CODESYS and iR Overview

CODESYS and iR Remote IO Resources

2024/11/20

Table of Contents

1. Overview

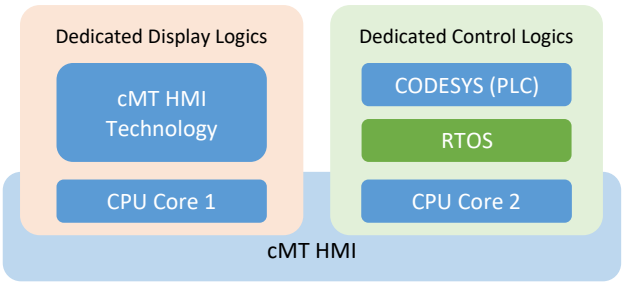
This document integrates relevant information about cMT HMI CODESYS and iR Remote IO.

2. Product Introduction

Click a link in the table below to see relevant information.

Hardware	cMT X			cMT-CTRL01	
Soft PLC	CODESYS				
Fieldbus	EtherNet/IP	Modbus TCP/IP	CANopen	EtherCAT	iBus
Coupler	iR-ETN		iR-COP	iR-ECAT	
I/O Modules	iR I/O Modules				
	EasyRemote IO	Demo Project		Tutorials	

cMT X HMI and cMT-CTRL01 with built-in CODESYS are in compliance with IEC 61131-3 Programmable Logic Controller (PLC) standard. Combining cMT X HMI and cMT-CTRL01 with iR Series I/O Modules delivers a new generation solution that achieves a more compact and flexible architecture.



cMT X + CODESYS is a product that integrates high-performance cMT X Series HMI with CODESYS PLC controller system, which is built upon an innovative architecture where a multi-core CPU runs 2 independent operating systems. With the multi-core processor, cMT X + CODESYS is able to not only provide data visualization with an operable user interface but also runs controller logic. The two systems run independently without mutual interference. On the one hand, the HMI boasts delicate graphical UI and advanced integration features (direct database access, OPC UA, and MQTT); on the other hand, CODESYS controller system in compliance with

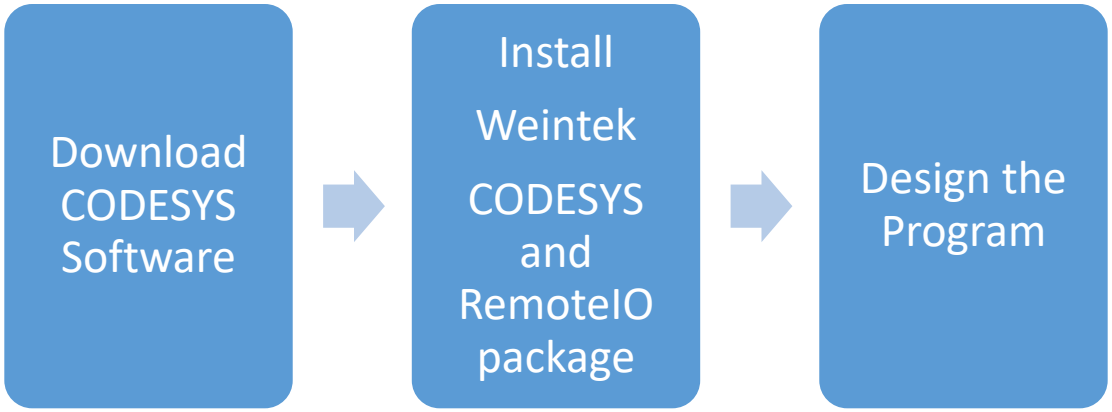
IEC61131-3 supports multiple languages such as FBD/LD/IL/ST/SFC/CFC, thus optimizing development flexibility.

cMT X + CODESYS utilizes a unique internal communication channel to allow the display unit to obtain control information from CODESYS very quickly, while at the same time aiding CODESYS controller system in connecting with other systems like database and 3rd party controllers. In addition, cMT X + CODESYS is equipped with dedicated Ethernet and CAN Bus interfaces which allow for stable and highly efficient data transmission to satisfy diverse automation demands.

iR Series I/O module is a brand new series Weintek product. By using couplers that support different bus systems: CANopen, EtherCAT, EtherNet/IP, or MODBUS TCP/IP, this modularized system is compatible with most existing control systems. Patented fixture clip makes it easy to connect many I/O modules and effectively prevents modules from falling off due to shock. Flexible module assembly can avoid unnecessary nodes and reduce overall costs. Additionally, iR Series patented iBus technology is strong in noise resistance and efficient in communication that ensures correct and timely update of I/O status.

cMT X + CODESYS can be used with CANopen, EtherCAT, or MODBUS TCP/IP modules from other manufacturers.

3. CODESYS



Please download CODESYS V3.5 SP15 using the following link in CODESYS website:

32-bit: CODESYS IDE V3.5.15.5

64-bit: CODESYS IDE 64-bit V3.5.15.5

- CODESYS V3 PLC Runtime (3.5.10.3) is the current version.
- CODESYS V2.3 is not compatible.
- CODESYS V3.5 SP15 is recommended.

After installing CODESYS, please also install:

Weintek_CODESYS_and_RemoteIO_package:

https://dl.weintek.com/public/cMT/CODESYS/Weintek_CODESYS_and_RemoteIO_package/Weintek_CODESYS_and_RemoteIO_1.5.3.470.package

This package includes:

* Weintek-Cortex-embedded.devdesc.xml
* iR-COP.devdesc.xml
* Weintek iR-ECAT devdesc.xml
* Weintek-library
    * PID Function Block
    * iR-PU01-P Motion Control Function Block

Double clicking on the file can start installation. If an earlier version is installed, please directly install the new version.

For more information about CODESYS version, see the following FAQ:

FAQ_112_CODESYS_Version_eng.pdf

4. cMT X + CODESYS Product Features

- **Reduced Complexity**
  No extra PLC hardware needed for cMT X + CODESYS.
- **Real-time Operating System**
  Innovative design makes two operating systems run independently. Built-in CODESYS operating system ensures that running controller logic will not be interrupted due to the complexity of the display side.
- **Dedicated Ethernet and CAN Bus**
  CODESYS has full control of Ethernet (LAN1) and CAN Bus. This ensures the real-time performance of control system.
- **High Performance**
  Bit operations take only 10 nanoseconds, meeting the demand for a medium-to-high level control system performance.
- **Fast Internal Communication**
  Dedicated data channel between the two systems allows the display unit to obtain data from control system very quickly and ensure efficient data exchange. CODESYS configuration and project management can be done from display side.
- **Inherits key features of cMT architecture**
  Supports rich picture libraries, over 300 protocols, MQTT, OPC UA client/server, and EasyAccess 2.0 remote access service.

1. Check and Update HMI OS

To find out whether the HMI OS version supports CODESYS activation, open Web page or HMI's System Setting. Please see cMT_CODESYS_Datasheet_ENG.pdf

2. Update CODESYS Firmware

If CODESYS Firmware contained in the OS package is an earlier one, please upgrade it so that it can work with Weintek_CODESYS_and_RemoteIO_package.

Download: codesys_20230204.670.bin
How to upgrade the CODESYS firmware：

UM023001E_CODESYS_Firmware_Update_UserManual_eng.pdf

Documents	
User Manual	Weintek CODESYS Library User Manual UM018017E_CODESYS_Weintek_Library_UserManual_eng.pdf

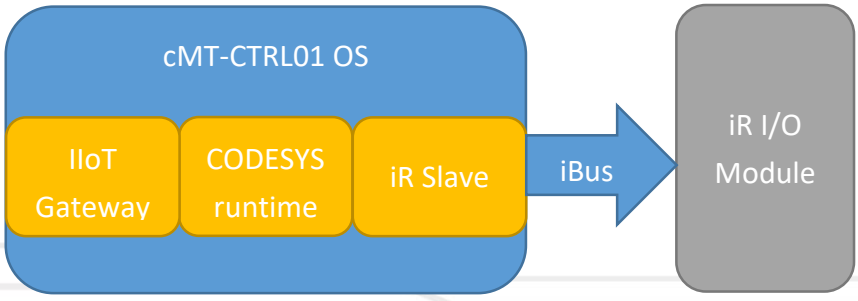
5. cMT-CTRL01

In compliance with IEC 61131-3 Programmable Logic Controller (PLC) standard, cMT-CTRL01's built-in CODESYS supports multiple languages such as FBD/LD/IL/ST/SFC/CFC. Also, cMT-CTRL01 supports IIoT protocol standards: OPC UA and MQTT with which data from the connected devices can be uploaded to IIoT datacenter. Additionally, users can, with a license, activate EasyAccess 2.0 to update the device's CODESYS project and monitor its operation status, thus reducing maintenance costs. With EasyAccess 2.0 push notification, users receive immediate notification about the operation errors on their portable devices for quick troubleshooting.

Documents	
Datasheet	cMT-CTRL01_Datasheet_ENG.pdf
User Manual	UM019006E_cMT-CTRL01_UserManual_eng.pdf
Installation Instruction	GMECTR100_cMT-CTRL01_Installation.pdf
CE Certificate	CE_Certificate_cMT_CTRL01.pdf

Files	
cMT-CTRL01 OS	cMT_CTRL_OS_20230308.zip
CODESYS runtime	Same as cMT HMI=> 2. Update CODESYS Firmware
iR Slave	iR_Slave_v1020_20201204.bin

How to upgrade cMT-CTRL01: See cMT-CTRL01 User Manual Chapter 3 Updating Web Package and OS.



6. iR Remote I/O

iR Series Product Features

- **Modular Design**
  Couplers can be paired with different combination of I/O modules and the number of nodes can be adjusted as required.
- **Compact Form Factor**
  More number of I/O in a compact form factor, reducing the size of the system and minimizing the wiring complexity.
- **Supports EtherCAT, EtherNet/IP, CANopen and MODBUS (TCP/IP)**
  Supports mature EtherCAT, EtherNet/IP, CANopen and MODBUS (TCP/IP), which facilitate integration with most control systems.
- **iBus Communication**
  Thanks to the noise resistance and communication efficiency of iBus, update of I/O status can be done within milliseconds even if over 10 modules are used.
- **Plug-in I/O Installation**
  Screw-less design expedites the installation and decreases the possibility of loose wire that happens in traditional screwing.
  Find relevant information by clicking on a link in the table below.

	iR Series		
Coupler	iR-ETN Modbus TCP/IP EtherNet/IP	iR-ECAT EtherCAT	iR-COP CANopen
Software	EasyRemote I/O		
Digital I/O	PNP		NPN
	iR-DI16-K		
	iR-DM16-P		iR-DM16-N
	iR-DQ16-P		iR-DQ16-N
	Relay Output		
	iR-DQ08-R		
Analog I/O	Analog Input		Analog Output
	iR-AI04-VI		
	iR-AM06-VI		

		iR-AQ04-VI
Temperature	iR-AI04-TR	
Motion Control	iR-PU01-P	

iR Series

Documents	
Datasheet	iR_Datasheet_ENG.pdf
User Manual	cMT+CODESYS and Remote I/O Quick Start Guide
	UM018003E_cMT_Codesys_Install_UserManual_eng.pdf

iR-COP

Documents and Files	
User Manual	iR-COP UserManual(English)
Installation	GMEIRCP00_iR-COP_Installation.pdf
Instruction	
Certificate	iR-COP_Certificate.pdf
iR-COP EDS	Download

iR-ECAT

Documents and Files	
User Manual	iR-ECAT User Manual(English)
Installation	GMERECT00_iR-ECAT_Installation.pdf
Instruction	
Certificate	iR-ECAT_Certificate.pdf
iR-ECAT ESI	iR-ECAT_ESI_20230321

iR-ETN

Documents and Files	
User Manual	iR-ETN User Manual(English)
Connection Guide	iR-ETN EtherNetIP Connection Guide
Installation	GMERETN00_iR-ETN_Installation.pdf
Instruction	
Certificate	iR-ETN_Certificate.pdf

iR Digital I/O

Documents and Files	
Installation Instruction	GMERDXM00_iR-Dxxx_Installation.pdf
Certificate	iR-COP_Certificate.pdf Model : iR-COP, iR-DI16-K, iR-DM16-P, iR-DM16-N, iR-DQ16-P, iR-DQ16-N, iR-DQ8-R iR-ETN_Certificate.pdf Model : iR-ETN, iR-DI16-K, iR-DM16-P, iR-DM16-N, iR-DQ16-P, iR-DQ16-N, iR-DQ8-R

iR Analog I/O

Documents and Files	
User Manual	iR-AI04-VI,iR-AM06-VI,iR-AQ04-VI User Manual(English)
Installation Instruction	GMERAXX00_iR-Axxx_Installation.pdf
Certificate	iR-AM06-VI_AI04-VI_Certificate.pdf Model Name: iR-AI04-VI, iR-AM06-VI iR-AQ04-VI_Certificate.pdf Model Name: iR-AQ04-VI

iR Temperature

Documents and Files	
User Manual	iR-AI04-TR User Manual(English)
Installation Instruction	GMERI4T00_iR-AI04-TR_Installation.pdf
Certificate	iR-AI04-TR_Certificate.pdf

iR Motion Control

Documents and Files	
User Manual	iR-PU01-P UserManual(English)
Installation Instruction	GMERU1P00_iR-PU01-P_Installation.pdf
Certificate	iR-PU01-P_Certificate.pdf

EasyRemoteIO

EasyRemoteIO is a tool for setting up Weintek iR-ETN. In EasyRemoteIO, users can set iR-ETN's IP address, configure parameters, monitor or modify values.

Documents and Files	
Software	EasyRemoteIO V1.4.7.0
User Manual	EasyRemoteIO UserManual(English)

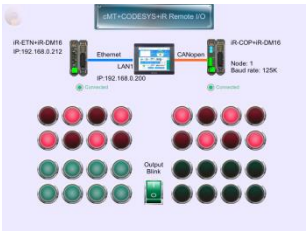
iR Modules Firmware Update Manual

UM019005E_iR_Series_Firmware_Update_UserManual_eng.pdf

IO Runtime Updater	IO_Runtime_Updata_V1.7.0.0.zip
iR-COP Version: 2.0.0.0	Support iR-PU01-P module
iR-ECAT iR-ECAT_v1 iR-ECAT_v2 iR-ECAT_v3	
iR-ETN V1.0.3.0 V2.0.0.1	Support EtherNet/IP
iR-ETN40R V1.0.1.0	
iR-PU01-P firmware V1.0.3.0	
iR-AM06-VI firmware V1.0.0.1	Bug fix-output channel 1 is closed, it will cause channel 2 not to output.

7. Demo Project

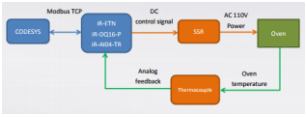
Demo Project



[DEM18002_iR-DM16, iR-COP, iR-ETN Demo]

This demo project demonstrates how to check connection status of CODESYS and iR.

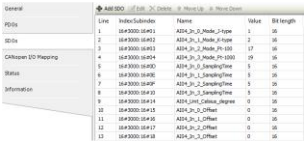
iR-COP iR-ETN iR-DM16



[DEM19001_iR_Application_Oven_Demo]

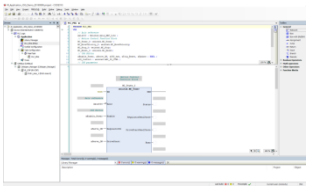
Oven Temperature Control - FB PID Application

iR-ETN iR-DM16-P iR-AI04-TR



[DEM19002_iR_Configuration_iR-COP_AI04-TR_Demo]

This demo project demonstrates how to add SDO and configure iR-AI04-TR in CODESYS.

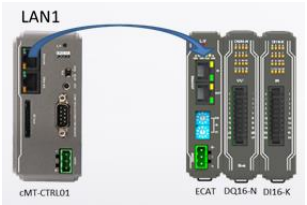


[DEM19004_iR_Application_JOG_Demo]

This demo project demonstrates how to use Weintek Library Function Block and iR-PU01-P to perform velocity control by outputting pulse signals to servo/stepper motors.

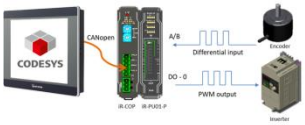
[DEM19005_iR_Application_Positioning_Demo]

This demo project demonstrates how to connect CODESYS with iR-COP via CANopen, in order to control iR-PU01-P to output pulse signals.



[DEM20005_EtherCAT_Master_Demo]

This demo project demonstrates how to use CODESYS EtherCAT Master to add iR Series modules.

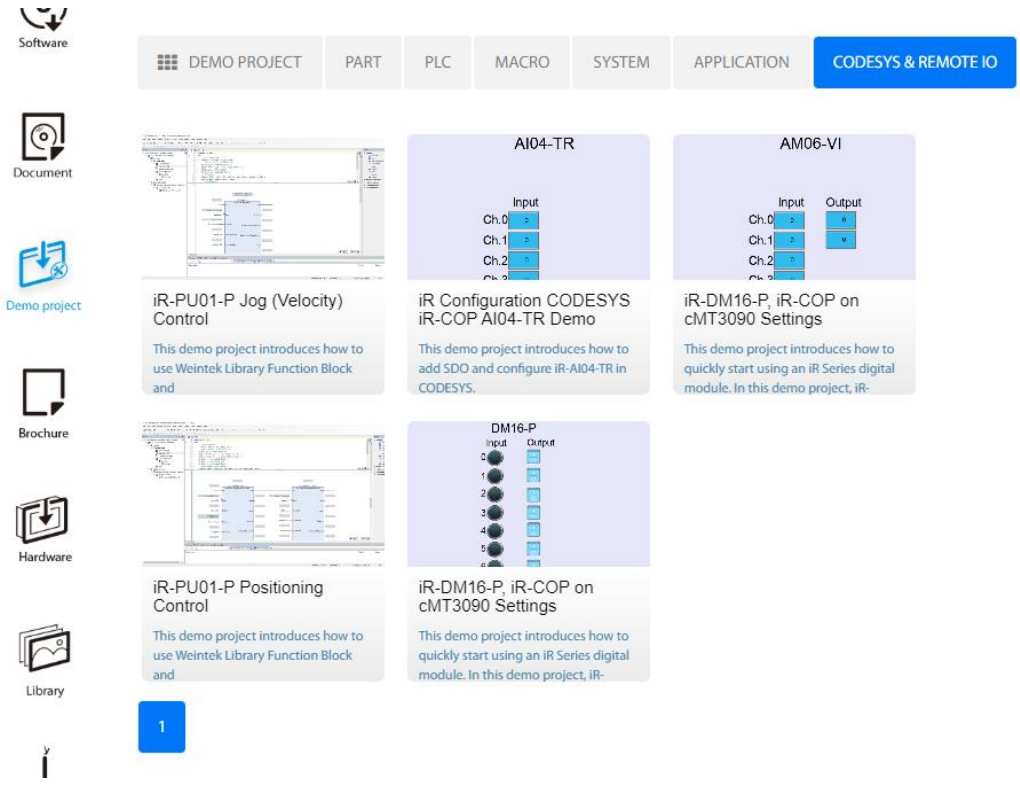


[DEM20006_iR_Application_PU_PWM_Inverter_Demo]

This demo project demonstrates how to develop a closed-loop control system. In this system, iR-PU01-P's DO-0 is used for PWM output to control the inverter to adjust the speed, and iR-PU01-P receives pulse input from the encoder.

DEM20007_CODESYS_Library_SysTimeRtc_Demo
This demo project demonstrates how to change HMI system time and read the new HMI system time by using CODESYS SysRtcTime Library.

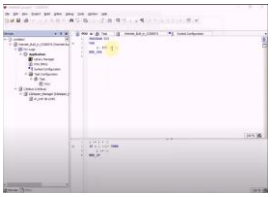
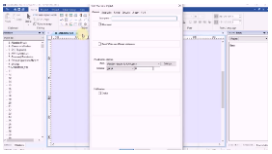
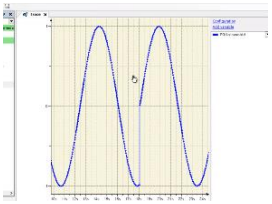
Please visit Weintek's official website to download the demo projects of CODESYS and iR Series modules:
https://www.weintek.com/globalw/Download/Download.aspx



8. Tutorial Videos

Documents and Files	
L29 – iR-ETN	https://forum.weintek.com/l29-ir-etn/ In this topic, you will learn: 1. What is iR-ETN? 2. Use EasyRemote IO to set iR-ETN parameter 3. EasyBuilder Pro Build-in driver support
L28 – iR-COP	https://forum.weintek.com/l28-ir-cop/ In this topic, you will learn: 1. Communication setting of iR-COP 2. Weintek Remote I/O (CANOpen) 3. PDO and SDO setting

YouTube Videos	https://www.youtube.com/user/WeintekCOM
Weintek Webinar 2019-03-06: Integrated Control Solution_HMI, Codesys & iR series feat 	https://youtu.be/fLIRC-yha3c During this webinar, you'll learn: • HMI with CODESYS • Remote I/O (iR Series): - Coupler - Digital I/O • Remote I/O (iR Series): - Analog I/O - Analog Temperature Input • Weintek Library (Codesys)
Weintek Webinar 2019-05-29: Weintek Control Solution – iR Basics & iR-ECAT 	https://youtu.be/navmyXmmxUM During this webinar, we will cover: • iR Basics - Wiring - Limit Calculation - Parameter/Data Access - Coupler Life Guarding • iR-ECAT Introduction
Weintek Webinar 2019-11-15: Motion	https://youtu.be/X_gkmPihYJE During this webinar, you will learn:

Control Solution iR-PU01-P  Tutorial Video Weintek Remote I/O Solutions - EASYREMOTEIO  Tutorial Video  Tutorial Video  Tutorial Video 	• Weintek's motion control solution • iR-PU01-P: - Specification - Wiring - Parameter • CODESYS motion control https://youtu.be/Gu10v4msH1Q https://youtu.be/uvjEj-3jpeU Demo 1: Add module in CODESYS How to add a module in CODESYS (which in turn imports into EBPro for control) https://youtu.be/67vsUhchopM Demo 2: Directly Control by cMT3090 w/o PLC A demonstration of direct control through a cMT without a PLC https://youtu.be/uNSyJRrxrPc Demo 4: Trace A demonstration of the trace function within CODESYS

Appendix A CODESYS Libraries

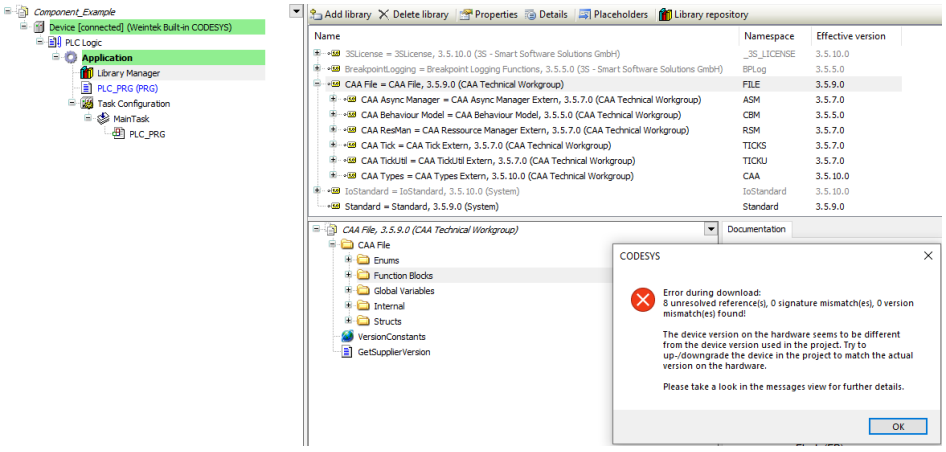
The libraries in the table below require OS support. Libraries that do not require OS support can be used directly; e.g. OSCAT Basic, Util library…etc.

Sys Library	Cmp Library	CAA Library
SysTimeRtc	CmpTraceMgr	CAAType
SysTimer	CmpSrv	CAATick
SysTime	CmpSettings	CAATickUtil
SysTask	CmpSchedule	CAAStorage
SysTarget	CmpRouter	
SysSocket	CmpPlcShell	
SysMem	CmpLog	
SysFile	CmpIoMgr	
SysExcept	CmpIoDrvC	
SysEvent	CmpIecVarAccess	
SysEthernet	CmpIecTask	
SysDir	CmpEventMgr	
SysCpuHandling	CmpDynamicText	
SysCom	CmpCheckSum	
	CmpChannelServer	
	CmpBinTagUtilIec	
	CmpAsyncMgr	
	CmpAppBP	

Please note that after adding a library that requires OS support but is not included in the list, an “unresolved” message may be displayed during login.

Example:

A CAA File contains multiple libraries, and among these libraries, only CAA Tick, CAA TickUtil, and CAA Types are supported. In this case, CAA File library cannot be used.



If a message indicating "unresolved" does not appear during the download, it is still essential to test the function block to confirm that it operates correctly on the Weintek built-in CODESYS.