



## Smart RIOs PCD3.T66x

<b>0</b>	<b>Content</b>	
0.1	Document-History .....	0-2
0.2	Trademarks .....	0-2
<b>1</b>	<b>Introduction</b>	
1.1	System overview .....	1-1
1.2	System requirements .....	1-2
1.3	Steps to configure, program and commission a Distributed Automation Network (DAN) .....	1-3
<b>2</b>	<b>How to create a Distributed Automation Network (DAN)</b>	
2.1	Create a Smart RIO Network .....	2-1
<b>3</b>	<b>Configuration and Build of Smart RIO stations without program</b>	
3.1	Configuration in the Device Configurator.....	3-1
3.2	Media Mapping in the RIO Network Configurator.....	3-3
3.3	Build and Download of the Smart RIO project.....	3-5
<b>4</b>	<b>Configuration and Build of Smart RIOs station with a program</b>	
4.1	Configuration in the Device Configurator.....	4-2
4.2	Media Mapping in the RIO Network Configurator.....	4-4
4.3	Creating user programs for Smart RIOs.....	4-7
4.4	Build and Download of Smart RIO project with user program .....	4-8
4.5	Online functions and program debugging.....	4-10
4.6	Using the RIO's built-in Web-Server.....	4-11
<b>5</b>	<b>Configuration of IP settings in a RIO station</b>	
<b>6</b>	<b>Troubleshooting and diagnostics</b>	
6.1	Diagnostic Flags .....	6-1
6.2	Built-in web page .....	6-2
6.3	LED display .....	6-3
<b>A</b>	<b>Appendix</b>	
A.1	Icons .....	A-1
A.2	Technical Data .....	A-2
A.3	Address of Saia-Burgess Controls AG .....	A-3

## 0.1 Document-History

Version	Published	Changed	Remarks
pEN01	2010-11-05	-	Initial edition
pEN01	2011-05-04	-	Version in InDesign
EN01	2011-06-14	-	PCD3.T660 removed
EN01	2011-07-20	-	published
EN02	2011-08-23	2011-08-23	Chapter 1.2 "System requirements": Adaption of the FW versions
EN03	2013-03-18	2013-03-18	Chapter 3.1 Download of the configuration with the Device Configurator is possible
EN04	2014-01-23	2014-01-23	Change of logo
EN05	2014-08-29	2014-08-29	General data added
EN06	2015-06-11	2015-06-11	New phone numbers Capacity of +V bus adjusted

## 0.2 Trademarks

Saia PCD® is a registered trademark of Saia-Burgess Controls AG.

Technical changes are subject to the state of technology

Saia-Burgess Controls AG, 2015. © All rights reserved.

Published in Switzerland

# 1 Introduction

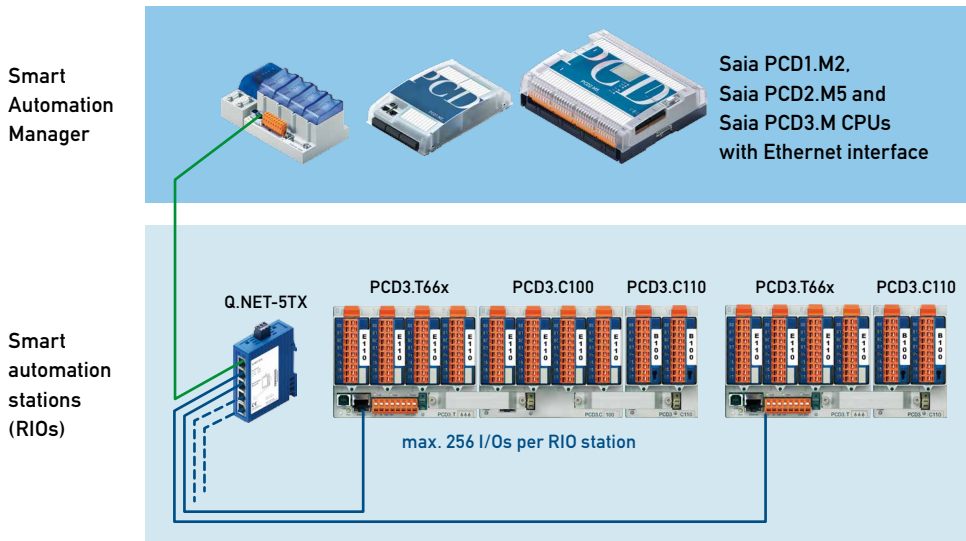
This quick start guide describes how to configure, program and commission Smart RIOs (PCD3.T665 and PCD3.T666) with PCDx.Mxxxx Smart Automation Managers.



For more details, refer to the online help in the PG5 «RIO Network Configurator»

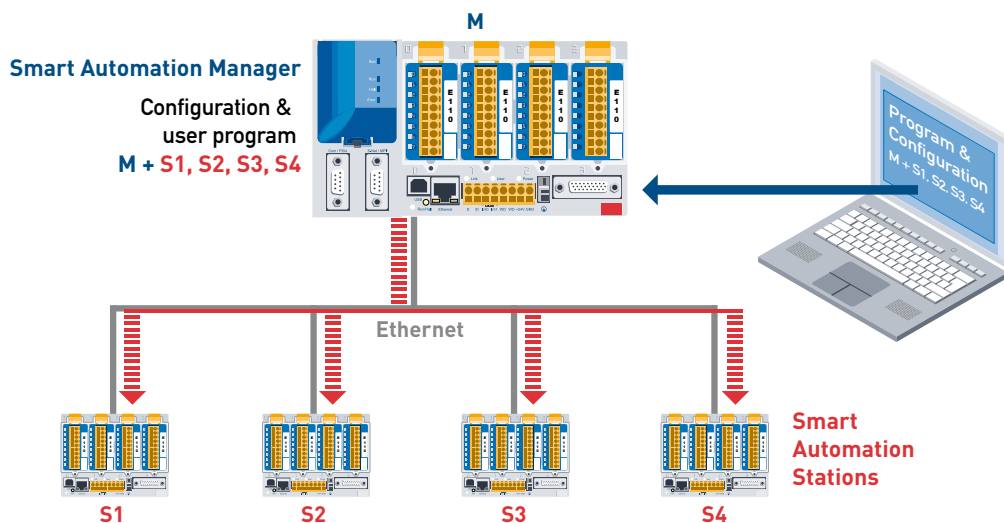
## 1.1 System overview

Distributed Automation Net (DAN) system overview

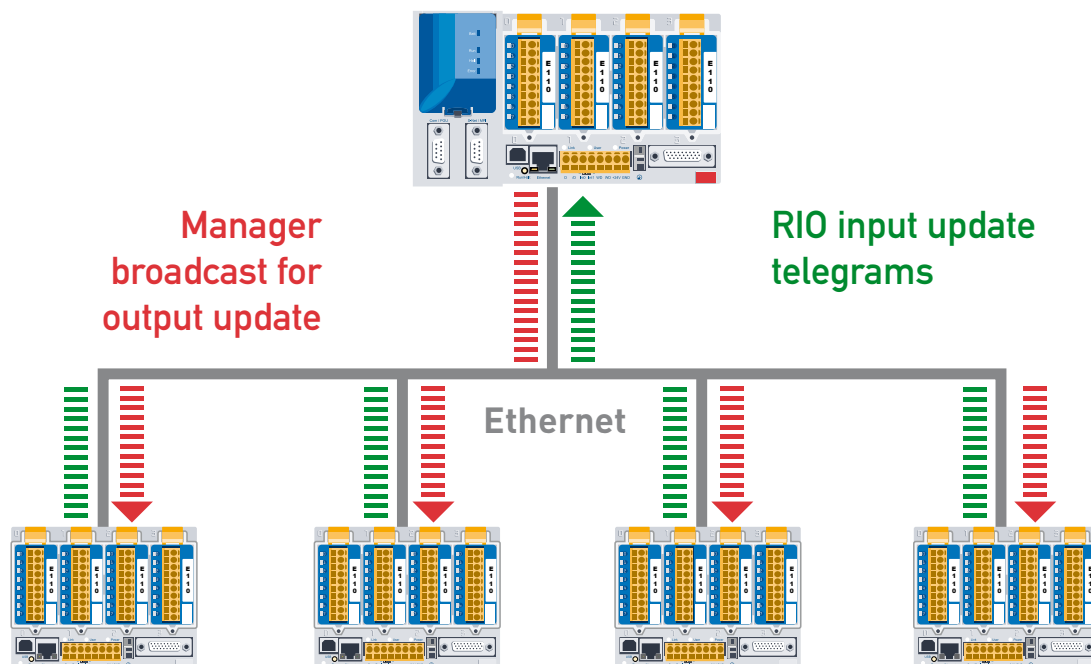


Smart RIOs can be used either as simple remote I/O stations or as intelligent, distributed Smart Automation Stations capable of executing PG5 user programs.

In the latter case, central management of user programs in the Smart Automation Manager (PCDx.Mxxxx CPU) greatly simplifies the use of Smart RIOs and saves costs during engineering, commissioning and service.



The efficient Ether-S-IO protocol is used to exchange data between Smart RIOs and the Smart Automation Manager.



1

Data exchange between Manager and RIO can be configured in the PG5 «RIO Network Configurator» with just a few mouse clicks (simple steps). Once the configuration has been loaded into the Manager station, the operating system deals with data exchange autonomously, executing it as a background function. No further user programming is necessary.

## 1.2 System requirements

Smart RIOs:

PCD3.T665, HW version A1 or higher, FW version 1.16.42 or higher

PCD3.T666, HW version G or higher, FW version 1.16.42 or higher

Smart Automation Manager:

FW version 1.16.45 or higher for systems:

PCD1.M2120, PCD3.M5560, PCD3.M6x60

FW version 1.16.42 or higher for systems:

PCD2.M5540, PCD3.M2130, PCD3.M2330, PCD3.M3330, PCD3.M5340,

PCD3.M5540, PCD3.M6x40.

PG5 engineering tool:

PG5 2.0. SP2 (PG5 2.0.200) or higher

Technical data for the above systems can be found in annex A of this document.

### 1.3 Steps to configure, program and commission a Distributed Automation Network (DAN)

The following is a brief list of the necessary steps. For details, refer to subsequent chapters.

1

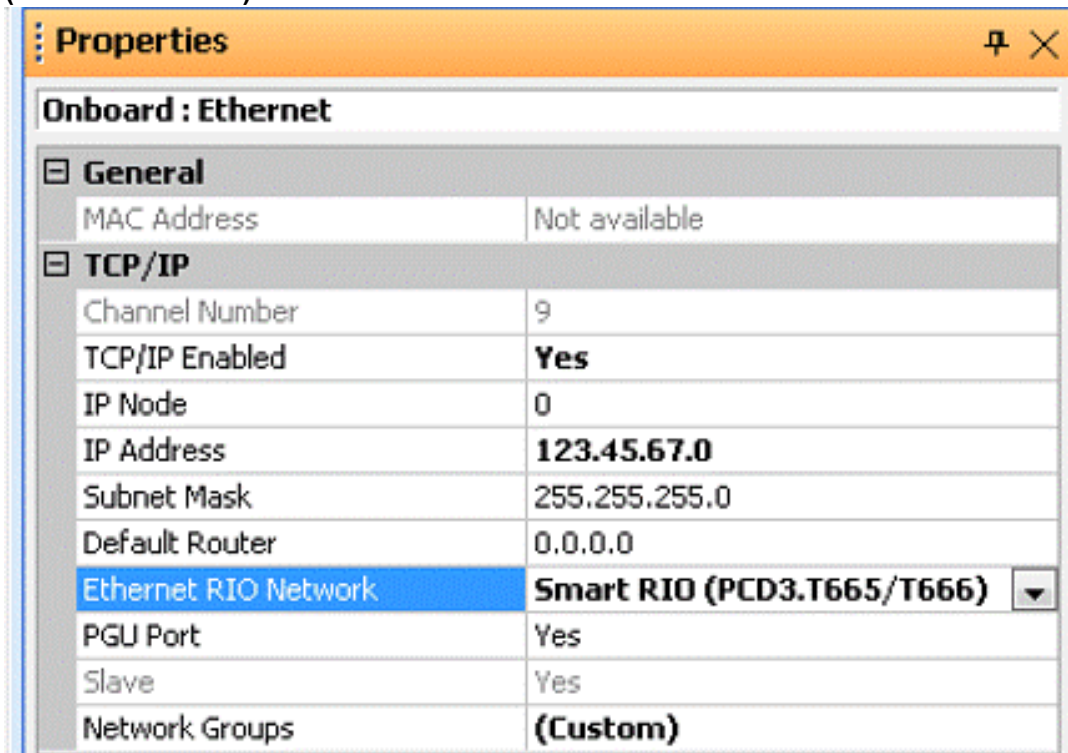
1. Create a new project in PG5 2.0 Project Manager
2. Create a CPU which will be used as Smart Automation Manager
3. Activate and configure the Ethernet interface of the Manager in the Device Configurator
  - a) Activate an Ethernet RIO network
4. Add RIO stations in the Project Manager
5. Configure RIO stations (I/O modules, media mapping, IP address, etc.) in the Device Configurator
6. Configure data exchange and any media mapping between Manager and RIO in the RIO Network Configurator
7. Create the user program for the Manager and the RIOs (if required)
8. Build and download the program in the Smart Automation Manager
9. Before the RIO station can be used, configure the IP settings with the help of the built-in Configuration web page. This can be accessed using a PC browser via USB (in this case Web-Connect is required) or Ethernet interface (default IP address: 192.168.10.100)

## 2 How to create a Distributed Automation Network (DAN)

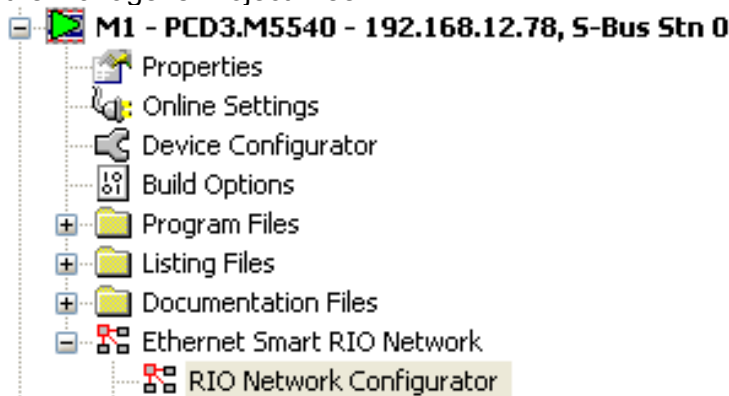
### 2.1 Create a Smart RIO Network

2

1. Using Project Manager, add the Manager (Master) PCD to your project (Device / New).
2. Open the Manager PCD's **Device Configurator**. and select the device type for the manager. It must be a PCD which supports Ethernet and the Ethernet RIO (also requires latest FW version).
3. Select the Device properties and ensure **S-Bus Support** is **Yes**.
4. Select the **Onboard Communications : Ethernet** properties and set **TCP/IP Enabled** to **Yes**, then set the Ethernet RIO Network property to **Smart RIO (PCD3.T665/T666)** as shown below.



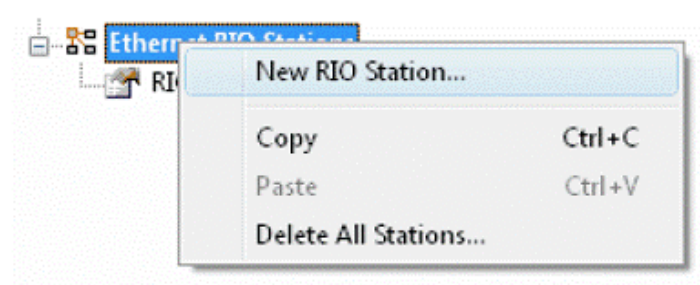
5. Close the Device Configurator and save the file. In Project Manager, you should now see a new **Ethernet RIO Network** branch in the Manager's Project Tree:





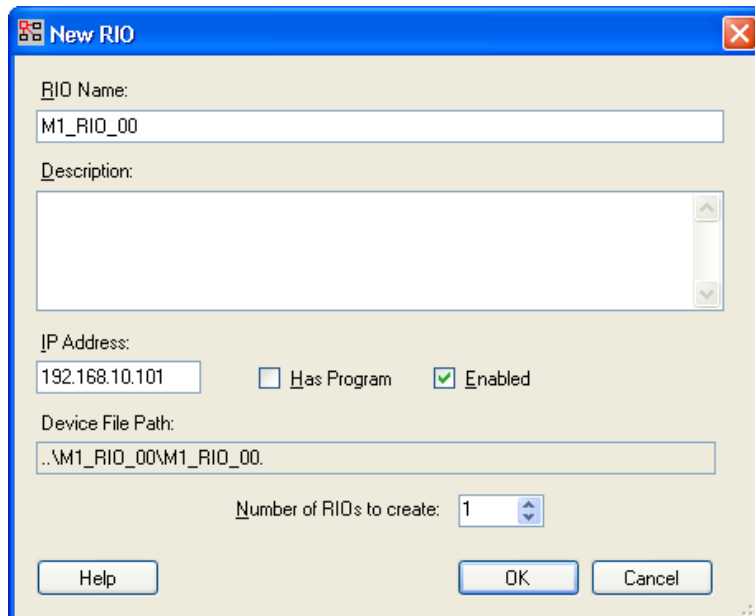
6. Now you can start adding RIOs to your network

RIOs can be created from Project Manager: Right-click on the Ethernet RIO's branch in the Project Tree and select **New RIO...**



2

Each RIO must have a unique name, i.e. it cannot have the same name as any other device in the project. (Copy/Paste of an existing RIO is also supported.)



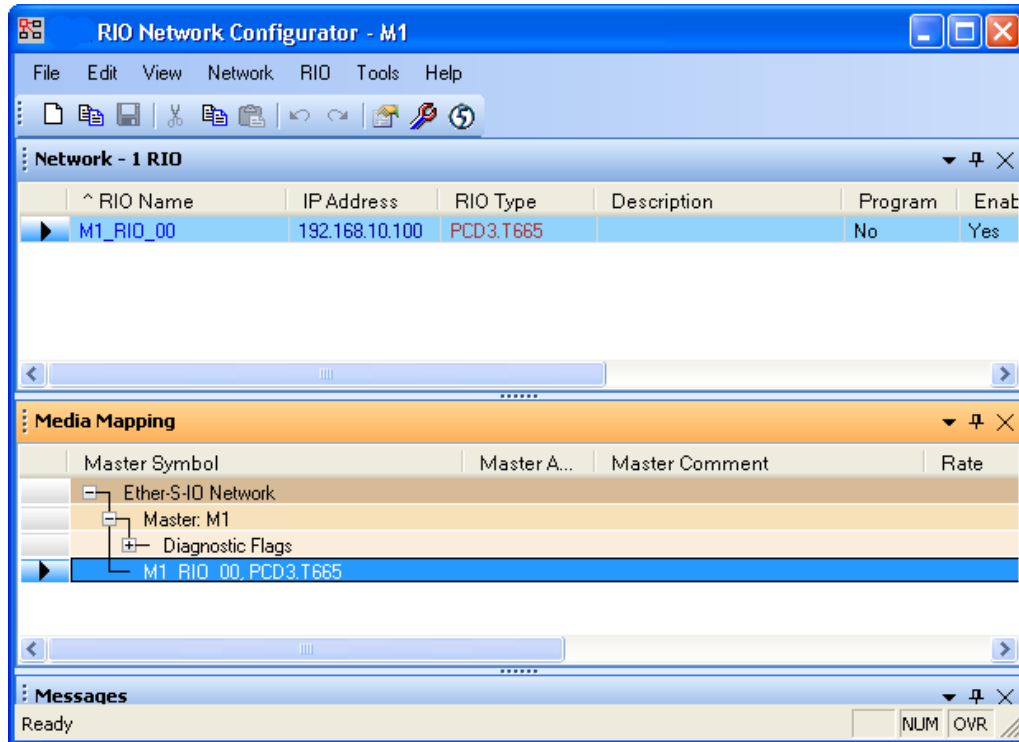
The above screen can be used to set a RIO's IP address. If the RIO has a program, the check box "Has Program" must be selected. Chapter 4 explains how to use RIOs that have a program.

Close the window by pressing the OK button.



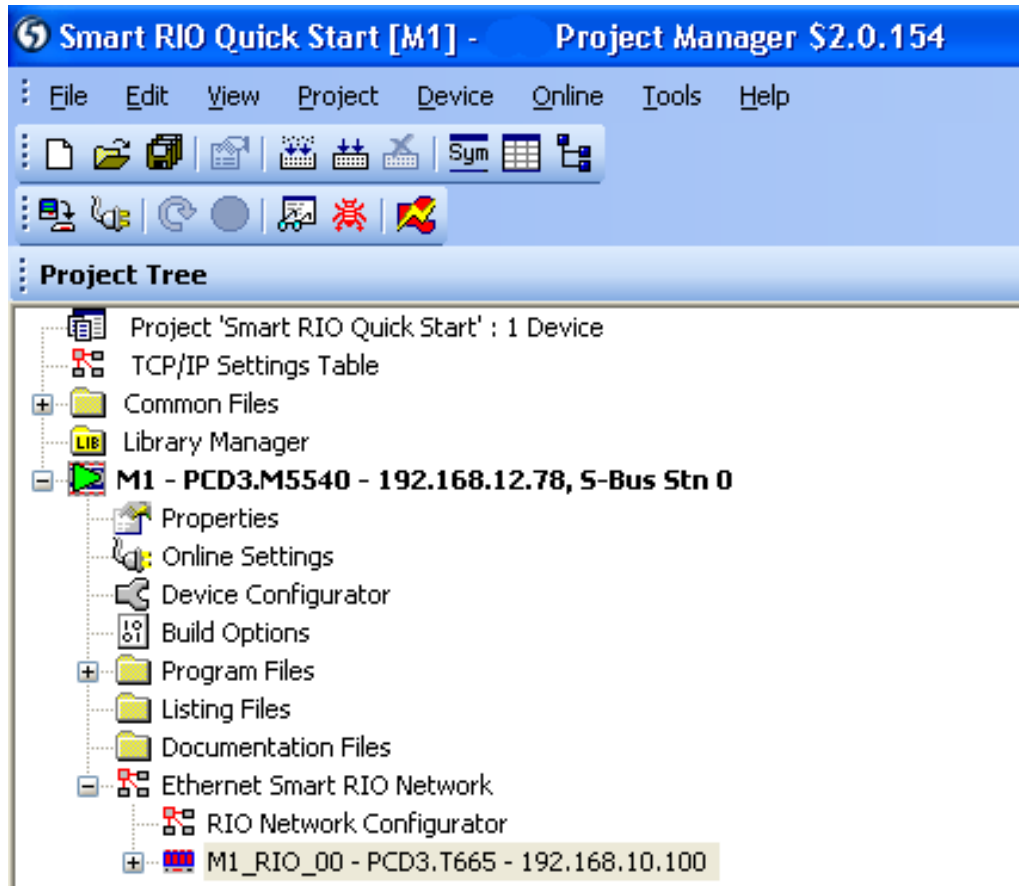
The RIO that has just been added should now appear as follows in the RIO Network Configurator and the Project Manager.

RIO Network Configurator:



2

Project Manager:

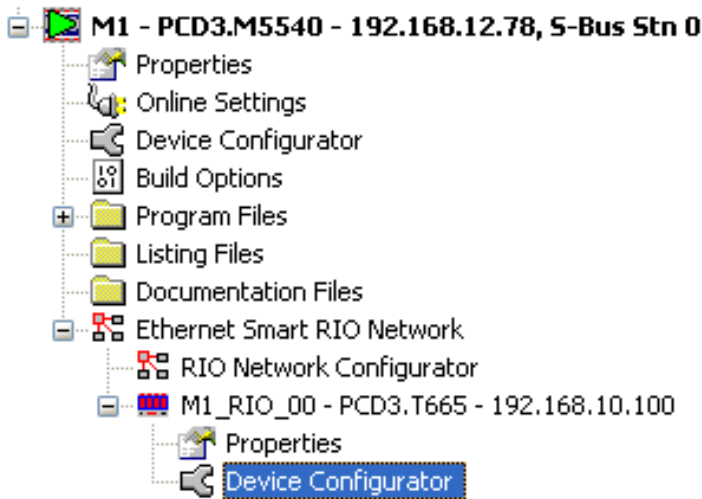


### 3 Configuration and Build of Smart RIO stations without program

#### 3.1 Configuration in the Device Configurator

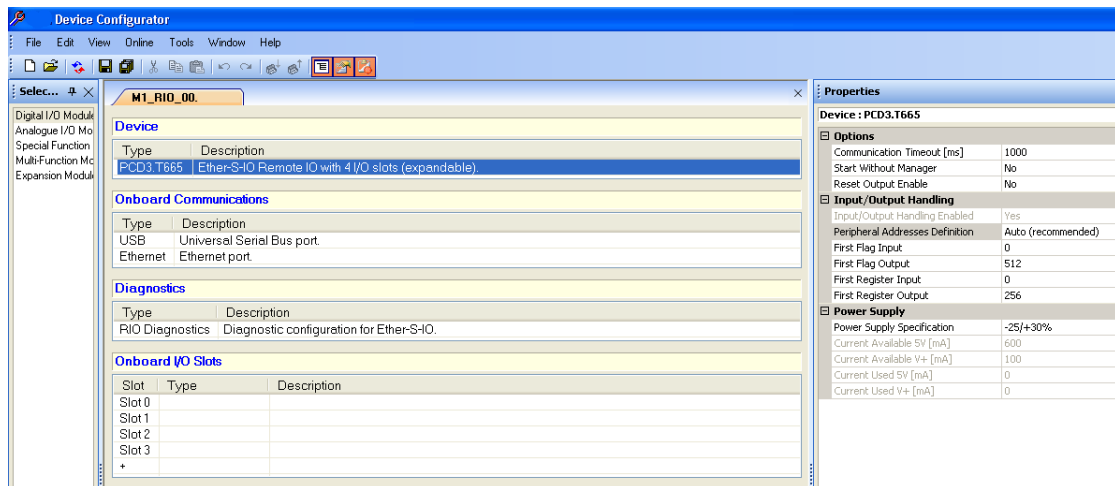
The RIO's Device Configurator can be opened either by double clicking on the RIO in the RIO Network Configurator or by opening the Device Configurator from the Project Manager.

3



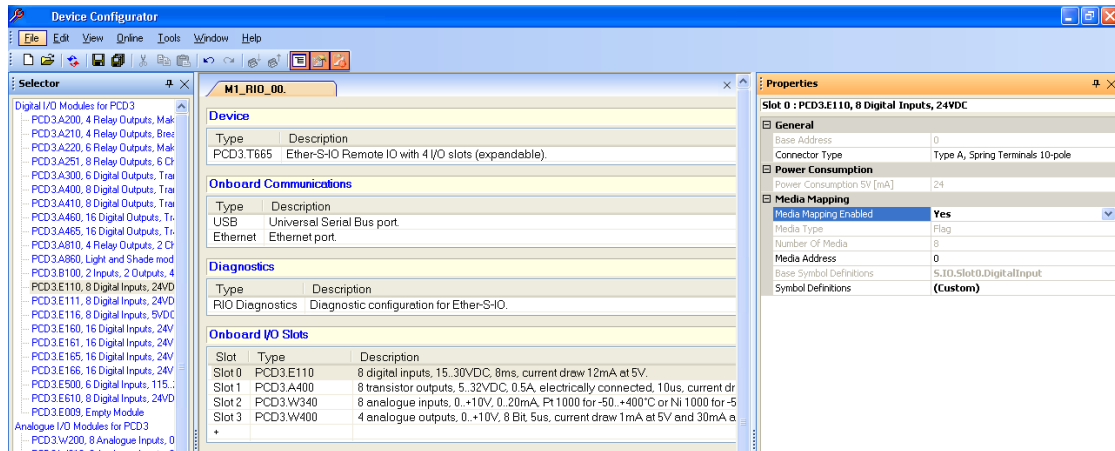
In the Device Configurator the RIO type and IP address can be changed if necessary.

The “reset output enable” option can be activated if required. For non-programmable RIOs, it is not necessary to change the other property settings.



### Configuring the RIO's I/O modules

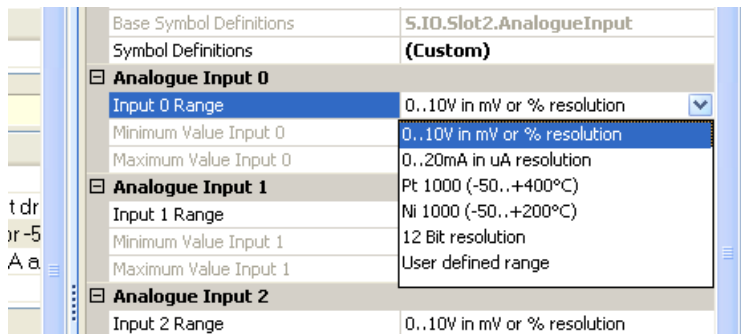
I/O modules are now added from the module selector:



3

Ensure Media Mapping is enabled. It is not necessary to modify addresses or symbol definitions for RIOs that have no program.

The inputs/outputs of analogue modules and other special modules should be configured in the same way as for a standard PCD.



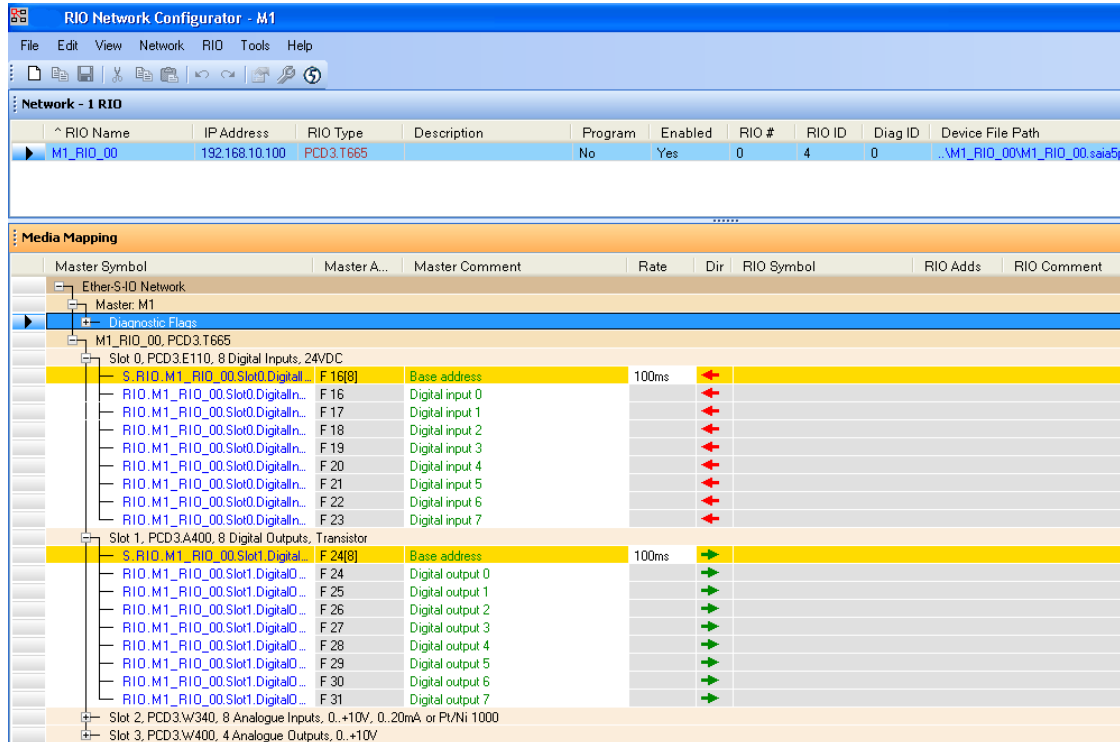
The RIO configuration can be downloaded from the Device Configurator into the Smart RIO station (Must never be downloaded with Firmware version < FW 1.16.xx).

The I/O configuration is downloaded with the user program in the Manager Station. The Manager automatically sends the configuration to the RIOs after startup. For details refer to chapter 3.3.

A RIO's IP address can be set using the PC browser via a built-in web page in the RIO station. For details refer to chapter 5.

### 3.2 Media Mapping in the RIO Network Configurator

After saving the RIO's I/O module configuration from the Device Configurator, the RIO's I/O symbols used in the Manager are listed in the Media Mapping view as shown below.

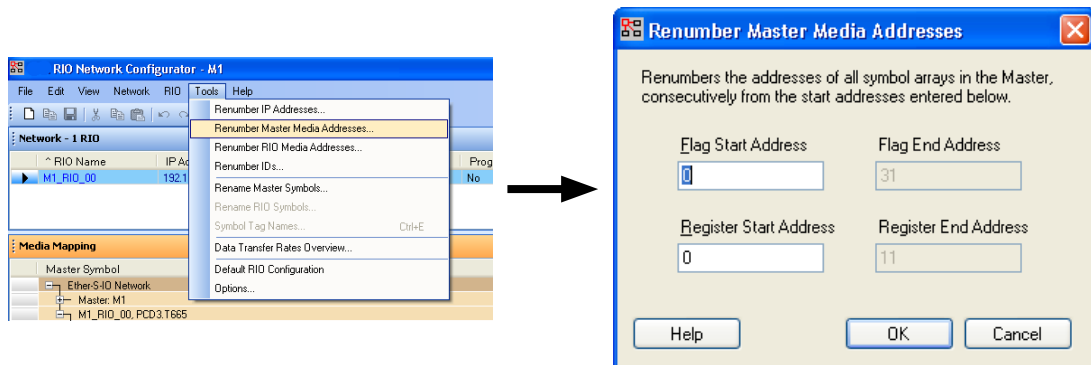


Symbols used on the Manager

Symbols used on the RIO are not present for a RIO without program

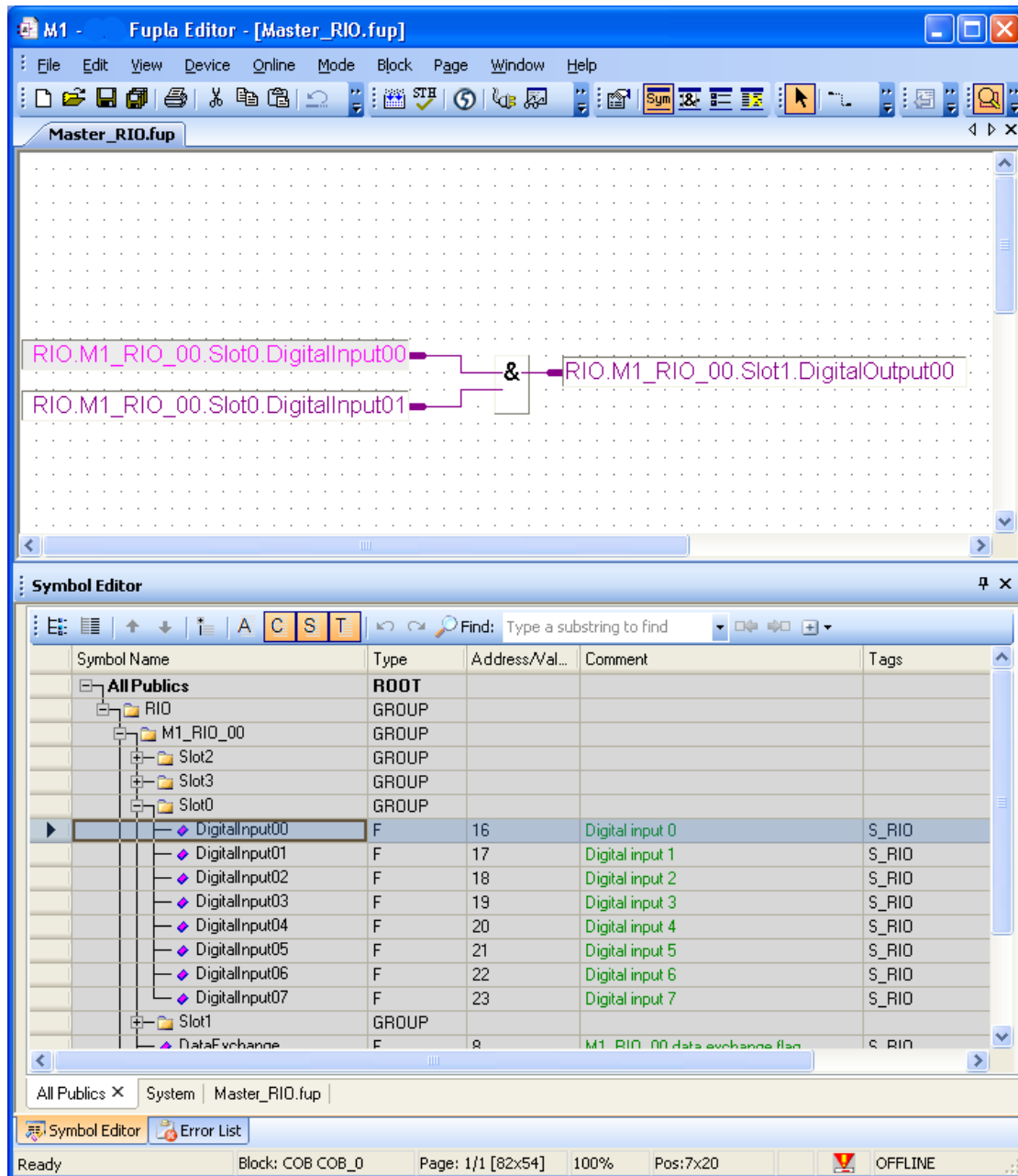


The absolute addresses of Manager media are allocated by the RIO Network Configurator. Only the base address can be changed.



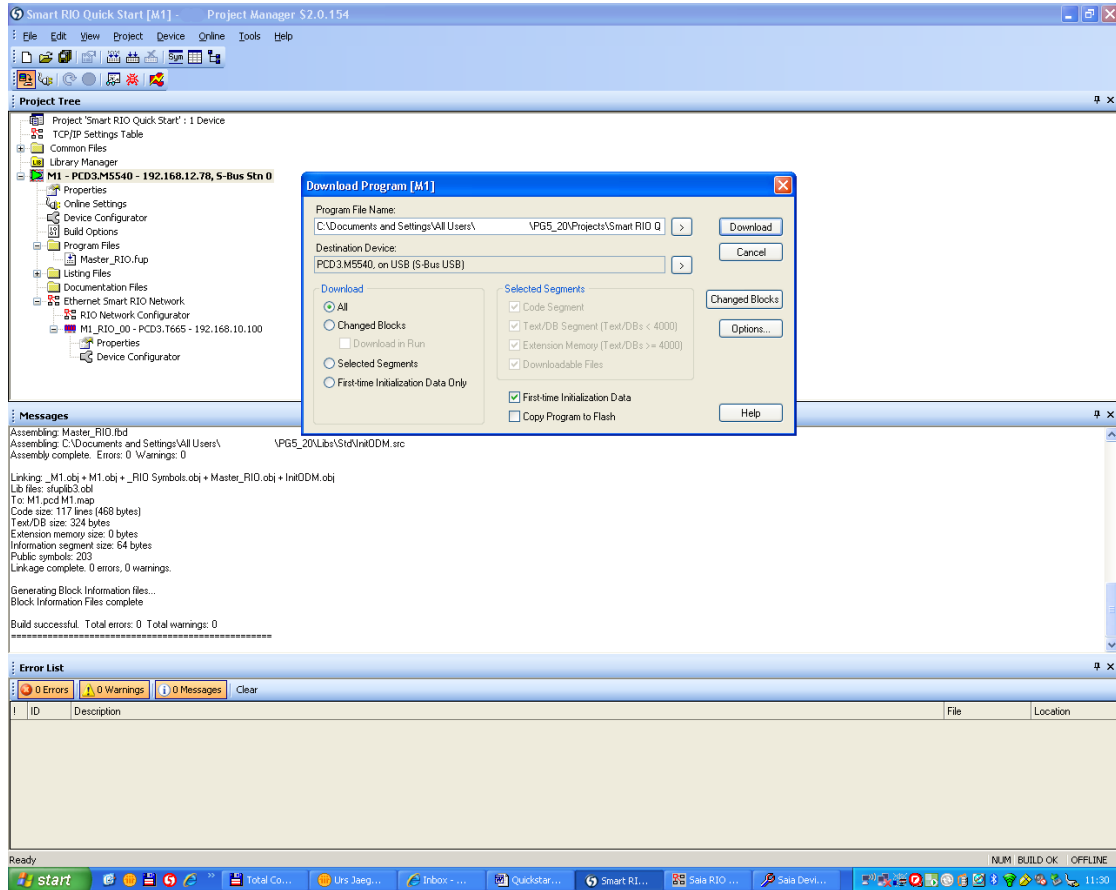
The symbol name can be modified if required. Allocated symbols are shown in the “All Publics” Tab and can be used in user programs.

3



### 3.3 Build and Download of the Smart RIO project

The complete Smart RIO application is built and downloaded from the Manager station. Building and downloading the Manager station program also builds and downloads the RIO configurations and programs. It is not necessary to deal with individual RIOs.



After start-up, the Manager sends the configuration to all RIOs automatically. If a RIO is disconnected or powered off and then reconnected, it will automatically receive its configuration from the Manager.

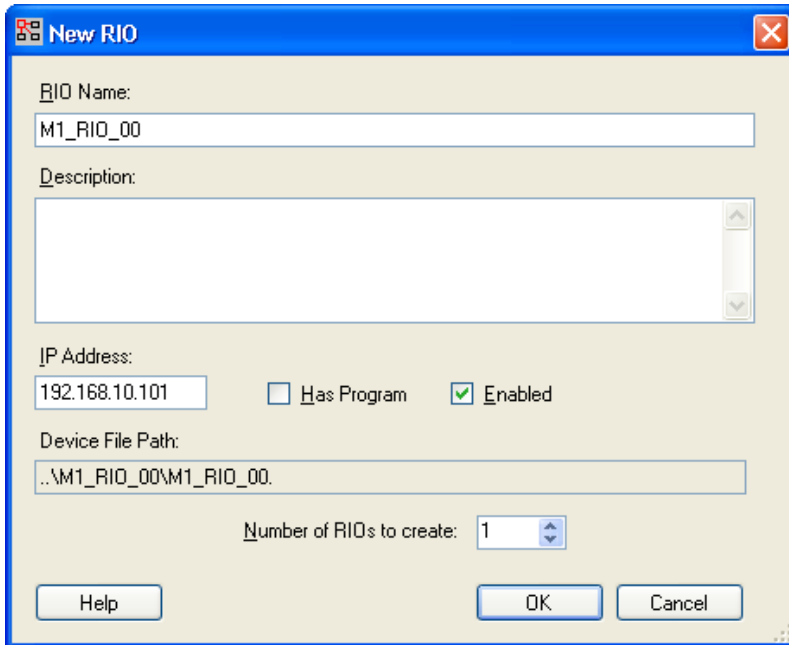
## 4 Configuration and Build of Smart RIOs station with a program

To add a RIO which has a program, the check box “Has Program” must be selected as shown below.

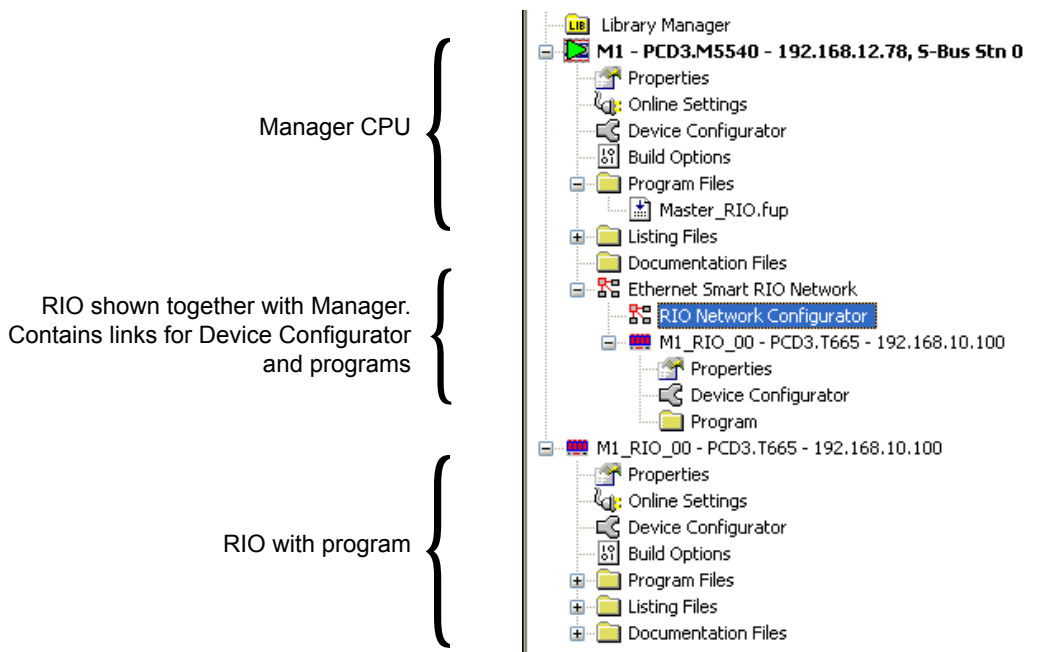


This setting can be changed at any time by opening the RIO properties from the RIO Network Configurator.

4



After confirming with the OK button, the RIO should appear as follows in the Project Manager:

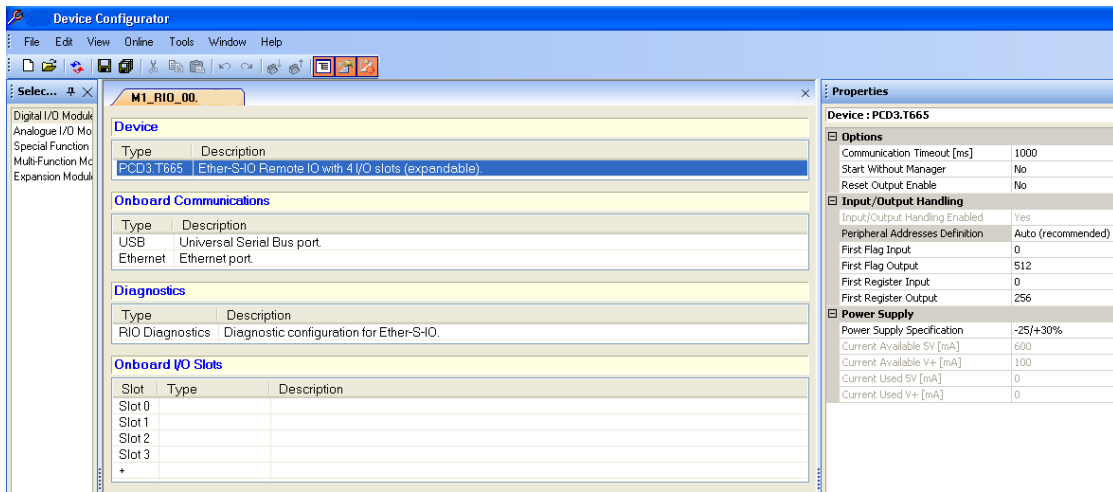


Please note that a RIO which has a program is presented in the Project Manager as a standard CPU (the icon is different) with its related files.



### 4.1 Configuration in the Device Configurator

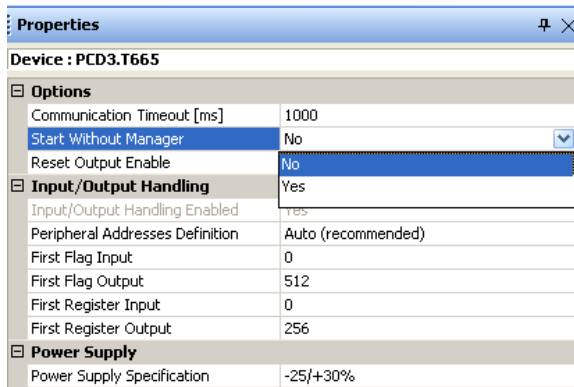
Presentation of RIO station which has a program in the Device Configurator:



4

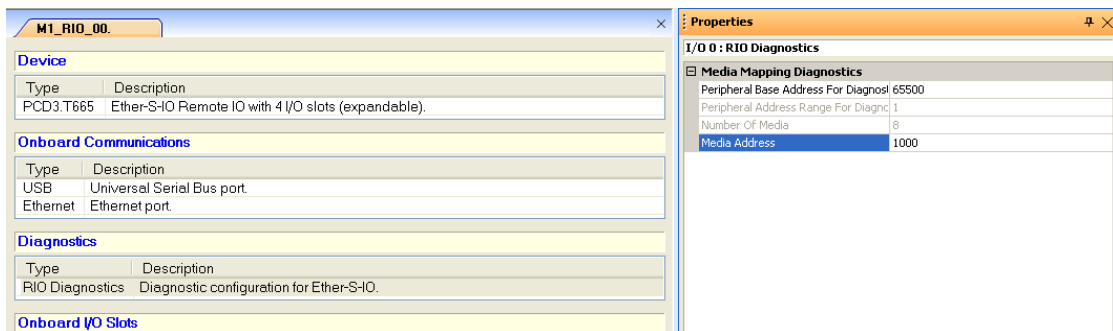
In addition to the configuration for a RIO without program, the following settings can/should be modified if necessary.

Set the startup behaviour of the RIO when powering up without the Manager.

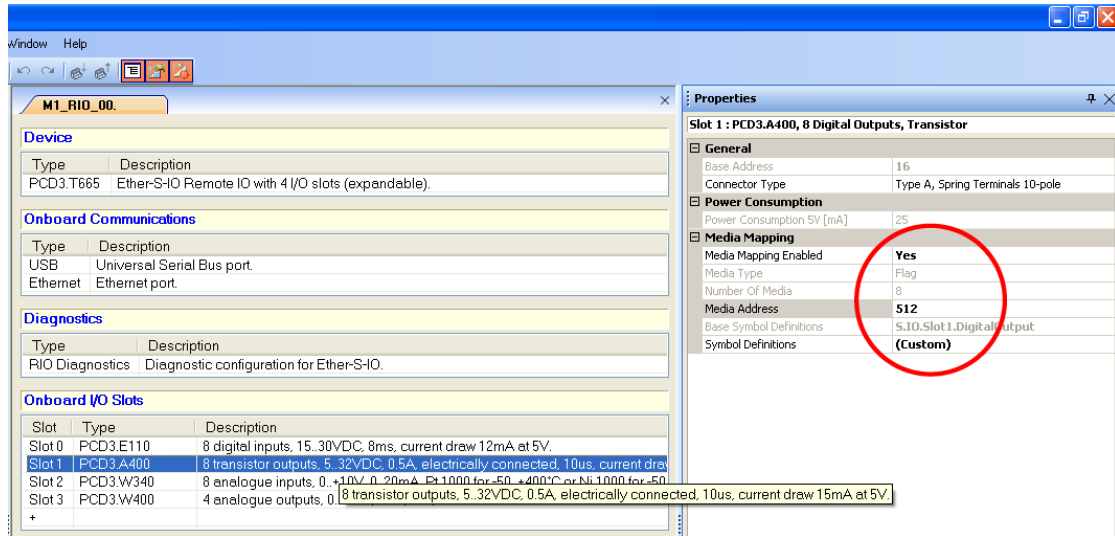


} The base addresses for I/O handling must be checked and set. Make sure there are no conflicts with the RIO user program

The base address of RIO diagnostic elements must also be checked and set.

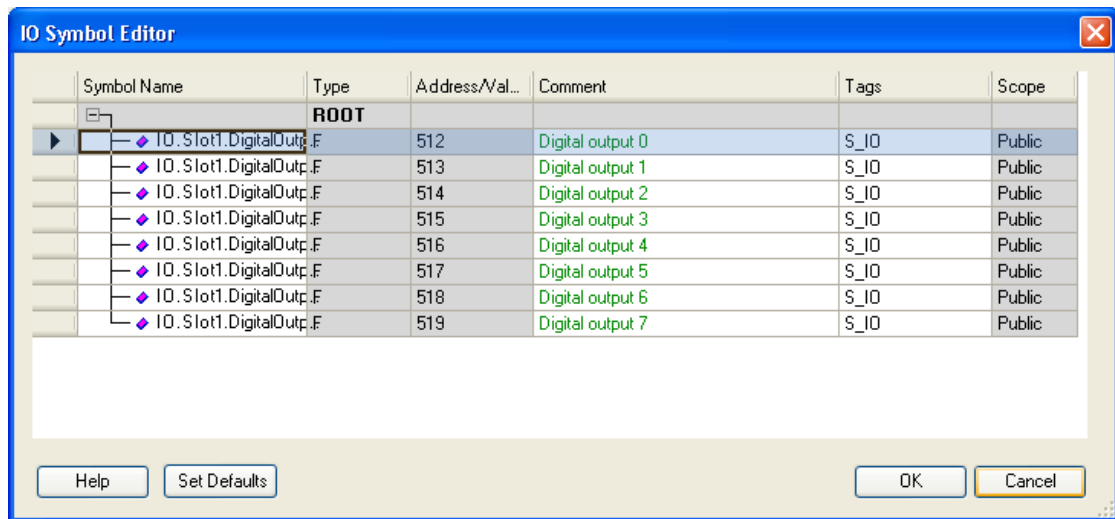


Media Mapping and addresses for I/O modules.



4

Automatically generated symbol names for I/Os can be used or customized here.



## 4.2 Media Mapping in the RIO Network Configurator

Presentation of a RIO with program:

The screenshot shows the 'RIO Network Configurator - M1' interface. The 'Media Mapping' tab is active, displaying a tree view of symbols. The table below summarizes the visible data:

Symbol	Base address	Rate	Dir	RIO Symbol	RIO Addr	RIO Comment
S RIO M1 RIO_00.Slot0.Digital... F 16[8]	F 16	100ms	←	S IO Slot0.DigitalInput	F 0[8]	Base address
RIO M1 RIO_00.Slot0.Digital... F 16	F 16		←	IO Slot0.DigitalInput0	F 0	Digital input 0
RIO M1 RIO_00.Slot0.Digital... F 17	F 17		←	IO Slot0.DigitalInput1	F 1	Digital input 1
RIO M1 RIO_00.Slot0.Digital... F 18	F 18		←	IO Slot0.DigitalInput2	F 2	Digital input 2
RIO M1 RIO_00.Slot0.Digital... F 19	F 19		←	IO Slot0.DigitalInput3	F 3	Digital input 3
RIO M1 RIO_00.Slot0.Digital... F 20	F 20		←	IO Slot0.DigitalInput4	F 4	Digital input 4
RIO M1 RIO_00.Slot0.Digital... F 21	F 21		←	IO Slot0.DigitalInput5	F 5	Digital input 5
RIO M1 RIO_00.Slot0.Digital... F 22	F 22		←	IO Slot0.DigitalInput6	F 6	Digital input 6
RIO M1 RIO_00.Slot0.Digital... F 23	F 23		←	IO Slot0.DigitalInput7	F 7	Digital input 7
S RIO M1 RIO_00.Slot1.Digital... F 24[8]	F 24	100ms	→	S IO Slot1.DigitalOutput	F 512[8]	Base address
RIO M1 RIO_00.Slot1.Digital... F 24	F 24		→	IO Slot1.DigitalOutput0	F 512	Digital output 0
RIO M1 RIO_00.Slot1.Digital... F 25	F 25		→	IO Slot1.DigitalOutput1	F 513	Digital output 1
RIO M1 RIO_00.Slot1.Digital... F 26	F 26		→	IO Slot1.DigitalOutput2	F 514	Digital output 2
RIO M1 RIO_00.Slot1.Digital... F 27	F 27		→	IO Slot1.DigitalOutput3	F 515	Digital output 3
RIO M1 RIO_00.Slot1.Digital... F 28	F 28		→	IO Slot1.DigitalOutput4	F 516	Digital output 4
RIO M1 RIO_00.Slot1.Digital... F 29	F 29		→	IO Slot1.DigitalOutput5	F 517	Digital output 5
RIO M1 RIO_00.Slot1.Digital... F 30	F 30		→	IO Slot1.DigitalOutput6	F 518	Digital output 6
RIO M1 RIO_00.Slot1.Digital... F 31	F 31		→	IO Slot1.DigitalOutput7	F 519	Digital output 7

Annotations in the image:

- Symbols used in the Manager:** Points to the 'S RIO M1 RIO\_00.Slot0.Digital...' and 'S RIO M1 RIO\_00.Slot1.Digital...' rows.
- Symbols used in the RIO:** Points to the 'IO Slot0.DigitalInput...' and 'IO Slot1.DigitalOutput...' rows.
- Transfer Cycle Time:** Points to the '100ms' value in the 'Rate' column.
- Transfer Direction:** Points to the '←' and '→' symbols in the 'Dir' column.

In addition to Manager symbols, those used in the RIO station are also listed.

All symbols listed will be exchanged between Manager and RIO. This means that, for example, if a RIO's outputs are controlled by a user program in the RIO, they need to be disabled from data transfer. Otherwise, they will be overwritten by the Manager.

Cycle time can be set individually for every data transfer array. In this way, time-critical signals (e.g. alarms) can be exchanged faster than non time-critical signals (e.g. temperature values).



Select appropriate cycle times. Do not set times that are unnecessarily short, since this will increase network traffic and add to the load on the Manager station. In the worst case, telegrams may even be lost. For more information refer to chapter 6. "Troubleshooting and Diagnostics"

### Data transfer cycle times

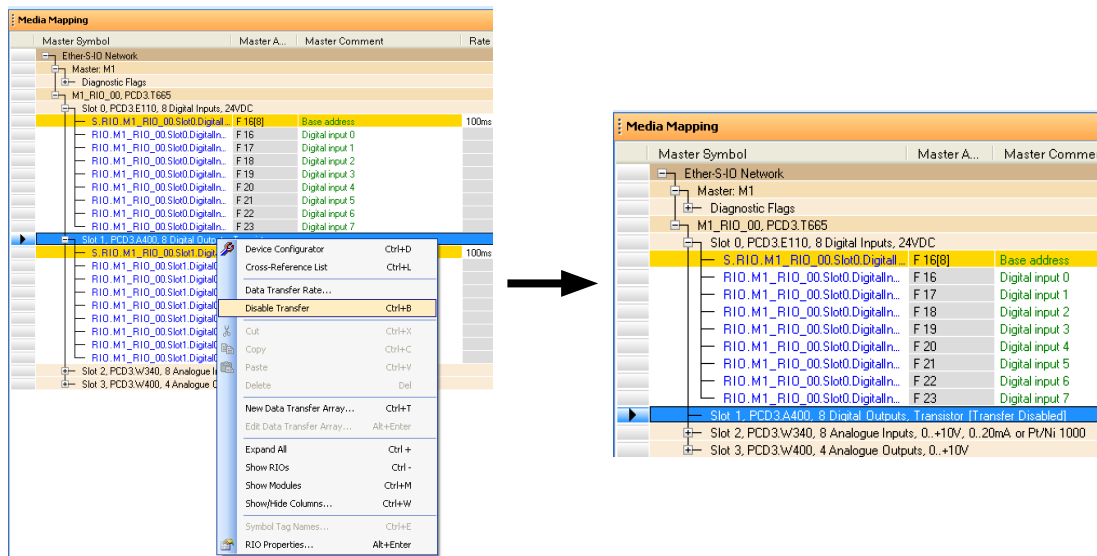
Number of RIOs	Minimum cycle time Data transfer
10	50 ms
20	100 ms
40	200 ms
80	400 ms
128	800 ms

**2 different transfer cycle times can be set for each RIO station:**

- a short cycle time for high-priority data
- normal cycle time for low-priority or slow data

### How to disable data transfer

Right-click on the slot to be disabled and select “Disable Transfer”.



4

After this, symbols for the slot will no longer be shown in Media Mapping.

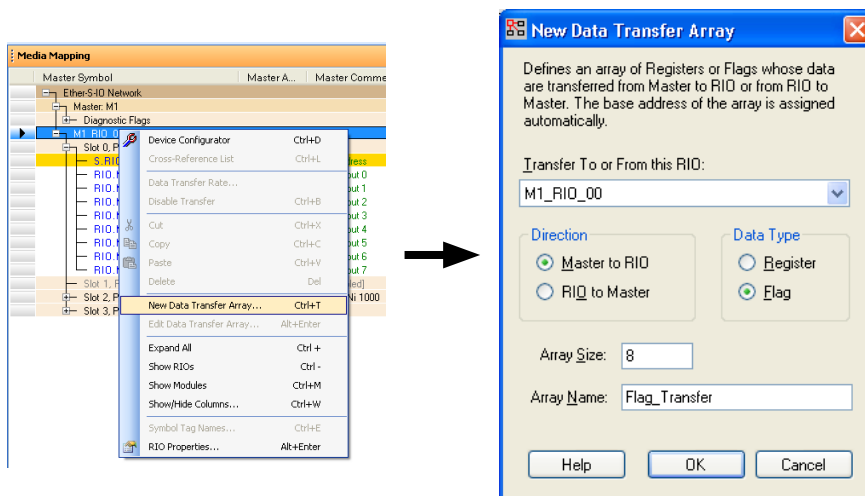


Only the whole I/O slot can be disabled!

### How to insert Data Transfer arrays

If you wish to exchange data other than I/O signals, it is possible to insert additional Data Transfer Arrays.

Right-click on the RIO station where the data array is to be inserted and select “New Data Transfer Array”.



Select the direction of transfer and the data type concerned. Then enter a name for the transfer array.

After insertion, the new array should appear as follows in the media mapping.

Master Symbol	Master A.	Master Comment	Rate	Dir	RIO Symbol	RIO Adds	RIO Comment
EtherS-IO Network							
Master: M1							
Diagnostic Flags							
M1_RIO_00_PCD3.T665							
Slot 0_PCD3.E110, 8 Digital Inputs, 24VDC							
S_RIO.M1_RIO_00.Slot0.Digital	F 16[8]	Base address	100ms	←	S_IO.Slot0.DigitalInput	F 0[8]	Base address
RIO.M1_RIO_00.Slot0.DigitalIn...	F 16	Digital input 0		←	IO.Slot0.DigitalInput0	F 0	Digital input 0
RIO.M1_RIO_00.Slot0.DigitalIn...	F 17	Digital input 1		←	IO.Slot0.DigitalInput1	F 1	Digital input 1
RIO.M1_RIO_00.Slot0.DigitalIn...	F 18	Digital input 2		←	IO.Slot0.DigitalInput2	F 2	Digital input 2
RIO.M1_RIO_00.Slot0.DigitalIn...	F 19	Digital input 3		←	IO.Slot0.DigitalInput3	F 3	Digital input 3
RIO.M1_RIO_00.Slot0.DigitalIn...	F 20	Digital input 4		←	IO.Slot0.DigitalInput4	F 4	Digital input 4
RIO.M1_RIO_00.Slot0.DigitalIn...	F 21	Digital input 5		←	IO.Slot0.DigitalInput5	F 5	Digital input 5
RIO.M1_RIO_00.Slot0.DigitalIn...	F 22	Digital input 6		←	IO.Slot0.DigitalInput6	F 6	Digital input 6
RIO.M1_RIO_00.Slot0.DigitalIn...	F 23	Digital input 7		←	IO.Slot0.DigitalInput7	F 7	Digital input 7
Slot 1_PCD3.A400, 8 Digital Outputs, Transistor [Transfer Disabled]							
Slot 2_PCD3.W340, 8 Analogue Inputs, 0...+10V, 0...20mA or Pt/Ni 1000							
Slot 3_PCD3.W400, 4 Analogue Outputs, 0...+10V							
S_RIO.M1_RIO_00.Flag_Transfer	F 24[8]	Data Transfer Array base address	100ms	→	S_RIO.Flag_Transfer	F 8[8]	Data Transfer Array base address
RIO.M1_RIO_00.Flag_Transfer...	F 24			→	RIO.Flag_Transfer00	F 8	
RIO.M1_RIO_00.Flag_Transfer...	F 25			→	RIO.Flag_Transfer01	F 9	
RIO.M1_RIO_00.Flag_Transfer...	F 26			→	RIO.Flag_Transfer02	F 10	
RIO.M1_RIO_00.Flag_Transfer...	F 27			→	RIO.Flag_Transfer03	F 11	
RIO.M1_RIO_00.Flag_Transfer...	F 28			→	RIO.Flag_Transfer04	F 12	
RIO.M1_RIO_00.Flag_Transfer...	F 29			→	RIO.Flag_Transfer05	F 13	
RIO.M1_RIO_00.Flag_Transfer...	F 30			→	RIO.Flag_Transfer06	F 14	
RIO.M1_RIO_00.Flag_Transfer...	F 31			→	RIO.Flag_Transfer07	F 15	

4



For Flags, only arrays with multiples of 8 flags can be transferred.

For Registers, arrays with a single Register are possible.

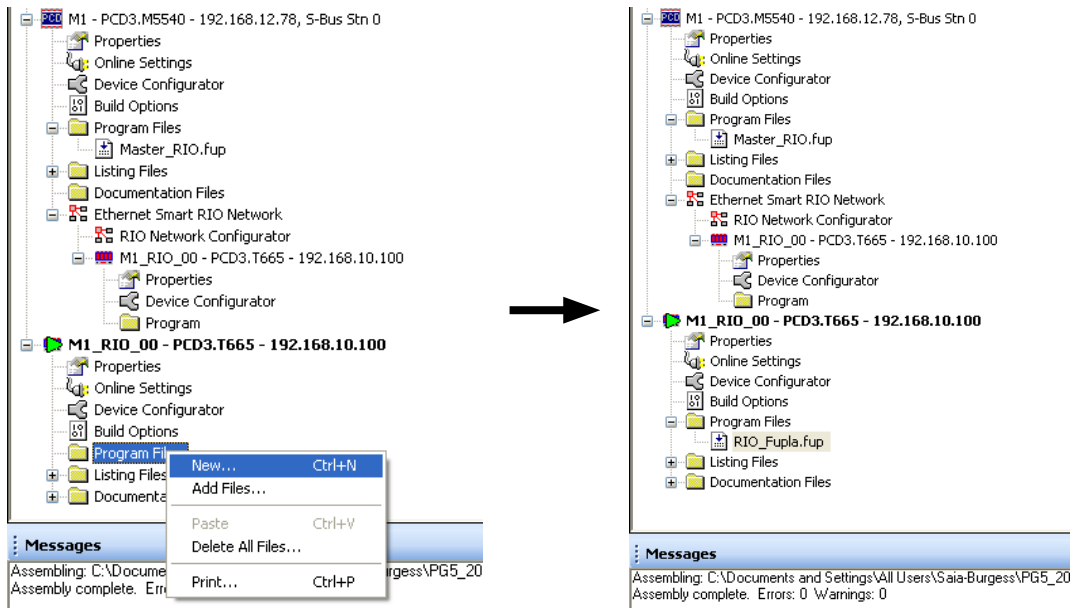
Master Symbol	Master A.	Master Comment	Rate	Dir	RIO Symbol	RIO Adds	RIO Comment
EtherS-IO Network							
Master: M1							
Diagnostic Flags							
M1_RIO_00_PCD3.T665							
Slot 0_PCD3.E110, 8 Digital Inputs, 24VDC							
S_RIO.M1_RIO_00.Slot0.Digital	F 16[8]	Base address	100ms	←	S_IO.Slot0.DigitalInput	F 0[8]	Base address
RIO.M1_RIO_00.Slot0.DigitalIn...	F 16	Digital input 0		←	IO.Slot0.DigitalInput0	F 0	Digital input 0
RIO.M1_RIO_00.Slot0.DigitalIn...	F 17	Digital input 1		←	IO.Slot0.DigitalInput1	F 1	Digital input 1
RIO.M1_RIO_00.Slot0.DigitalIn...	F 18	Digital input 2		←	IO.Slot0.DigitalInput2	F 2	Digital input 2
RIO.M1_RIO_00.Slot0.DigitalIn...	F 19	Digital input 3		←	IO.Slot0.DigitalInput3	F 3	Digital input 3
RIO.M1_RIO_00.Slot0.DigitalIn...	F 20	Digital input 4		←	IO.Slot0.DigitalInput4	F 4	Digital input 4
RIO.M1_RIO_00.Slot0.DigitalIn...	F 21	Digital input 5		←	IO.Slot0.DigitalInput5	F 5	Digital input 5
RIO.M1_RIO_00.Slot0.DigitalIn...	F 22	Digital input 6		←	IO.Slot0.DigitalInput6	F 6	Digital input 6
RIO.M1_RIO_00.Slot0.DigitalIn...	F 23	Digital input 7		←	IO.Slot0.DigitalInput7	F 7	Digital input 7
Slot 1_PCD3.A400, 8 Digital Outputs, Transistor [Transfer Disabled]							
Slot 2_PCD3.W340, 8 Analogue Inputs, 0...+10V, 0...20mA or Pt/Ni 1000							
Slot 3_PCD3.W400, 4 Analogue Outputs, 0...+10V							
S_RIO.M1_RIO_00.Flag_Transfer	F 24[8]	Data Transfer Array base address	100ms	→	S_RIO.Flag_Transfer	F 8[8]	Data Transfer Array base address
RIO.M1_RIO_00.Flag_Transfer...	F 24			→	RIO.Flag_Transfer00	F 8	
RIO.M1_RIO_00.Flag_Transfer...	F 25			→	RIO.Flag_Transfer01	F 9	
RIO.M1_RIO_00.Flag_Transfer...	F 26			→	RIO.Flag_Transfer02	F 10	
RIO.M1_RIO_00.Flag_Transfer...	F 27			→	RIO.Flag_Transfer03	F 11	
RIO.M1_RIO_00.Flag_Transfer...	F 28			→	RIO.Flag_Transfer04	F 12	
RIO.M1_RIO_00.Flag_Transfer...	F 29			→	RIO.Flag_Transfer05	F 13	
RIO.M1_RIO_00.Flag_Transfer...	F 30			→	RIO.Flag_Transfer06	F 14	
RIO.M1_RIO_00.Flag_Transfer...	F 31			→	RIO.Flag_Transfer07	F 15	
S_RIO.M1_RIO_00.Register_Tra...	R 12[2]	Data Transfer Array base address	100ms	←	S_RIO.Register_Transfer	R 260[2]	Data Transfer Array base address
RIO.M1_RIO_00.Register_Tran...	R 12			←	RIO.Register_Transfer00	R 260	
RIO.M1_RIO_00.Register_Tran...	R 13			←	RIO.Register_Transfer01	R 261	



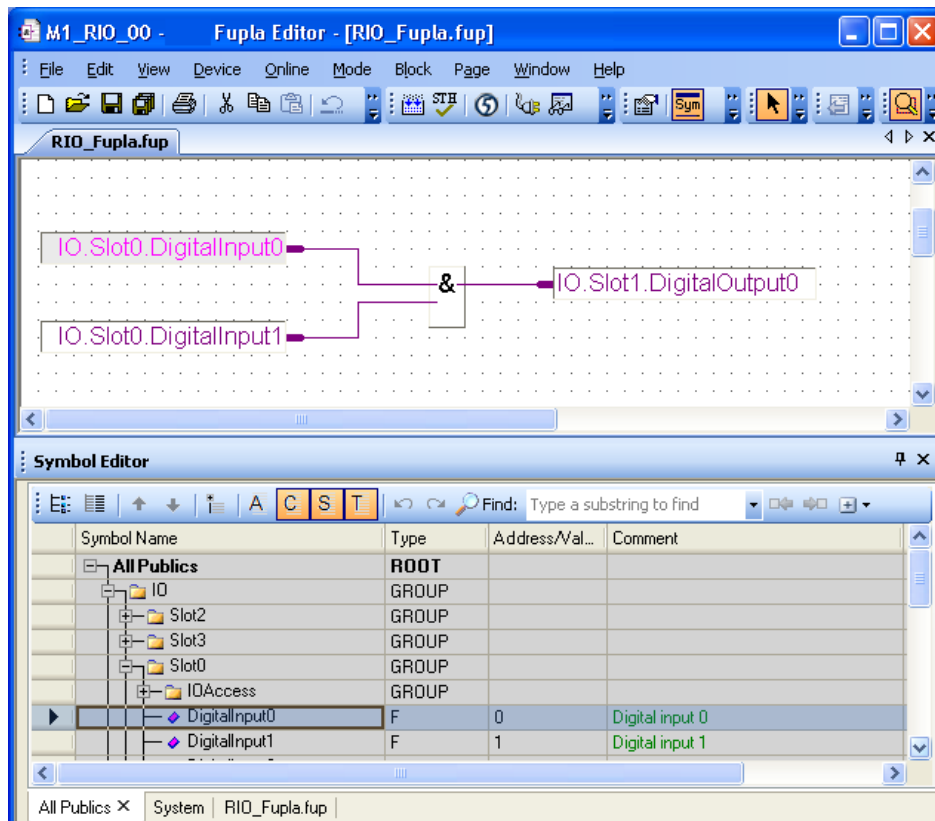
For every Data Transfer Array an individual transfer telegram will be generated. It is therefore advisable to structure Data Transfer Arrays in a useful way.

### 4.3 Creating user programs for Smart RIOs

In the Project Manager, a user program can be created with any standard editor (Fu-pla, IL or Graftec)



For RIOs the usable media (R, F, C, X, DB) are the same as with a standard CPU. The only limitation is in the space available for the user program (32 KB for PCD3.T665 and 128 KB for PCD3.T666).



There is no battery on the RIOs → registers, flags, DBs and RAM texts are volatile!  
 There is no hardware clock → date and time must be transmitted from the Manager to the RIO using a data transfer array

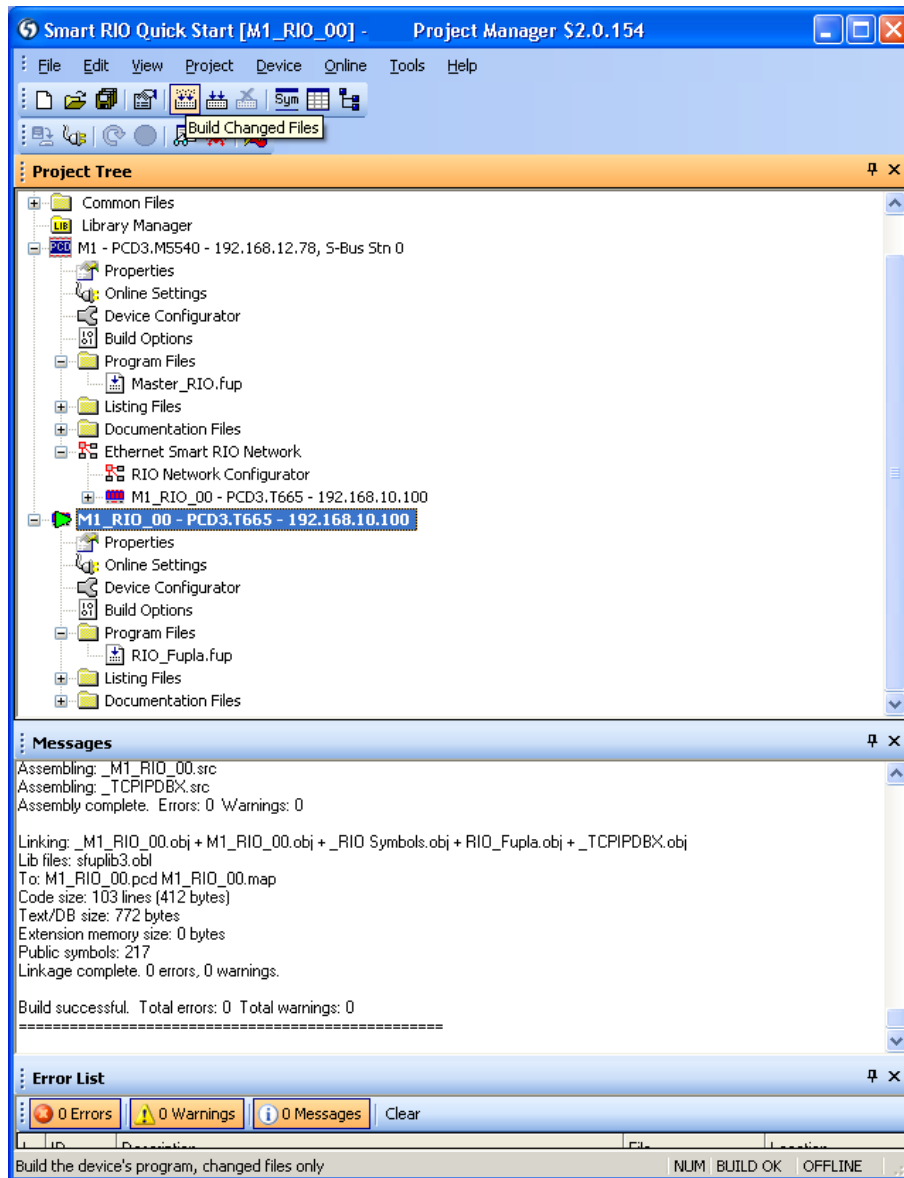
### 4.4 Build and Download of Smart RIO project with user program

The complete Smart RIO application is built and downloaded from the Manager station. Building and downloading the Manager station program also builds and downloads the RIO configurations and programs. It is not necessary to deal with individual RIOs.

For a quick check the RIO application can be built individually without the Manager project.

Select the RIO in the Project Manager:

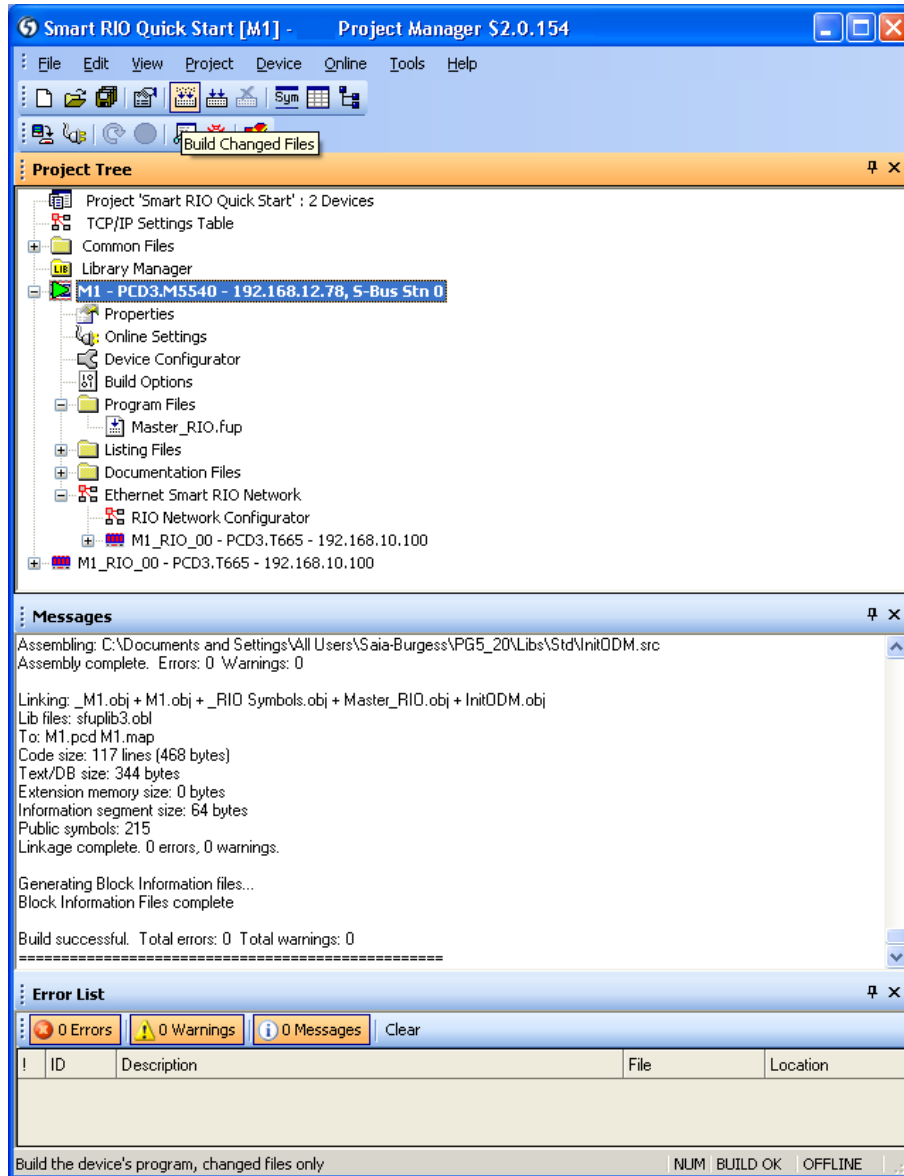
4



The user program cannot (must not) be downloaded in the RIO station with the PG5 downloader.



To build the complete Smart RIO Network project, the Manager station must be selected in the Project Manager and then the Build started.



4



If there are many RIO stations, a «Rebuild All Files» may take quite a long time.

To save time, «Build Changed Files» can be used. This will also include the RIO stations.

The Smart RIO Network application is downloaded with the Manager’s user program.

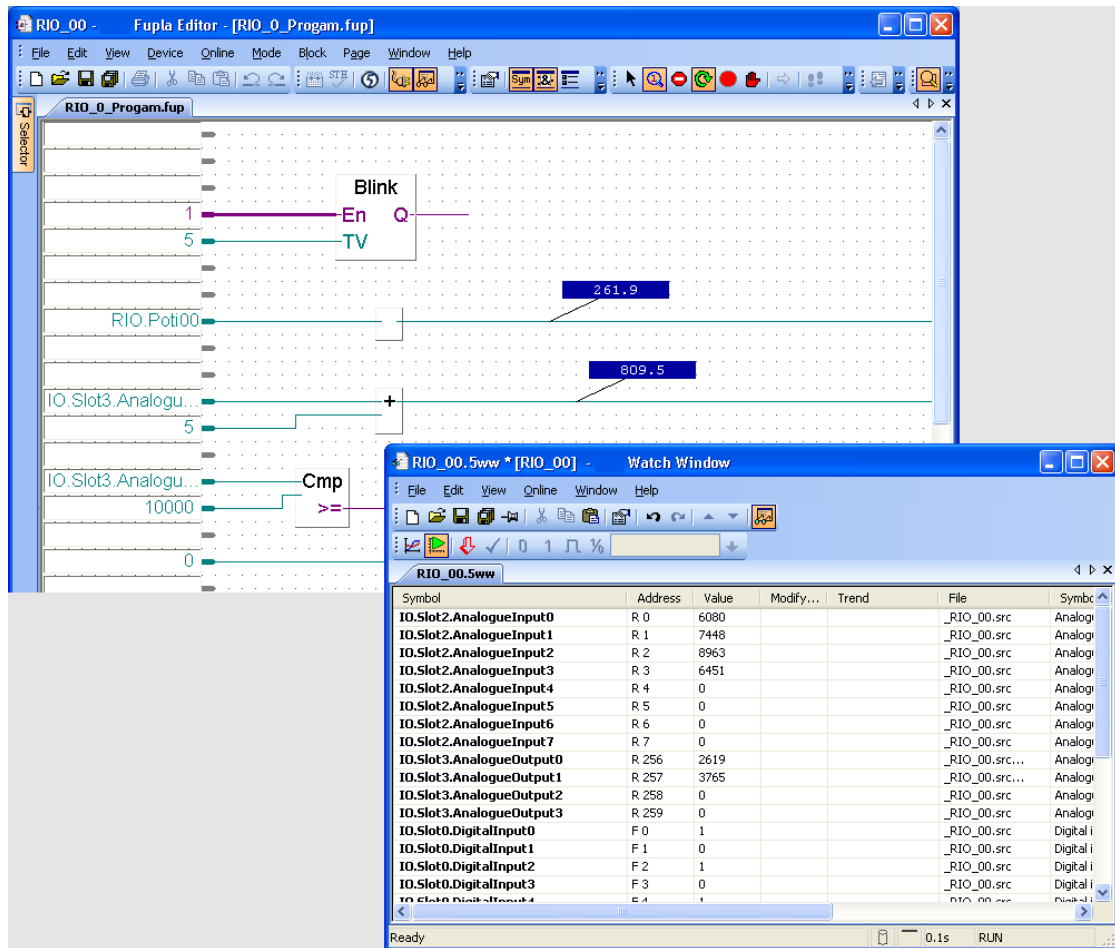
After start-up, the Manager sends the configuration and user programs to all RIOs automatically. If a RIO is disconnected or powered off and then reconnected, it will automatically receive its configuration and program from the Manager.

### 4.5 Online functions and program debugging

A RIO station supports the online connection with PG5 via USB or Ethernet.

It does not support the online functions for program download and program debugging (Run, Stop, Restart, Single Step, Breakpoints etc.).

Other online functions are supported, such as Fupla Online Mode and Watch Window. These are useful for debugging the RIO user program.

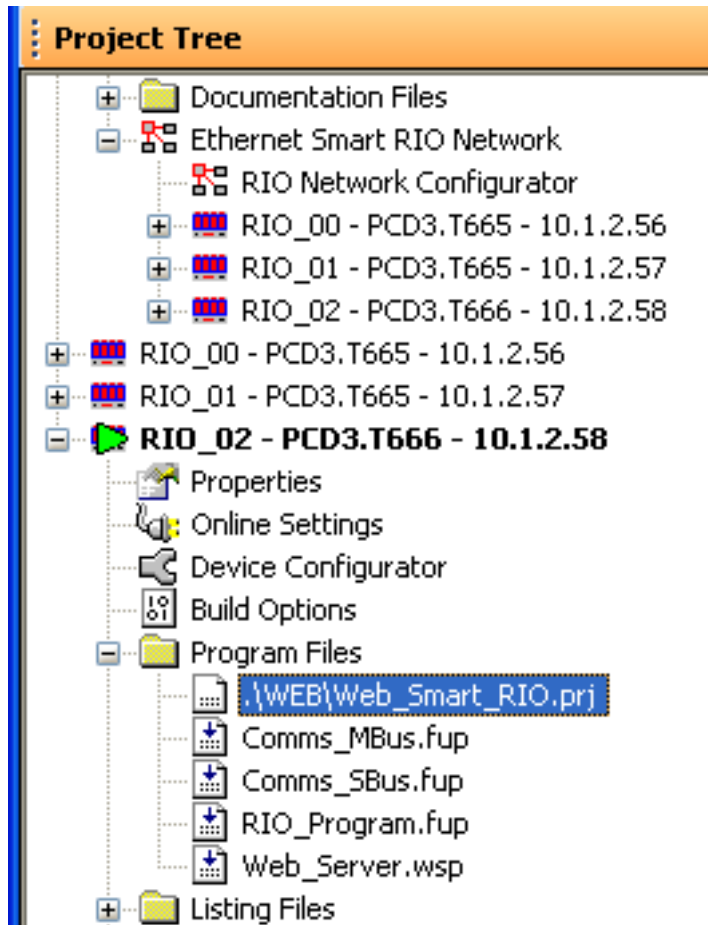


## 4.6 Using the RIO's built-in Web-Server

The RIO includes the standard PCD Web-Server, which supports user web pages.

These web pages can either be stored in user program memory (using Web-Builder) or on the onboard file system.

The Web-Server supports standard HTML pages or web pages created with our Web-Editor.



4

Since user program memory is limited, the IMaster.jar applet should be copied to the onboard flash file system or a Web-Connect PC.

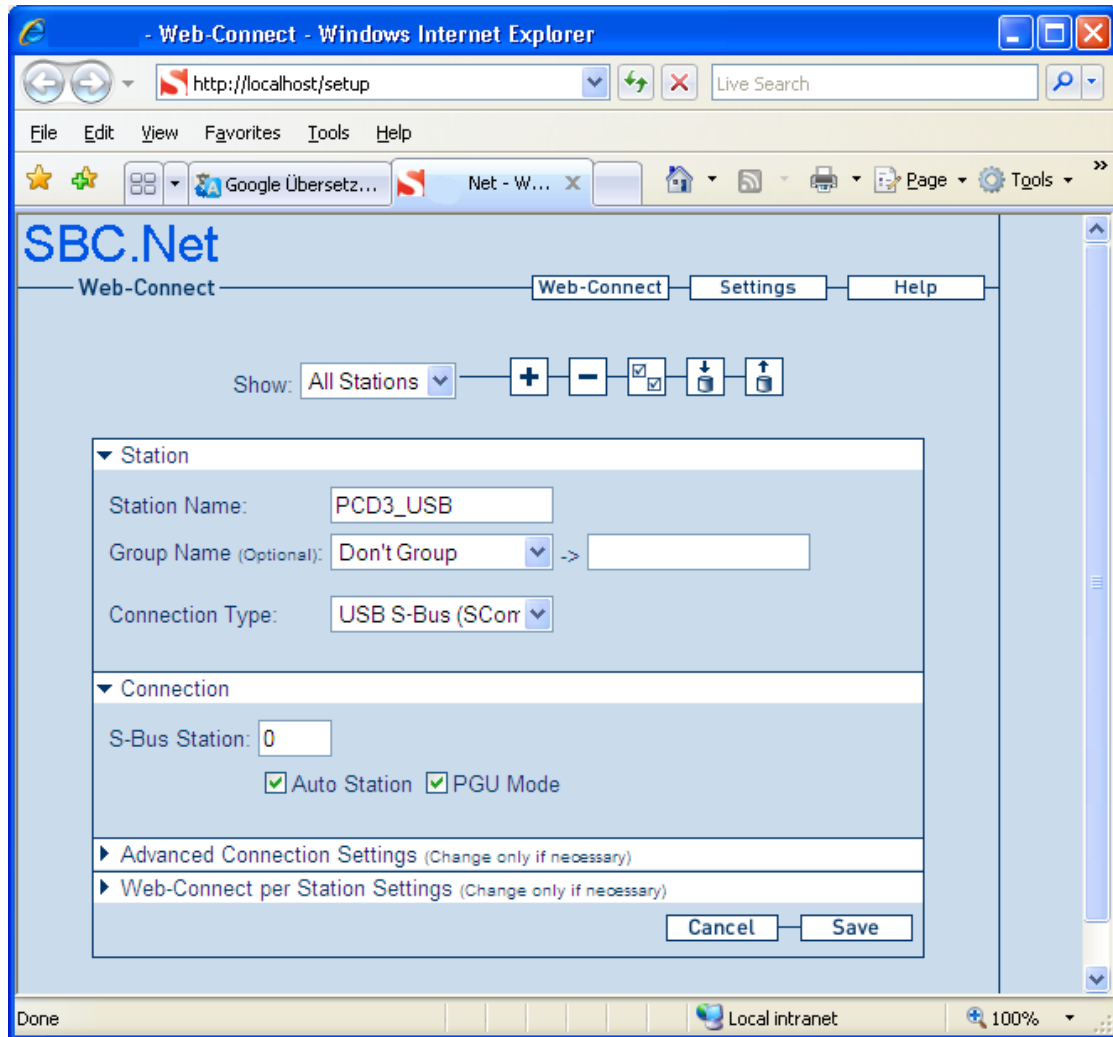
The flash file system can be accessed via the FTP server as with a standard PCD CPU.

## 5 Configuration of IP settings in a RIO station

Before a RIO station can be used its IP settings must be configured.

Connect the RIO to your Ethernet network and use the factory-default IP address 192.168.10.100 (or other IP address if you have changed it). Alternatively, you can use SBC.Net Web-Connect to connect to the RIO via the S-Bus USB port.

When using the USB interface, configure a connection for USB S-Bus in SBC.Net Web-Connect.



Connect to RIO station using the link to its web page:

## Saia PCD Web-Server

System	
Product	PCD3.T665
FW Version	1.15.27
HW Version	A
HW Modification	1
Production Date	10/37
Serial Number	0334DFAA
MAC Address	00:50:C2:CD:77:1D

Status/Diagnostic	
RIO Status	Wait Config
Program Status	HALT
MasterIP	Not configured
Global Diag	00000000
Telegram Lost Diag	Not present

Ethernet / S-Bus Configuration		
	Current	New
IP Address	192.168.10.100	<input type="text" value="192.168.10.100"/>
Subnet Mask	255.255.255.0	<input type="text" value="255.255.255.0"/>
Default Gateway	0.0.0.0	<input type="text" value="0.0.0.0"/>
S-Bus Address	100	<input type="text" value="100"/>

5

Enter the Ethernet / S-Bus Configuration settings. For the standard Smart RIO Ether-S-IO protocol the S-Bus address is not used. It is only important if the Ether-S-Bus protocol is used (data exchange between RIOs).



If you change anything in the RIO using the web page then must make the same changes to the RIO with the Device Configurator or the RIO Network Configurator, so that the master will use the correct addresses.

## 6 Troubleshooting and diagnostics

### 6.1 Diagnostic Flags

The RIO Manager PCD contains Diagnostic Flags for the RIO network and for each individual RIO. It also contains a telegram lost counter for each RIO. RIOs with programs also contains Diagnostic Flags and a telegram lost counter which indicates the Manager's status.

#### Manager's Diagnostic Flags

The first 8 flags are for the Manager (but only the first three are currently used). Flags from 8 onwards are for each RIO. When adding RIOs with the RIO Configurator, it will increase the array size in multiples of 8 if it needs more Flags. This may cause an overlap with Flag addresses used by the RIO's I/Os, which can be corrected by using the Renumber Master Media Addresses command.

The first two Flags are for the Manager, and have these symbol names:

- RIO.GlobalDiagnostic            1=The diagnostic flag of one or more RIOs is set
- RIO.TelegramLost                1=One or more telegrams have been lost
- RIO.SendError                    1=Transmission failed

From offset 8, there are two Flags for each RIO, which have symbol names like this:

- RIO.<rio\_name>.DataExchange    1=Data exchange failed, 0=OK
- RIO.<rio\_name>.Diagnostic        1=RIO has error, 0=OK

Master Symbol	Master A...	Master Comment
Ether-S-IQ Network		
Master: Device1		
Diagnostic Flags		
S.RIO.DiagFlagBase	F 100 [16]	Base address of RIO Diagnostic Flags
S.RIO.GlobalDiagnostic	F 100	Another RIO Diagnostic Flag is set
S.RIO.TelegramLost	F 101	One or more telegrams lost
S.RIO.SendError	F 102	Transmit failed
	F 103	(not used)
	F 104	(not used)
	F 105	(not used)
	F 106	(not used)
	F 107	(not used)
S.RIO.RIO_00.DataExchange	F 108	RIO_00 data exchange Flag
S.RIO.RIO_00.Diagnostic	F 109	RIO_00 Diagnostic Flag
S.RIO.RIO_01.DataExchange	F 110	RIO_01 data exchange Flag
S.RIO.RIO_01.Diagnostic	F 111	RIO_01 Diagnostic Flag
S.RIO.RIO_02.DataExchange	F 112	RIO_02 data exchange Flag
S.RIO.RIO_02.Diagnostic	F 113	RIO_02 Diagnostic Flag
	F 114	(not used)
	F 115	(not used)

### RIO Diagnostic Flags and Telegram Lost Counter

For each programmed RIO, 8 diagnostic flags have also been reserved, but only the first two are currently used. They have been assigned the following system symbols, which can be used in the RIO program:

- RIO.GlobalDiagnostic 1 = The Manager is not responding
- RIO.TelegramLost 1 = One or more telegrams have been lost

## 6.2 Built-in web page

If problems occur, the system and status information provided on the built-in web pages can be used for trouble-shooting.

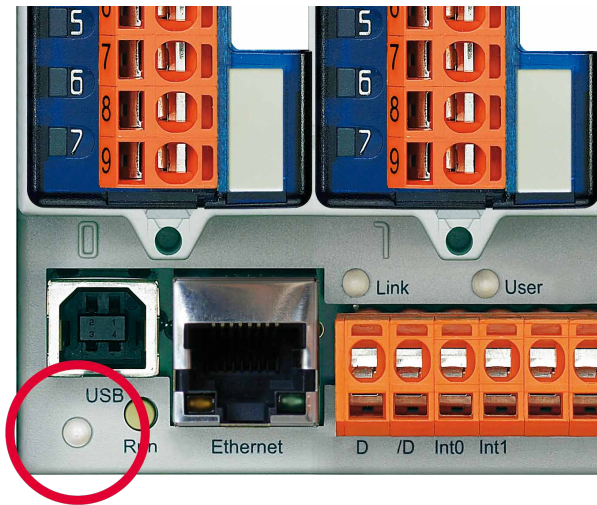
The screenshot displays the 'Saia PCD Web-Server' interface with three main sections:

- System information:** A table listing system details such as Product (PCD3.T665), FW Version (1.16.01), HW Version (A), HW Modification (1), Production Date (10/25), Serial Number (031347CF), and MAC Address (00:50:C2:C9:C5:84).
- Status/Diagnostic:** A table showing RIO Status (Data Exchange), Program Status (RUN), MasterIP (192.168.12.78), Global Diag (00000000), and Telegram Lost Diag (0). It includes a 'Clear Diagnostics' button.
- Ethernet / S-Bus Configuration:** A table with columns for 'Current' and 'New' values for IP Address, Subnet Mask, Default Gateway, and S-Bus Address. It includes 'Factory Default' and 'Save' buttons.



**6.3 LED display**

The LED on the front indicates the status of the RIO.








6

RIO status	LED status/colour
WAIT FOR FIRST CONFIG	RED
CONFIG AND PROG RECEIVED (no data exchange)	RED blinking if no Program RUN GREEN blinking if Program RUN
DATA EXCHANGE	GREEN
INVALIDE CONFIG	RED/GREEN blinking

## A Appendix

### A.1 Icons

	In manuals, this symbol refers the reader to further information in this manual or other manuals or technical information documents. As a rule there is no direct link to such documents.
	This symbol warns the reader of the risk to components from electrostatic discharges caused by touch. Recommendation : at least touch the Minus of the system (cabinet of PGU connector) before coming in contact with the electronic parts. Better is to use a grounding wrist strap with its cable attached to the Minus of the system.
	This sign accompanies instructions that must always be followed.
	Explanations beside this sign are valid only for the Saia-Burgess PCD Classic series
	Explanations beside this sign are valid only for the Saia-Burgess PCD xx7 series.

**A.2 Technical Data**

Property	PCD3.T665	PCD3.T666	
Number of inputs/outputs	64 in base unit, extensible to 256 <sup>1)</sup> )		
I/O-module slots	4 in base unit, extensible to 16 <sup>1)</sup> )		
I/O-modules supported	PCD3.Exxx, PCD3.Axxx, PCD3.Bxxx, PCD3.Wxxx		
Max. number of RIO stations	128		
Protocol for data transfer	Ether-S-IO		
Ethernet connection	10/100 Mbit/s, full-duplex, auto-sensing, auto-crossing		
Default IP configuration	IP address: 192.168.10.100 Subnet mask: 255.255.255.0 Default gateway: 0.0.0.0		
USB port for configuration and diagnostics	yes		
Program memory	32 kByte	128 kByte	
Web server for configuration and diagnostics	yes		
Web server for user pages	yes		
Onboard file system for web pages and data	512 kByte		
BACnet® or LONWORKS®	no	no	
Onboard interrupt inputs	2		
Onboard RS-485 interface	no	yes	
Special modules	for I/O-slot 0 only	---	
	for I/O-slots 0...3 (up to 4 modules)	PCD3.H1xx	PCD3.H1xx counter
		---	PCD3.F26x DALI
	---	PCD3.F27x M-Bus	
S-Web alarming/trending	no	no	
Watchdog	no		
Real-time clock	no		
Software clock (not battery-powered)	yes, synchronized by the Manager		
Battery	no		

1) with PCD3.Cxxx I/O extension modules

**Smart Automation Manager (master station)**

Max. 16 RIO stations	PCD3.M2130, PCD3.M2330
Max. 32 RIO stations	PCD1.M212x, PCD3.M3330,
Max. 64 RIO stations	PCD1.M2160, PCD3.M5340, PCD3.M5540, PCD3.M6x40, PCD7.D457VT5F, PCD7.D410VT5F, PCD7.D412DT5F
Max. 128 RIO stations	PCD3.M5560, PCD3.M6560, PCD3.M6860

**General data**

Supply voltage	24 VDC ±20% smoothed or 19 VAC ±15% full-wave rectified
Capacity of 5 V bus / +V bus (24 V)	max. 600 mA/100 mA
Ambient temperature	0...+55 °C or 0...+40 °C (depending on mounting position)
Storage temperature	-20...+70 °C
Relative humidity	30...95% RH with no condensation
Mechanical strength	according to EN/IEC61131-2



**Ordering information**

Type	Description
PCD3.T665	Smart-RIO, Ether-S-IO data exchange, programmable 32 kB
PCD3.T666	Smart-RIO, Ether-S-IO data exchange, programmable 128 kB, serial interfaces

**A.3 Address of Saia-Burgess Controls AG****Saia-Burgess Controls AG**

Bahnhofstrasse 18  
CH-3280 Murten / Schweiz

Telephone ++41 26 672 72 72

Telefax ++41 26 672 74 99

E-mail: [pcd@saia-burgess.com](mailto:pcd@saia-burgess.com)

Homepage: [www.saia-pcd.com](http://www.saia-pcd.com)

Support: [www.saia-support.com](http://www.saia-support.com)

**Postal address for returns from customers of the Swiss Sales office :****Saia-Burgess Controls AG**

Service Après-Vente  
Bahnhofstrasse 18  
CH-3280 Murten / Schweiz