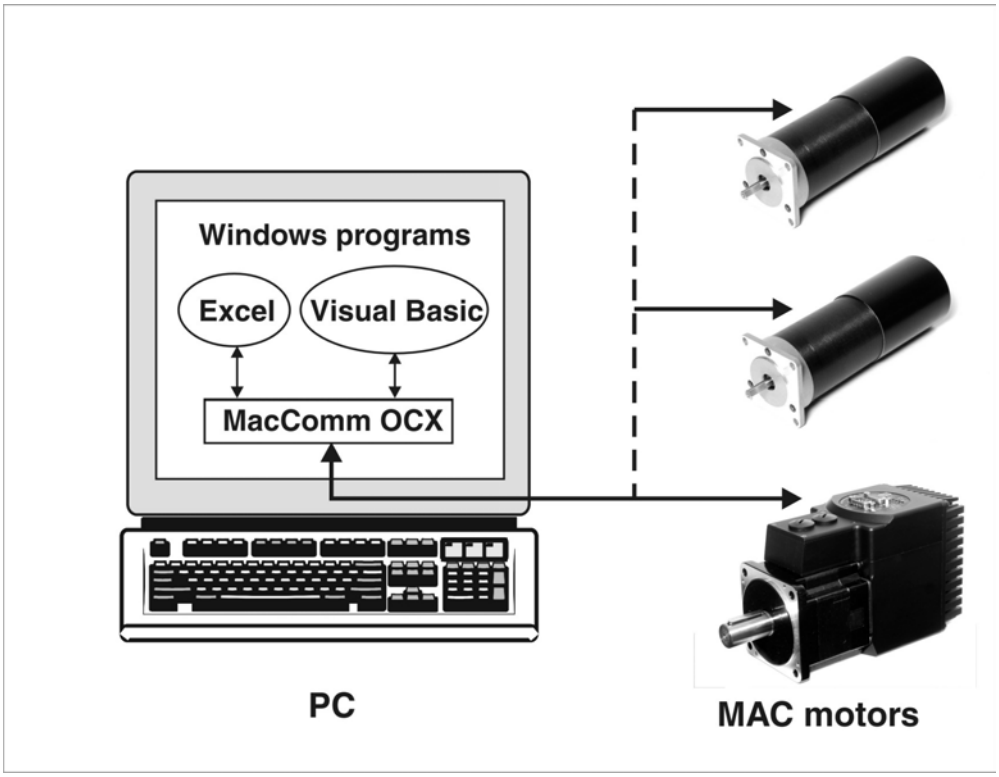
MacComm OCX Control 1.07

User Manual



JVL Industri Elektronik A/S

Contents

1 Introduction

1.1 Foreword

MacComm OCX has been developed to provide an easy way of interfacing to the MAC motors from various Windows applications.

To use the MacComm OCX you only need a development environment that supports ActiveX components (previously called OLE controls)

This includes: MS Excel, MS Visual Studio, Borland C++ Builder, Borland Delphi, LabView, and many more.

By using this OCX you do not need to worry about setting up the COM port settings such as: baud rate, start bits, stop bits, databits, parity, CTS, RTS etc.
These settings are handled automatically by the OCX. All you need is to tell what COM port is used and what addresses the MAC motors are connected.

The MAC motor address is only required when more than one MAC motor is connected to the same serial cable. Otherwise address 255 is a broadcast address, where the MAC motor will react regardless of configured address.

1.2 What is new in version 1.07

Version 1.07 adds support for the QuickStep family of stepper motor controllers and integrated steppers.

Current JVL products in this range include the SMC75 stepper motor controller board, and the MIS231, MIS232 and MIS234 integrated stepper motors. All of them are programmable in the same way as the MAC00-R1/R2/R4 modules. For further information on these products, visit the JVL website at http://www.jvl.dk.

The addition of the QuickStep family has required an extension to the MacComm OCX interface. This is in the form of the SetMotorType method, which tells the OCX how to handle a motor, at a given address on the serial bus. It is similar to the SetMACType method, but is more flexible. Also added is the GetMotorType method, which allows you to read back the type code provided to SetMotorType. For more information, see sections 3.3.20, 3.3.19, and 3.3.21 for detailed descriptions of the relevant functions. For a list of currently defined motor type codes, see appendix 4.3.

In addition, this manual has been revised and extended.

1.3 Conventions in this manual

This manual is mainly about programming with the MacComm OCX, and there is really only one convention that matters: the form of the code examples.

In all cases where the text is a concrete example, like code that can be added to a program, or commands that can be entered at a command prompt, the text will look like this:

```
'This is a Visual Basic comment
MacComm.Retries = 5
```

Where nothing else is indicated, 'MacComm' in the code samples refer to an instance of the MacComm OCX.

1.4 If you are not going to read anything else

If you are anxious to get started quickly, we suggest you turn to section 2.1 of the programming guide. It explains the basics of using the MacComm OCX, and also points out some important pitfalls.

Instructions for installing the OCX to your system are found in appendix 4.1.

Instructions for using the OCX with your development environment are found in appendix 4.2.

2 Programming guide

2.1 MacComm OCX programming basics

First you need to add the OCX to your project (See Installation instructions later in this manual)
To initialize the OCX the following are required:

Setting "ComPort" to wanted COM port number
Calling SetMACType to set MAC type (only required for MAC 400/800)
Calling "OpenPort"

Now it is possible to use the various commands for setting/retrieving values:

Call ReadParameterAlternate to read a value
Call WriteParameterAlternate to set a value
Etc.

To close the communications do the following:

Call ClosePort

2.2 Advanced programming issues

This chapter deals with various issues which, strictly speaking, is beyond the scope of a reference manual like this one. However, we know that many JVL costumers will appreciate having these issues clarified.

2.2.1 Timing and multithreading

All calls to the MacComm OCX block the calling thread until completed. This simplifies programming and debugging, but delays execution of the thread. If this is not acceptable, we recommend that each instance of the OCX is handled by its own background thread.

The details of how this should be done both depends on your choice of programming tool, and the intended application. They are therefore beyond the scope of this manual.

2.2.2 Controlling programmable motors

Programmable motors include the QuickStep family, and any MAC motor with a MAC00-Rx, -RxP, -FB4, or –EW4 module. A programmable motor can be controlled in the same fashion as a non-programmable motor. However, if a program is run locally on the motor, concurrently with the motor being controlled from the outside, certain things must be considered.

MAC motors with MAC00-Rx modules: the Rx NanoPLC module has been discontinued, but remains in use with many JVL costumers.

MAC motors with MAC00-RxP, -FB4, and -EW4 modules:

QuickStep motors and controllers:

3 Interface reference

3.1 Overview

This is a brief overview of the methods and properties available in the MacComm OCX interface.

3.1.1 Methods

OpenPort()
ClosePort()
ReadParameter([in] Address, [in] ParamNum, [out] Value)
ReadParameterAlternate([in] Address, [in] ParamNum, [out] Value)
WriteParameter([in] Address, [in] ParamNum, [in] Value)
WriteParameterAlternate([in] Address, [in] ParamNum, [in] Value)
GetParamNumFromName([in] Address, [in] ParamNum)
GetLastError()
GetLastErrorStr([in] long ErrorCode)
GetParameterType([in] Address, [in] ParamNum)
Reset([in] Address)
ResetWait([in] Address)
WriteToFlash([in] Address)
WriteToFlashWait([in] Address)
SetFactors([in] PositionFactor, [in] AccelerationFactor, [in] VelocityFactor)
SetFactorsBig([in] PositionFactor, [in] AccelerationFactor, [in] VelocityFactor)
SetMACType([in] Address, [in] Type)
GetModuleType([in] Address, [out] ModuleType, [out] FirmWareVersion)
NanoGet([in] Address, [in] Page, [out] Data)
NanoPut([in] Address, [in] Page, [in] Data)
NanoProgram([in] Address, [in] FileName)
NanoWrite([in] Address)
NanoStop([in] Address)
NanoReset([in] Address)
NanoResetWait([in] Address)
NanoDebug([in] Address, [out] State, [out] Inputs, [out] Outputs, [out] Time, [out] Count, [out] ModeCmd)
RxPReset([in] Address)
RxPResetWait([in] Address)
RxPNOOP([in] Address, [out] Value)
RxPStart([in] Address)
RxPStop([in] Address)
RxPPause([in] Address)
RxPStep([in] Address, [in] MinAddress, [in] MaxAddress)
RxPSetOutputs([in] Address, [in] Outputs, [in] Mask)
ReadStatus([in] Address, [out] Status, [out] Position, [out] ErrCount);
WriteGroup([in] Group, [in] RegisterNo, [in] Value);
AboutBox()
SetMotorType([in] Address, [in] Type)
GetMotorType([in) Address, [out] Type)

3.1.2 Properties

ComPort
Retries
GrpSends
Baud

3.2 Property descriptions

3.2.1 ComPort

Type: Integer
Default value: 1
Description:
Use this property to select the serial port

Example(s):
C++:

```
// Use COM1
MacComm.ComPort = 1;
```

BASIC:

```
'Use COM1
MacComm.ComPort = 1
```

3.2.2 Retries

Type: Integer
Default value: 5
Description:
Use this property to set the number of retries

Example(s):
C++:

```
// Try five times before reporting failure
MacComm.Retries = 5;
```

BASIC:

```
'Try five times before reporting failure
MacComm.Retries = 5
```

3.2.3 GrpSends

Type: Integer
Description:
Use this property to set the serial port

Example(s):
C++:

```
// Use COM1
MacComm.ComPort = 1;
```

BASIC:

```
'Use COM1
MacComm.ComPort = 1
```

3.2.4 ComPort

Type: Boolean
Description:
Use this property to set the serial port

Example(s):
C++:

```
// Use COM1
MacComm.ComPort = 1;
```

BASIC:

```
'Use COM1
MacComm.ComPort = 1
```

3.3 Method Descriptions

3.3.1 OpenPort()

Return type: Boolean
Returns true if open was successful

Description:
Use this method to open the port

Example(s):
C++:

```
// Opening the port
bool Result=MacComm.OpenPort();
```

BASIC:

```
'Opening the port
Dim Result As Boolean
Result = MacComm.OpenPort
```

3.3.2 ClosePort()

Description:
Use this method to close the port

Example(s):
C++:

```
// Closing the port
MacComm.ClosePort();
```

BASIC:

```
'Closing the port
MacComm.ClosePort
```

3.3.3 ReadParameter([in] Address, [in] ParamNum, [out] Value)

Parameters:

Type	Name	Description
16 bit signed integer	Address	Address of the motor (255 for broadcast)
16 bit signed integer	ParamNum	Parameter number
32 bit signed integer (pointer)	Value	Value to be read (Pointer)

Return type: Boolean
Returns true if read was successful
It will try the amount of times the property "Retries" has been set to before returning false.

Description:
Use this method to read a parameter from a Macmotor register
This method can also be used for accessing the module registers by using ParamNums above 256.
Register 1 in the module can be accessed by reading ParamNum 257

Value is one of the following types cast to a long integer:

Word:	16 bit unsigned integer
Integer:	16 bit signed integer
LongInt:	32 bit signed integer
Fixed4:	16 bit signed fixed point (Unit: 1/4096)
Fixed8:	16 bit signed fixed point (Unit: 1/256)
Fixed16	32 bit signed fixed point (Unit: 1/65536)
Fixed24	32 bit signed fixed point (Unit: 1/256)

Example(s):
C++:

```
// Getting operation mode (Parameter number 2)
long Value;
bool Result=MacComm.ReadParameter(255,2,&Value);

// Getting position (Parameter 10: P_IST)
long Value;
bool Result=MacComm.ReadParameter(255,3,&Value);
```

BASIC:

```
'Common dim statements:
Dim LocalValue As Long
Dim Result As Boolean

'Getting operation mode (Parameter number 2)
Result = MacComm.ReadParameter(255, 2, LocalValue)

'Getting position (Parameter 10: P_IST)
Result = MacComm.ReadParameter(255, 10, LocalValue)
```

3.3.4 ReadParameterAlternate([in] Address, [in] ParamNum, [out] Value)

Parameters:

Type	Name	Description
16 bit signed integer	Address	Address of the motor (255 for broadcast)
16 bit signed integer	ParamNum	Parameter number
32 bit floating point (pointer)	Value	Value to be read (Pointer)

Return type: Boolean
Returns true if read was successful
It will try the amount of times the property "Retries" has been set to before returning false.

Description:
Use this method to read a parameter from a Macmotor register
This method uses the factors for Acceleration, Position and Velocity-registers, which can be set by calling SetFactors.
Some of the other registers are converted using predefined factors (See SetFactors)
The rest just pass through
Types are handled automatically by this method

Example(s):
C++:

```
// Getting operation mode (Parameter number 2)
float Value;
bool Result=MacComm.ReadParameterAlternate(255,2,&Value);

/* Getting position (Parameter 10: P_IST) multiplied with
Positionfactor */
float Value;
bool Result=MacComm.ReadParameterAlternate(255,3,&Value);
```

BASIC:

```
'Common dim statements:
Dim LocalValue As Single
Dim Result As Boolean

'Getting operation mode (Parameter number 2)
Result = MacComm.ReadParameterAlternate(255, 2, LocalValue)

'Getting position (Parameter 10: P_IST) multiplied with
'Positionfactor
Result = MacComm.ReadParameterAlternate(255, 10, LocalValue)
```

3.3.5 WriteParameter([in] Address, [in] ParamNum, [in] Value)

Parameters:

Type	Name	Description
16 bit signed integer	Address	Address of the MAC motor (Use 255 to broadcast)
16 bit signed integer	ParamNum	Parameter number
32 bit signed integer	Value	Value to be written

Return type: Boolean
Returns true if write was successful
It will try the amount of times the property "Retries" has been set to before returning false.

Description:
Use this method to write a parameter to a Macmotor register
This method can also be used for accessing the module registers by using ParamNums above 256.
Register 1 in the module can be accessed by writing to ParamNum 257

Value is one of the following types cast to a long integer:

Word:	16 bit unsigned integer
Integer:	16 bit signed integer
LongInt:	32 bit signed integer
Fixed4:	16 bit signed fixed point (Unit: 1/4096)
Fixed8:	16 bit signed fixed point (Unit: 1/256)
Fixed16	32 bit signed fixed point (Unit: 1/65536)
Fixed24	32 bit signed fixed point (Unit: 1/256)

Example(s):
C++:

```
/* Setting operation mode (Parameter number 2) to Position mode
(Value 2) */
bool Result=MacComm.WriteParameter(255,2,2);

// Setting Position (Parameter 3: P_SOLL) to 4096 (Value 4096)
bool Result=MacComm.WriteParameter(255,3,4096);
```

BASIC:

```
'Setting operation mode (Parameter number 2) to Position mode
'(Value 2)
Dim Result As Boolean
Result = MacComm1.WriteParameter(255, 2, 2)

'Setting Position (Parameter 3: P_SOLL) to 4096 (Value 4096)
Dim Result As Boolean
Result = MacComm1.WriteParameter(255, 3, 4096)
```

3.3.6 WriteParameterAlternate([in] Address, [in] ParamNum, [in] Value)

Parameters:

Type	Name	Description
16 bit signed integer	Address	Address of the MAC motor (Use 255 to broadcast)
16 bit signed integer	ParamNum	Parameter number
32 bit floating point	Value	Value to be written

Return type: Boolean
Returns true if write was successful
It will try the amount of times the property "Retries" has been set to before returning false.

Description:
Use this method to write a parameter to a Macmotor register
This method uses the factors for Acceleration, Position and Velocity-registers, which can be set by calling SetFactors.
Some of the other registers are converted using predefined factors (See SetFactors)
The rest just pass through
Types are handled automatically by this method

Example(s):
C++:

```
// Setting operation mode (Parameter number 2)
// to Position mode (Value 2)
bool Result=MacComm.WriteParameterAlternate(255,2,2);

// Setting Position (Parameter 3: P_SOLL)
// to 4000 divided by Positionfactor (Value 4000)
bool Result=MacComm.WriteParameterAlternate(255,3,4000);
```

BASIC:

```
'Setting operation mode (Parameter number 2)
'to Position mode (Value 2)
Dim Result As Boolean
Result = MacComm1.WriteParameterAlternate(255, 2, 2)

'Setting Position (Parameter 3: P_SOLL)
'to 4000 divided by Positionfactor (Value 4000)
Dim Result As Boolean
Result = MacComm1.WriteParameterAlternate(255, 3, 4000)
```

3.3.7 GetParamNumFromName([in] Address, [in] ParamName)

Parameters:

Type	Name	Description
16 bit signed integer	Address	Address of the MAC motor
String	ParamName	Parameter name

Return type: 16 bit signed integer
Returns parameter number or 0 if not found.

Description:
Use this method to retrieve the parameter number from the name

Example(s):

C++:

```
// Getting last error code:
unsigned short ParamNum=MacComm.GetParamNumFromName(255, "P_IST");
```

BASIC:

```
'Getting last error code:
Dim ParamNum As Integer
ParamNum=MacComm.GetParamNumFromName(255, "P_IST")
```

3.3.8 AboutBox()

Description:

Shows a dialog about the program

Example(s):

C++:

```
// Show the about box
MacComm.AboutBox();
```

BASIC:

```
'Show the about box
MacComm.AboutBox
```

3.3.9 GetLastError()

Return type: 32 bit signed integer
Returns an error code like the Windows GetLastError(), but with some additions

Description:
Use this method to retrieve the error code for the last error

Example(s):
C++:

```
// Getting last error code:
unsigned short ErrorCode=MacComm.GetLastError();
```

BASIC:

```
'Getting last error code:
Dim ErrorCode As Integer
ErrorCode = MacComm.GetLastError
```

3.3.10 GetLastErrorStr([in] ErrorCode)

Parameters:

Type	Name	Description
32 bit signed integer	ErrorCode	Errorcode to be converted to a string

Return type: String
Returns an error code description like the Windows GetLastError(), but with the same additions as GetLastError()

Description:
Use this method to retrieve a description of an error code

Example(s):
C++:

```
// Get description of passed error code
CString Text=MacComm.GetLastErrorStr(MacComm.GetLastError());
```

BASIC:

```
'Getting last error code:
Dim Description As String
Description = MacComm.GetLastErrorStr(MacComm.GetLastError)
```

3.3.11 GetParameterType([in] Address, [in] ParamNum)

Parameters:

Type	Name	Description
16 bit signed integer	Address	Address of the MAC motor
16 bit signed integer	ParamNum	Parameter number

Return type: 16 bit signed integer

Return value indicates what type the parameter is stored as internally in the MAC Motor

-1	Invalid	Invalid parameter!
0	Word:	16 bit unsigned integer
1	Integer:	16 bit signed integer
2	LongInt:	32 bit signed integer
3	Fixed4:	16 bit signed fixed point (Unit: 1/4096)
4	Fixed8:	16 bit signed fixed point (Unit: 1/256)
5	Fixed16	32 bit signed fixed point (Unit: 1/65536)
6	Fixed24	32 bit signed fixed point (Unit: 1/256)

Description:

Use this method to determine how a parameter should be sent.
The integer types should just be used as parameters.
The Fixed4 type should be converted to an integer by multiplying with 4096
The Fixed8 type should be converted to an integer by multiplying with 256
The Fixed16 type should be converted to an integer by multiplying with 65536
The Fixed24 type should be converted to an integer by multiplying with 256

Example(s):

C++:

```
// Get Parameter 100's type
short Type=MacComm.GetParameterType(100);
```

BASIC:

```
'Get Parameter 100's type
Dim ParameterType As Integer
ParameterType = MacComm.GetParameterType(100)
```

3.3.12 Reset([in] Address)

Parameters:

Type	Name	Description
16 bit unsigned short integer	Address	Address of the motor (255 for broadcast)

Return type: Boolean
Returns true if reset was successful
It will try the amount of times the property "Retries" has been set to before returning false.

Description:
Resets MAC motor to last flashed values.
Returns as soon as the Reset command has been sent to the MAC motor.

Example(s):
C++:

```
// Reset MAC motor
bool Result=MacComm.Reset(255);
```

BASIC:

```
'Reset MAC motor
Dim Result As Boolean
Result=MacComm.Reset(255)
```

3.3.13 ResetWait([in] Address)

Parameters:

Type	Name	Description
16 bit unsigned short integer	Address	Address of the motor (255 for broadcast)

Return type: Boolean
Returns true if reset was successful
It will try the amount of times the property "Retries" has been set to before returning false.

Description:
Resets MAC motor to last flashed values
Returns when MAC motor is ready.

Example(s):
C++:

```
// Reset MAC motor
bool Result=MacComm.Reset(255);
```

BASIC:

```
'Reset MAC motor
Dim Result As Boolean
Result=MacComm.Reset(255)
```

3.3.14 WriteToFlash([in] Address)

Parameters:

Type	Name	Description
16 bit unsigned short integer	Address	Address of the motor (255 for broadcast)

Return type: Boolean
Returns true if flashing was successful
It will try the amount of times the property "Retries" has been set to before returning false.

Description:
Writes MAC registers to Flash memory
Returns as soon as the Flash command has been sent to the MAC motor.

Example(s):
C++:

```
// Write registers to flash
bool Result=MacComm.WriteToFlash(255);
```

BASIC:

```
'Write registers to flash
Dim Result As Boolean
Result=MacComm.WriteToFlash(255)
```

3.3.15 WriteToFlashWait([in] Address)

Parameters:

Type	Name	Description
16 bit unsigned short integer	Address	Address of the motor (255 for broadcast)

Return type: Boolean
Returns true if flashing was successful
It will try the amount of times the property "Retries" has been set to before returning false.

Description:
Writes MAC registers to Flash memory
Returns when MAC motor is ready.

Example(s):
C++:

```
// Write registers to flash
bool Result=MacComm.WriteToFlashWait(255);
```

BASIC:

```
'Write registers to flash
Dim Result As Boolean
Result=MacComm.WriteToFlashWait(255)
```

3.3.16 SetFactors([in] PositionFactor, [in] AccelerationFactor, [in], VelocityFactor)

Parameters:

Type	Name	Description
32 bit floating point	Pos	Position Factor
32 bit floating point	Acc	Acceleration Factor
32 bit floating point	Vel	Velocity Factor

Description:

Sets factors used by ReadParameterAlternate and WriteParameterAlternate
If a value of 0 is passed the previous factor is retained.
This function is used with the MAC50/95/140/141 family of motors. The default values can be found in appendix 4.4.

Example(s):

C++:

```
/* Set Position factor to 1/4096 (Converts Pulses to
revolutions),and disable the others */
MacComm.SetFactors((float)1/4096,1,1);
```

BASIC:

```
'Set Position factor to 1/4096 (Converts Pulses to revolutions),
'and disable the others
MacComm.SetFactors 1/4096,1,1
```

3.3.17 SetFactorsBig([in] PositionFactor, [in] AccelerationFactor, [in] VelocityFactor)

Parameters:

Type	Name	Description
32 bit floating point	Pos	Position Factor
32 bit floating point	Acc	Acceleration Factor
32 bit floating point	Vel	Velocity Factor

Description:

Sets factors used by ReadParameterAlternate and WriteParameterAlternate
If a value of 0 is passed the previous factor is retained
This function is used with the MAC400/800 family of motors. The default values can be found in appendix 4.4.

Example(s):

C++:

```
/* Set Position factor to 1/8000 (Converts Pulses to revolutions),
and disable the others */
MacComm.SetFactorsBig((float)1/8000,1,1);
```

BASIC:

```
'Set Position factor to 1/8000 (Converts Pulses to revolutions),
'and disable the others
MacComm.SetFactorsBig 1/8000,1,1
```

3.3.18 SetFactorsMIS([in] PositionFactor, [in] AccelerationFactor, [in] VelocityFactor)

Parameters:

Type	Name	Description
32 bit floating point	Pos	Position Factor
32 bit floating point	Acc	Acceleration Factor
32 bit floating point	Vel	Velocity Factor

Description:

Sets factors used by ReadParameterAlternate and WriteParameterAlternate
If a value of 0 is passed the previous factor is retained
This function is used with the SMC75/MIS231/MIS232/MIS234 family of motors. The default values can be found in appendix 4.4.

Example(s):

C++:

```
/* Set Position factor to 1/1600 (Converts Pulses to revolutions),
and disable the others */
MacComm.SetFactorsMIS((float)1/1600,1,1);
```

BASIC:

```
'Set Position factor to 1/1600 (Converts Pulses to revolutions),
'and disable the others
MacComm.SetFactorsMIS 1/1600,1,1
```

3.3.19 SetMACType([in] Address, [in] Type)

Parameters:

Type	Name	Description
16 bit unsigned short integer	Address	Address of the motor (255 for broadcast)
BOOL	Type	True if it is a MAC 400 or MAC 800

Description:
Sets MAC motor type.
Default is 0
Type can have the following values:

0	MAC50/95/140/141
1	MAC400/800

This function is not recommended for new programs. It is retained for backwards compatibility only. Use SetMotorType instead.

Example(s):
C++:

```
// Set MAC400 on address 4:
MacComm.SetMACType(4,TRUE);
```

BASIC:

```
'Set MAC80 on address 4:
MacComm.SetMACType 4,FALSE
```

3.3.20 SetMotorType([in] Address, [in] Type)

Parameters:

Type	Name	Description
16 bit unsigned short integer	Address	Address of the motor (255 for broadcast)
16 bit unsigned short integer	Type	The type code of the motor

Description:
Sets the motor type, which determines how the OCX formats parameters sent and received.
Default is 0, which is interpreted as one of the MAC50/95/140/141 types.
A list of type codes can be found in appendix 4.3.

Example(s):
C++:

```
// Set MAC400 on address 4:
MacComm.SetMotorType(4,10);
```

BASIC:

```
'Set SMC75 on address 4:
MacComm.SetMotorType 4,64
```

3.3.21 GetMotorType([in] Address)

Parameters:

Type	Name	Description
16 bit signed integer	Address	Address of the motor

Return type: 16 bit signed integer
Return value indicates what type of motor is configured at the specified address

Description:
Use this funtion to read back the type code set with SetMotorType.
This can be useful in programs that control a mix of different motor types.
Note that this function does not detect what type of motor, if any, that actually is there.

Example(s):
C++:

```
// Get the type of the motor at address 100
short Type=MacComm.GetMotorType(100);
```

BASIC:

```
'Get the type of the motor at address 100
Dim MotorType As Integer
MotorType = MacComm.GetMotorType(100)
```

3.3.22 GetModuleType([in] Address, [out] ModuleType, [out] FirmWareVersion)

Parameters:

Type	Name	Description
16 bit unsigned short integer	Address	Address of the motor (255 for broadcast)
16 bit unsigned short integer	ModuleType	What type of module is it
16 bit unsigned short integer	FWVersion	FirmWare version

Description:

Reads module information from the MAC motor

The values of ModuleType are:

1	MAC00-Rx module (NanoPLC)
2	MAC00-FPx module (Profibus)
3	MAC00-FCx module (CAN-Open)

Example(s):

C++:

```
// Read page 0:
VARIANT Data;
MacComm.NanoGet(255,0,Data);
```

BASIC:

```
'Read Page 0:
dim Data as VARIANT
MacComm.NanoGet 255,0,Data
```

3.3.23 NanoGet([in] Address, [in] Page, [out] Data)

Parameters:

Type	Name	Description
16 bit unsigned short integer	Address	Address of the motor (255 for broadcast)
16 bit unsigned short integer	Page	What page is to be read
VARIANT	Data	Array of Bytes (128 elements of VT_UI1)

Description:
Reads a page from the RX module

Example(s):
C++:

```
// Read page 0:
VARIANT Data;
MacComm.NanoGet(255,0,Data);
```

BASIC:

```
'Read Page 0:
dim Data as VARIANT
MacComm.NanoGet 255,0,Data
```

3.3.24 NanoPut([in] Address, [in] Page, [in] Data)

Parameters:

Type	Name	Description
16 bit unsigned short integer	Address	Address of the motor (255 for broadcast)
16 bit unsigned short integer	Page	What page is to be read (0-3)
VARIANT	Data	Array of Bytes (128 elements of VT_UI1)

Description:
Sends a page to the RX module

Example(s):
C++:

```
// Send page 0:
VARIANT Data;
MacComm.NanoPut (255,0,Data);
```

BASIC:

```
'Send Page 0:
dim Data as VARIANT
MacComm.NanoPut 255,0,Data
```

3.3.25 NanoProgram([in] Address, [in] FileName)

Parameters:

Type	Name	Description
16 bit unsigned short integer	Address	Address of the motor (255 for broadcast)
BSTR	FileName	HEX-file to be sent to RX module

Description:

Reads the HEX-file, and writes it to the RX module

Example(s):

C++:

```
// Send "C:\File.hex":
MacComm.NanoProgram(255,"C:\\File.hex");
```

BASIC:

```
'Send "C:\File.hex":
MacComm.NanoProgram 255,"C:\File.hex"
```

3.3.26 NanoStop([in] Address)

Parameters:

Type	Name	Description
16 bit unsigned short integer	Address	Address of the motor (255 for broadcast)

Description:

Stops the program

Example(s):

C++:

```
// Stop progam:
MacComm.NanoStop(255);
```

BASIC:

```
'Stop progam:
MacComm.NanoStop 255
```

3.3.27 NanoReset([in] Address)

Parameters:

Type	Name	Description
16 bit unsigned short integer	Address	Address of the motor (255 for broadcast)

Description:
Resets RX module (which also starts the program)
Returns immediately after the command has been sent

Example(s):
C++:

```
// Reset module/start progam:
MacComm.NanoReset(255);
```

BASIC:

```
'Reset module/start progam:
MacComm.NanoReset 255
```

3.3.28 NanoResetWait([in] Address)

Parameters:

Type	Name	Description
16 bit unsigned short integer	Address	Address of the motor (255 for broadcast)

Description:
Resets RX module (which also starts the program)
Returns when the module is ready

Example(s):
C++:

```
// Reset module/start progam:
MacComm.NanoResetWait(255);
```

BASIC:

```
'Reset module/start progam:
MacComm.NanoResetWait 255
```

3.3.29 NanoDebug ([in]Address, [out]State, [out]Inputs, [out]Outputs, [out]Time, [out]Count, [out]ModeCmd)

Parameters:

Type	Name	Description
16 bit unsigned short integer	Address	Address of the motor (255 for broadcast)
16 bit unsigned short integer	State	
16 bit unsigned short integer	Inputs	Inputs in binary format
16 bit unsigned short integer	Outputs	Outputs in binary format
32 bit unsigned long integer	Time	Time module has been running
32 bit unsigned long integer	Count	
16 bit unsigned short integer	ModeCmd	

Description:
Reads information for debugging

Example(s):
C++:

```
// Reset module/start progam:
unsigned short State,Inputs,Outputs,ModeCmd;
unsigned long Time,Count;
MacComm.NanoDebug(255,State,Inputs,Outputs,Time,Count,ModeCmd);
```

BASIC:

```
'Reset module/start progam:
dim State, Inputs, Outputs, ModeCmd as Integer
dim Time, Count as Long;
MacComm.NanoReset 255, State, Inputs, Outputs, Time, Count, ModeCmd
```

3.3.30 RxPNOOP ([in] Address, [out] Value)

Parameters:

Type	Name	Description
16 bit unsigned short integer	Address	Address of the motor (255 for broadcast)
16 bit unsigned short integer	Value	Status information and inputs

Description:
Gets Input and Status
Value consists of:

bits:	Description:
0-7	Inputs 1-8
8	Error
9	In position
10-11	Reserved
12-15	Outputs 1-4

Example(s):
C++:

```
// Get inputs:
unsigned short Value;
MacComm.RxPNOOP (255,Value);
Value=Value&0xFF
```

BASIC:

```
'Get inputs:
dim Value as integer
MacComm.RxPNOOP 255, Value
Value=Value and 255
```

3.3.31 RxPReset ([in] Address)

Parameters:

Type	Name	Description
16 bit unsigned short integer	Address	Address of the motor (255 for broadcast)

Description:
Resets RxP module.
Returns immediately after the command has been sent

Example(s):
C++:

```
// Reset module:
MacComm.RxPReset(255);
```

BASIC:

```
'Reset module:
MacComm.RxPReset 255
```

3.3.32 RxPResetWait ([in] Address)

Parameters:

Type	Name	Description
16 bit unsigned short integer	Address	Address of the motor (255 for broadcast)

Description:
Resets RxP module.
Returns when the module is ready

Example(s):
C++:

```
// Reset module:
MacComm.RxPResetWait(255);
```

BASIC:

```
'Reset module:
MacComm.RxPResetWait 255
```

3.3.33 RxPStart ([in] Address)

Parameters:

Type	Name	Description
16 bit unsigned short integer	Address	Address of the motor (255 for broadcast)

Description:
Starts the program in the RxP module.

Example(s):
C++:

```
// Start program in RxP module:
MacComm.RxPStart(255);
```

BASIC:

```
'Start program in RxP module:
MacComm.RxPStart 255
```

3.3.34 RxPStop ([in] Address)

Parameters:

Type	Name	Description
16 bit unsigned short integer	Address	Address of the motor (255 for broadcast)

Description:
Stops the program in the RxP module.

Example(s):
C++:

```
// Stop program in RxP module:
MacComm.RxPStop(255);
```

BASIC:

```
'Stop program in RxP module:
MacComm.RxPStop 255
```

3.3.35 RxPPause ([in] Address)

Parameters:

Type	Name	Description
16 bit unsigned short integer	Address	Address of the motor (255 for broadcast)

Description:
Pauses the program in the RxP module.

Example(s):
C++:

```
// Pause program in RxP module:
MacComm.RxPPause(255);
```

BASIC:

```
'Pause program in RxP module:
MacComm.RxPPause 255
```

3.3.36 RxPStep ([in] Address , [in] MinAddress, [in] MaxAddress)

Parameters:

Type	Name	Description
16 bit unsigned short integer	Address	Address of the motor (255 for broadcast)
16 bit unsigned short integer	MinAddress	Lower address of code-area
16 bit unsigned short integer	MaxAddress	High address of code-area

Description:
Continues execution of the RxP Program until program pointer is outside specified area (MinAddress□MaxAddress).

Example(s):
C++:

```
// Step through program until outside (0x1C,0x23):
MacComm.RxPStep(255,0x1C,0x23);
```

BASIC:

```
'Step through program until outside (&H1C,&H23):
MacComm.RxPStep 255, &H1C, &H23
```

3.3.37 RxPSetOutputs ([in] Address , [in] Outputs, [in] Mask)

Parameters:

Type	Name	Description
16 bit unsigned short integer	Address	Address of the motor (255 for broadcast)
16 bit unsigned short integer	Outputs	binary representation of the Outputs
16 bit unsigned short integer	Mask	Output mask

Description:

Sets or clears the outputs according to the mask and output values.
i.e.: (binary values)
Output value of 1010 and Mask of 1100 sets output 4, and clears output 3. Output 1 and 2 are not modified, since they are masked out.

Example(s):

C++:

```
// Set output 1, and clear output 4:
MacComm.RxPSetOutputs(255,0x01,0x09);
```

BASIC:

```
'Set output 1, and clear output 4:
MacComm.RxPSetOutputs 255, 1, 9
```

3.3.38 ReadStatus([in] Address, [out] Status, [out] Position, [out] ErrCount)

Parameters:

Type	Name	Description
16 bit unsigned short integer	Address	Address of the motor
16 bit signed integer	Status	
32 bit signed integer	Position	
16 bit signed integer	ErrCount	Amount of Errors received since pwr on

Return type: Boolean
Returns true if Read was successful

Description:
Use this method to get the status of a Macmotor.

Example(s):
C++:

```
// Read status for address 7
short Status, ErrCount;
long Position;
bool Result=MacComm.ReadStatus(7, Status, Position, ErrCount);
```

BASIC:

```
'Read status for address 7
Dim Result As Boolean
Dim Status As Integer
Dim Position As Long
Dim ErrCount As Integer
Result = MacComm1.ReadStatus (7, Status, Position, ErrCount)
```

3.3.39 WriteGroup([in] Group, [in] ParamNum, [in] Value)

Parameters:

Type	Name	Description
16 bit signed integer	Group	Group of MAC motors
16 bit signed integer	ParamNum	Parameter number
32 bit signed integer	Value	Value to be written

Return type: Boolean
Returns true if write was successful
It will send the command the amount of times the property "GrpSends" has been set to.

Description:
Use this method to write a parameter to a Macmotor register
This method can also be used for accessing the module registers by using ParamNums above 256.
Register 1 in the module can be accessed by writing to ParamNum 257

Value is one of the following types cast to a long integer:

Word:	16 bit unsigned integer
Integer:	16 bit signed integer
LongInt:	32 bit signed integer
Fixed4:	16 bit signed fixed point (Unit: 1/4096)
Fixed8:	16 bit signed fixed point (Unit: 1/256)
Fixed16	32 bit signed fixed point (Unit: 1/65536)
Fixed24	32 bit signed fixed point (Unit: 1/256)

Example(s):
C++:

```
/* Setting operation mode (Parameter number 2)
to Position mode (2) in group 1 */
bool Result=MacComm.WriteGroup(1,2,2);

/* Setting Position (Parameter 3: P_SOLL)
to 4096 (Value 4096) in group 1 */
bool Result=MacComm.WriteGroup(1,3,4096);
```

BASIC:

```
'Setting operation mode (Parameter number 2)
'to Position mode (2) in group 1
Dim Result As Boolean
Result = MacComm1.WriteGroup (1, 2, 2)

'Setting Position (Parameter 3: P_SOLL)
'to 4096 (Value 4096) in group 1
Dim Result As Boolean
Result = MacComm1.WriteGroup (1, 3, 4096)
```

4 Appendix

4.1 Installation

The MacComm OCX and required DLLs are installed automatically by running Setup.exe and following the onscreen prompts.
You have the option to install a Visual Basic sample and a LabVIEW sample along with the OCX.

It can also be done manually by copying the following Microsoft redistributable DLLs to the Windows\System folder:

OLEAUT32.DLL
OLEPRO32.DLL

MacComm.OCX should be placed in a directory called MacComm in the Windows folder, and registered with RegSvr32, i.e.

```
Regsvr32 C:\Windows\MacComm\MacComm.ocx
```

4.2 Adding MacComm OCX to your program

MacComm OCX has been tested with a variety of different programming tools. Below are the basic steps for adding it to programs made with these tools.

4.2.1 Visual Basic 6

1. In the menu Projects click Components.
2. Make sure the "Selected Items Only" checkbox is NOT selected
3. Find "MacComm ActiveX Control module", and put a checkmark besides it, and click OK

The MacComm OCX is now available in the controls bar
When placed on a form the properties page of the object can be used to set the startup values for the 2 properties (Retries, ComPort, baudrate and Group sends)

4.2.2 Visual C++ 6

1. In the menu "Projects" choose "Add To Project" and click "Components and Controls..."
2. Go into the folder "Registered ActiveX Controls" and click "MacComm Control"
3. Click Insert, and two times OK followed by a Close

The MacComm OCX is now available in the controls bar
When put on a dialog the properties page of the object can be used to set the startup values for the 2 properties (Retries, ComPort, baudrate and Group sends)

4.2.3 Visual .NET

1. In the menu "Tools" click "Customize Toolbox..."
2. Find "MacComm OCX Control module", and put a checkmark besides it, and click OK

The MacComm OCX is now available in the Toolbox
When put on a form the properties page of the object can be used to set the startup values for the 2 properties (Retries, ComPort, baudrate and Group sends)

4.2.4 Borland C++ Builder 6.0

1. In the menu "Component" click "Import ActiveX Control..."
2. Select "MacComm ActiveX Control module..." in the lists of components.
3. Press the "install..." button.
4. On the page "Into existing package" select the dclusr.bpk file (This should be default) and click "OK".
5. Select "yes" to rebuild the package.
6. The ActiveX should now be available in the tool palette on the ActiveX page.

4.2.5 LabVIEW 7.0

1. Place an ActiveX container on your Front Panel.
2. Right click it and select "Insert ActiveX object..."
3. Select MacComm Control from the list.
4. Connect it to a "Property node" and use this to setup the properties.
5. Connect it to an "Invoke node" and use this to call the methods.

4.3 Motor type codes

This is a list of the type codes used with the SetMotorType and GetMotorType methods. At the time of writing, the following type codes refer to actual or upcoming JVL products:

Type code	Model	Description
1	MAC50	Integrated servo
2	MAC95	Integrated servo
3	MAC140	Integrated servo
4	MAC141	Integrated servo, high-torque version of MAC140
12	MAC400	Integrated servo
13	MAC400B	Integrated servo, with brake
14	MAC800	Integrated servo
15	MAC800B	Integrated servo, with brake
64	SMC75	Stepper motor controller, programmable
65	MIS231	Integrated stepper motor, programmable
66	MIS232	Integrated stepper motor, programmable
67	MIS234	Integrated stepper motor, programmable

4.4 Parameter conversion factors

The table columns have the following meanings:

Fixed	the conversion factor can not be configured
Number	the register number in the motor
Name	the name of the register
Factor	the default conversion factor
Res. unit	the engineering unit of the converted number

PositionFactor, AccelerationFactor, and VelocityFactor each do not refer to a single register. They are conversion factors that are common to registers that deal with position, acceleration, and velocity. For further information, see the reference guide entries 3.3.16 SetFactors, 3.3.17 SetFactorsBig, and 3.3.18 SetFactorsMIS.

4.4.1 MAC50, MAC95, MAC140, MAC141

Fixed	Number	Name	Factor	Resulting unit
	N/A	PositionFactor	1	Pulses
	N/A	AccelerationFactor	~248.3	RPM/s
	N/A	VelocityFactor	~0.4768	RPM
x	7	T_SOLL	100/1023	Percent
x	8	P_SIM	1/16	Encoder counts
x	16	I2T	1/22	Percent (assuming I2TLIM is 2200)
x	18	UIT	1/6	Percent (assuming UITLIM is 600)
x	41	T_HOME	100/1023	Percent
x	77-80	T1-4	100/1023	Percent
x	121	VF_OUT	100/1023	Percent
x	122	ANINP	10/1023	Volts
x	123	ANINP_OFFSET	10/1023	Volts
x	124	ELDEGN_OFFSET	360/2048	Electrical degrees
x	125	ELDEGP_OFFSET	360/2048	Electrical degrees

4.4.2 MAC400 and MAC800 servomotor family

Fixed	Number	Name	Factor	Resulting unit
	N/A	PositionFactor	1	Pulses
	N/A	AccelerationFactor	~277.922	RPM/s
	N/A	VelocityFactor	~0.360938	RPM
X	7	T_SOLL	100/1023	Percent
X	8	P_SIM	1/16	Encoder counts
X	21	U_24V	~74.47	Volts
X	29	DEGC	0.05/4096	Degrees centigrade
X	31	DEGCMAX	0.05/4096	Degrees centigrade
X	77-80	TQ0-3	100/1023	Percent
X	169	VF_OUT	100/1023	Percent
X	170	ANINP	10/2047	Volts
X	171	ANINP_OFFSET	10/2047	Volts
X	172	ELDEG_OFFSET	360/1143	Electrical degrees
X	176	MAN_ALPHA	360/1143	Electrical degrees
X	190	ELDEG_IST	360/1143	Electrical degrees
X	191	V_ELDEG	360/1143	Electrical degrees
X	198	U_BUS	325.3/400	Volts
X	199	U_BUS_OFFSET	325.3/400	Volts

4.4.3 SMC75, MIS231, MIS232, MIS234

Fixed	Number	Name	Factor	Resulting unit
	N/A	PositionFactor	1	Pulses
	N/A	AccelerationFactor	9.54	RPM/s
	N/A	VelocityFactor	1	RPM
X	89-96	ANALOG1-8	5.0/1024	Volts
X	97	BUSVOL	111.4/1024	Volts
X	98	MIN_BUSVOL	111.4/1024	Volts

4.5 Custom Errors:

Hex value:	Description
2000 0000	Serial port could not be initialized
2000 0001	Serial port is not open
2000 0002	Could not write required Bytes to serial port
2000 0003	Answer is not of expected length
2000 0004	Invalid accept from mac motor
2000 0005	Startsync error in reply
2000 0006	Address mismatch in reply
2000 0007	Parameter number mismatch in reply
2000 0008	Parameter length mismatch in reply
2000 0009	Inversion check failed on value
2000 000A	Endsync error in reply
2000 000B	Unspecified error
2000 000C	Error entering safe mode
2000 000D	Timeout