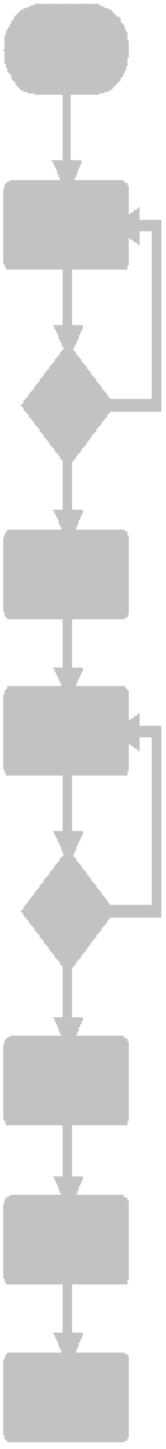

JetControl 24x

Version Update

from V2.01 to V3.00

Jetter

Rev. 1.01

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1 Introduction

Overview of Version Update			
Version	**Function**	**Expanded**	**Corrected**
V3.00	File System	✓	
	Interpreter	✓	
	Register interface	✓	
	pcom5/JetIP-Server	✓	
	Email	✓	✓
	Debug interface	✓	
	Real-time clock		✓
	Hardware support	✓	✓

1.1 Update Information

1.1.1 File System

Due to major changes in the file system (e.g. user administration), the flash disk has to be formatted following an update to this or a higher version from a version earlier than 3.00.

Save all essential files before updating the OS since formatting the flash disk will delete all files except for the files located in the directory "System". Do not forget to backup the "license.dat" located in the directory "licenses" for JC-24x modules with the option "-W".

For more information on how to format the flash disk please refer to the User's Manual.

After formatting has been completed the following FTP access will be available:
User: admin
Password: admin
Rights: Administrator

In the newly created file "users.ini" the password can be modified and new users can be set up (see 2.1).

1.1.2 JetSym

Beginning from this OS version JetSym version 2.0 or higher is required.

2 Expansions

2.1 File System

2.1.1 Description

The new version of the JetControl file system offers the possibility to define authorization for access (locks) to flash disk directories, as well as to set up users with specific permissions (keys).
Such settings can be made in various configuration files located in the directory "System". Since these files are stored outside the normal flash disk, they will not be deleted when formatting the flash disk.
Only users with administrator rights are authorized to read and modify these files.
Administrator rights are assigned by the key "1". This assignment is permanently defined in the file system and cannot be influenced by the user.

Basically, the following rule applies: The contents of a file can be read immediately after the file has been transferred. However, it will be applicable only after the next reboot of the control system.

Attention: Due to major changes in the file system, the flash disk has to be formatted following an update to this or a higher version from a version earlier than 3.00.

2.1.2 Flash Disk Lock File

2.1.2.1 General Information

In this file locks can be assigned to subdirectories located on the flash disk. Only users with the corresponding key are allowed to read or write (delete) files and subdirectories located in these directories.

2.1.2.2 File

The "flashdisklock.ini" is a configuration file and has only one section, namely "[LOCK]". Each subdirectory on the flash disk is specified with its lock number in an individual line. Lock numbers from 0 to 31 can be assigned. "0" means that the given subdirectory is not locked, i.e. it can be accessed without particular authorization.
It is also possible to assign a name instead of a number. The name has first to be defined in the file "keys.ini".

2.1.2.3 Example

```
[LOCKS]
test1=0
test1/sub1=0
test1/sub2=5
test2=user1
```

2.1.3 Key Names File

2.1.3.1 General Information

The file system supports up to 31 different user locks/keys which are consecutively numbered from 1 to 31. To provide ease of handling, a name can be assigned to each

lock/key combination in this file. The names have to be unambiguously and may comprise of a maximum of 15 alphanumeric characters.
To access a subdirectory protected by a lock, users have to use the matching key. Lock and key have the same name.

2.1.3.2 File

The lock and key names are entered into the section "[KEYS]" of the file "keys.ini".
The names defined here can be used when creating locks (chapter 2.1.2) and users (chapter 2.1.4) once the file has been transferred and the controller has been rebooted.

2.1.3.3 Example

```
[KEYS]
KEY01=admin
KEY02=os
KEY03=
KEY04=
KEY05=
KEY06=
KEY07=
KEY08=
KEY09=
KEY10=user1
KEY11=user2
KEY12=
KEY13=
KEY14=user5
KEY15=
KEY16=
KEY17=
KEY18=
KEY19=
KEY20=
KEY21=
KEY22=
KEY23=
KEY24=
KEY25=
KEY26=
KEY27=
KEY28=
KEY29=
KEY30=
KEY31=
```

2.1.4 User File

2.1.4.1 General Information

The file system supports up to 32 users. Each user is provided with:

- an unambiguous name with up to 31 alphanumeric characters
- a password with up to 31 alphanumeric characters
- a set of up to 31 read access keys
- a set of up to write access 31 keys

The ftp and http servers use the user database to control file system access.

2.1.4.2 File

The file "users.ini" is a configuration file comprising of up to 32 sections with user names ranging from "[USER1]" to "[USER32]". The user name (NAME) is mandatory, password (PW), read access keys (READKEYS) and write access keys (WRITEKEYS) are optional.
The read and write keys are displayed as a comma separated list. They have to be entered into the list in the same format. Keys, to which names have been assigned (chapter 2.1.3), are displayed with their names. When creating the file, both names and numbers of the keys can be used.
Any user with administrator rights is allowed to modify the user file.

It is not possible to delete the user ‚admin' ([USER1]) nor to modify his write or read key. Only his password can be set.

2.1.4.3 Example

```
[USER1]
NAME=admin
PW=admin
READKEYS=1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,
29,30,31
WRITEKEYS=1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,2
8,29,30,31

[USER2]
NAME=os_update
PW=janett
READKEYS=1
WRITEKEYS=1

[USER3]
NAME=jetter
PW=test
```

2.1.5 License File

Now, the subdirectory "licenses" and the file "license.dat" which is responsible for licensing and enables web functions are not located in the normal file area of the flash disk any more. Thus, they cannot be deleted (not even by formatting the disk).

2.2 New Interpreter Instructions

2.2.1 Network Copy Instructions

2.2.1.1 Description

Network copy instructions are used for copying register blocks via Ethernet (JetIP) to another node on the network or from it. One JetIP message may contain a maximum of 64 registers. If it is intended to copy more than 64 registers, the entire block is subdivided into several blocks with a maximum of 64 registers each. Data consistency can be guaranteed only within one block.

2.2.1.2 Instructions

All parameters of the instructions described below can be specified directly, indirectly or double indirectly. For this purpose, only local registers can be used as pointer registers.

2.2.1.2.1 Writing register blocks

In order to copy a register block to a remote station, the following instruction is used:

N_COPY_TO (<address>, <source>, <destination>, <count>, <port>, <mode>)

<address> IP address of the communication partner to which the register block is to be sent.
<source> Number of the first local register to be sent
<destination> Number of the first register of the destination system to which the block is to be sent
<count> Number of registers to be copied.
<port> Interface through which the blocks are to be copied. For the Ethernet interface (JetIP) "3" has to be specified here.
<mode> Copy mode in the destination system. This parameter is bit-coded.

Bit #	Mode
1, 0	Autoincrement the number of the destination register Value: 00 – Constant destination register number, <count> indicates the number of write accesses to the destination register. 01 – The destination register number is incremented after each write access 10 – The destination register number is decremented after each write access 11 – Reserved
2	Indirectly addressing the number of the destination register Value: 0 – <destination> specifies the number of the first register of the destination system to which the first value of the register block is to be sent 1 – <destination> specifies the register number of the destination system which contains the number of the first register of the destination system to which the first value of the register block is to be sent

"1" has to be specified to simply copy a register block.

Registers in the source system are always read in bottom-up direction beginning with the first specified register (<source>).

2.2.1.2.2 Reading register blocks:

In order to copy a register block from a remote station, the following instruction is used

N_COPY_FROM (<address>, <source>, <destination>, <count>, <port>, <mode>)

<address> IP address of the communication partner from which the register block is to be copied.
<source> Number of the first register of the destination system to be copied from.
<destination> Number of the first local register to which the received values are to be stored.
<count> Number of registers to be copied.
<port> Interface through which the blocks are to be copied. For the Ethernet interface (JetIP) "3" has to be specified here.
<mode> Copy mode in the destination system. This parameter is bit-coded.

<table>
<tr><td>Bit #</td><td>Mode</td></tr>
<tr><td>1, 0</td><td>Autoincrement the number of the source register

<table><tr><td>Value</td><td>Meaning</td></tr><tr><td>00</td><td>Constant source register number,
indicates the number of read accesses to the source register.</td></tr><tr><td>01</td><td>The source register number is incremented after each write access</td></tr><tr><td>10</td><td>The source register number is decremented after each write access</td></tr><tr><td>11</td><td>Reserved</td></tr></table></td></tr>
<tr><td>2</td><td>Indirectly addressing the number of the source register

<table><tr><td>Value</td><td>Meaning</td></tr><tr><td>0</td><td><source> specifies the number of the first register of the destination system from which the first value of the register block is to be read.</td></tr><tr><td>1</td><td><source> specifies the register number of the destination system which contains the number of the first register of the destination system from which the first value of the register block is to be read.</td></tr></table></td></tr>
</table>

"1" has to be specified to simply copy a register block.

Registers in the source system are always read in bottom-up direction beginning with the first specified register.

2.2.1.3 JetSym keyboard shortcuts

Instruction	Shortcut
N_COPY_TO	NCT
N_COPY_FROM	NCF

2.2.1.4 Errors

Errors that will possibly occur will be indicated by flag 2075, as well as in registers 2710 / 2711 and 2750 / 2751 as with the N_SEND/GET_REGISTER instructions.
In case an invalid IP address (< 1.1.1.1 or > 254.254.254.254) or port number has been entered, error code 3 is displayed in register 2711 / 2751.

2.2.2 Register Shift Instructions

2.2.2.1 Description

By means of the instructions SHIFT_LEFT and SHIFT_RIGHT, register contents can bitwise be shifted to the left (which corresponds to a multiplication by 2), or to the right (which corresponds to a division by 2). To do so, you have to specify the amount of bits to be shifted (from 0 to 32).
The bit shifted out of the register last can be read from special flag 2076.
"0" bits are shifted into the register from the other side.
An amount of 0 bits will not affect the register and flag 2076. If the amount exceeds 32 bits, the register and flag 2076 will be zeroed.

2.2.2.2 Instructions

Both parameters of this instruction can be specified directly or indirectly.

2.2.2.2.1 Shift register contents to the left

Corresponds to a multiplication by 2.

SHIFT_LEFT (<RegNum>, <Count>)

<RegNum> Number of the register the contents of which are to be shifted.
<Count> Amount of shifting operations.

2.2.2.2.2 Shift register contents to the right

Corresponds to a division by 2.

SHIFT_RIGHT (<RegNum>, <Count>)

<RegNum> Number of the register the contents of which are to be shifted.
<Count> Amount of shifting operations.

2.2.2.3 JetSym Keyboard Shortcuts

Instruction	Shortcut
SHIFT_LEFT	SL
SHIFT_RIGHT	SR

2.2.2.4 Flags

Flag 2076: Shift Carry	
Function	**Description**
Read	Register bit shifted out last
Write	not useful
Value after reset	0

2.2.3 Floating Point Constants

So far, only integer constants (decimal, binary, hexadecimal) could be entered into the source text of a JetSym program. From this version on, it is possible to load registers containing a floating point number, or to use floating point numbers within an arithmetic operation.

2.2.3.1 Loading Registers

The known instruction REGISTER_LOAD is used to load a floating point number into a register. Simply specify the floating point number as value to be loaded.

2.2.3.2 Arithmetic Operations

Within an arithmetic calculation, the floating point number can simply be entered into the source text, or ,once "dialog support" is enabled, it can be entered into the dialog box "number (float)".

2.2.3.3 JetSym Keyboard Shortcuts

Instruction	Shortcut
REGISTER_LOAD	RL
number (float)	NF

2.2.4 Special Functions

With these special functions the first parameter indicates the number of the register containing the functional parameters, and the second parameter the number of the register containing the results.

2.2.4.1 Description

Attention: To be used by experienced Ethernet users only!

These special functions are for modifying network interface settings. Since these functions directly access the interface on a low level, they should only be activated during times when no network communication takes place. Failure to do so may result in data loss.
IP and MAC addresses have to be specified as 32 bit values.

2.2.4.2 Permanent Entry into ARP Table

At the moment, the ARP table comprises of up to 20 entries. If this table is completely filled, one of the existing entries will be deleted when communication with a new partner starts. This function is for entering addresses that will not be deleted automatically.

<table>
<tr><th colspan="2">SPECIALFUNCTION 120</th></tr>
<tr><td>Declaration</td><td>SPECIALFUNCTION (120, InReg, OutReg)</td></tr>
<tr><td>Parameters</td><td>InReg: Number of the first register of a block consisting of 3 registers
<table>
<tr><th>Register</th><th>Meaning</th></tr>
<tr><td>InReg + 0</td><td>IP ddress</td></tr>
<tr><td>InReg + 1</td><td>MAC address, manufacturer section</td></tr>
<tr><td>InReg + 2</td><td>MAC address, device section</td></tr>
</table></td></tr>
<tr><td>Rückgabe</td><td>OutReg: Number of the register to which the result will be stored.
= 0: No error
> 0: Error</td></tr>
</table>

2.2.4.3 Deleting an Entry from ARP Table

This function is required, for example, to replace a network node during operation, thus, for addressing a new node with the same IP address but with a different MAC address.

SPECIALFUNCTION 121	
Declaration	SPECIALFUNCTION (121, InReg, OutReg)
Parameters	InReg: Number of the register containing the IP address to be deleted.
Return values	OutReg: Number of the register to which the result will be stored. = 0: No error > 0: Error

2.2.4.4 Modifying Own IP Address

This special function is for modifying the IP address of the controller carrying out the function. When this function has been completed without errors, the new IP address can be read out of register 2931.
However, the configuration file "cfg_var.ini" or registers 10132 and 10135 are not affected by this function (the rotary switches for setting the address have not been switched neither), so that after the next reboot the settings defined here will be activated again.

SPECIALFUNCTION 122	
Declaration	`SPECIALFUNCTION (122, InReg, OutReg)`
Parameters	`InReg: Number of the register containing the new IP address.`
Return values	`OutReg: Number of the register to which the result will be stored.` = 0: No error > 0: Error

2.3 New / Enhanced Registers

2.3.1 Type of Node

Register 10170: Type of Node	
Function	**Description**
Read	JC-24x type
Write	Disabled
Value range	**Controller** / **Register Contents** JC -241 / 241 JC -243 / 243 JC -246 / 246
Value after reset	Depending on the type of node

2.3.2 Error Counter of the Serial Interface

This function is for counting faults in data communications, such as frame and parity errors, as well as buffer overruns.

Register 10019: Error Counter SER1	
Function	**Description**
Read	Amount of receive and send errors of the serial interface SER1.
Write	Only clearing makes sense
Value range	signed 32 bit

Value after reset	0

Register 10039: Error Counter SER2	
Function	**Description**
Read	Amount of receive and send errors of the serial interface SER2.
Write	Only clearing makes sense
Value range	signed 32 bit
Value after reset	0

2.3.3 Task-specific Network Registers

These two register contain the amount of network errors and the error code of the network instructions which occurred in the task reading these registers. The desired task can be selected in JetSym when monitor mode has been activated.

Register 2750: Amount of Network Errors	
Function	**Description**
Read	Present amount of network errors in a task
Write	Only clearing makes sense
Value range	Signed 32 bit
Value after reset	0

Register 2751: Error Code	
Function	**Description**
Read	Error code of the last network access 0 = No error 1 = Timeout 3 = Error message of the remote station 5 = Invalid network address 6 = Invalid amount of registers 7 = Invalid interface number
Write	Writing makes no sense
Value range	0 .. 255
Value after reset	0

2.3.4 Network Error Register 2710

Register 2710, from which the total amount of network errors can be read out, has been expanded from 8 to 32 bits.

2.3.5 Error Register 2008

In case of a task stack overrun, or underrun the corresponding task, or the complete application program will be stopped and the error will be displayed in bit 12 of error register 2008.

2.3.6 Special Characters with Display_Text Instruction

Now, the special characters for the functions "clear display" and "clear to end of line" of the Display_Text instructions can be set in registers 2839 and 2840. Then, these characters can no longer be displayed on the display modules.

Register 2839: "Delete Screen" Character	
Function	**Description**
Read	Special character for clearing the LCD
Write	Set new special character
Value range	0 .. 255
Value after reset	95 (underscore ‚_')

Register 2840: "Delete to end of line" Character	
Function	**Description**
Read	Special character for clearing the display to the end of the line
Write	Set new special character
Value range	0 .. 255
Value after reset	36 (‚$')

The reset values correspond to the present fixed codes.

2.4 New / Enhanced Functions

2.4.1 Interface Activity Monitoring

2.4.1.1 Description

The activity of a connected communications partner, communicating via pcom7 / JetIP with JetControl, can be monitored from the application program by means of two flags per interface. This allows to determine, for instance, whether a connection to an operator or display module still exists.
Upon receipt of a valid telegram the first bit is set by the operating system. At the same time, a monitoring time is started which can be set in a register. Each new request restarts the monitoring time. The user can set a second bit. If valid telegrams do not arrive anymore, both bits are reset upon expiry of the monitoring time. The fact that the second bit is not set by the operating system indicates the user that the connection was interrupted even if the first bit was only reset shortly after an interruption, and then set again.
The activity monitoring can be switched off by setting the monitoring time to “0”.

Activity monitoring requires cyclical queries to be sent to the control by pcom7 / JetIP.
For HMIs (e.g. LCD9, LCD34, LCD19 etc.) a value smaller than 200 ms should not be set. The reason is that errors might be reported in multi-display mode or with large displays although a communication still exists.
With visualization systems (e.g. VIADUKT, JetLink, browsers with Java applets) or the programming system JetSym, the scan time can be set or communication can be stopped completely. This fact has to be taken into account when using activity monitoring.

2.4.1.2 Register

Register 2955: Ethernet Monitoring Time (JetIP)	
Function	**Description**
Read	Current monitoring time in milliseconds
Write	New monitoring time in milliseconds
Value range	0 .. 65535
Value after reset	0 (no monitoring)

Register 2956: Monitoring Time SER1 (pcom7)	
Function	**Description**
Read	Current monitoring time in milliseconds
Write	New monitoring time in milliseconds
Value range	0 .. 65535
Value after reset	0 (no monitoring)

Register 2957: Monitoring Time SER2 (pcom7)	
Function	**Description**
Read	Current monitoring time in milliseconds
Write	New monitoring time in milliseconds
Value range	0 .. 65535
Value after reset	0 (no monitoring)

2.4.1.3 Flags

Flag number	Interface	Meaning
2088	Ethernet	OS flag 0 = no JetIP activity 1 = JetIP activity
2089	Ethernet	User flag 0 = no JetIP activity to be set by user
2090	SER 1	OS flag 0 = no pcom7 activity 1 = pcom7 activity
2091	SER 1	User flag 0 = no pcom7 activity to be set by user
2092	SER 2	OS flag 0 = no pcom7 activity 1 = pcom7 activity
2093	SER 2	User flag 0 = no pcom7 activity to be set by user

2.4.2 Email

Entries of the sections FROM, TO, CC and ATTACHMENT in the e-mail configuration files can be created via data tags on the basis of controller values (e.g. text registers).

2.4.3 Function Result

If within an user function no value was assigned to the register with the function name, the result of this function was undetermined when returning from this function. Starting from this version, "zero" will be returned as predefined value.

2.4.4 Flash Disk

Starting from this version, large flash disks in the JC-243 (3 MB) and JC-246 (7 MB) are supported.

2.4.5 Repetition of Network Instructions

2.4.5.1 Description

If an error (e.g. due to a transmission interfered by EMI) occurs with a network instruction (e.g. N_SEND_REGISTER), the instruction will be repeated as often as set in register 2717. Only if all attempts failed, execution of this instruction will be cancelled and an error will be reported through flag 2075 and registers 2710/2711 and 2750/2751.
The total number of attempts can be read from register 2718. This value, for example, could be used to evaluate transmission quality.

2.4.5.2 Register

Register 2717: Number of Repetitions	
Function	**Description**
Read	Set number of repetitions
Write	New number of repetitions
Value range	0 .. 255
Value after reset	0

Register 2718: Total number of Repetitions	
Function	**Description**
Read	Number of repetitions
Write	Only clearing makes sense
Value range	32 bits
Value after reset	0

2.4.6 JetSym

Starting from this version, the OS supports the JetSym V2.0 debugger (breakpoints, single step etc.) and the new programming language "ST".

2.4.7 Communication

Starting from this version, the serial and the Ethernet interfaces (JetIP) use the communication protocol "pcom7".

3 Eliminated Software Bugs

3.1 Real-time Clock

In case an user program accessed registers of the real-time clock (register 2911 through 2928) while files were written to the flash disk of the JetControl by ftp, it could happen that the real-time clock shifted.
Now, concurrent accesses to the real-time clock are blocked.

3.2 Email

If in the file "email.ini" the entry for the IP address of the SMTP server was missing, the file remained opened, and, thus, could not be replaced by a correct file.
Now, a faulty "email.ini" gets closed and can be replaced by another file.

3.3 Festo CP Valve Terminals

Due to errors in the driver for Festo CP valve terminals it could happen that connected modules were not detected or that only one of them was operated.