

sysWORXX CTR-500

Technical Specifications Version 1.0

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Changes

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1 Introduction

This document includes all device specific information for the sysWORXX CTR-500.

To get more general information on how to operate the device, please refer to the System Manual of our sysWORXX device series L-2782 (see Table 1).

2 Overview

Table 1 lists up all relevant manuals for the device.

Table 1: Overview of relevant manuals

Information about...	In which manual?
Specific technical information about the device	In this manual
Basic information about the device (configuration, administration, process image, connection assignment, firmware update, reference designs et cetera)	System Manual sysWORXX series – L-2782

3 Product Description

The sysWORXX CTR-500 extends the SYS TEC electronic AG product range within the field of IoT and control applications. It is an innovative, Linux-based compact controller for universal processing purposes of standard industrial signals. The controller module provides to the user numerous local in- and outputs as well as versatile communication interfaces. Due to CAN and Ethernet interfaces, it is suited for realizing decentral control tasks in distributed fieldbus systems of automation technology. With all these tools and interfaces, one can write their own applications for their specific needs and purposes.



Figure 1: Top view of device

These are some significant features of device:

- Linux-based compact PLC for industrial controls
- High-capacity CPU kernel (Freescale i.MX7 series Dual ARM Cortex-A7 Core 1GHz, Real-time Core Cortex-M4 200MHz)
- Up to 1024 MiB RAM, 8GiB eMMC FLASH Memory
- 1x USB 2.0 Host interface
- Up to 2x 10/100/1000 Mbps Ethernet LAN interface
- 1x WLAN
- 1x optional integrated uBlock NINA-B111 module
- 1x CAN 2.0B interface, usable as CANopen Manager (CiA 302-conform)
- Up to 2x asynchronous serial ports (UART), usable as RS-232 or RS-485 (switchable via software)
- Up to 4 digital inputs 24VDC, galvanic isolated
 - Alternate function: 1 high-speed counter input, galvanic isolated
 - Alternate function: 1 A/B-Encoder
- Up to 4 digital outputs 24VDC/500mA, galvanic isolated, short-circuit-proof
 - Alternate function: 2 PWM outputs 24VDC/500mA 1KHz
- RTC (with buffer capacitor)
- 2 temperature sensors, CPU and System temperature
- On-board software: Linux, PLC firmware with CANopen Master, Node-RED, HTTP and SFTP server
- Programming with C/C++, C#, Java, and Python
- Linux-based (other user programs are executable in parallel)
- Remote login via SSH
- Dimensions: 10 x 91 x 60mm
- Temperature 0° ... 55°C

- Suitable for DIN top hat rail mounting
- Future features:
 - Programmable according to IEC 61131-3
 - Easy, HTML-based OpenPCS configuration via web browser
 - Functions for the PLC runtime:
 - Function block libraries for communication (CANopen, Ethernet and UART)
 - Function block libraries for hardware components (RTC, Counter, PWM)

The default hardware comes with a Linux operating system. This base system can be used to program in different programming languages and also provides the Node-RED programming environment. To identify each individual device, the manufacturer, revision, serial and order number are printed on a label on the right side of the device. Some additional hardware and software components are also available:

Feature:	19031003 Without NINA-B111 module	19032003 With NINA-B111 module
Description	The basic Debian/GNU Linux installation and the default hardware	The basic Debian/GNU Linux installation, Bluetooth capabilities.
Digital Inputs		4
Digital Outputs		4
NINA-B111	No	Yes
WLAN		Yes
CAN		1
Ethernet		2
RS-232/485		2

Additionally available licenses to purchase:

Order no.: **240011**: Runtime license OpenPCS RT sysWORXX devices

4 Interface of the Device

4.1 Pin Assignment

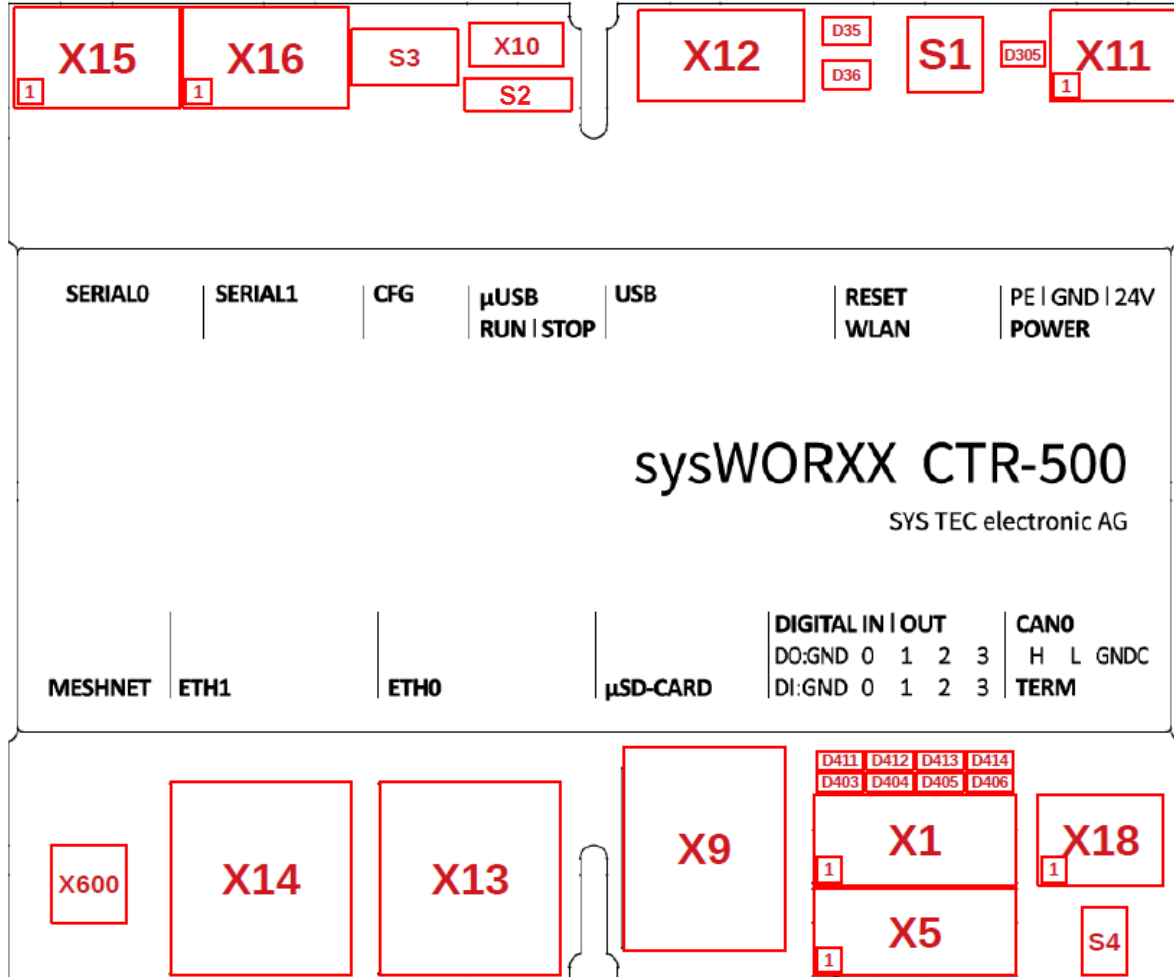


Figure 2: Interface and connector assignment

Figure 2 shows the positioning of connectors on the device as an overview. Table 2 lists all connectors in detail.

Table 2: Pin assignment

Terminal	Pins	Signal name	Remark
Digital Outputs X1	1	GND0	24V
	2 ... 4	DO0 ... DO3	
Digital Inputs X5	1	GND1	24V
	2 ... 4	DI0 ... DI3	
µSD-Card-Holder X9	-	-	-
µUSB (console) X10	-	-	-
Power X11	1	PE	24V
	2	GND	
	3	24VDC	
USB-Host X12	-	-	-
Ethernet 0 (ETH0) X13	-	-	-
Ethernet 1 (ETH1) X14	-	-	-
Serial Interface 0 X15	1	RX	RS-232
	2	-	
	3	TX	
	4	GND	
	1	A/D0	RS-485/Modbus RTU
	2	B/D1	
	3	-	
	4	GND	
Serial Interface 1 X16	1	RX	RS-232
	2	-	
	3	TX	
	4	GND	
	1	A/D0	RS-485/Modbus RTU
	2	B/D1	
	3	-	
	4	GND	
CAN 0 X18	1	HIGH	-
	2	LOW	
	3	GND_CAN0	
Bluetooth antenna X600	-	-	-
WLAN antenna	-	-	-

NOTICE

Limitation of liability

Technical specifications and approvals of this device only apply, if expansion components with a valid CE approval are used.

Also, the installation conditions for expansion components, described in the associated documentation, must be followed.

SYS TEC electronic is not liable for functional limitations caused by the use of third-party devices or components.

4.2 User Interface

Table 3: Description Switches

Switch	Port	OFF	ON
S1	-	-	RESET
S2	-	Position = left (see Figure 2) PLC stop (outputs deactivated)	Position = right (see Figure 2) PLC run (program re-starts)
S3	1	SERIAL0: RS-485: Bus termination off RS-232: Must be set!	SERIAL0: RS-485: Bus termination on RS-232: Do not set!
	2	SERIAL1: RS-485: Bus termination off RS-232: Must be set!	SERIAL1: RS-485: Bus termination on RS-232: Do not set!
	3	Configuration: ON	Configuration: OFF
	4	Normal Booting	Boot in U-Boot Bootloader CLI
	5	Boot mode: SD-Card	Boot mode: eMMC
S4	1	CAN0: Termination off	CAN0: Termination on
	2	Reserved	Reserved

Table 4: Description LEDs

LED	Color	Feature
D01	Green	Status of the power supply for the DO's
D02 ... D05	Yellow	Signal status of the DO's (on = high; D02 = DO0, D03 = DO1, ...)
D06	Green	Status of the power supply for the DI's
D07 ... D10	Yellow	Signal status of the DI's (on = high; D19 = DI0, D20 = DI1, ...)
D11	Green	Status of the PLC: RUN f=1 Hz; STOPP f=0.5 Hz
D12	Red	ERROR-LED, signals an occurring (PLC or IO-driver) error
D13	Green	Status of the power supply for the device

Mounting antenna to RF ports:

WLAN antenna



Bluetooth antenna



4.3 Power Supply

The devices feature power supply inputs (24VDC $\pm 20\%$), and has reverse polarity protection. If the device experiences a power fail, there is a short time window to act accordingly, for example to save your data. During this time frame, the device will work normally then shuts down. To access the power fail signal, one must use the driver library in a separate program (see L-2782, Section 6). The exact values for power fail and the delay time are documented in section 7.

4.4 Galvanic Isolation

Figure 3 shows the galvanic isolation of the different interfaces and system components

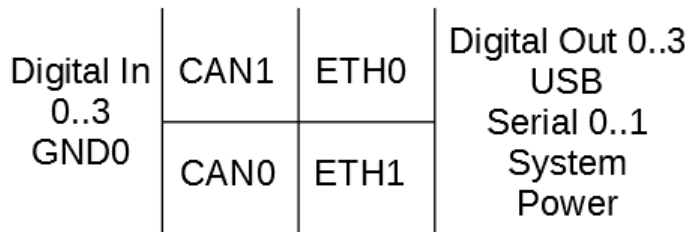


Figure 3: Galvanic isolation

- Analog In, USB and serial interfaces have **no isolation**.
- Digital out/in and CAN have **functional isolation** of 50 VDC
- Interfaces ETH0 and ETH1 have a **basic isolation** of 230 VAC

4.5 Cable types and maximum cable lengths

The following table shows, which cable types are recommended for the different interfaces:

Table 5: Recommended cable lengths, types and wire cross section

Interface	Cable length	Recommended cable types	Wire cross section
Digital outputs	<30m	Any cable suitable to the specific usage.	0,2 - 1,5mm ² or AWG24 – 16
Digital inputs			
Analog inputs			
Analog outputs			
Relay Output			

Interface	Cable length	Recommended cable types	Wire cross section
RTD			
Thermocouple			
CAN	<30m	Shielded twisted pair	
SERIAL	RS232: <15m Modbus RTU: <30m	Shielded twisted pair	
Ethernet	<30m	S/FTP Cat 6	-
USB, Service	<3m	USB standard cable	-
MESHNET	-	-	
WLAN	-	-	
POWER	<30m	Any cable suitable to the specific usage.	1mm ² - 1,5mm ² or AWG17 - 16

4.6 Serial Interfaces

The following table shows the list of serial interfaces and the corresponding Linux-Devices:

Table 6: Serial interface to Linux device node path

Interface	Linux-Device (<i>INTERFACE</i>)
SERIAL0	/dev/ttyxc6
SERIAL1	/dev/ttyxc5
SERIAL2	/dev/ttyxc1
SERVICE ¹	/dev/ttyxc0

SERIAL2 is the connection to the NINA B111 Bluetooth module.

¹ The **SERVICE** interface is used as the default Linux console for serial access to the device. Do not use this for custom applications unless you really know how to handle this without any conflicts.

4.7 Shared Process Image

Compared to other SYS TEC compact control systems, this device obtains a process image with identical addresses. All supported in- and outputs listed in Table 7.

Table 7: Assignment of in- and outputs to the process image

I/O of the device	Address and Data type in the Process Image
DI0 ... DI3	%IB0.0 as Byte with DI0 ... DI3 %IX0.0 ... %IX0.3 as single Bit for each input
C0	%ID40.0 31Bit + sign ($-2^{31} - 2^{31} - 1$) counter input: DI2 (%IX1.6), direction: DI3 (%IX1.7)
CPU Temperature Sensor	%ID72.0 31Bit + sign as 1/10000 °C
System Temperature Sensor	%ID76.0 31Bit + sign as 1/10000 °C
DO0 ... DO3	%QB0.0 as Byte with DO0 ... DO3 %QX0.0 ... %QX0.3 as single Bit for each output
DO Mask	%QD1984.0 Mask of digital outputs a bitmask of digital outputs, which will not be written from process image to hardware registers. (LSB relates to DO0, MSB relates to DO15)

Advice: The device works with Little-Endian format ("Intel-Notation). Consequently, and on the contrary to controls using Big-Endian ("Motorola-Notation), it is **possible** to sum up several BYTE variables of the process image to one WORD or DWORD and to access Bits above Bit7. The following example shows issue described:

```

bInByte0 AT %IB0.0 : BYTE;
bInByte1 AT %IB1.0 : BYTE;
wInWord0 AT %IW0.0 : WORD;

wInWord0.0 == bInByte0.0 due to Little-Endian: wInWord0.0 <> bInByte1.0
wInWord0.8 == bInByte1.0 due to Little-Endian: wInWord0.8 <> bInByte0.0
    
```

In- and outputs are not negated in the process image. Hence, the H-level at one input leads to value "1" at the corresponding address in the process image. Contrariwise, value "1" in the process image leads to an H-level at the appropriate output.

5 Firmware Function Scope

Table 8 lists all firmware functions and function blocks available on the device.

Sign explanation:

FB Function block
 FUN Function
 Online Help *OpenPCS* online help
 L-1054 Manual "*SYS TEC-specific extensions for OpenPCS / IEC 61131-3*", Manual no.:
 L-1054)
 PARAM:={0,1,2} values 0, 1 and 2 are valid for the given parameter

Table 8: Firmware functions and function blocks

Name	Type	Reference	Remark
<i>PLC standard Functions and Function Blocks</i>			
SR	FB	Online Help	
RS	FB	Online Help	
R_TRIG	FB	Online Help	
F_TRIG	FB	Online Help	
CTU	FB	Online Help	
CTD	FB	Online Help	
CTUD	FB	Online Help	
TP	FB	Online Help	
TON	FB	Online Help	
TOF	FB	Online Help	

Functions and Function Blocks for string manipulation			
ETRC	FB	L-1054	
PTRC	FB	L-1054	
GETVARPOINTER	FB	L-1054	
BIN_TO_STR	FUN	L-1054	
STR_TO_BIN	FUN	L-1054	
OBJ_TO_STR	FB	L-1054	
GETSTRINFO	FB	L-1054	
CHR	FUN	L-1054	
ASC	FUN	L-1054	
STR	FUN	L-1054	
VAL	FUN	L-1054	
LEN	FUN	L-1054	
LEFT	FUN	L-1054	
RIGHT	FUN	L-1054	
MID	FUN	L-1054	
CONCAT	FUN	L-1054	
INSERT	FUN	L-1054	
DELETE	FUN	L-1054	
REPLACE	FUN	L-1054	
FIND	FUN	L-1054	
STR_UPPER	FUN		
STR_LOWER	FUN		
STR_TRIM	FUN		
Functions and Function Blocks for OpenPCS specific task controlling			
GETVARDATA	FB	Online Help	
GETVARFLATADDRESS	FB	Online Help	
GETTASKINFO	FB	Online Help	
Functions and Function Blocks for handling of non-volatile data			
NVDATA_BIT	FB	L-1054	DEVICE:={0} see ⁽¹⁾
NVDATA_INT	FB	L-1054	DEVICE:={0} see ⁽¹⁾
NVDATA_STR	FB	L-1054	DEVICE:={0} see ⁽¹⁾
NVDATA_BIN	FB	L-1054	DEVICE:={0} see ⁽¹⁾
Functions and Function Blocks for handling of time			
GETTIME	FUN	Online Help	
GETTIMECS	FUN	Online Help	
TIME_TO_DINT	FUN		
DINT_TO_TIME	FUN		
DT_CLOCK	FB	L-1054	
DT_ABS_TO_REL	FB	L-1054	
DT_REL_TO_ABS	FB	L-1054	
DT_REL_TO_DT			
Functions and Function Blocks for counter inputs and pulse outputs			
CNT_FUD	FB	L-1054	CHANNEL:={0,1,2}
PTO_PWM	FB	L-1054	CHANNEL:={0,1}
PTO_TAB	FB	L-1054	CHANNEL:={0,1}
Function Block for PID regulator			
PID1	FB	L-1054	

Functions and Function Blocks for Serial interfaces			
SIO_INIT	FB	L-1054	PORT:={0,1,2,3} see ⁽²⁾
SIO_STATE	FB	L-1054	PORT:={0,1,2,3} see ⁽²⁾
SIO_READ_CHR	FB	L-1054	PORT:={0,1,2,3} see ⁽²⁾
SIO_WRITE_CHR	FB	L-1054	PORT:={0,1,2,3} see ⁽²⁾
SIO_READ_STR	FB	L-1054	PORT:={0,1,2,3} see ⁽²⁾
SIO_WRITE_STR	FB	L-1054	PORT:={0,1,2,3} see ⁽²⁾
SIO_READ_BIN	FB	L-1054	PORT:={0,1,2,3} see ⁽²⁾
SIO_WRITE_BIN	FB	L-1054	PORT:={0,1,2,3} see ⁽²⁾
Functions and Function Blocks for CAN interfaces / CANopen			
CAN_GET_LOCALNODE_ID	FB	L-1008	NETNUMBER:={0,1}
CAN_CANOPEN_KERNEL_STATE	FB	L-1008	NETNUMBER:={0,1}
CAN_REGISTER_COBID	FB	L-1008	NETNUMBER:={0,1}
CAN_PDO_READ8	FB	L-1008	NETNUMBER:={0,1}
CAN_PDO_WRITE8	FB	L-1008	NETNUMBER:={0,1}
CAN_SDO_READ8	FB	L-1008	NETNUMBER:={0,1}
CAN_SDO_WRITE8	FB	L-1008	NETNUMBER:={0,1}
CAN_SDO_READ_STR	FB	L-1008	NETNUMBER:={0,1}
CAN_SDO_WRITE_STR	FB	L-1008	NETNUMBER:={0,1}
CAN_SDO_READ_BIN	FB	L-1008	NETNUMBER:={0,1}
CAN_SDO_WRITE_BIN	FB	L-1008	NETNUMBER:={0,1}
CAN_GET_STATE	FB	L-1008	NETNUMBER:={0,1}
CAN_NMT	FB	L-1008	NETNUMBER:={0,1}
CAN_RECV_EMCY_DEV	FB	L-1008	NETNUMBER:={0,1}
CAN_RECV_EMCY	FB	L-1008	NETNUMBER:={0,1}
CAN_WRITE_EMCY	FB	L-1008	NETNUMBER:={0,1}
CAN_RECV_BOOTUP_DEV	FB	L-1008	NETNUMBER:={0,1}
CAN_RECV_BOOTUP	FB	L-1008	NETNUMBER:={0,1}
CAN_ENABLE_CYCLIC_SYNC	FB	L-1008	NETNUMBER:={0,1}
CAN_SEND_SYNC	FB	L-1008	NETNUMBER:={0,1}
Functions and Function Blocks for Ethernet interfaces / UDP			
LAN_GET_HOST_CONFIG	FB	L-1054	NETNUMBER:={0}
LAN_ASCII_TO_INET	FB	L-1054	NETNUMBER:={0}
LAN_INET_TO_ASCII	FB	L-1054	NETNUMBER:={0}
LAN_GET_HOST_BY_NAME	FB	L-1054	NETNUMBER:={0}
LAN_GET_HOST_BY_ADDR	FB	L-1054	NETNUMBER:={0}
LAN_UDP_CREATE_SOCKET	FB	L-1054	NETNUMBER:={0}
LAN_UDP_CLOSE_SOCKET	FB	L-1054	NETNUMBER:={0}
LAN_UDP_RECVFROM_STR	FB	L-1054	NETNUMBER:={0}
LAN_UDP_SENDTO_STR	FB	L-1054	NETNUMBER:={0}
LAN_UDP_RECVFROM_BIN	FB	L-1054	NETNUMBER:={0}
LAN_UDP_SENDTO_BIN	FB	L-1054	NETNUMBER:={0}

<i>Functions and Function Blocks for file access</i>			
FILE_OPEN	FB	L-1828	
FILE_CLOSE	FB	L-1828	
FILE_READ	FB	L-1828	
FILE_READ_LINE	FB	L-1828	
FILE_WRITE	FB	L-1828	
FILE_SEEK	FB	L-1828	
FILE_SYNC	FB	L-1828	
FILE_STAT	FB	L-1828	
FILE_CHMOD	FB	L-1828	
FILE_TOUCH	FB	L-1828	
FILE_DELETE	FB	L-1828	
FILE_RENAME	FB	L-1828	
FILE_COPY	FB	L-1828	
FILE_SPLIT_PATH	FB	L-1828	
FILE_DIR_OPEN	FB	L-1828	
FILE_DIR_CLOSE	FB	L-1828	
FILE_DIR_READ	FB	L-1828	
FILE_GET_DIR	FB	L-1828	
FILE_SET_DIR	FB	L-1828	
FILE_MKDIR	FB	L-1828	
FILE_RMDIR	FB	L-1828	
FILE_MKFIFO	FB	L-1828	
FILE_EXEC_SYS_CMD	FB	L-1828	
FTYPE_TO_UINT	FUN	L-1828	
FSEEK_TO_UINT	FUN	L-1828	
FPERM_TO_STRING	FUN	L-1828	
SYSERR_TO_STRING	FUN	L-1828	
<i>Functions and Function Blocks for Modbus communication</i>			
MODBUS_OPEN_INSTANCE	FB	L-1829	
MODBUS_CLOSE_INSTANCE	FB	L-1829	
MODBUS_REGISTER_VAR_LIST	FB	L-1829	
MODBUS_READ_REGS	FB	L-1829	
MODBUS_WRITE_SINGLE_REG	FB	L-1829	
MODBUS_WRITE_MULTI_REGS	FB	L-1829	
MODBUS_READ_WRITE_REGS	FB	L-1829	
MODBUS_READ_INPUT_REGS	FB	L-1829	
MODBUS_READ_DISCR_INPUTS	FB	L-1829	
MODBUS_READ_COILS	FB	L-1829	
MODBUS_WRITE_SINGLE_COIL	FB	L-1829	
MODBUS_WRITE_MULTI_COILS	FB	L-1829	
MODBUS_RAW_PDU_REQUEST	FB	L-1829	

Functions and Function Blocks for MQTT communication			
MQTT_GET_CAPABILITIES	FB	Demo	
MQTT_CONNECT	FB	Demo	
MQTT_DISCONNECT	FB	Demo	
MQTT_GET_CONNECT_STATE	FUN	Demo	
MQTT_SUBSCRIBE	FB	Demo	
MQTT_UNSUBSCRIBE	FB	Demo	
MQTT_GET_ARRIVED_MESSAGE	FB	Demo	
MQTT_PUBLISH	FB	Demo	

- (1) All nonvolatile data is filed into directory `"/home/plc/plcdata/PlcPData.bin"`. This file has a fix size of 32 KiB. By calling function blocks of type `NVDATA_Xxx` in a writing mode, the modified data is directly stored into file `"/home/plc/plcdata/PlcPData.bin"` ("*flush*"). Thus, unsecured data is not getting lost in case of power interruption.

- (2) Interface SERVICE primarily serves as service interface to administer the device. Hence, this interface should only be used for sign output. The module always tries to interpret and execute sign inputs as Linux commands.
Interface 2 is used for communication with the Bluetooth NINA B111 module.

6 Library sysWORXX IO

This section describes the usage of the sysWORXX IO library that enables access to the different inputs and outputs of the device as well as additional device information. The header file with the public interface is located at `"/usr/include/sysworxx_io.h"`. The driver is managed via a systemd service `"iodaemon.service"` that is enabled by default and located at `"/lib/systemd/system"`.

To enable access to the interfaces of the device include the header in a C/C++ application and use the public interface to program your functionality. Afterwards compile the application with the GCC-compiler and link against the corresponding library located at `"/usr/lib/libsysworxx_io.so"`. For the necessary compiler flags and usability of the "GNU Compiler Collection" refer to <https://gcc.gnu.org/onlinedocs/gcc-7.3.0/gcc/>.

6.1 IoResult Description

Each of the public functions listed in *Table 10* returns a status code that is listed in *Table 9* to indicate the success of the function's behavior.

Table 9: SYSWORXX IO Return Status Codes

Error	Return Status Code
IoResult_Success	0
IoResult_Error	255
IoResult_NotImplemented	254
IoResult_InvalidParameter	253
IoResult_InvalidChannel	252
IoResult_InvalidMode	251
IoResult_InvalidTimebase	250
IoResult_InvalidDelta	249
IoResult_PtoParamTabFull	248
IoResult_DevAccessFailed	247
IoResult_AddressOutOfRange	243
IoResult_WatchdogTimeout	242

6.2 Public Interface Description

The functions listed in *Table 10* are used to access the peripheral as well as status flags of the device. You may use it to read or write digital as well as analog values and setup configurations for e.g., RDT inputs. For details about the parameters of the functions please refer the header file `"sysworxx_io.h"`.

Table 10: SYSWORXX IO Public Interface Functions

Function Name	Description
IoInit	Initializes the I/O driver
IoShutdown	De-initialization of the I/O driver
IoGetVersion	Get the version of the I/O driver
IoGetTickCount	Get the tickcount of the system in milliseconds
IoEnableWatchdog	Enable the systems watchdog
IoServiceWatchdog	Service the system watchdog
IoGetHardwareInfo	Get information about device revision and available I/O channels
IoSetRunLed	Set/reset the RUN LED
IoSetErrLed	Set/reset the ERROR LED
IoGetRunSwitch	Get status of the RUN switch
IoGetConfigEnabled	Get status of the config switch

Function Name	Description
IoSetOutput	Set the value of a digital output e.g. REL[0,1]
IoGetInput	Get the value of a digital input e.g., D0...D9
IoRegisterInputCallback	Register a callback to signal changes on a digital input
IoUnregisterInputCallback	Un-register / disable interrupt handling for a digital input
IoTmpSetMode	Set mode of a given temperature sensor
IoTmpGetValue	Get the value of a temperature sensor
IoCntEnable	Enable/disable a counter channel
IoCntSetup	Setup the counters mode e.g., mode, trigger, or direction
IoCntSetPreload	Set the initial value of the counter
IoCntGetValue	Get the value of a counter channel

6.3 Device Interface and Signal Channel Mapping

To access status signals or device inputs with the functions listed in *Table 10*, the target of a function is addressed with channel numbers. The following table lists the channels to the corresponding signals or device inputs/outputs. The actual channel names and values can vary depending on the device.

Table 11: Device Interface and Signal Channel Mapping

Name	Channel	Remarks
Digital Inputs		
DI0	0	Access through "IoGetInput" Event notification though "IoRegisterInputCallback" and "IoUnregisterInputCallback"
DI1	1	
DI2	2	
DI3	3	
Digital Outputs		
DI0	0	Access through "IoSetOutput"
DI1	1	
DI2	2	
DI3	3	
Temperature Sensors		Default
CPU Temperature Sensor	0	Access through "IoTmpGetValue"
System Temperature Sensor	1	
Counters		
Counter 0	0	Access through "IoCntGetValue" Enable/Disable through "IoCntEnable" Configure through "IoCntSetPreload" and "IoCntSetup"
Counter 1	1	
LEDs		
PLC Run Led	-	Access through dedicated function "IoSetRunLed"
PLC Error Led	-	Access through dedicated function "IoSetErrorLed"
Status/Control Signals		
PowerFail24VDC (/PF)	32	Access through "IoGetInput" Event notification though "IoRegisterInputCallback" and "IoUnregisterInputCallback"
DiEr (DI_/ERR)	33	
UsbOc (USB_/OC)	34	
DoPf/DO_PF)	35	
DoDiag	36	

7 Technical Specification

Environmental Parameters		Typical	Minimum Maximum
Power Supply	V_{CPU}	24VDC	19.2...30VDC
	V_{IO}	24VDC	19.2...30VDC
	power fail level	18,2V	
	power fail delay time	10ms	
Current Consumption (inactive IOs)	I_{CPU}	100mA	
	I_{IO}	30mA	
Temperature Range	Storage temperature		-20..+70°C
	Operating temperature		0...55°C
MTTF	According to SN29500 at 40°C		tbd
Protection class	Housing	IP20	
Weight	without any cable and packing	295g	
Dimensions	Width		108mm
	Height		61mm
	Depth		91mm
Connector type	Spring type connector		
Lowest cycle time for PLC		5 ms	

I/O-configuration (digital)		Typical	Maximum
Digital Outputs DO0 ... 3			
24VDC-Output (High Side Switch)	U_{OH} at $I_{OH} = 500$ mA	$V_{IO} - 0.12V < U_{OH} < V_{IO}$	
	U_{OL} at $I_{OL} = 0$ mA		0.5V
	Current limitation I_{OH_max}		700mA
	Max. current		4x0,5A
	Impedance		0.08Ohm
	$I_{OL(off)}$		5 μ A
	t_{off} at $I_{OH} = 500$ mA	30 μ s	35 μ s
	t_{on} at $I_{OH} = 500$ mA	20 μ s	35 μ s
Frequency	ca. 200 Hz	1KHz ²	
PWM Output (DO2 + DO3)			
24VDC-Output (High Side Switch)	T_{jitter}		25 μ s
	T_{on_min} and min. pulse width		800ns
	Frequency		1kHz
Digital Inputs DI0 ... 3			
24VDC- Inputs, plus switching	U_{IH}	12.6V	30V
	U_{IL}	-3V	12V
	I_{IH} ($V_{IN}=6.7V$)	0.9mA	
	I_{IH} ($V_{IN}=30V$)		5.5mA
	Input type according to IEC61131-2	Type 1	
	T_{DLY}		100ns
Counter Input and Step Direction (DI2 + DI3)			
24VDC- Inputs, plus switching	Min. pulse width		25 μ s
	Frequency		10kHz
A/B-Encoder (DI2 + DI3)			
24VDC- Inputs, plus switching	Frequency		10kHz
	Phase Margin (A/B-Encoder)		$\pm 45^\circ$

² Frequency limit of hardware interface circuit. The actually frequency may vary due to software limitations.

Communication Interfaces		Minimum	Maximum
CAN-Bus			
CAN0	Baudrate	5kBaud	1Mbaud
	Max. number of nodes		64
	CAN-H, CAN-L short-circuit-proof towards 24V		
RS-232/RS-485			
SERIAL0	Baudrate	1200Baud	115200Baud
SERIAL1	Baudrate	1200Baud	115200Baud
SERVICE	Baudrate	1200Baud	115200Baud
Ethernet			
ETH0	Bandwith	10Mbit/s	1000Mbit/s
ETH1	Bandwith	10Mbit/s	1000Mbit/s

Standards and approvals			
See the appendix or product folder on the website for the currently valid declaration of conformity			

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Do you have any suggestions for improving this manual?

Did you find any mistakes in this manual?

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