MultiCore Handling Automation and Control Solutions



# 1. Load the Webinterface of the MultiCore PLC

To load the Webinterface please connect the MultiCore PLC with your PC open you default browser and type the IP of the PLC as the URL.

If you have a Berghof display controller, the current IP address of the first Ethernet port is shown on screen.

Every Berghof PLC is shipped with a default IP address.

The default address is: 169.254.255.XX

Where XX denotes the last two digits of the device serial number.



Exception 1: If XX = 00, then the IP address is 169.254.255.100. Exception 2: If XX = 0X, then the IP address is 169.254.255.X, X is the last digit of the devices serial number. The network mask is always set to 255.255.255.0.

Please note that for a successful connection to a PC, the PC also needs to have an IP address with the range of 169.254.255.xxx and the network mask must be 255.255.255.0. Both devices cannot have the same IP address!

## 2. Login into the Webinterface of the MultiCore PLC

If the IPs on PLC and PC are correctly configured the browser will load a login screen. Default: User: admin / password: admin

Newer devices (e.g. like the MC-Pi) have a randomly generated password which is printed on the device label. The users remain the same.

## 3. Install MultiCore compatible firmware (1.24.x or newer) onto your MultiCore PLC (optional)

If your MultiCore PLC already has Firmware 1.24.x or newer installed go to step 6. Go to the update page and press the Button for "File Search" and select the downloaded firmware file. Upload the file to the PLC by pressing "Send Data"

	Package Update							
nfiguration etwork	For package update, control ha	s to be in a save mod	e!					
AN	,							
me and Date	Choose package for update process.Wron	g handling could passivate	the module.					
<u>IC-Server</u> TP-Server	Durchsuchen Keine Datei ausgewählt.	⊌ Datei hochladen						2
SH-Server EB-Server	Daten absenden	← → • ↑ 🔒 « CAI	NtrolMX6 > firmware-plc > 1.24.99_Multicore	_BETA_FW > public	~	· <, 5	public" durchsuchen	
PN		Organisieren 🔻 Neuer	Ordner					
<u>N</u> rs		Videos ^	Name	Änderungsdatum	Тур	Größe		
onfig Connect		🛀 Windows (C:)	Anwendungshinweise_FW_1.24.99.pdf	08.12.2020 08:05	Adobe Acrobat D	72 KB		
ig		CODEMETER (D:	Berghof_MX6_Target_1.24.99.0.package	07.12.2020 15:12	CODESYS Package	12.367 KB		
		🛖 BAT_S_PLM (\\BI	firmware_mx6-plc_1.24.99.tgz	07.12.2020 15:12	TGZ-Datei	33.269 KB		
		EKE (\\BLASRV0"						
		🛖 Arabatzis\$ (\\bla						
		👳 QM (\\BLASRV0						
		🛖 Anwendungen (						
		👳 BAT_Arbeitsschu						
		ArchivEE\$ (\\BSF						
		BAT_S (\\blasrv0						
		CODEMETER (D:)						
		A Netzwerk						
		~						
		Datein	ame: firmware_mx6-plc_1.24.99.tgz			~ Alle Da	ateien (*.*)	~
						Öff	nen 🚽 Abbred	chen
n Log							nen V Abbrec	.nen

# 4. Start firmware flashing (optional)

The firmware file will be loaded onto the PLC, after the upload is complete an update information screen is loaded. Press "Start" to engage the firmware flashing.

A log screen will be shown and reloaded automatically; you can also reload manually.

Wait until the log displays "Update Succeded" then reboot the PLC.

# 5. Lock the EtherCAT port to Core

With a MultiCore PLC it is possible to lock the EtherCAT port to a CPU core (recommended for SoftMotion) to enable, load the network page in the Webinterface. By default "eth1" is set to ethercat. By setting a port to "ethercat" it is automatically locked to the last CPU core of the MultiCore PLC Which is Core1 on a DualCore PLC and Core3 on QuadCore PLC.

	Network Configuration						
Configuration	соммон						
Network							
CAN	Hostname	252200200-00104					
Time and Date	riosularite	232200200 00104					
VNC-Server	DNS Server 1	0.0.0.0					
FTP-Server							
SSH-Server	DNS Server 2	0.0.0.0					
WEB-Server							
VPN IXON	ETH0						
Users							
SVC Config	Mode:	static					
Easy-Connect	moue:	static 🗸					
Config Protection	IPAddress	10.255.226.204					
Reset Config							
	NetMask	255.255.224.0					
System							
<u>Info</u>	Gateway	10.255.255.253					
Licenseinfo							
Screenshot	ETH0:1						
Update							
<u>Reboot</u>	Mode:	inactive 🗸					
PLC-Manager							
Control							
Config	ETH1						
Application Info							
Application Files							
Font Files	Mode:	ethercat 🗸					
Disgnactics							

If it is not required that the EtherCAT is locked to a core select an unconfigured mode like "dhcp" CODESYS will do the correct configuration of the Port on startup.

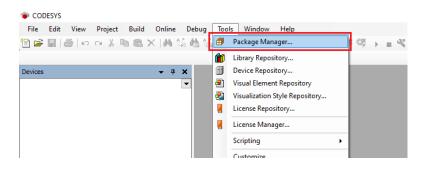
Be aware that by not selecting "ethercat" mode, the real time behavior of EhterCAT on this port may differ. If EtherCAT is not required at all select the required mode.

After the required settings are done, save the configuration and reboot the PLC.

The matching CODESYS Version can either be downloaded from the CODESYS Store at <u>https://store.codesys.com/en/</u> Please do not install the latest CODESYS version found at the store but check about the supported versions. Alternatively, you can find the supported CODESYS versions at the closed Berghof download area.

# 7. Install MultiCore compatible Target Package file (1.24.x or newer)

Using the Package Manager (3.5.16.xx or older):



Open the Package manager and click on Install to open file browser and select the Target Package file

Package Manager	×			
Currently Installed Packages Refresh	Sort by Name ~ Install			
Berghof MX6 Control Target	Version Installation date Update info License info 1.23.0.0 24.69.2020 No locense required 1.15.0.0 00.12.2020 No locense required			
	4.8.0. Ø Offnen 1.3.0.			
	← → × ↑ 🧧 « CANtrolMX6 → firmware-plc → 1.24.99_Multicore_BETA_FW	> public	✓ Ŏ "public" durchss	chen
	Organisieren 🔻 Neuer Ordner		1	
	Berghof IO-Module ^ Name ^	Änderungsdatum	Typ Größe	
	10 Objects     20 Objects     Convents     Convents     Downleads     Maric     Fortheres			

Continue through the setup and select full installation.

Using the CODESYS Installer (3.5.17.xx or newer):

Alle Apps Dokumente Web Mehr	· · · · · · · · · · · · · · · · · · ·
Höchste Übereinstimmung	
CODESYS Installer	<b>(</b>
Apps	C+F
	□ <sup>*</sup> Öffnen
🖽 🔎 Installer	이 봐 📃

CODESYS Installer	2	×
Installations		Add Installation
CODESYS 3.5 SP18 (64 bit) Patch 2	CODESYS 3.5 SP17 (64 bit) Patch 4	CODESYS 3.5 SP16 (64 bit) 1 Patch 9 Patch 7
Start Change 10 Repair Uninstall	Start Change 10 Repair Uninstall	Start Change Repair Uninstall
· · · ·		······

#### Run installer as administrator and select CODESYS installation you want to install the target package

#### Click Install File to open file browser and select the Target Package file

CODESYS Installer								
						-	Add Installation	
rsion DDESYS 64 3.5.17.40								
cation \Program Files\CODESYS	3.5.17.40\CODESYS							Brow
annel for Setups eleases			Channel for Releases					
\dd0ns								
				Instal	l File E:	oprt Config	Import C	onfig
Installed Brov	Öffnen							
Berghof MC-PI Contr	← → · ↑ 🔤 « Firm	wareTargetDevices	; > PLC_Devices		ٽ ~	PLC_Devic	es durchsuchen	م
CODESYS Applicatio	Organisieren 🔻 Neuer C	Ordner					l∺ <b>-</b> □	
CODESYS Automatic	🛱 Dokumente	* ^	Name	^	Änderun	gsdatum	Тур	
CODESYS BACnet	Downloads Bilder	*	Berghof_MX6_Tar	get_1.25.5.0	21.06.202	1 12:26	CODESYS Pack	kage
CODESYS C Code Int	data Lizenzgenerator							
	👌 Musik							
vright © 2022 CODESYS Deve	Videos 🖌							
	OneDrive	~ *						
	Dateina	ime: Berghof_MX	5_larget_1.25.5.0			Package I		. ~
and the second						Öffner	n 🔻 Abbre	chen

Continue through the setup and select full installation.

# 8. First Project (optional)

Create a Standard Project and Select a Berghof MX6 or MC-Pi device Description (with or without Softmotion)

管 Neues Projekt		× Standa	rd Project	×
Kategorien	Vorlagen HMI Projekt Leeres Projekt Standardprojekt Standardprojekt mit Application Composer		You are about to create a new standard project. This wi objects within this project: - One programmable device as specified below - A program PLC_PRG in the language specified below - A cyclic task which calls PLC_PRG - A reference to the newest version of the Standard libr. Device Berghof MXG Control (Berghof Automation) PLC_PRG in Berghof MXG Control (Berghof Automation) Berghof MXG Control (Berghof Automation) CODESY Control For PCIO 82, 05 - Smar CODESYS Control for Respective PLS, 05 - Smar CODESYS Control for Respective PLS, 05 - Smar	ary currently installed.
Name Unbenar	Gerät, einer Applikation und einer leeren Implementation für PLC_PRG mt4 Sywekermann/Documents		CODESYS Control RTE V3 (25 - Smart Softw CODESYS Control RTE V3 x64 (35 - Smart Softw CODESYS Control Win V3 x64 (35 - Smart Softw CODESYS Control Win V3 x64 (35 - Smart Softw CODESYS Control Win V3 x64 (35 - Smart Software Solutio	are Solutions GmbH) oftware Solutions GmbH) are Solutions GmbH) oftware Solutions GmbH)
	OK Abbrechen		CODER'S Software (30 - and 30 met 30	oftware Śolutions GmbH) rt Software Solutions GmbH) ftware Solutions GmbH) rt Software Solutions GmbH) ation GmbH)

## 9. Open Existing Project

Open an already existing project and update the PLC device to a MultiCore compatible Version (1.24.x with or without SoftMotion or newer)

Devices		<b>→</b> 中 X	Update Device			
BGH_Demo_App_MX6_SP16_Test		-	- F			
🖹 🔟 PLC (Berghof MX6 Control) 🛛	ц		Name PLC			
PLC Logic	Ж	Cut	Action			
😑 🧔 BGH_Demo_App	ð	Сору				
🗷 📶 Alarm Configurat	Ê.	Paste	O Append device O Insert device O Plug de	evice 🔘 🕻	pdate device Update same	devices in pro
	×	Delete	String for a full text search	Vendor	<all vendors=""></all>	
🖲 🗀 FUNCTIONS 🛡 🧰 Motion		Refactoring +	Name	Vend	pr	Version
	2	Properties	HMI devices			
GVL_IO	<b>5</b> 11	Add Object +	PLCs			
	ò	Add Folder	Berghof MC-PI SoftMotion Control	Bergh	of Automation GmbH	1.0.0.250
FB_BLINKER (FB)		Add Device	Berghof MX6 SoftMotion Control	Bergh	of Automation GmbH	1.24.0.0
PLC_PRG (PRG)		Update Device	CODESYS SoftMotion RTE V3	3S - S	mart Software Solutions GmbH	3.5.16.40
PRG_BLINK (PRG	ĩ	Edit Object	CODESYS Softmotion RTE V3 x64	3S - S	mart Software Solutions GmbH	3.5.16.40

If the existing project is based on an older CODESYS Version, please upgrade the rest of the project properly to the installed CODESYS Version. Besides the PLC device please check the sub devices like the EtherCAT Master, CANOpen Manager etc, the configured Compiler and Visu Profile Version in the project settings.

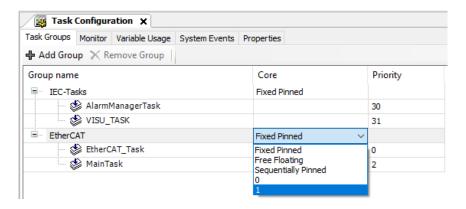
POUs 👻 🕂 🗙	Project Settings	
■ BGH_Demo_App_MX6_SP16_		
🖲 🧰 Project Information	Compile options	Compile options
GlobalImagePool	Compiler warnings	
GlobalTextList	👔 Library development	Compiler Version
📶 Library Manager	🗃 🗃 Page Setup	Fix version 3.5.16.40 V
Project Information	🚯 Security	
Project Settings	SFC	
	SoftMotion	Settings
	📴 Source Download	Allow unicode characters for identifiers
	🖇 Static Analysis Light	Replace constants
	😫 Users and Groups	Enablelogging inbreakpoints
	Uisualization	
	💾 Visualization Profile	Compiler Warnings
		Maximum number of warnings 100 ~

As well as manually added libraries in the library manager.

## **10. Multicore Task Configuration**

Under "Task Configuration-> Task Groups"you can add additional task groups and select the scheduling algorithm for the task group. Then tasks can be added to a task group.

When using EtherCAT locked to a core, create a new Task group and add the EtherCAT task to it. Other Tasks that are of high priority or linked to the EtherCAT task may be added as well.



Select the last Core (Core1 or Core3) on the EtherCAT Task group.

It is possible to create multiple task groups, but it is not recommended to create more task groups than actual cores. On the DualCore it is enough to select Core0 for the other Task group if no high priority tasks are used in that group. On a QuadCore PLC the configuration is more flexible. But for an easy to use start we recommend having one more task group besides the EtherCAT task group and set it to "Free Floating".

If there is no core locked to EtherCAT the best practice is to go with one task group and select "Free Floating".

🛛 🔣 Task	Configur	ation X					
Task Groups	Monitor	Variable Usage	System Events	Properties			
🕂 Add Grou	up 🔀 Re	emove Group					
Group name	2			Core		Priority	
🖃 🛛 IEC-Ta	sks			Fixed Pinned	~		
	EtherC	AT_Task		Fixed Pinned		0	
	MainTask			Free Floating Sequentially Pinned		2	
🕼 AlarmManagerTask		0		30			
	VISU_	TASK		1		31	

In "Free Floating" mode the system is responsible for scheduling the tasks over the two or four cores. More information about the multicore features and the scheduling modes can be found in the CODESYS help: https://help.codesys.com/webapp/\_cds\_obj\_task\_config\_task\_groups;product=codesys;version=3.5.16.20;language=en\_

In case of manually assigning the cores on either DualCore or QuadCore PLCs it is recommended to only pin low priority tasks (Prio 16 or higher) to Core0 and to use the remaining cores to pin high priority tasks (15 or lower) to, as Core0 is additionally running the OS and the Runtime.

Be aware that MultiCore systems perform real multitasking on separate cores, and thus race conditions can occur on unoptimized applications that were previously running on SingleCore systems. Please make sure that different task groups are not writing the same variables or lock parallel writing with the help of state machines or semaphores.