



# **SPiiPlus NTM Network Manager**

## **Hardware Guide**

Version NT 1.0

## SPiiPlus NTM

Version NT 1.0, 30 December 2010

Copyright © 2010 ACS Motion Control Ltd.

Changes are periodically made to the information in this document. Changes are published as release notes and are to be incorporated into future revisions of this document.

No part of this document may be reproduced in any form without prior written permission from ACS Motion Control.

### TRADEMARKS

ACS Motion Control, PEG and SPii are trademarks of ACS Motion Control Ltd.

Visual Basic and Windows are trademarks of Microsoft Corporation.

Any other companies and product names mentioned herein may be the trademarks of their respective owners.



Web Site: [www.AcsMotionControl.com](http://www.AcsMotionControl.com)

Information: [info@AcsMotionControl.com](mailto:info@AcsMotionControl.com)

Tech Support: [support@AcsMotionControl.com](mailto:support@AcsMotionControl.com)

### **ACS Motion Control, Ltd.**

Ramat Gabriel Industrial Park

POB 5668

Migdal HaEmek, 10500

ISRAEL

Tel: (972) (4) 6546440

Fax: (972) (4) 6546443

### **ACS Motion Control, Inc.**

6575 City West Parkway

Eden Prairie, MN 55344

USA

Tel: (1) (763) 559-7669

(800-545-2980 in USA)

Fax: (1) (763) 559-0110

### **ACS Motion Control (Korea)**

Digital Empire Building D-191

980-3, Youngtong-dong, Youngtong-gu,

Suwon, Geonggi-do, 443-813, Korea

Tel: +82-31-202-3541

Fax: +82-31-202-3542

### NOTICE

The information in this document is deemed to be correct at the time of publishing. ACS Motion Control reserves the right to change specifications without notice. ACS Motion Control is not responsible for incidental, consequential, or special damages of any kind in connection with using this document.

### Changes in Version NT 1.0

<b>Page</b>	<b>Change</b>
	New Document

# Table of Contents

<b>1</b>	<b>About this Document</b> .....	<b>1</b>
1.1	Related SPiiPlus Tools .....	1
1.2	The SPiiPlus Documentation .....	1
1.3	Conventions Used in this Guide .....	2
1.3.1	Text Formats .....	2
1.3.2	Flagged Text .....	3
1.4	Terms and Definitions .....	4
<b>2</b>	<b>SPiiPlus NTM Overview</b> .....	<b>5</b>
2.1	SPiiPlus NTM Block Diagram .....	6
2.2	SPiiPlus NTM Communication Channels .....	6
2.3	Operating Environment .....	8
2.4	SPiiPlus NTM Dimensions .....	8
<b>3</b>	<b>SPiiPlus NTM Interfaces</b> .....	<b>10</b>
3.1	Ethernet Connectors .....	10
3.2	Communication Connectors .....	11
3.3	Power Supply Connector .....	12
<b>4</b>	<b>Safety and EMC Guidelines</b> .....	<b>13</b>
4.1	General Safety Guidelines .....	13
4.2	Safety Screw .....	13
4.3	SPiiPlus NTM Input Power Supply .....	13

## List of Figures

Figure 1 SPiiPlus NTM Network Manager.....	5
Figure 2 SPiiPlus NTM Block Diagram .....	6
Figure 3 SPiiPlus NTM Dimensions.....	8
Figure 4 SPiiPlus NTM Front Panel .....	10

## List of Tables

Table 1	Related SPiiPlus Tools .....	1
Table 2	Collateral Documentation.....	1
Table 3	Text Format Conventions .....	2
Table 4	Terms .....	4
Table 5	SPiiPlus NTM Communication Channels .....	7
Table 6	SPiiPlus NTM Dimensions.....	9
Table 7	Ethernet Connector Pinout.....	10
Table 8	COM Connector Pinout .....	11
Table 9	Power Supply Connector Pinout.....	12

# 1 About this Document

The SPiiPlus NTM (NeTwork Master) is an advanced stand-alone, multi-axis Ethernet communication manager and is designed to extend the ACS Motion Control EtherCAT-based products. SPiiPlus NTM is EtherCAT Technology Group (ETG) compliant with any EtherCAT component qualified by ACS. The controller supports any network product developed by ACS Motion Control and any third-party component that is qualified by ACS.

This document provides detailed hardware information for the SPiiPlus NTM Network Manager.

## 1.1 Related SPiiPlus Tools

**Table 1 Related SPiiPlus Tools**

Tool	Description
SPiiPlus MMI Application Studio	MMI Application Studio is a comprehensive environment for setting up and managing ACS Motion Control SPiiPlus motion controllers as well as control modules such as the MC4U product line.
SPiiPlus C Library	A DLL (Dynamic Link Library) that supports host application programming in a variety of languages including C/C++.
SPiiPlus COM Library	A DLL (Dynamic Link Library) that supports host application programming in a variety of languages including Visual Basic, LabView, and more.

## 1.2 The SPiiPlus Documentation

**Table 2 Collateral Documentation (page 1 of 2)**

Document	Description
<a href="#"><i>HSSI Expansion Modules Guide</i></a>	High-Speed Synchronous Serial Interface (HSSI) for expanded I/O, distributed axes, and nonstandard devices.
<a href="#"><i>SPiiPlus Setup Guide</i></a>	Communication, configuration and adjustment procedures for SPiiPlus motion control products.
<a href="#"><i>SPiiPlus Command &amp; Variable Reference Guide</i></a>	Command and variables of high level language for programming SPiiPlus controllers.
<a href="#"><i>SPiiPlus ACSPL+ Programmer's Guide</i></a>	Command set and high level language for programming SPiiPlus controllers.
<a href="#"><i>SPiiPlus C Library Reference</i></a>	C++ and Visual Basic® libraries for host PC applications. This guide is applicable for all the SPiiPlus motion control products.
<a href="#"><i>SPiiPlus COM Library Reference</i></a>	COM Methods, Properties, and Events for communication with SPiiPlus controllers.

**Table 2 Collateral Documentation** (page 2 of 2)

Document	Description
<i>SPiiPlus MMI Application Studio User Guide</i>	SPiiPlus MMI Application Studio is a comprehensive environment for setting up and managing ACS Motion Control SPiiPlus motion controllers as well as control modules such as the MC4U product line.
<i>SPiiPlus Modbus User's Guide</i>	Describes Modbus setup and register address.
<i>MC4U Hardware Guide</i>	Provides a detailed technical description of the MC4U Control Module - a completely integrated controller, including the SPiiPlus Motion Controller, Power Supplies, and motor Drivers.
<i>SPiiPlus NT-DC Hardware Guide</i>	A detailed technical guide to the SPiiPlus NT and SPiiPlus DC motion controllers.
<i>PDMnt Hardware Guide</i>	A detailed technical guide to the SPiiPlus PDMnt Network Interface.
<i>SPiiPlus SDMnt Hardware Guide</i>	A detailed technical guide to the SPiiPlus SDMnt-8 Multi-Axis Step Motor EtherCAT Control Module.
<i>SPiiPlus UDMnt Hardware Guide</i>	A detailed technical guide to the SPiiPlus UDMnt Universal Drive Module.

## 1.3 Conventions Used in this Guide

### 1.3.1 Text Formats


Several text formats and fonts, illustrated in [Table 3](#), are used in the text to convey information about the text.


**Table 3 Text Format Conventions**


Text	Description
<b>BOLD CAPS</b>	ACSPL+ elements (commands, functions, operators, standard variables, etc.) when mentioned in the text. Software tool menus, menu items, dialog box names and dialog box elements.
<b>bold</b>	Emphasis or an introduction to a key concept.
<b>Blue</b>	Links within this document, to web pages, and to e-mail addresses.
<i>Italics Blue</i>	Used to highlight referenced documentation.


### 1.3.2 Flagged Text


The following symbols are used for flagging text in this document:

<b>Note</b> 	<i>Notes include helpful information or tips.</i>
--	---

<b>Caution</b> 	<i>A Caution describes a condition that may result in damage to equipment.</i>
---	--

<b>Warning</b> 	<i>A Warning describes a condition that may result in serious bodily injury or death.</i>
---	---

<b>Advanced</b> 	<i>Indicates a topic for advanced users.</i>
--	--

<b>Model</b> 	<i>Highlights a specification, procedure, condition, or statement that depends on the product model.</i>
---	--

## 1.4 Terms and Definitions

The following terms are used in this document.

**Table 4 Terms**

<b>Term</b>	<b>Definition</b>
A2D	Analog to Digital
D2A	Digital to Analog
FW	Firmware
HSSI	High-Speed Synchronous Serial Interface
HW	Hardware
I <sup>2</sup> C	Inter-Integrated Circuit
MARK	Registration input that is used for latching current position with high precision
MPU	Motion Processing Unit
PEG	Position Event Generator

## 2 SPiiPlus NTM Overview

The SPiiPlus NTM Network Manager provides complete communication control between the ACS Motion Control products on an EtherCAT network. SPiiPlus NTM is capable of controlling up to 32 axes.

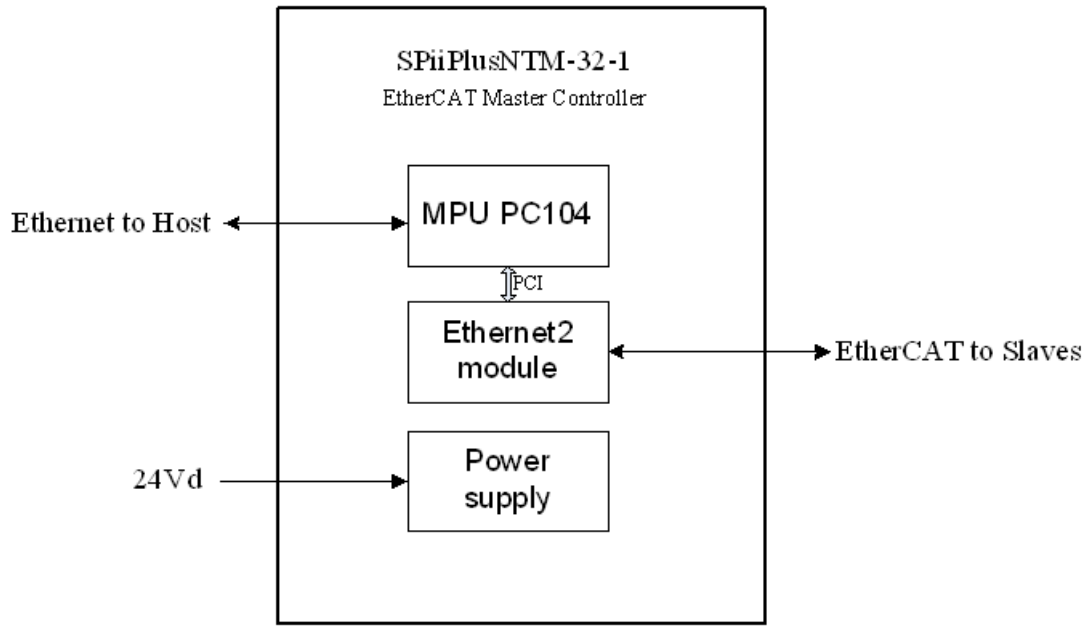


**Figure 1 SPiiPlus NTM Network Manager**

The SPiiPlus NTM may be wall-mounted, or, with the optional clip, mounted on a DIN rail.

## 2.1 SPiiPlus NTM Block Diagram

The SPiiPlus NTM block diagram is given in [Figure 2](#).



**Figure 2** SPiiPlus NTM Block Diagram


The MPU is the same full PC used in all current SPiiPlus products.

The power supply generates all needed internal voltages. The input voltage is 24Vdc.

## 2.2 SPiiPlus NTM Communication Channels

SPiiPlus NTM has two Ethernet communication ports:

- One to communicate with the host computer using TCP/IP protocol.
- One to communicate with the real-time network components using EtherCAT protocol.

<p><b>Note</b></p> 	<p><i>Optionally, RS232/RS485 serial communication ports can be used with the host.</i></p>
--	---

[Table 5](#) details the SPiiPlus NTM communication channels.

**Table 5 SPiiPlus NTM Communication Channels**

	Description / Identification	Remarks
<b>Ethernet</b>		
Designation	Transmit: ETH1_TX± Receive: ETH1_RX±	
Line impedance	100Ω	Galvanic Isolated
Quantity	One	
Protocol	TPC/IP 10/100Mbps	
<b>EtherCAT</b>		
Designation	Transmit: ETH2_TX± Receive: ETH2_RX±	
Line impedance	100Ω	
Quantity	One	
Protocol	TPC/IP 10/100Mbps or EtherCAT	
<b>RS232/RS485</b>		
		There are applications, when this channel is used for: <input type="checkbox"/> Connecting special devices that provide some data to the controller (RS232 is industry standard for this) <input type="checkbox"/> Different MODBUS devices <input type="checkbox"/> HMIs, PLCs (as Host)
Designation	COM1: DCD1 data carrier detect RXD1 receive signal TXD1 transmit signal DTR1 data terminal ready DSR1 data set ready CST1 clear to send RI1 ring indicator  COM2: DCD2 data carrier detect RXD2 receive signal TXD2 transmit signal DTR2 data terminal ready DSR2 data set ready CST2 clear to send RI2 ring indicator	
Number of channels	Two	
Maximum Baud rate	115,200	

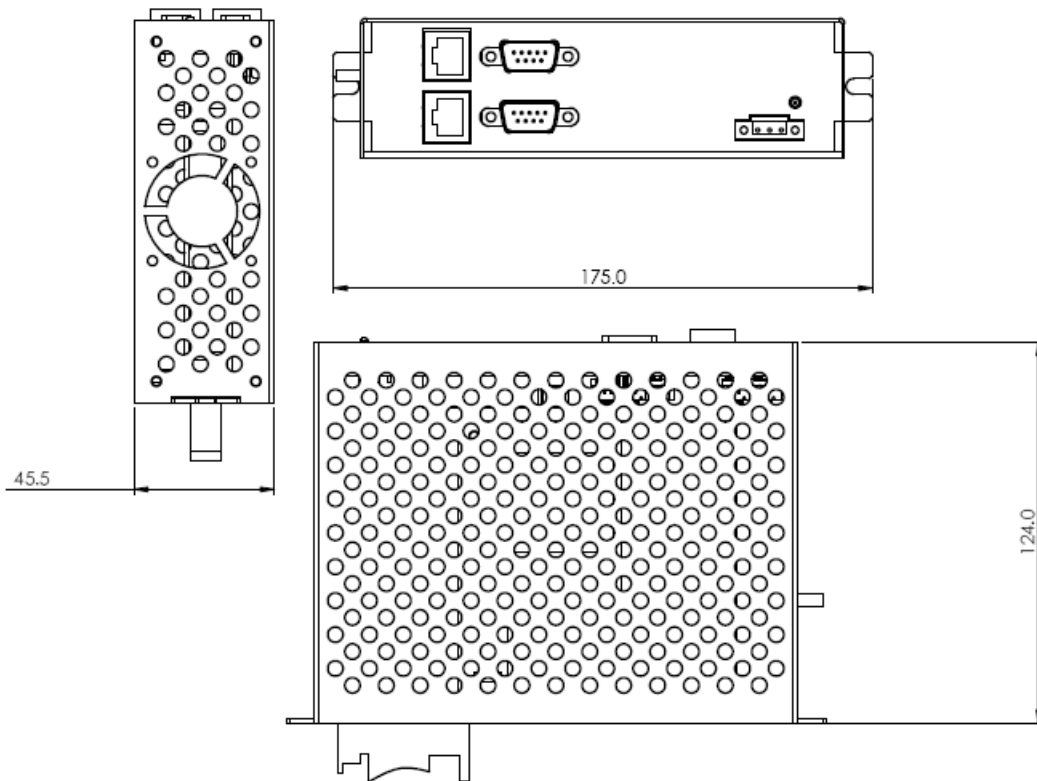
## 2.3 Operating Environment

The SPiiPlus NTM operating environment is as follows:

- ❑ Operating climatic conditions: +5 °C - +40 °C
- ❑ Storage climatic conditions: -40 °C - +70 °C
- ❑ Operating mechanical conditions: Acceleration 5 m/s<sup>2</sup>  
Frequency range 9 - 200 Hz
- ❑ Storage mechanical conditions: Acceleration 10 m/s<sup>2</sup>  
Frequency range 9 - 200 Hz

## 2.4 SPiiPlus NTM Dimensions

The SPiiPlus NTM dimensions are shown in [Figure 3](#).



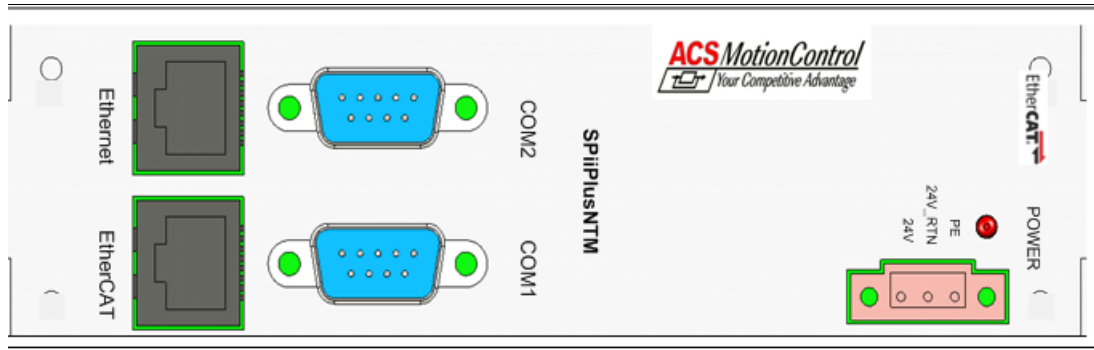
**Figure 3** SPiiPlus NTM Dimensions

**Table 6 SPiiPlus NTM Dimensions**

Max Height	45.5mm $\pm$ 0.5mm
Max Width	175mm $\pm$ 0.5mm
Max Length	124mm $\pm$ 0.5mm
Weight	$\leq$ 450g

## 3 SPiiPlus NTM Interfaces

This chapter details the SPiiPlus NTM connectors. [Figure 4](#) shows the layout of the SPiiPlus NTM front panel and the locations of the connectors.



**Figure 4** SPiiPlus NTM Front Panel

### 3.1 Ethernet Connectors

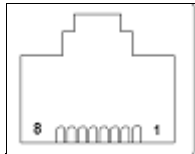
There are two Ethernet 10/100 Base -T connectors:

Label: Ethernet1 (for translating the Ethernet from MPU)

EthernetCAT (for real time network master)

Connector Type: RJ45

Mating Type: Ethernet plug



[Table 7](#) provides the pinout for the Ethernet connectors.

**Table 7** Ethernet Connector Pinout (page 1 of 2)

Pin	Name	Description
1	TD+	Positive transmit signal
2	TD-	Negative transmit signal
3	RD+	Positive receive signal
4	EGND	AC terminated to EGND
5	EGND	AC terminated to EGND
6	RD-	Negative receive signal

**Table 7 Ethernet Connector Pinout** (page 2 of 2)

Pin	Name	Description
7	EGND	AC terminated to EGND
8	EGND	AC terminated to EGND

## 3.2 Communication Connectors

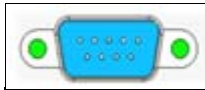
There are two RS232/RS585 Communication connectors which can be used for connecting with the host PC:

Label: COM1

COM2

Connector Type: D-type, 9 pin, male

Mating Type: D-type, 9 pin, female



**Table 8** provides the pinout for the COM connectors

**Table 8 COM Connector Pinout**

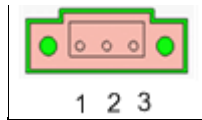
Pin	Name	Description
1	DCD	Data carrier detect
2	RXD	Receive signal for communication port
3	TXD	Transmit signal for communication port
4	DTR	Data terminal ready
5	DGND	Digital ground
6	DSR	Data set ready
7	RTS	Request to send
8	CST	Clear to send
9	RI	Ring indicator

### 3.3 Power Supply Connector

Label: POWER

Connector Type: Phoenix MCV 1,5/ 3-GF-3,81, female

Mating Type: Phoenix MCV 1.5/3 STF-3.81, male



#### Note



*There is a red LED associated with the connector that illuminates when power is operating.*


**Table 9** provides the pinout for the Power connectors.

**Table 9 Power Supply Connector Pinout**

Pin	Name	Description
1	24VDC	+24V dc supply
2	24VRTN	24V dc supply return
3	PE	Power Earth

## 4 Safety and EMC Guidelines

### 4.1 General Safety Guidelines

<b>Warning</b> 	<b><i>Read and understand the following precautions before operating the SPiiPlus NTM!</i></b>
---	--

Under emergency situations the unit should be completely disconnected from any power supply. The end user is responsible for complying with all Electrical Codes.

### 4.2 Safety Screw

A safety screw (Earth Ground) must be installed on the bottom side of the box.

The connection impedance to the screw must be  $\leq 0.1\Omega$ .

### 4.3 SPiiPlus NTM Input Power Supply

The SPiiPlus NTM Network Manager must be provided with 24Vdc  $\pm 15\%$  from an external source connected to the POWER connector on the front panel. The following applies to SPiiPlus NTM input power:

- Power consumption not more 15W
- Maximum input current not more 1.A
- Maximum inrush current not more 2 Arms (for first 500 ms)
- Power Supply type -Isolated DC to DC.

