tries to maintain a certain setpoint with the greatest possible accuracy and without any delay irrespective of external interferences.

Interpolation	The estimation of intermediate values between known values of a sequence. Example: Linear Interpolation Placing a straight between two known points.
Manipulated variable	A quantity that the controller applies to the controlled system.
Registers	A high-speed memory for a group of bits placed in a microprocessor or in another electronic device where data can be buffered for a specific purpose. With JETTER controllers, usually, these are 24 bit wide storage positions in a remanent RAM.
Ripple - Smoothing - Filtering	Ripple: The percentage of AC left on a DC signal after rectifying. Filtering: Circuit configuration with a RC or LC component in order to achieve more smoothness or a lower ripple of the DC voltage.
Sampling interval	An A/D converter requires a certain time, i.e. the sampling interval, to convert an analog value into a digital value.
Vibration Resistance	The device can permanently or shockwise be exposed to a vibration defined in the standard.

Appendix C: List of Abbreviations

AC	A lternating C urrent
AD	A nalog/ D igital
AM	A mplitude M odulation
approx.	approximately
betw.	between
CE	C ommunautés E uropéennes = European Union
cf.	compare
Cl.	C lass
D	D epth
DA	D igital/ A nalog
DC	D irect C urrent
e.g.	[lat. <i>exempli gratia</i>] for example
EMC	E lectro M agnetic C ompatibility
EN	E uropäische N orm, that is: European Standard
ESD	E lectro S tatic D ischarge
EU	E uropean U nion
Fig.	F igure
GND	G round
Gr.	G roup
H	H eight
i.e.	[Latin: <i>id est</i>] that is
IEC	I nternational E lectrotechnical C ommission
IP	I nternational P rotection
LED	L ight- E mitting D iode
max.	maximum
min.	minimum
neg.	negative
PE	P rotective E arth , respectively "Protective Earth Conductor"
PID	P roportional/ I ntegral/ D ifferential (control)
pos.	positive
reg.	R egisters
resp.	respectively

RH	Relative humidity
RM	Contact spacing
SELV	Safe Extra Low Voltage: Voltage, which, under all operating conditions will not exceed a peak or DC voltage of 42.4 V. This voltage is either measured between two conductors or between one conductor and earth. The circuit, in which this voltage occurs, must be separated from the mains power supply by a safety isolating transformer or some equivalent.
SUB-D	Type name of a plug-in connector
tn	Total duration of burst
tr	Rise time of burst
typ.	typical
W	Width

Units:

A	Ampere (electric current)
g	gram
Hz	Hertz
MHz	Megahertz (1 MHz = 10 ⁶ Hz)
m	Meter
min	Minute
mm	Millimeter (1 mm = 10 ⁻³ m)
mm ²	square millimeter
ms	Millisecond (1 ms = 10 ⁻³ s)
μs	Mikrosecond (1 μs = 10 ⁻⁶ s)
s	Second
V	Volt (electric voltage)
W	Watt (electric active power)
Ω	Ohm (electric resistance)
kΩ	Kiloohm (1 kΩ = 10 ³ Ω)
°C	Degrees centigrade (temperature unit)
%	Per cent

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Jetter AG

Gräterstraße 2
D-71642 Ludwigsburg

Germany

Phone: +49 7141 2550-0
Phone -
Sales: +49 7141 2550-433
Fax: +49 7141 2550-425
Telefax
Sales: +49 7141 2550-484
Hotline: +49 7141 2550-444
Internet: <http://www.jetter.de>
E-Mail: sales@jetter.de

Jetter Subsidiaries

Jetter Asia Pte. Ltd.

32 Ang Mo Kio Industrial Park 2
#07-03 Sing Industrial Complex
Singapore 569510

Singapore

Phone: +65 6483 8200
Fax: +65 6483 3881
E-Mail: sales@jetter.com.sg

Jetter AG Switzerland

Münchwilerstraße 19
CH-9554 Tägerschen

Switzerland

Phone: +41 719 1879-50
Fax: +41 719 1879-69
E-Mail: info@jetterag.ch
Internet: www.jetterag.ch

Jetter Automation Inc.

165 Ken Mar Industrial Parkway
Broadview Heights
OH 44147-2950

U.S.A.

Phone: +1 440 8380860
Fax: +1 440 8380861
E-Mail: bschulze@jetterus.com