

JetWeb

JX2-IA4

Operator's Manual



Edition 1.1

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This Manual is an Integral Part of the JetWeb Module JX2-IA4:

Model: _____
Serial Number: _____
Year of Manufacture: _____
Order Number: _____



To be entered by the customer:

Inventory Number: _____
Place of Operation: _____

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Significance of this Operator's Manual

This manual is an integral part of the JX2-IA4 module, and

- and must be kept in a way that it is always at hand until the JX2-IA4 module will be disposed of.
- If the JX2-IA4 module is sold, alienated or loaned, this manual must be handed over.

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

We would appreciate any kind of suggestion and contributions on your part and would ask you to inform or write us. This will help us to produce manuals that are more user-friendly and to address your wishes and requirements.

From this JX2-IA4 module may result unavoidable residual risks to persons and property. For this reason, any person who has to deal with the operation, transport, installation, maintenance and repair of the JX2-IA4 module must have been familiarised with it and must be aware of these dangers.

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.

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1 Safety Instructions

The JX2-IA4 module is in line with the current state of the art. The JX2-IA4 module complies with the safety regulations and standards in effect. Special emphasis was given to the safety of the users.

Of course, the following regulations apply to the user:

- 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 JX2-IA4 module is used to control machinery, such as conveyors, production machines, and handling machines.

The supply voltage of the JX2-IA4 module is DC 24 V. This operating voltage is classified as SELV (Safety Extra Low Voltage). The JX2-IA4 module is therefore not subject to the EU Low Voltage Directive.

The JX2-IA4 module may only be operated within the limits of the stated data.

Usage Other Than Agreed Upon

The JX2-IA4 module must not be used in technical systems which to a high degree have to be fail-safe, e.g. ropeways and aeroplanes.

If the JX2-IA4 module is to be run under surrounding conditions, which differ from the conditions mentioned in chapter 3: "Operating Parameters", page 13, the manufacturer is to be contacted beforehand.

Who is Permitted to Operate the JX2-IA4 Module?

Only instructed, trained and authorised persons are permitted to operate the JX2-IA4 module.

Mounting and backfitting may only be carried out by specially trained personnel, as specific know-how will be required.

Maintaining the JX2-IA4 Module

The JX2-IA4 module is maintenance-free. Therefore, for the operation of the module no inspection or maintenance are required.

Decommissioning and Disposal of the JX2-IA4 Module

Decommissioning and disposal of the JX2-IA4 module are subject to the environmental legislation of the respective country in effect for the operator's premises.

Descriptions of Symbols



Danger

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.



Note!

You will be informed of various possible applications and will receive further useful suggestions.



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.



Illustration of PC and user interface keys.

1.1 Ensure Your Own Safety

- Disconnect the JX-2 IA4 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.

Modifications and Alterations to the Module

For safety reasons, no modifications and changes to the JX2-IA4 module and its functions are permitted. Any modifications to the 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 JX2-IA4 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 JX2-IA4 module.

For any damages resulting from the use of non original parts and equipment any claims with respect to liability of Jetter AG are excluded.

Malfunctions

- Malfunctions or other damages are to be reported to an authorised person immediately.
- Safeguard the JX2-IA4 module against misuse or accidental use.
- Only qualified experts are allowed to carry out repairs.

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.

1.2 Instructions on EMI

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



Important!

Measures for increasing immunity to interference:

- On principle, physical separation should be maintained between signal and voltage lines.
- Shield both sides of the cable.
- 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 metallised connectors, e.g. SUB-D with metallised housing. Please take care of direct connection of the strain relief with the housing here as well (refer to Fig. 1).

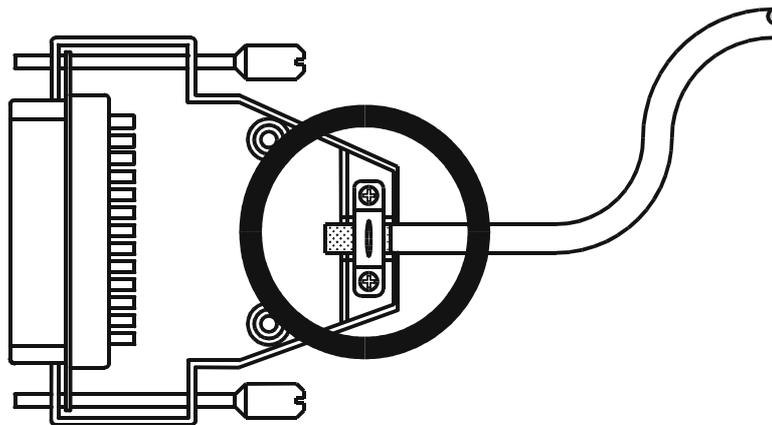


Fig. 1: Shielding of SUB-D connectors in conformity with the EMC standards.

2 Physical Dimensions

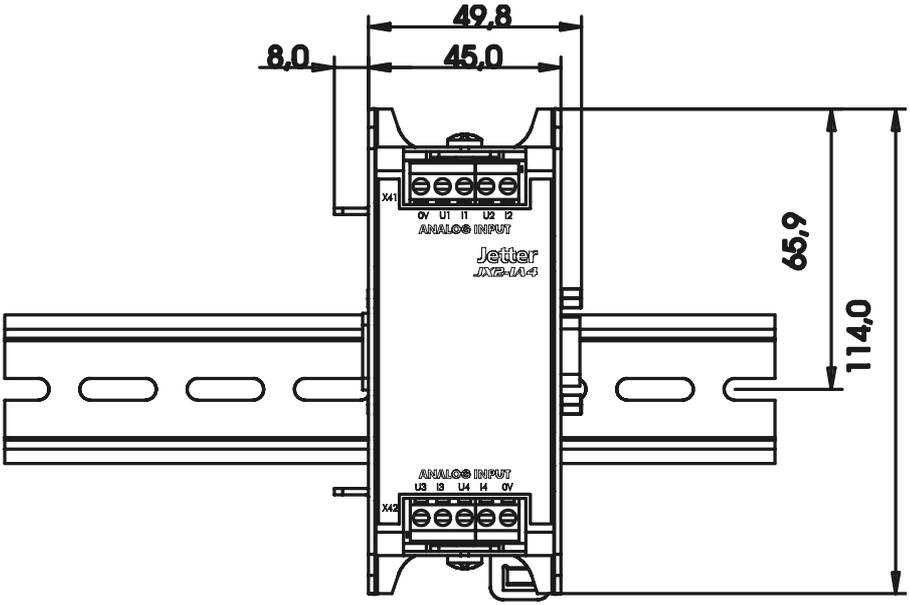


Fig. 2: Front View - JX2-IA4

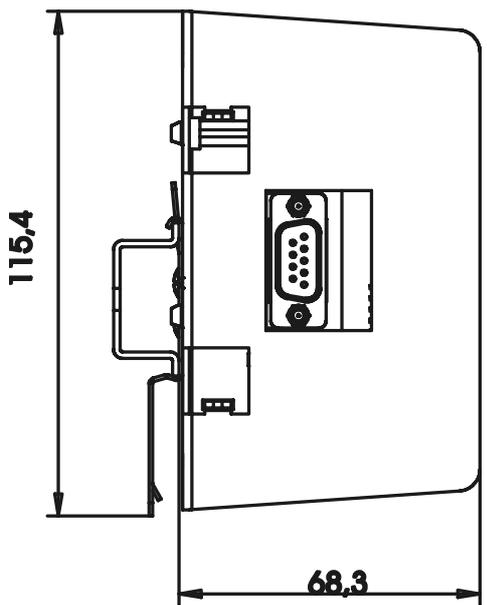


Fig. 3: Side View - JX2-IA4

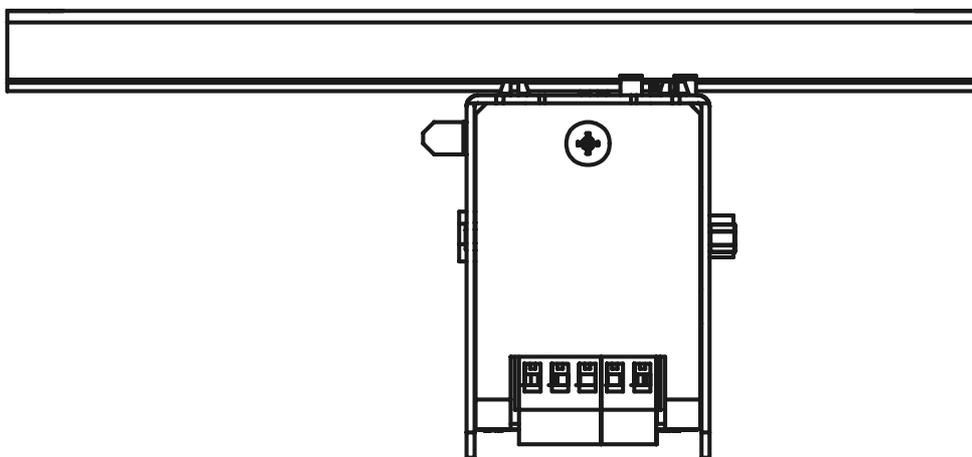


Fig. 4: Top View - JX2-IA4

3 Operating Parameters

Environmental Operating Parameters		
Parameter	Value	Reference
Operating Temperature Range	0 °C through 50 °C	
Storage Temperature Range	-25 °C through +70 °C	DIN EN 61131-2 DIN EN 60068-2-1 DIN EN 60068-2-2
Air Humidity / Humidity Rating	5 % to 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 electroconductive contaminants	
Operating Altitude	Up to 2000 m above sea level	DIN EN 61131-2

Mechanical Operating Parameters		
Parameter	Value	Reference
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: with an amplitude of 0.0375 mm for continuous operation (peak amplitude of 0.075 mm) 57 Hz -150 Hz: 0.5 g constant acceleration for continuous operation (1 g constant acceleration as peak value), 1 octave per minute, 10 frequency sweeps (sinusoidal), all spatial axes	DIN EN 61131-2 IEC 68-2-6
Shock Resistance	15 g occasionally, 11 ms, sinusoidal half-wave, 2 shocks in all three spatial axes	DIN EN 61131-2 IEC 68-2-27
Degree of Protection	IP20, rear: IP10	DIN EN 60529
Mounting Position	Any position, snapped on DIN Rail	

Operating Parameters - Electrical Safety		
Parameter	Value	Reference
Class of Protection	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

Operating Parameters (EMC) - Emitted Interference		
Parameter	Value	Reference
Enclosure	Frequency 30 -230 MHz, limit 30 dB ($\mu\text{V}/\text{m}$) at 10 m distance frequency band 230-1000 MHz, limit 37 dB ($\mu\text{V}/\text{m}$) at 10 m distance (class B)	DIN EN 50081-1 DIN EN 55011 DIN EN 50081-2

Operating Parameters (EMC) - Immunity to Interference of Housing		
Parameter	Value	Reference
Magnetic Field with Mains Frequency	50 Hz, 60 Hz 30 A/m	DIN EN 61000-6-2 DIN EN 61000-4-8
RF Field, amplitude-modulated	Frequency band 27 - 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
ESD	Discharge through air: Test peak voltage 15 kV (Humidity Rating RH-2 / ESD-4) Contact Discharge: Test peak voltage 4 kV (severity level 2) Criterion A	DIN EN 61000-6-2 DIN EN 61131-2 DIN EN 61000-4-2

Operating Parameters (EMC) - Immunity to Interference of Signal Ports		
Parameter	Value	Reference
Asymmetric RF, amplitude-modulated	Frequency band 0.15 -80 MHz Test voltage 10 V AM 80 % with 1 kHz Source impedance 150 Ohm Criterion A	DIN EN 61000-6-2 DIN EN 61000-4-6
Burst	Test voltage 1 kV tr/tn 5/50 ns Repetition rate 5 kHz Criterion A	DIN EN 61131-2 DIN EN 61000-6-2 DIN EN 61000-4-4

Operating Parameters (EMC) - Immunity to Interference of DC Power Supply In- and Outputs		
Parameter	Value	Reference
Asymmetric RF, amplitude-modulated	Frequency band 0.15 -80 MHz Test voltage 10 V AM 80 % with 1 kHz Source impedance 150 Ohm Criterion A	DIN EN 61000-6-2 DIN EN 61000-4-6
Burst	Test voltage 2 kV tr/tn 5/50 ns Repetition rate 5 kHz Criterion A	DIN EN 61131-2 DIN EN 61000-6-2 DIN EN 61000-4-4

4 Technical Data

Technical Data - JX2-IA4 Module		
Power Supply		<ul style="list-style-type: none"> centralised arrangement: via basic unit decentralised arrangement: via power supply module JX2-PS1.
Connections to the basic unit via system bus		Male connector SUB-D, 9 pins
Input terminals		Plug-in terminal blocks
Enclosure		Aluminium, painted
Dimensions (H x W x D in mm):		115 x 45 x 69
Weight		190 g
Mounting		DIN Rail
Input quantity		4 channels: - U ₁₋₄ for voltage - I ₁₋₄ for current
Voltage Range	- Unipolar - Bipolar	DC 0 .. 10 V DC -10 +10 V
Value range (voltage)	- Unipolar - Bipolar	0 ... 4095 -2048 ... 2047
Current range		0 ... 20 mA
Value range (current)		0 ... 2047
Input impedance	- Current	220 Ω
Resolution (voltage)		12 Bit
Resolution (current)		11 Bit
Sampling interval		< 13 ms
Heat loss of CPU logic circuit		0.3 W
Electrical isolation		None

Accuracy Classes of the JX2-IA4 Module			
Type of Error	Input Configuration	Maximum Error ^{*)}	
		in LSB	in LSB
Zero Error:	– Unipolar	± 5 LSB	12.2 mV
	– Bipolar	± 10 LSB	48.8 mV
	– Current	± 10 LSB	98 μ A
Gain Error:	– Unipolar	± 10 LSB	24.4 mV
	– Bipolar	± 10 LSB	48.8 mV
	– Current	± 10 LSB	98 μ A

^{*)} The typical measuring accuracy is higher.

5 JX2-IA4 Module - Analog Inputs

The JX2-IA4 module is for measuring analog input voltages and currents. The measured values are evaluated and processed by the application program.

5.1 Description of Connections

On the expansion module, 4 channels with 8 terminals have been provided for the inputs. These terminals are grouped in the following way:

- four terminals for voltage measurement ± 10 V
- four terminals for current measurement 0 through 20 mA

Each channel can be switched individually between voltage and current. All voltage and current input signals relate to the 0 V terminal. Within the module, the 0 V signal is connected to ground internally via the enclosure.

Terminal Specifications

- 5-pole terminal block COMBICON RM 5.08 (for printed circuit boards)
- Cable cross-sectional area: 0.25 - 2.5 mm²
- Torque (for input plug screws): 0.5 .. 0.6 Nm
- The maximum stripping length for input lines is 7 mm
- The accepted VDE guidelines have to be observed
- Flat-bladed screwdriver: 0.6 x 3.5 x 100 mm

Connecting Cable Specifications

- Not required

Cable Shielding

Make sure that the signal lines are shielded (see following figure)



Important!

Apply to the analog inputs of the JX2-IA4 module a maximum voltage of DC 12 V, or a maximum current of 50 mA. This will prevent the JX2-IA4 module and the sensor, e.g. a temperature sensor, from being destroyed.

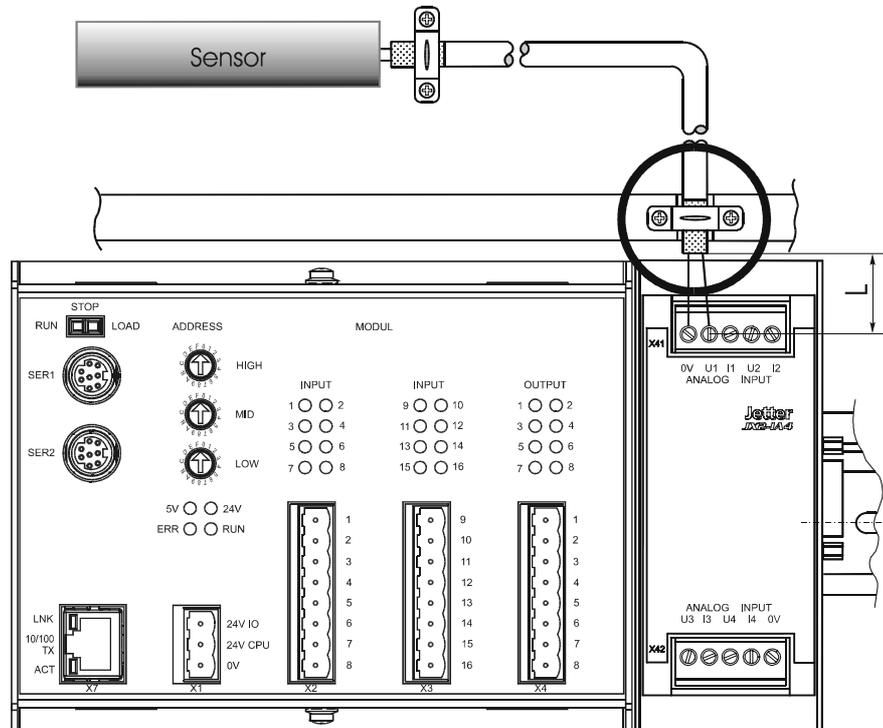


Fig. 5: Diagram of Input Wiring of a JX2-IA4 Module



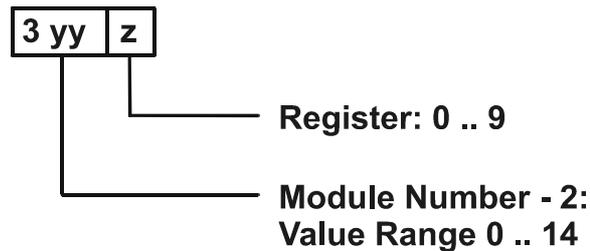
Important!

To avoid malfunctions the following must be ensured:

- The shielding must be clamped under a strain relief with the greatest possible surface area.
- The connection between shielding and ground must be electrically conducting.
- The distance "L" of unshielded conductor ends must not exceed 8 cm.

5.2 Registers of the JX2-IA4 Module

Coding of the registers:



Note!

For determination of the module number, only the non-intelligent modules will be counted. Intelligent modules, such as SV, SM, PID, etc., located among the modules, are not being taken into consideration.

Module number 1 is always assigned to the basic control unit. Starting from there, the module numbers are being counted left to right.

For communication with the CPU, 5 registers have been provided by the JX2-IA4 module. The operating system version number of the module can always be read from register 9. The other module registers are being defined by the function of the module. The registers are addressed as follows:

`Register number = 3000 + (module number - 2) * 10 + local register number`

Example: Determination of the register numbers

The number of the third expansion module's register is determined as follows:

Module number = 4

Local register number = 9

Register number = $3029 + (4-2) * 10 + 9 = 3003$

For communication with the CPU, 5 registers have been provided by the JX2-IA4 module. The operating system version number of the module can always be read from register 9. The other module registers are being defined by the function of the module. The registers are addressed as follows:

Configuring Inputs and Outputs JX2-IA4				
Inputs	A/D Value Register	Voltage		Current
		Unipolar	Bipolar	
Channel # 1	3yy0	xxx0xxx0	xxx1xxx0	xxxxxxx1
Channel # 2	3yy1	xx0xxx0x	xx1xxx0x	xxxxxx1x
Channel # 3	3yy2	x0xxx0xx	x1xxx0xx	xxxxx1xx
Channel # 4	3yy3	0xxx0xxx	1xxx0xxx	xxxx1xxx
	Output	↑↑↑↑↑↑↑↑	↑↑↑↑↑↑↑↑	↑↑↑↑↑↑↑↑
Configuring Virtual Outputs	xx01 through xx08	87654321	87654321 Output numbers	87654321

xx = Module number

YY = Module number - 2

Example: Configuring and Evaluating Measurements

Task definitions for the first expansion module:

1. A unipolar input voltage ranging from 0 to 10 V is to be measured using channel 1. Register 3yy0 contains the input voltage.
2. A bipolar input voltage ranging from -10 V to +10 V is to be measured using channel 2. Register 3yy1 contains the input voltage.
3. An input current ranging from 0 to 20 mA is to be measured using channel 3. Register 3yy2 contains the input voltage.
4. A unipolar input voltage ranging from 0 to 10 V is to be measured using channel 4. Register 3yy3 contains the input voltage.

Note!



To carry out measurements, the virtual outputs for the respective measuring method (unipolar, bipolar, current) have to be set in the program. The assignment can be seen from table "Configuring Inputs and Outputs" on page 22.

Comments on the approach for task # 1:

Through channel 1 a voltage ranging from 0 V to 10 V is to be measured. In the program, the code of output xx01 becomes 201 and that of output xx05 becomes 205, since module number 2 is assigned to the first expansion module. By resetting inputs 201, and 205 to zero, a unipolar voltage measurement ranging from 0 V through 10 V with a value range from 0 ... 4095 is defined.

The other tasks are accomplished in the same way. For details refer to the following table:

Channel #	A/D Value Register	Measurement settings for		
		Unipolar	Bipolar	Current
Channel # 1	3000	201 = 0 205 = 0		
Channel # 2	3001		202 = 0 206 = 1	
Channel # 3	3002			203 = 1
Channel # 4	3003	204 = 0 208 = 0		

Register 3yy0: Channel # 1 for input voltage/current	
Function	Description
Read	Present value for input voltage/current Value following reset: Present value for applied input voltage/current
Write	Illegal
Value range	Voltage - unipolar: 0 ... 4095 - bipolar: -2048 ... 2047 Current: 0 ... 2047

Register 3yy1: Channel # 2 for input voltage/current	
Function	Description
Read	Present value for input voltage/current Value following reset: Present value for applied input voltage/current
Write	Illegal
Value range	Voltage - unipolar: 0 ... 4095 - bipolar: -2048 ... 2047 Current: 0 ... 2047

Register 3yy2: Channel # 3 for input voltage/current	
Function	Description
Read	Present value for input voltage/current Value following reset: Present value for applied input voltage/current
Write	Illegal
Value range	Voltage - unipolar: 0 ... 4095 - bipolar: -2048 ... 2047 Current: 0 ... 2047

Register 3yy3: Channel # 4 for input voltage/current	
Function	Description
Read	Present value for input voltage/current Value following reset: Present value for applied input voltage/current
Write	Illegal
Value range	Voltage - unipolar: 0 ... 4095 - bipolar: -2048 ... 2047 Current: 0 ... 2047

Register 3yy9: Version number of the operating system	
Function	Description
Read	Version number of the operating system e.g. 101= V 1.01
Write	Illegal
Value range	32-bit-signed integer