



CODESYS and iR Overview

CODESYS and iR Remote IO Resources

2024/11/20

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1. Overview

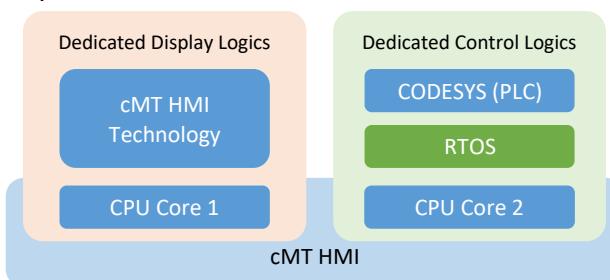
This document integrates relevant information about cMT HMI CODESYS and iR Remote IO.

2. Product Introduction

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

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

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

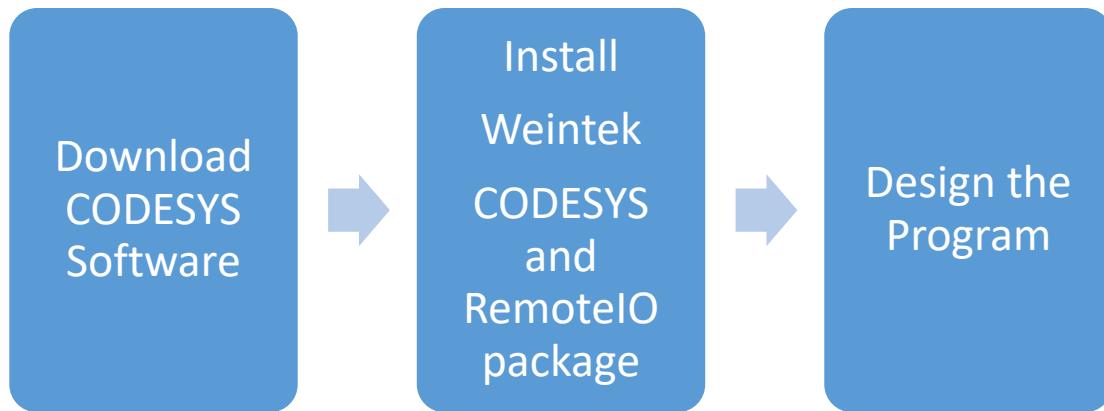
IEC61131-3 supports multiple languages such as FBD/LD/IL/ST/SFC/CFC, thus optimizing development flexibility.

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 <u>UM018017E CODESYS Weintek Library UserManual eng.pdf</u>

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	iR-ECAT	iR-COP
	Modbus TCP/IP	EtherCAT	CANopen
	EtherNet/IP		
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 Certificate	<p><u>GMERDXM00_iR-Dxxx_Installation.pdf</u></p> <p><u>iR-COP_Certificate.pdf</u> Model : iR-COP, iR-DI16-K, iR-DM16-P, iR-DM16-N, iR-DQ16-P, iR-DQ16-N, iR-DQ8-R</p> <p><u>iR-ETN_Certificate.pdf</u> Model : iR-ETN, iR-DI16-K, iR-DM16-P, iR-DM16-N, iR-DQ16-P, iR-DQ16-N, iR-DQ8-R</p>

iR Analog I/O

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

iR Temperature

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

iR Motion Control

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

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)

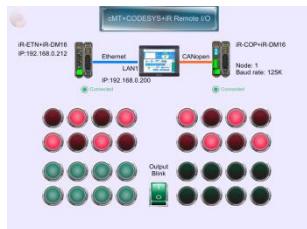
iR Modules Firmware Update Manual

[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

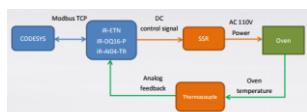
Demo Project



[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

All SDO			
General	SDOs	SDOs	SDOs
PSOs			
1	16#0000.0#1	A014_In_0_Mode_3_Type	1
2	16#0000.0#1	A014_In_1_Mode_3_Type	2
3	16#0000.0#1	A014_In_2_Mode_3_Type	3
4	16#0000.0#1	A014_In_3_Mode_Pt_0000	29
5	16#0000.0#1	A014_In_4_Mode_Pt_0000	30
6	16#0000.0#1	A014_In_5_Mode_Pt_0000	31
7	16#0000.0#1	A014_In_6_Mode_Pt_0000	32
8	16#0000.0#1	A014_In_7_Mode_Pt_0000	33
9	16#0000.0#1	A014_In_8_Mode_Pt_0000	34
10	16#0000.0#1	A014_In_9_Mode_Pt_0000	35
11	16#0000.0#1	A014_In_10_Mode_Pt_0000	36
12	16#0000.0#1	A014_In_11_Mode_Pt_0000	37
13	16#0000.0#1	A014_In_12_Mode_Pt_0000	38
14	16#0000.0#1	A014_In_13_Mode_Pt_0000	39
15	16#0000.0#1	A014_In_14_Mode_Pt_0000	40
16	16#0000.0#1	A014_In_15_Mode_Pt_0000	41
17	16#0000.0#1	A014_In_16_Mode_Pt_0000	42
18	16#0000.0#1	A014_In_17_Mode_Pt_0000	43
19	16#0000.0#1	A014_In_18_Mode_Pt_0000	44
20	16#0000.0#1	A014_In_19_Mode_Pt_0000	45
21	16#0000.0#1	A014_In_20_Mode_Pt_0000	46
22	16#0000.0#1	A014_In_21_Mode_Pt_0000	47
23	16#0000.0#1	A014_In_22_Mode_Pt_0000	48
24	16#0000.0#1	A014_In_23_Mode_Pt_0000	49
25	16#0000.0#1	A014_In_24_Mode_Pt_0000	50
26	16#0000.0#1	A014_In_25_Mode_Pt_0000	51
27	16#0000.0#1	A014_In_26_Mode_Pt_0000	52
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32	16#0000.0#1	A014_In_31_Mode_Pt_0000	57
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34	16#0000.0#1	A014_In_33_Mode_Pt_0000	59
35	16#0000.0#1	A014_In_34_Mode_Pt_0000	60
36	16#0000.0#1	A014_In_35_Mode_Pt_0000	61
37	16#0000.0#1	A014_In_36_Mode_Pt_0000	62
38	16#0000.0#1	A014_In_37_Mode_Pt_0000	63
39	16#0000.0#1	A014_In_38_Mode_Pt_0000	64
40	16#0000.0#1	A014_In_39_Mode_Pt_0000	65
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42	16#0000.0#1	A014_In_41_Mode_Pt_0000	67
43	16#0000.0#1	A014_In_42_Mode_Pt_0000	68
44	16#0000.0#1	A014_In_43_Mode_Pt_0000	69
45	16#0000.0#1	A014_In_44_Mode_Pt_0000	70
46	16#0000.0#1	A014_In_45_Mode_Pt_0000	71
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56	16#0000.0#1	A014_In_55_Mode_Pt_0000	81
57	16#0000.0#1	A014_In_56_Mode_Pt_0000	82
58	16#0000.0#1	A014_In_57_Mode_Pt_0000	83
59	16#0000.0#1	A014_In_58_Mode_Pt_0000	84
60	16#0000.0#1	A014_In_59_Mode_Pt_0000	85
61	16#0000.0#1	A014_In_60_Mode_Pt_0000	86
62	16#0000.0#1	A014_In_61_Mode_Pt_0000	87
63	16#0000.0#1	A014_In_62_Mode_Pt_0000	88
64	16#0000.0#1	A014_In_63_Mode_Pt_0000	89
65	16#0000.0#1	A014_In_64_Mode_Pt_0000	90
66	16#0000.0#1	A014_In_65_Mode_Pt_0000	91
67	16#0000.0#1	A014_In_66_Mode_Pt_0000	92
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76	16#0000.0#1	A014_In_75_Mode_Pt_0000	101
77	16#0000.0#1	A014_In_76_Mode_Pt_0000	102
78	16#0000.0#1	A014_In_77_Mode_Pt_0000	103
79	16#0000.0#1	A014_In_78_Mode_Pt_0000	104
80	16#0000.0#1	A014_In_79_Mode_Pt_0000	105
81	16#0000.0#1	A014_In_80_Mode_Pt_0000	106
82	16#0000.0#1	A014_In_81_Mode_Pt_0000	107
83	16#0000.0#1	A014_In_82_Mode_Pt_0000	108
84	16#0000.0#1	A014_In_83_Mode_Pt_0000	109
85	16#0000.0#1	A014_In_84_Mode_Pt_0000	110
86	16#0000.0#1	A014_In_85_Mode_Pt_0000	111
87	16#0000.0#1	A014_In_86_Mode_Pt_0000	112
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93	16#0000.0#1	A014_In_92_Mode_Pt_0000	118
94	16#0000.0#1	A014_In_93_Mode_Pt_0000	119
95	16#0000.0#1	A014_In_94_Mode_Pt_0000	120
96	16#0000.0#1	A014_In_95_Mode_Pt_0000	121
97	16#0000.0#1	A014_In_96_Mode_Pt_0000	122
98	16#0000.0#1	A014_In_97_Mode_Pt_0000	123
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100	16#0000.0#1	A014_In_99_Mode_Pt_0000	125



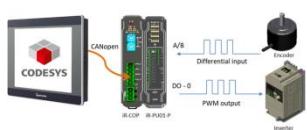
[DEM19004 iR Application JOG Demo](#)

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.



[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.

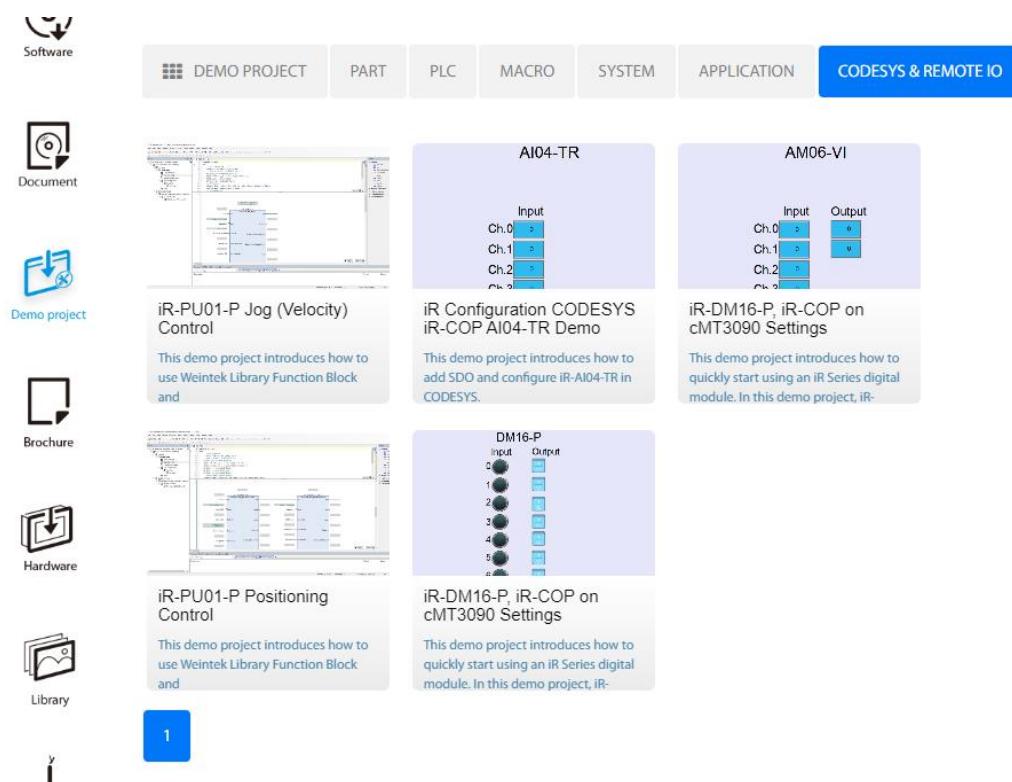


DEM20007 CODESYS Library SysTimeRtc Demo

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>



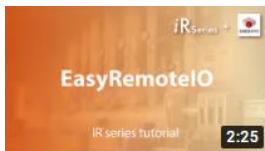
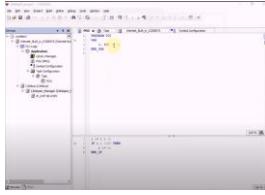
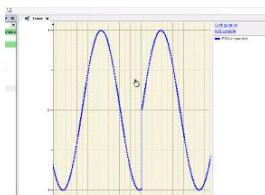
The screenshot shows a navigation bar with tabs: DEMO PROJECT, PART, PLC, MACRO, SYSTEM, APPLICATION, and CODESYS & REMOTE IO (which is selected). On the left, there are icons for Software, Document, Demo project, Brochure, Hardware, and Library. The main area displays six demo project cards:

- iR-PU01-P Jog (Velocity) Control**: This demo project introduces how to use Weintek Library Function Block and iR-PU01-P.
- AI04-TR**: iR Configuration CODESYS iR-COP AI04-TR Demo. This demo project introduces how to add SDO and configure iR-AI04-TR in CODESYS.
- AM06-VI**: iR-DM16-P, iR-COP on cMT3090 Settings. This demo project introduces how to quickly start using an iR Series digital module. In this demo project, iR-DM16-P is used.
- iR-PU01-P Positioning Control**: This demo project introduces how to use Weintek Library Function Block and iR-PU01-P.
- iR-DM16-P, iR-COP on cMT3090 Settings**: This demo project introduces how to quickly start using an iR Series digital module. In this demo project, iR-DM16-P is used.

A blue button labeled '1' is located at the bottom center of the page.

8. Tutorial Videos

Documents and Files	
L29 – iR-ETN	<p>https://forum.weintek.com/l29-ir-eth/</p> <p>In this topic, you will learn:</p> <ol style="list-style-type: none"> 1. What is iR-ETN? 2. Use EasyRemote IO to set iR-ETN parameter 3. EasyBuilder Pro Build-in driver support
L28 – iR-COP	<p>https://forum.weintek.com/l28-ir-cop/</p> <p>In this topic, you will learn:</p> <ol style="list-style-type: none"> 1. Communication setting of iR-COP 2. Weintek Remote I/O (CANOpen) 3. PDO and SDO setting
YouTube Videos	<p>https://www.youtube.com/user/WeintekCOM</p>
Weintek Webinar 2019-03-06: Integrated Control Solution_HMI, Codesys & iR series feat	<p>https://youtu.be/fLIRC-yha3c</p> <p>During this webinar, you'll learn:</p> <ul style="list-style-type: none"> • HMI with CODESYS • Remote I/O (iR Series): <ul style="list-style-type: none"> - Coupler - Digital I/O • Remote I/O (iR Series): <ul style="list-style-type: none"> - Analog I/O - Analog Temperature Input • Weintek Library (Codesys) 
Weintek Webinar 2019-05-29: Weintek Control Solution – iR Basics & iR-ECAT	<p>https://youtu.be/navmyXmmxUM</p> <p>During this webinar, we will cover:</p> <ul style="list-style-type: none"> • iR Basics - Wiring - Limit Calculation - Parameter/Data Access - Coupler Life Guarding • iR-ECAT Introduction 
Weintek Webinar 2019-11-15: Motion	<p>https://youtu.be/X_gkmPihYJE</p> <p>During this webinar, you will learn:</p>

Control Solution iR-PU01-P	<ul style="list-style-type: none">• Weintek's motion control solution• iR-PU01-P:<ul style="list-style-type: none">- Specification- Wiring- Parameter• CODESYS motion control <p>https://youtu.be/Gu10v4msH1Q</p>
Tutorial Video Weintek Remote I/O Solutions - EASYREMOTEIO	 <p>https://youtu.be/uvjEj-3ipeU</p> <p>Demo 1: Add module in CODESYS How to add a module in CODESYS (which in turn imports into EBPro for control)</p>
Tutorial Video	 <p>https://youtu.be/67vsUhchopM</p> <p>Demo 2: Directly Control by cMT3090 w/o PLC A demonstration of direct control through a cMT without a PLC</p>
Tutorial Video	 <p>https://youtu.be/uNSyJRxxrPc</p> <p>Demo 4: Trace A demonstration of the trace function within CODESYS</p>

Appendix A CODESYS Libraries

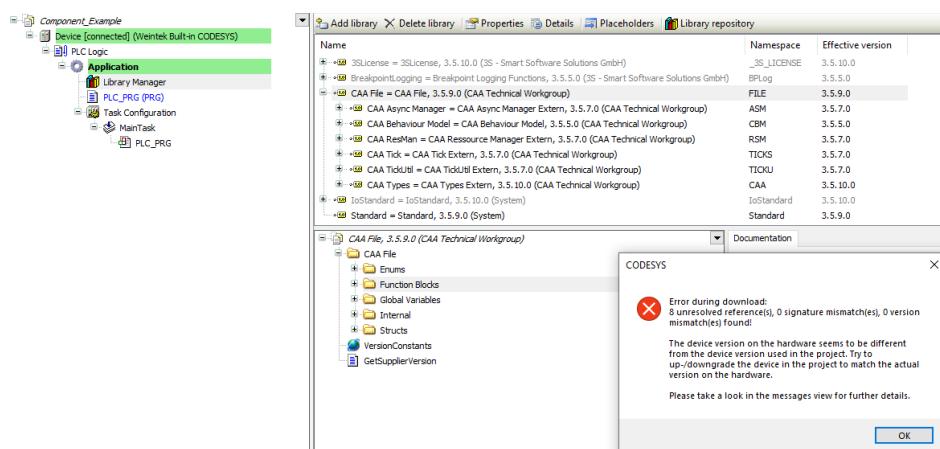
The libraries in the table below require OS support. Libraries that do not require OS support can be used directly; e.g. OSCAT Basic, Util library...etc.

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	
	CmpBinTagUtillec	
	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.