

X-GO Flex Logic Control Documentation (Cluster 64 Bit)

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8.2 **Event** File

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1 Introduction

The software X-GO Flex for Windows allows the control of fieldbus devices (EtherCAT, ProfiNET, SERCOS III and Ethernet/IP) under realtime condition, without programming. All stations can be controlled logically with a PLC programming language. On this occasion, different language elements are provided for evaluation of constants and station values, for timer, counter and conditional jumps. Additional function modules may be added to the system. Moreover, the input is checked for logical errors with a PLC program checker. X-GO Flex enables the complete administration of all fieldbus stations. The station monitor shows the current input and output conditions. Data exchange between PLC system and outside applications can be easily done with the X-GO Software Development Kit (SDK). The ability of offering a photorealistic desktop screen, simply designed by parameter files, allows a new dimension for control applications.



1.1 Features

- Flex Protocol
- Flex Monitor
- Flex Coding
- Flex Debug
- Flex Panel
- Flex Extend
- Flex Exchange
- EtherCAT, ProfiNET, Sercos III and Ethernet/IP support
- Input / Output monitoring with position mask
- adjustable PLC programming language syntax
- interactive PLC debugging system with code interpretation
 - photorealistic, parameter controlled HMI
- programming interface for PLC function extensions
 - programming interface for exchanging data with outside applications

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1.2 Supported OS

- Windows 7
- Windows 8
- Windows 10

1.3 Supported Platforms

- INTEL Multi-Core (i3 / i5 / i7 / CoreDuo)
- AMD Multi-Core (x2 / x4)

1.4 Reference Hardware

X-GO was especially tested with following hardware platforms:

Mainboard:	DQ57TM
Processor:	INTEL I5
RAM:	4 GB
Graphics:	RADEON 9800 PRO
Mainboard:	ASROCK 785GM-S3
Processor:	ATHLON II X4 320
RAM:	4 GB
Graphics:	ATI Radeon HD 4200 (OnBoard)
Mainboard:	ASUS P5LD2-SE
Processor:	INTEL Core 2 Duo
RAM:	3 GB
Graphics:	ATI Radeon HD 4300
Mainboard: Processor: RAM: 4 GB	Lenovo 44444XG INTEL Core i5 M480
Graphics:	INTEL HD Graphics BR-1004 (OnBoard)

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2 Flex Modules

2.1 FlexProtocol

Whether ProfiNET, EtherCAT, SERCOS III or Ethernet/IP, X-GO Flex based on the X-Realtime Engine for Windows controls the fieldbus protocols without complex programming. A multiple instantiation of X-GO Flex enables even the simultaneous operation of different protocols. All parameters are saved within the file XGO.PAR.

- EtherCAT
- ProfiNET
- Sercos III
- Ethernet/IP

1. NIC (07)	Test	
Period [µsec] 100		
		A.
Master Stack	Configuration File	
Master Stack	Configuration File C:\EIP\StationList.par	Select
Master Stack C EtherCAT ProfiNET C Ethernet/IP	Configuration File C:\EIP\StationList.par LogicFile	Select
Master Stack C EtherCAT ProfiNET C Ethernet/IP C SERCOS III	Configuration File C:\EIP\StationList.par LogicFile C:\XGO\Logic (Buffer).par	Select

Each protocol has its own initial parameter set, like sampling period, synchronisation period, network card index. Additionally the network connection may tested by pressing the [TEST] button. If so, the network link LED will turn off and on to signal the correct adapter choice.

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2.2 FlexMonitor

The Flex Monitor provides you an easy to use station control system which is particularly suitable for service applications. It allows you to display the input data, and the change of output data with different data masks. All data masks are saved within the file "MASK.PAR" (or another given name) by leaving the software. The saved dialog location and name will be used by the Auto Start function..

Main Logic Debug ?	X-GO32 Flex Logic Fielbo	us Control (N	l:\Xgo32\App\	Logic (ILB).par)	- □ ×
06.02.2014 09:15:56 > Welcome to X 06.02.2014 09:15:56 > Logic ready 06.02.2014 09:16:10 > ProfiNET rea 06.02.2014 09:40:29 > ProfiNET sto 06.02.2014 09:40:29 > Core stopped 06.02.2014 09:40:29 > Logic ready	-G032 Flex	Name Motor 1 Digital	Input	Station [0.1.0]:Input Data	×
06.02.2014 09:42:50 > ProfiNET rea	dy	Offset 0	Data (WORD) 0004	₩ Hex	•
Station Information - UpdateC	nt:77825				
□-■ [0.1.0]: Name:16 digitale Ein → PS [80] Data [04][00]	/Ausgänge	0		Station [0.1.0]:Output Data	×
CS [80] Data [04][00] □-Ⅲ [0.2.0]: Name:16 digitale Ein →Ⅰ PS [80] Data [00][00]	gänge	Name Motor 1 Digital	Output		
- ← CS [80] Data		Offset	Data (WORD)	✓ Hex	
		1-	1		
		3		Station [0.2.0]:Input Data	×
		Name Motor 2 Digital	Input		_
		Offset	Data (WORD)	✓ Hex	•
- 14 × 1	2010000000000000000000				ALCONTRACTOR OF ALCONTRACT

The value dialog allows reading or writing of station values. Just click on a station input or output item inside the Station Monitor opens the dialog. The data format is adjustable (due to the data length) and provides BYTE, WORD, DWORD, ASCII format (either HEX or DEC). The data offset determines the beginning of the payload data (Sercos III without CCON). The Data may be entered or read binary as well as text with an adjustable data format

Ę.	Stati	ion [0.1.0]:Output Data	
Name			
Station1 D	iigital Inputți		
Offset	Data (WORD)	₩ Hex	
0	0005		Update

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2.2.1 Sample: Drive Startup Sequence

1. Set Drive Control Word (Bit 13) : Drive Restart

Station	[1] - Output	Data		
Offset	Data (DW0	IRD)	🔽 Hex	
0	00002000			Update
	FEEE			

2. Set Drive Control Word (Bit 14) : Drive Enable

Station	[1] - Output Data			×
Offset	Data (DWORD)	🔽 Hex		
0	00006000		Update	

3. Set Drive Control Word (Bit 15) : Drive ON

Station	[1] - Output	Data			
Offset	Data (DWC)RD)	I Hex		
0	0000e000			•	Update
	- F F F F F				

4. Set Drive Velocity (Bit 31)

Offset	Data (DWORD)	🔽 Hex	
0	8000e000	UF	odate

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2.3 FlexCoding

A programming language adapting to your preference ? Write your PLC realtime code with your own common syntax, with all the language elements and without crashes. A code checker checks the code and displays errors. X-GO Flex provides an editor to edit the PLC program. The PLC language provides all elements of a programming language and may be extended by own function modules (see FlexExtend). The PLC program is saved as text file (default name LOGIC.PAR)

```
Edit Logic File : M:\Xgo32\App\Logic (ILB).par
```

```
0:
      var["DigIn1"] = in[ station(0.1.0) data(0) mask(FFFFh)]
var["DigIn2"] = in[ station(0.2.0) data(0) mask(FFFFh)]
                                                                                          :Digital Input
:Digital Input
                                                                                                                ~
 1:
 2:
      variable["Trigger"] = con[(1)]
variable["ResultHigh"] = con[(4)]
variable["ResultLow"] = con[(5)]
 3:
 4:
      variable["ResultLow"]
variable["ResultEnd"]
 5:
 6:
7:
                                      = con[(8)]
 8:
      var["DigOut1"] = function["Timer" valDelay(500) valSignal(500) ref("Once") r
 9:
      output[station(0.1.0) data(0) mask(FFFFh)] = var["DigOut1"]
10:
            {"Label1"}
11:
12:
      var["BufferWait"]
var["BufferReset"]
buffer["MyBuffer" wait("BufferWait") reset("BufferReset") size(1000h)]
13:
14:
15:
16:
17:
      jump["MyLabel"] = var["DigIn1"] < const[(8000h)]</pre>
18:
19:
            {"Labe12"}
20:
      out[station(0.1.0) data(0) mask(FFFFh)] = constant[(1122h)]
21:
22:
      jump["Label3"]
23:
24:
            {"MvLabel"}
25:
      out[station(0.2.0) data(0) mask(FFFFh)] = var["DigIn2"]
26:
27:
            {"Labe13"}
28:
       <
                                                                                                              5
                                                                                                          OK
                                                                                         Cancel
```

The adapting syntax allows using element declarations of your own preference. So these declarations are equal:

<mark>v</mark>[``Sensor"] var[``Sensor"] variable[``Sensor"] vMyVariable[``Sensor"]

Only the first character (prefix) of the language element is fixed and must be common.

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2.3.1 PLC Execution

All PLC program lines are executed at realtime, starting from the first line to the last and starting again in a loop by the given realtime synchronization period:



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2.3.2 PLC Language structure

A PLC program line consists of 1, 3 or 5 language elements:

Element1	Element2	Element3	Element4	Element5
Variable / Buffer / Station /Jump	Operator [=]	Variable / Buffer / Station / Constant / Function	Logical Operator [+,-,/.*,<,>,&, ,^,?,:,#]	Variable / Buffer / Station /Constant / Function

1 element PLC line:

Element1 = Variable / Buffer / Station /Jump

jump["MyLabel"] ;jump to MyLabel
var["BufferWait"] ;global variable

3 elements PLC line:

Element1 : Variable / Buffer / Station /Jump Element2 : Operator [=] Element3 : Variable / Buffer / Station / Constant / Function variable["DigIn1"] = input[station(0.1.0 data(0) mask(-1)] var["ResultLow"] = const[(9000h)] ; set result low for timer jump["MyLabel"] = var["Cond"]

5 language elements line:

Element1 : Variable / Buffer / Station /Jump Element2 : Operator [=] Element3 : Variable / Buffer / Station / Constant / Function Element4 : Logical Operator [+,-,/.*,<,>,&,|,^,?,:,#] Element3 : Variable / Buffer / Station / Constant / Function variable["DigIn1"] = input[station(0.1.0 data(0) mask(-1)] + constant[(5)] jump["MyLabel"] = var["Test1"] < const[(8000h)]</pre>

The size of each value is upto 4 bytes. Each program line may be decorated optionally by comments. Comments are separated by [;]. Even if a line contains only comments, it's included to the logic cycle as NOP program line.

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2.3.3 Station Value

The station value defines a location inside the station data input or output area. The size of each element is upto 4 bytes. The station element may consists of a combination of the parameters StationAddress (see FlexMonitor), DataOffset, BitMask and DataType. Due to the controlled fieldbus, the station address contains of the station index (EtherCAT, Sercos III) or the station index , module index and submodule index (ProfiNET). All station indexes starting from zero and have decimal format.

```
output[station(0.2.0) data(9) mask(FFh) type(4)] ;output station address 0.2.0
    ;data Offset 9
    ;bit mask FFh
    ;data type string
out[s(3) d(0) m(2)] ;output station address 0
;data offset 0
;bit mask 2
input[station(1) d(2) m(-1)] ;input station address 1
;data offset 2
;bit mask 0xFFFFFFFF
Data Types:
0:None (DWORD)
```

1 : BYTE 2 : WORD 3 : DWORD 4 : WORD STRING 5 : DWORD STRING

2.3.4 Constant Value

Constant values may have decimal or hexadecimal format. The size of each element is upto 4 bytes.

<mark>c</mark> onstant[(3)]	;constant	value	decimal 3	
<mark>c</mark> on[(-1)]	;constant	value	decimal -1	(OxFFFFFFF)
<mark>c</mark> [(15h)]	;constant	value	hexadecimal	0x15

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2.3.5 Variables

Variables are used as place holders for any language element. The size of each element is upto 4 bytes. A variable element may consists of the parameters Name in combination of the parameter BitMask.

v	["Sensor1"]	;sensor 1
v	ar["DigIn1"]	;digital input 1
v	ariable["Motor2"]	;motor 2
v	MyVariable["Test"]	;test variable

Variable li	nformat	tion
· · · · •	0 -	Status : [57905] [0x0000e231]
•	1 -	ActMode : [8] [0x0000008]
↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓	2 -	ActPos : [85959189] [0x051fa215]
•	3 -	ActIO : [48] [0x00000030]
↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓	4 -	StopFault : [0] [0x0000000]
↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓	5 -	Control : [0] [0x0000000]
•	6 -	OpMode : [8] [0x0000008]
•	7 -	TargetPos : [85906240] [0x051ed340]
•	8 -	SetIO : [0] [0x0000000]
•	9 -	BufferWait : [0] [0x0000000]
•	10 -	BufferReset : [0] [0x0000000]
↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓	11 -	BufferCond : [0] [0x0000000]
↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓	12 -	Increment : [0] [0x0000000]
↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓	13 -	Done : [0] [0x00000000]
•	14 -	Reset : [1] [0x00000001]
	15 -	State : [5] [0x0000005]
	0 -	IncBuffer : BIndex [0] FIndex [0] Gap [0]



2.3.5.1 Changing a variable value

On pressing the left button at the selected variable, the value dialog appears. In debug mode, the value can be changed immediately

🔳 Update Da	ta		×
Name			
State			
Offset	Data (BYTE)	🔽 Hex 🗌 End	an
0	05		✓ Update
MSB			LSB
		Г	

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2.3.5.2 Selecting a panel

On pressing the right mouse button, a panel can be selected for the variable (see FlexPanel)

rganisieren Veuer Ordner Name Namalog Neter (1A).par Name Name Namo Name Namo Name Namo Name Namo Name Nam	nderungsdatum 3.05.2020 10:37 4.05.2020 12:46 4.05.2020 12:23 4.05.2020 12:23	Typ Dateiordner RA Database
Name A Images 2 AnalogControl (1).par 0 AnalogMeter (1A).par 0 AnalogMeter (30V).par 0 AnalogMeter (30V).par 0 AnalogMeter (1A).par 0 AnalogMeter (1A).par 0 AnalogMeter (30V).par 0 AnalogMeter (1A).par 0 Asco Button Down.par 0 Asco Button Up.par 0 Asco Digital Out.par 0 Beckhoff EL1018.par 0 Beckhoff EL2008.par 0 Beckhoff EL4132.par 0 Beckhoff Module (1).par 0 DigitalMeterLed (1V).par 0 DigitalModule (1).par 0 DigitalModule (1).par 0	nderungsdatum 3.05.2020 10:37 4.05.2020 12:46 4.05.2020 12:23 4.05.2020 12:23	Typ Dateiordner RA Database
Images 2 AnalogControl (1).par 0 AnalogMeter (1A).par 0 AnalogMeter (30V).par 0 AnalogMeter (1A).par 0 AnalogMeter (30V).par 0 AnalogMeter (1A).par 0 Asco Background Image.par 0 Asco Digital Out.par 0 Asco Upper Image.par 0 Beckhoff EL1018.par 0 Beckhoff EL2008.par 0 Beckhoff EL2008.par 0 Beckhoff EL4132.par 0 Beckhoff EL4132.par 0 DigitalMeterLed (1V).par 0 DigitalMeterLed (1V).par 0 DigitalModule (1).par 0 DigitalModule (1).par 0	3.05.2020 10:37 4.05.2020 12:46 4.05.2020 12:23 4.05.2020 12:23	Dateiordner RA Database
Image: AnalogControl (1).par 0 Image: AnalogMeter (1A).par 0 Image: AnalogMeter (30V).par 0 Image: AnalogMeter (1A).par 0 Image: AnalogMeter (30V).par 0 Image: AnalogMeter (1A).par 0 Image: Asco Batton Up.par 0 Image: Asco Digital Out.par 0 Image: Asco Upper Image.par 0 Image: Beckhoff EL1018.par 0 Image: Beckhoff EL4132.par 0 Image: Beckhoff EL4132.par 0 Image: Beckhoff Module (1).par 0 Image: DigitalMeterLed (1V).par 0 Image: DigitalMeterLed (1V).par 0 Image: DigitalModule (1).par 0 Image: DigitalModule (1).par 0	4.05.2020 12:46 4.05.2020 12:23 4.05.2020 12:23	RA Database
 AnalogMeter (1A).par AnalogMeter (30V).par AnalogMeter2 (1A).par AnalogMeterBig (1).par AnalogMeterBig (1).par Asco Background Image.par Asco Button Down.par Asco Button Up.par Asco Digital Out.par Asco Upper Image.par Beckhoff EL1018.par Beckhoff EL2008.par Beckhoff EL4132.par Beckhoff EL4132.par Beckhoff EL4132.par DigitalMeterLcd (1V).par DigitalMeterLed (1V).par DigitalMeterLed (1V).par 	4.05.2020 12:23 4.05.2020 12:23	
 AnalogMeter (30V).par AnalogMeter2 (1A).par AnalogMeterBig (1).par AnalogMeterBig (1).par Asco Background Image.par Asco Button Down.par Asco Button Up.par Asco Digital Out.par Asco Upper Image.par Beckhoff EK1100.par Beckhoff EL1018.par Beckhoff EL2008.par Beckhoff EL4132.par Beckhoff EL4132.par Bethoff Module (1).par DigitalMeterLcd (1V).par DigitalMeterLed (1V).par DigitalModule (1).par 	4.05.2020 12:23	RA Database
 AnalogMeter2 (1A).par AnalogMeterBig (1).par AnalogMeterBig (1).par Asco Background Image.par Asco Button Down.par Asco Digital Out.par Asco Digital Out.par Asco Upper Image.par Beckhoff EL1018.par Beckhoff EL2008.par Beckhoff EL4132.par Beckhoff EL4132.par ButtonControl.par DigitalMeterLed (1V).par DigitalMeterLed (1V).par DigitalModule (1).par 		RA Database
AnalogMeterBig (1).par 0 Asco Background Image.par 0 Asco Button Down.par 0 Asco Button Up.par 0 Asco Digital Out.par 0 Asco Upper Image.par 0 Beckhoff EK1100.par 0 Beckhoff EL1018.par 0 Beckhoff EL2008.par 0 Beckhoff EL4132.par 0 Beckhoff Module (1).par 0 DigitalMeterLed (1V).par 0 DigitalModule (1).par 0 DigitalModule (1).par 0	4.05.2020 12:23	RA Database
Image: Asco Background Image: par 0 Image: Asco Button Down.par 0 Image: Asco Button Up.par 0 Image: Asco Digital Out.par 0 Image: Beckhoff EL1018.par 0 Image: Beckhoff EL2008.par 0 Image: Beckhoff EL4132.par 0 Image: Beckhoff Module (1).par 0 Image: Beckhoff EL4132.par 0	4.05.2020 12:23	RA Database
Asco Button Down.par Asco Button Up.par Asco Digital Out.par Asco Digital Out.par Asco Upper Image.par Beckhoff EK1100.par Beckhoff EL1018.par Beckhoff EL2008.par Beckhoff EL4132.par Beckhoff Module (1).par DigitalMeterLed (1V).par DigitalMeterLed (1V).par DigitalModule (1).par	5.05.2020 13:17	RA Database
Image: Asco Button Up.par 0 Image: Asco Digital Out.par 0 Image: Asco Upper Image.par 0 Image: Asco Upper Image.par 0 Image: Beckhoff EL1018.par 0 Image: Beckhoff EL1018.par 0 Image: Beckhoff EL2008.par 0 Image: Beckhoff EL4132.par 0 Image: Beckhoff EL4132.par 0 Image: Beckhoff Module (1).par 0 Image: Beckhoff EL4132.par 0	5.05.2020 13:03	RA Database
Image: Digital Out, par O Image: Digital MeterLed (1V), par O	5.05.2020 13:03	RA Database
Image.par 0 Im	4.05.2020 12:27	RA Database
Image: Beckhoff EK1100.par 0 Image: Beckhoff EL1018.par 0 Image: Beckhoff EL2008.par 0 Image: Beckhoff EL2008.par 0 Image: Beckhoff EL4132.par 0 <t< td=""><td>5.05.2020 13:16</td><td>RA Database</td></t<>	5.05.2020 13:16	RA Database
Image: Beckhoff EL1018.par 0 Image: Beckhoff EL2008.par 0 Image: Beckhoff EL4132.par 0 Image: Beckhoff EL414.par 0 <tr< td=""><td>4.05.2020 12:25</td><td>RA Database</td></tr<>	4.05.2020 12:25	RA Database
Image: Beckhoff EL2008.par 0 Image: Beckhoff EL4132.par 0 <t< td=""><td>5.05.2020 11:53</td><td>RA Database</td></t<>	5.05.2020 11:53	RA Database
Image: Beckhoff EL4132.par 0 Image: Beckhoff Module (1).par 0 Image: Beckhoff EL4132.par 0 Image: Beckhoff Module (1).par 0 Image: Beckhoff EL4132.par 0	5.05.2020 11:48	RA Database
BeckhoffModule (1).par ButtonControl.par ButtonControl.par DigitalMeterLcd (1V).par DigitalMeterLed (1V).par DigitalModule (1).par DigitalModule (1).par	5.05.2020 12:06	RA Database
ButtonControl.par DigitalMeterLcd (1V).par DigitalMeterLed (1V).par DigitalMeterLed (1V).par DigitalModule (1).par	4.05.2020 12:40	RA Database
DigitalMeterLcd (1V).par DigitalMeterLed (1V).par DigitalMeterLed (1V).par DigitalModule (1).par	4.05.2020 12:41	RA Database
DigitalMeterLed (1V).par DigitalModule (1).par	4.05.2020 15:06	RA Database
DigitalModule (1).par 0	4.05.2020 12:48	RA Database
	4.05.2020 12:33	RA Database
L DigitalModule (2).par 0	4.05.2020 12:33	RA Database
GenericGraph.par 2	7.08.2020 16:23	RA Database
• • •		
Dateiname:	Files (* a	ar)

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2.3.6 Buffers

Buffers can be used to share information with the programming interface between the PLC program and an outside application (see FlexAttach, part of the X-GO SDK). The buffer elements consist of the parameters Name, Size and a reference to the control variables BufferWait, BufferReset and BufferCond.

```
var["BufferWait"] = const[(0)]
var["BufferReset"] = const[(0)]
var["BufferCond"] = const[(0)]
buffer["MyBuffer" wait("BufferWait") reset("BufferReset") cond("BufferCond")
size(1000h)]
```

Prameters:

["buffer_name"] buffer name wait["name"] (in): if variable is set (1), buffering is suspended, else (0) buffering is active reset["name"] (in): if variable is set (1), buffering is reset, else (0) buffering is active condition["name"] (out): return buffer condition: BUFFER_EMPTY = 0 BUFFER_BUSY = 1 BUFFER_FULL = 2

size(x) (in): buffer size. If buffer is located multiple times within the PLC program, only the first location specifies the buffer size

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2.3.7 Standard Operators

X-GO provides almost all standard operators, like addition, subtraction, multiplication, division, negation, greater than, less than.

var["Limit"]	=	<mark>i</mark> n[station	(1)	<mark>d</mark> (0)	<mark>m</mark> (1)] + <mark>c</mark> [(1000)]	;Addition
<mark>v</mark> ar["Hold"]	=	<mark>i</mark> n[station	(2)	<mark>d</mark> (0)	<mark>m</mark> (FFFFh)] < <mark>c</mark> [(2000)]	;if less than 2000 the
						;result becomes 1 else 0

Operator	Туре	Result
&	LOGIC_TYPE_AND	Element1 & Element2
	LOGIC_TYPE_OR	Element1 Element2
۸	LOGIC_TYPE_XOR	Element1 ^ Element2
~	LOGIC_TYPE_NOT	Element1 & (~Element2)
+	LOGIC_TYPE_PLUS	Element1 + Element2
-	LOGIC_TYPE_MINUS	Element1 - Element2
<	LOGIC_TYPE_LESS	(Element1 < Element2) ? 1 : 0
^	LOGIC_TYPE_GREATER	(Element1 > Element2) ? 1 : 0
*	LOGIC_TYPE_MUL	Element1 * Element2
/	LOGIC_TYPE_DIV	Element1 / Element2
?	LOGIC_TYPE_COND	Element1 ? Element2 : 0
:	LOGIC_TYPE_NOTCOND	Element1 ? 0 : Element2
#	LOGIC_TYPE_CMP	(Element1 == Element2) ? 1 : 0

2.3.8 Conditional Operators

Conditional operators result with element2 on condition of element1, if the result is logical true, and 0 if the result is false

j	ump["MyLabel"]	=	var["Hold"]	?	<mark>c</mark> onst[(1)]	;Jump	if	<pre>var["Hold"]</pre>	>	0
j	ump["MyLabel"]	=	var["Hold"]	?	<mark>c</mark> onst[(0)]	;Jump	if	<pre>var["Hold"]</pre>	=	0

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2.3.9 Jumps

Typically all programming languages provide conditional or unconditional jumps. X-GO Flex provides 3 jump types, conditional, unconditional and conditional wait.

2.3.9.1 Conditional Jump

Conditional jumps are proceeded due to the result of a conditional. The destination of the jump is the label line

jump["MyLabel"] = <mark>v</mark>ar["Hold"] # <mark>c</mark>onst[(5)]



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2.3.9.2 Unconditional jump

A unconditional jump is immediately executed. The destination of the jump is the label line

jump["MyLabel"]

Line 0		
Line 1	jump["MyLabel"]	
Line 2		
Line 3		
Line 4	{"MyLabel"}	
Line n		

2.3.9.3 Conditional Wait

Conditional wait keeps the line position while "result == TRUE". On "result == FALSE" the destination of the jump is the next line

Line 0		yes
Line 1	jump[""] = var["Hold"] ? Const[(5)]	
Line 2		↓

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2.3.10Functions

X-GO Flex provides a set of PLC functionality, like TIMER, COUNTER, THRESHOLD,Each function may be used as language element inside the PLC program. A function consists of the FunctionName followed by parameters.

Var["Result"] = function["Name", Param1, Param2, Param3, ...)

Each function parameter may be a value or a reference. Each function returns a value.

Value:	val***(x)	e.g.	valPosistion(2)
Reference:	ref***("VarName")	e.g.	<pre>ref ("Trigger")</pre>

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2.3.10.1 Function Timer

Timers may be used as periodic or single-shot timer. The timer function is defined by the parameter order FunctionName, DelayTime, SignalTime, OnceFlag, ResultLow, ResultHigh, ResultEnd and TriggerFlag. Each parameter may be a reference to a variable (prefix r), or a constant value (prefix v). The timer resolution is 1 msec.



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2.3.10.2 Function Counter

The counter function is defined by the parameter order FunctionName, IntervalCount, RepeatCount, TriggerFlag, and upto 5 positions. Each parameter may be a reference to a variable (prefix r), or a constant value (prefix v). The position parameter is define with X and Y steps. The counter function makes use of a matrix which allows a wide range of use. The matrix is defined by counter positions (x/y). The gap between 2 positions is divided into steps given from the x distance:

e.g. pos1 = (0, -10) pos2 = (10, 10) -> 10 Steps resulting (counter = -10, -8, -6, -4, -2, 0, 2, 4, 6, 8, final 10)

Counters may be used as periodic or single-shot counter. The step time of a counter is based on the given sampling time (typically 100 µsec). This time may be multiplied by the parameter IntervalCount. The RepeatCount is the number of the periodically repeation of the matrix. A RepeatCount of -1 means endless repeation.

e.g.

var["Trigger"] = const[(1)]
var["Result"] = function["Counter" valInterval(100) valRepeat(3) ref("Trigger")
pos(0, -10) pos(10,10) pos(20,10) pos(30,0)]



Note: Calculation of $Y_{step} = (long)$ $(Y_n - Y_{n-1})$ $(X_n - X_{n-1})$

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2.3.10.3 Function Threshold

The threshold function is defined by the parameter order FunctionName, Level, HoldLevel, Deviation, ResultUp, ResultDown and ResultHold. Each parameter may be a reference to a variable (prefix r), or a constant value (prefix v).

e	•	g	•
e	•	y	•

```
var["Level"] = in[station (2) data(0) mask(FFFFh)]
var["Result"] = function["Threshold" ref("Level") valHoldLevel(25) valDeviation(10)
valResultUp(4), valResultDown(1), valResultHold(2)]
```

Definition:



Result = ResultDown Result = ResultUp Result = ResultHold



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2.3.10.4 Function Shift(Left/Right)

The function Shift(Left/Right) is defined by the parameter order FunctionName, Value, and Shift. Each parameter may be a reference to a variable (prefix r), or a constant value (prefix v).

e	•	g	•

```
var["Value"] = const[(11223344h)]
var["Result"] = <mark>f</mark>unction["ShiftLeft" <mark>r</mark>ef(``Value") valShift(8)]
var["Result"] = function["ShiftRight" ref(``Value") valShift(16)]
```

Definition: Result = Value << Shift

2.3.10.5 Function Compare

The function Compare is defined by the parameter order FunctionName, Comperand1, Comperand2, ResultEqual and ResultNotEqual. Each parameter may be a reference to a variable (prefix r), or a constant value (prefix v).

e.g.

Definition: if (Value1 == Value2) { Result = valEqual; } else { Result = valNotEqual; }

2.3.10.6 Function BitTst

The function BitTst is defined by the parameter order FunctionName, Value, Bit, ResultEqual and ResultNotEqual. Each parameter may be a reference to a variable (prefix r), or a constant value (prefix v).

e.g.

```
<mark>v</mark>ariable["Value"] = <mark>c</mark>onst[(4)]
<mark>v</mark>ar["Result"] = <mark>f</mark>unction["BitTst" <mark>r</mark>ef("Value") valBit(2) <mark>v</mark>alEqual(4) <mark>v</mark>alNotEqual(5)]
```

Definition: if (Value & (1<<Bit)) { Result = valEqual; } else { Result = valNotEqual; }

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2.4 FlexExtend

The X-GO Software Development Kit (SDK) allows the extension of the X-GO PLC language with new functional modules. With a simple programming interface new functional modules can be developed and used in the PLC program. For example Drive modules for complex curve control, or encoder modules may be added.

2.4.1 Function Encoder

The encoder function of FlexExtend provides a counter value for the encoder signals A, B and Reset. The encoder function is defined by the parameter order SignalA, SignalB and Reset. Each parameter may be a reference to a variable (prefix r), or a constant value (prefix v).

e.g.

v	ar["SignalA"]	=	<mark>i</mark> n[station	(2)	<mark>d</mark> ata(0)	<mark>m</mark> ask(1)]	;Get	SignalA	of	incremental	encoder
v	ar["SignalB"]	=	in[station	(2)	<mark>d</mark> ata(0)	<mark>m</mark> ask(2)]	;Get	SignalB	of	incremental	encoder
v	ar["Reset"]	=	in[station	(2)	<mark>d</mark> ata(0)	<mark>m</mark> ask(4)]	;Get	Reset si	gna	al	
v	ar["Result"]	=	<mark>f</mark> unction["E	ncod	le" <mark>r</mark> ef(`	`SignalA")	<mark>r</mark> ef	("SignalE	3″)	ref("Reset"))]



For more information about FlexExtend see the manual of the X-GO Software Development Kit (SDK)

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Sample Program:

```
{"Start"}
var["DigIn1"] = in[ station(0.1.0) data(0) mask(FFFFh)] ;Digital Input
var["DigIn2"] = in[ station(0.2.0) data(0) mask(FFFFh)]
                                                            ;Digital Input
variable ["Trigger"]
                     = const[(1)]
variable ["ResultHigh"] = const[(4)]
variable ["ResultLow"] = const[(5)]
variable ["ResultEnd"] = const[(8)]
variable ["Timer1"] = function["Timer" valDelay(1000) valSignal(1000) ref("Once")
               ref("ResultLow") ref("ResultHigh") ref("ResultEnd") ref("Trigger")]
jump["MyLabel"] = var["Timer1"] ? const[(4)] ;Jump if timer result is 4
var["BufferWait"] = const[(0)]
var["BufferReset"] = const[(0)]
buffer["Buffer1" wait("BufferWait") reset("BufferReset") size(1000h)] = var["Timer1"]
{ "MyLabel" }
var["Counter1"] = function["Counter" valInterval(10) valRepeat(-1) valTrigger(1)
                   pos(0, -10) pos(10, 10) pos(20, 0)]
out[station(0.1.0) data(0) mask(FFFFh)] = var["Counter1"]
```

2.4.2 Function ConvertEndian

The function "ChangeEndian" changes a value to Big/LittleEndian. The function is defined by the parameter order Value and Size. Each parameter may be a reference to a variable (prefix r), or a constant value (prefix v).

e.g.

```
var["Value"] = in[station (2) data(0) mask(-1)]
var["Result"] = function["ConvertEndian" ref("Value") varSize(4)]
```

2.4.3 Function Delay

The function "Delay" implies a timer which is used as functional delay in units of [msec] by returning a binary result value (TRUE / FALSE). Each parameter may be a reference to a variable (prefix r), or a constant value (prefix v).

e.g.

```
var["Reset"] = const[(0)]
var["Done"] = function["Delay" ref("Reset") valDelay(10000)]
```

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2.4.4 PneumaticMotion

The function "PneumaticMotion" is used to drive a pneumatics cylinder due to a proportional valve. Therefore the parameter "ParamDist" is measured by a sensor, while the parameter "ParamProp" drives a proportional valve. The parameter mode defines the motion ramp (1: linear, 2: progressive, 3: degressive), defined by 3 points:

x1 , pressure1 X2 , pressure2 X3 , pressure3

Each parameter may be a reference to a variable (prefix r), or a constant value (prefix v).

e.g.

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2.5 FlexExchange

To make use of the FlexExchange Module the X-GO Software Development Kit (SDK) is required. The FlexExchange module allows easily connecting external applications to the X-GO PLC program. The whole logic stack is accessible via shared memory, so that PLC data can be processed directly with your C # or C + + program, via exported PLC variables and multiple buffers.

2.5.1 Buffer Exchange

Buffers can be used to share information with the programming interface between PLC program and any outside application. Therefore 2 interface functions are available:



Xgo32/64DetachFromBuffer(hBuffer); Xgo32/64DetachFromBuffer(hBuffer);

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e.g. set value to buffer

```
var["BufferVal"] = const [(11223344h)]
var["BufferWait"] = const [(0)]
var["BufferReset"]= const [(0)]
var["BufferCond"]
buffer["InBuffer" wait("BufferWait")
    reset("BufferReset")
    cond("BufferCond")
    size(10000h)] = var["BufferVal"]
```

e.g. get value from buffer

```
var["BufferVal"]
var["BufferWait"] = const [(0)]
var["BufferReset"]= const [(0)]
var["BufferCond"]
var["BufferVal"]= buffer["OutBuffer" wait("BufferWait")
reset("BufferReset")
cond("CondFlag")
size(1000h)]
```

2.5.2 Buffer Synchronization

With the BufferWait flag buffers can be synchronized between PLC program and outside application. Also the buffer can be resetted from both sides using the flag BufferReset. The condition indicates following buffer states:

- BUFFER_FULL
- BUFFER_BUSY
- BUFFER_EMPTY

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2.6 FlexDebug

The FlexDebug allows breakpoints and single line execution of the PLC program. Each program line will be evaluated separately, while its result is updated inside FlexMonitor and FlexPanel. Flex Debug allows constant repositioning of the current execution line. When the program is running, it's interrupted on pressing the BREAK button. On BREAK, you can change or display values associated to FlexPanel elements.



2.6.1 Setting a Breakpoint

A breakpoint is set on pressing the left mouse button at the selected line. Press the GO button to run the program until the breakpoint is reached

Deb	ug	
	34:	A
	35:	; Enable
	36:	{"DriveEnable"}
	37:	var["TargetPos"] = var["ActPos"]
	38:	<pre>var["Done"] = function["DriveEnable" ref("Reset") ref("Control") ref("Status")]</pre>
	39:	<pre>var["Reset"] = var["Done"]</pre>
	40:	<pre>var["State"] = var["State"] + var["Done"]</pre>
	41:	jmp["End"]
	42:	
	43:	; Homing
	44:	{"DriveHoming"}
	45:	<pre>var["OpMode"] = const[(6)]</pre>
	9 46:	<pre>var["Done"] = function["DriveHoming" ref("Reset") ref("Control") ref("Status")]</pre>
	47:	<pre>var["Reset"] = var["Done"]</pre>
	48:	<pre>var["State"] = var["State"] + var["Done"]</pre>
	49:	jmp["End"]
	50:	
	51:	; CyclicSynchPos
	52:	{"CyclicSynchPos"}
	53:	<pre>var["OpMode"] = const[(8)]</pre>
	54:	<pre>var["Done"] = function["CyclicSynchPos" ref("Reset") ref("Control") ref("Status") ref("ActPo</pre>
	55:	<pre>var["Reset"] = var["Done"]</pre>
	56:	<pre>var["State"] = var["State"] + var["Done"]</pre>
	57:	jmp["End"]
	58:	
	59:	; Disable V
	60:	
S	itate: BREA	Break Step Go OK



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^
ctPo
~
>

Note:

When pressing the STEP button the line will be executed. Comment lines are stepped as NOP command

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2.6.2 Setting an execution line

When pressing the right mouse button at any line, the execution will be set to this line



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2.6.3 Logic Check

X-GO provides a PLC program check while stepping. Thus, e.g. endless loops will be recognized.

*** Error at Line 19, Line will be ignored ***	
0: {"Start"} 1: 2: v["LiftSensor1" m(2)] = i[s(1) d(0) m(2)] 3: v["LiftValve1"] = c[(0)] 4: v["NickValve1"] = c[(7FFFh)] 5: v["NickValve2"] = c[(0)] 6: v["TurnValves"] = c[(0)]	
7: v["TurnTimer" m(-1)] = t[s(30000) p(40000)] ? c[(1)] 8: v["StartTimer"] = t[s(20)] ? c[(1)] 9: 10: j = v["StartTimer"] ? {"End"} ;Jump equal 11: v["LiftValve1"] = c[(7FFFh)] 12: v["NickValve1"] = c[(7FFFh)] 13: 14: i = v["LiftSeneer1"] # ("LiftTimer") ;Jump not equal	
<pre>15: v["LiftTimer"] = c[(1)] 16: v["LiftCount"] = v["LiftCount"] + c[(1)] 17: 18: {"LiftTimer"} 19: j = {"LiftTimer"} 20: 21: j = v["LiftTimer"] # {"NickTimer"} 20: 21: j = v["LiftTimer"] # {"NickTimer"} 20: 10: 10: 10: 10: 10: 10: 10: 10: 10: 1</pre>	_
23: 24:	>

The error line will be ignored when pressing the button twice.

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2.7 FlexPanel (HmiDesignBox)

The Flex Panel module allows the photorealistic design and integration of machine panel instruments and controls, like meters, switches, modules and backgrounds - without programming. You can use images and graphics of your machine instruments, overlaid by corresponding software templates and simply linked to PLC program variables. The overlay of the software templates is carried out through simple adjustment of the parameter files. Additionally new templates can be programmed and integrated with the X-GO Software Development Kit (SDK).

Pre-defined panel images:





т

DigitalControlOff

.bmp

Motion.bmp



DigitalControlER R.bmp



Manometer 6Bar.bmp



AnalogControl (1).bmp



DigitalControlOn. bmp



Phoenix Module1 (400).bmp



AnalogControl_1. bmp

DigitalMeter2.bm

p

Phoenix Module2

(400).bmp



AnalogMeter(102 4).bmp



川目にに Beckhoff.bmp

LcdMeter.bmp Led.bmp



LedMeter.bmp

VoltMeter.bmp

Pre-defined panel functions:

- AnalogMeter
- DigitalMeter
- LinearMeter
- AnalogControl
- DigitalControl
- DigitalModule
- GenericGraph •
- Monitor •
- Motion

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Sample: Parameter File for AnalogMeter Panel:

String	g [Images\\Volt	tMeter.bmp]	//Image file
String	g [AnalogMeter	r]	//Function name
String	ŋ []		//Unit name
Value	[0]	//ShowTitle	e;
Value	[0]	//MinVal;	
Value	[30]	//MaxVal;	
Value	[1000]	//Scale;	
Value	[203]	//MagXCenti	re;
Value	[240]	//MagYCenti	re;
Value	[0]	//MagXOffs;	;
Value	[60]	//MagYOffs;	;
Value	[180]	//MagLen;	
Value	[45]	//AngleOffs	s;
Value	[88]	//AngleSpar	n;
Value	[0]	//UnitXOffs	5
Value	[0]	//UnitYOffs	5
Value	[200]	//UnitFontS	Size
Value	[0x00646464]	//ColorOk	
Value	[0x00000FF]	//ColorErr	

2.7.1 Panel parameter

To overlay a software panel template on a given image, simply adjust the parameter set. This can be done with any editor while X-GO is running. The default parameters set files are stored within the directory \Params, while corresponding images are stored within \Params\Images as files of Windows bitmap type BMP. To adjust the template element positions, like magnitude, unit offset, font size, by pressing the key [F5] the coordinates are shown in the left-top corner inside the panel dialog. When pressing the key [F4] the movement of the panel is adjusted to a grid.





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2.7.2 Panel selection

For selecting a panel just right-click on a variable inside the Variable Information dialog.

Logic Debug ?	X-GO32 Flex Logic	: Fielbus Control (M:\Xgo	32\App\Logic (ILB).par)	- □
02.2014 09:15:56 >	Welcome to X-G032 Flex		12 1/		
)2.2014 09:16:09 > _	Logic ready			Di-0.44 (0.500) C	
2	Variable Information	1000		DigOuti - [0.500] Sc	cale: 10
12 ◆ 0 - DigIr 12 ◆ 1 - DigIr 12 ◆ 2 - Trigg 12 ◆ 3 - Result 12 ◆ 4 - Result 12 ◆ 5 - Result 12 ◆ 6 - DigOt 12 ◆ 6 - DigOt 12 ◆ 7 - Test1 12 ◆ 8 Buffet 10 • 9 - Buffet 10 - Resu: 0 - MyBut	n1 : [4386] [0x00001122] n2 : [8192] [0x00002000] ger : [1] [0x00000001] ltHigh : [4] [0x0000004] ltLow : [5] [0x0000008] utl : [5] [0x0000008] utl : [5] [0x0000000] erWait : [0] [0x0000000] erReset : [0] [0x0000000] lt3 : [0] [0x0000000] ffer : BIndex [0] FIndex [0] :	Lead [0]	0	0.2 0.4 0.6	0.8 111111111 L KL 2.5
161		örr			and the second se
NEA		Offnen			
	Dieser PC → Windows 8.1 (32-Bit) (C:) → X	GO → Params		* U Parainis	s uurchsuchen p
Crganisieren → Neu	Dieser PC → Windows 8.1 (32-Bit) (C:) → X Ier Ordner	GO → Params		* U Falailis	
Correct Correct Correction	Dieser PC → Windows 8.1 (32-Bit) (C:) → X ier Ordner Name	GO > Params	Тур	Größe	
Crganisieren ♥ Neu	Dieser PC > Windows 8.1 (32-Bit) (C:) > X uer Ordner Name	GO > Params Änderungsdatum 04.02.2014 20:51	Typ Dateiordner	Größe	
Crganisieren → Neu Pieser PC Bilder	Dieser PC Windows 8.1 (32-Bit) (C:) X ier Ordner Name Images AnalogControl (1).par	GO > Params Änderungsdatum 04.02.2014 20:51 31.01.2014 19:20	Typ Dateiordner PAR-Datei	Größe	
Image: Constraint of the second s	Dieser PC → Windows 8.1 (32-Bit) (C:) → X er Ordner Name Images AnalogControl (1).par AnalogMeter (1A).par	Anderungsdatum 04.02.2014 20:51 31.01.2014 19:20 31.01.2014 19:08	Typ Dateiordner PAR-Datei PAR-Datei	Größe 1 KB 1 KB	
Crganisieren → Neu Dieser PC Bilder Dokumente	Dieser PC → Windows 8.1 (32-Bit) (C:) → X ier Ordner Name Images AnalogControl (1).par AnalogMeter (1A).par AnalogMeter (30V).par	Anderungsdatum 04.02.2014 20:51 31.01.2014 19:20 31.01.2014 19:08 06.02.2014 16:53	Typ Dateiordner PAR-Datei PAR-Datei PAR-Datei	Größe 1 KB 1 KB 1 KB	
KEA Crganisieren → Neu P Dieser PC Bilder Desktop Dokumente Dokumente Downloads	Dieser PC Windows 8.1 (32-Bit) (C:) X ier Ordner Name Images AnalogControl (1).par AnalogMeter (1A).par AnalogMeter (30V).par AnalogMeter (21(A).par	Anderungsdatum 04.02.2014 20:51 31.01.2014 19:20 31.01.2014 19:08 06.02.2014 16:53 05.02.2014 21:10	Typ Dateiordner PAR-Datei PAR-Datei PAR-Datei PAR-Datei	Größe 1 KB 1 KB 1 KB 1 KB 1 KB	
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Image: Constraint of the second s	Dieser PC Windows 8.1 (32-Bit) (C:) X er Ordner Name Images AnalogControl (1).par AnalogMeter (1A).par AnalogMeter (30V).par AnalogMeter2 (1A).par DigitalControl (1).par DigitalControl (1).par DigitalControl (1).par	Commen CGO → Params Anderungsdatum 04.02.2014 20:51 31.01.2014 19:20 31.01.2014 19:08 06.02.2014 16:53 05.02.2014 21:10 31.01.2014 19:45 23.01.2014 19:45 23.01.2014 18:15	Typ Dateiordner PAR-Datei PAR-Datei PAR-Datei PAR-Datei PAR-Datei PAR-Datei	 ♥ ♥ Parante Größe 1 KB 	
Image: Constraint of the second s	Dieser PC Windows 8.1 (32-Bit) (C:) X uer Ordner Name Images AnalogControl (1).par AnalogMeter (1A).par AnalogMeter (30V).par AnalogMeter2 (1A).par DigitalControl (1).par DigitalControl (1).par DigitalMeterLcd (1V).par	Commen CGO ▶ Params Anderungsdatum 04.02.2014 20:51 31.01.2014 19:20 31.01.2014 19:08 06.02.2014 16:53 05.02.2014 21:10 31.01.2014 19:45 23.01.2014 19:45 23.01.2014 18:16 02.02.2014 18:16	Typ Dateiordner PAR-Datei PAR-Datei PAR-Datei PAR-Datei PAR-Datei PAR-Datei PAR-Datei	Größe 1 KB 1 KB	
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Image: Constraint of the second s	Dieser PC Windows 8.1 (32-Bit) (C:) X uer Ordner Name Images AnalogControl (1).par AnalogMeter (1A).par AnalogMeter (30V).par AnalogMeter2 (1A).par DigitalControl (1).par DigitalMeterLcd (1V).par DigitalMeterLcd (1V).par DigitalMeterLed (1V).par DigitalMeterLed (1V).par ChalogMeter2 (1A).par	GO > Params Anderungsdatum 04.02.2014 20:51 31.01.2014 19:20 31.01.2014 19:20 31.01.2014 19:08 06.02.2014 16:53 05.02.2014 21:10 31.01.2014 19:45 23.01.2014 19:45 23.01.2014 19:45 23.01.2014 18:16 02.02.2014 18:16 04.02.2014 15:09	Typ Dateiordner PAR-Datei PAR-Datei PAR-Datei PAR-Datei PAR-Datei PAR-Datei PAR-Datei PAR-Datei	 ▼ ○ Potentis Größe 1 KB 2 KB ▼ Files (*. 	s- uurchsuchen

Function Keys:

- F4: Lock to Grid. When pressing F4 the selected panel is moving along a grid.
- F5: Print Grid Position. When pressing F5, the grid position appears within the selected
- F6: Unlock for moving. The selected panel appears at the upper left corner and must be unlocked for moving by pressing the Key F6.
- F7: Delete the selected panel
- F8: Decrease Z-Order
- F9: Increase Z-Order

Note:

For the development of new panel functions, Sybera offers the X-GO Software Development Kit
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2.8 Background Image

If an image named ""MAINIMG.BMP" is present within the XGO directory, the image is used as background image for XGO. It may be used as panel background to build up a photo-realistic control desktop in combination with the AUTOSTART feature.



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3 X-GO Installation

For installation of the X-GO software following steps are required:

Preparation

- 1. Provide a PC with INTEL or REALTEK Ethernet adapter and Windows operating system with administrator
- 2. rights
- 3. Make shure, the latest Updates are installed (especially Windows 7)
- 4. Check the installed Ethernet adapter has given a correct IP address
- 5. Install the MFC redistributables DLLs (in Folder MISC \ REDIST)
- 6. Install Fonts (in Folder MISC \ FONTS)
- 7. Install MSXML redistributables (in Folder MISC \ MSXML)

Installation

- 8. Run the program SYSETUP32/64
- 9. (make sure the directory path has no space characters)
- 10. On Installation the PEC information (PID, SERNUM and KEYCODE) must be
- 11. entered. The SERNUM for the evaluation version is: 12345678,
- 12. the KEYCODE is: 00001111-22223333
- 13. Select Network card
- 14. Reboot the System

Optional: Install network card manually (see chapter 2.1) Optional: Check license with SYLICENCECHECK(32/64).EXE

Operation

15. Use additional Tools for device configuration

ProfiNET: Use PNIOVERIFY to generate device configuration file

EtherCAT: Use ECATVERIFY to generate device configuration file ECATDEVICE.PAR (to be placed in \WINDOWS\SYSTEM32)

Ethernet/IP: Use EIPCONFIG to generate device configuration file

Sercos III: Use editor to generate device configuration file SC3CONFIG (to be placed in \WINDOWS\SYSTEM32)

16. Run X-GO(32/64)

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Start installation program SySetup32/64 with administrator privileges



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Select windows processor count (typically Active - 1 is best)

Active	4	
New	1	ок

Select ethernet device and quit with button [OK]

	Selec	t Device	
Gigabit-Netzwerkverbing	lung Intel(R) 8257	SDM.	
			[]
		Install manually	ОК

Reboot the system

Installation compl System needs to	eted successfu reboot - do you	illy. want reboot now ?
	0	

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3.1 BIOS Adjustment

Note:

For proper operation, make sure within the BIOS the INTEL SpeedStep Technology, the INTEL TurboBoost Technology as well as the INTEL C-STATE Technology is turned off.

3.1.1 Disable Intel SpeedStep Technology

Enhanced SpeedStep — SpeedStep also modulates the CPU clock speed and voltage according to load, but it is invoked via another mechanism. The operating system must be aware of SpeedStep, as must the system BIOS, and then the OS can request frequency changes via ACPI. SpeedStep is more granular than C1E halt, because it offers multiple rungs up and down the ladder between the maximum and minimum CPU multiplier and voltage levels.

3.1.2 Disable C-States

C1E enhanced halt state — Introduced in the Pentium 4 500J-series processors, the C1E halt state replaces the old C1 halt state used on the Pentium 4 and most other x86 CPUs. The C1 halt state is invoked when the operating system's idle process issues a HLT command. (Windows does this constantly when not under a full load.). C0 is the operating state. C1 (often known as Halt) is a state where the processor is not executing instructions, but can return to an executing state essentially instantaneously. All ACPI-conformant processors must support this power state. Some processors, such as the <u>Pentium 4</u>, also support an Enhanced C1 state (C1E or Enhanced Halt State) for lower power consumption. C2 (often known as Stop-Clock) is a state where the processor maintains all software-visible state, but may take longer to wake up. This processor state is optional. C3 (often known as Sleep) is a state where the processor does not need to keep its <u>cache</u> coherent, but maintains other state. Some processors have variations on the C3 state (Deep Sleep, Deeper Sleep, etc.) that differ in how long it takes to wake the processor. This processor state is optional.

3.1.3 Disable TurboMode

Intel® Turbo Boost Technology automatically allows processor cores to run faster than the base operating frequency, increasing performance. Under some configurations and workloads, Intel® Turbo Boost technology enables higher performance through the availability of increased core frequency. Intel® Turbo Boost technology automatic allows processor cores to run faster than the base operating frequency if the processor is operating below rated power, temperature, and current specification limits. Intel® Turbo Boost technology can be engaged with any number of cores or logical processors enabled and active. This results in increased performance of both multi-threaded and single-threaded workloads.

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3.2 Jitter Control

Note: Since a notebook has a quiet different jitter behaviour than desktop systems, an enhanced jitter control mechanism is required. Therefore SYBERA provides a registry entry called "JitterCtrl". This entry allows an adaptive iteration to the best jitter behaviour of the notebook.

ei Bearbeiten Ansicht Favoriten ?				
🗈 🚞 Realtek Semiconductor Corp.	^	Name	Тур	Wert
🗈 🦲 Schlumberger		(Standard)	REG_SZ	
		CoreID	REG_DWORD	0×00000008 (8)
		a DestinationPath	REG_SZ	C:\SHA
		ItterCtrl	REG_DWORD	0×00000001 (1)
		MeyCode	REG_SZ	fee25bbc-b8fa165f
		👪 NoDynLoad	REG_DWORD	0×00000001 (1)
SHA		8 NoErrLog	REG_DWORD	0×00000000 (0)
		NoErrMsg	REG_DWORD	0×00000001 (1)
		and Pid	REG_SZ	e1a980ee
WinPcap		💩 SerNum	REG_SZ	12345678
	~	<		

Following values are valid:

- 0: No enhanced jitter control
- 1: Enhaced Jitter Control, Step 1 (first choice together with BIOS settings)
- 2: Enhaced Jitter Control, Step 2 (for INTEL platforms only)
- 3: Enhaced Jitter Control, Step 3 (for INTEL platforms only, together with BIOS settings)

Note:

In order to operate SYBERA software under VISTA or Windows 7, the program must be started with Administrator privilleges. It's not sufficient to be logged on as administrator, since VISTA or Windows 7 does not share the rights with the processes automatically.

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3.3 Autostart

Note: For frequent operation X-GO may be started with command line options:

AutoStartX-GO uses last saved startup parameters

	S Nomparionitat	Sichemen	Details
xgo 32.ex	e - Verknüpfung		
Ziełtyp:	Anwendung		
Zielort:	XGO		
Ziel:)\xgo32.exe Aut	toStart PosX	[700] PosY[10
Ausführen in:	C:\XGO		
Tastenkombination:	Keine		
Ausführen:	Normales Fenster		
Kommentar:			
Dateipfad öffnen	Anderes Symbo	I E	Erweitert



X position of the main window Y position of the main window

Note:

On Autostart, all Dialogs (Station Information, Variable Information and Value Dialogs) are hidden. The Main windows is minimized. Only Panel elements are displayed

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4 EtherCAT

When using X-GO EtherCAT following parameters have to be used:

1. NIC [07]	Test	
Period [µsec] 100	Sync Period [μsec] 2000	EtherCATT
		and the second s
Master Stack EtherCAT ProfiNET Ethernet/IP	LogicFile	

- 1.NIC Index of the first realtime Ethernet dirver (typically 0)
- Period Sampling period (typically 100 µsec)
- Sync Period Synchronisation (Update) Period (typically 2000 µsec)

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Note:

For proper EtherCAT operation its recommended to use the SERCOS III network as standalone network. This requires to turn off the Windows protocols for this network connection:

S Netzwerkverbindungen		
Datei Bearbeiten Ansicht Favoriten	Extras Erweitert ?	
🕲 Zurück + 🕥 + 🏂 🔎 Su	ichen 🝺 Ordner 🕼 🍞	× 9
Adresse 🔇 Netzwerkverbindungen		💌 🄁 Wechseln zu
Name Typ S	Status	Gerätename
A		
Assistent für neue V Assistent		
LAN-Verbindung 55 LAN oder V	/erbindung hergestellt	Intel(R) PRO/100 M Desktop Adapter #3
LAN-Verbindung 58 LAN oder V	erbindung hergestellt	X-Realtime ETH-Core [REA8168] #10
LAN-Verbindung 59 LAN oder N	Jetzwerkkabel wurde entfernt	Intel(R) PRO/1000 GT Desktop Adapter #10
N 🚽 Eigenschaften von LA	AN-Verbindung 58	? 🛛
Verbindung herstellen i iber		
Verbindung heistellen über.	• IREA91691#10	
	Kontigurieren.	
Diese Verbindung verwend	let folgende Elemente:	
QoS-Paketplaner		
The second	Version ь reiber	
🔲 🐨 Internetorotokoli (TCP/IP)	
Installieren	Deinstallieren Eigenschaften	
Beschreibung	atakali 6 ir 11 (ANI Matawarka, das das	
Datenaustausch über ve Netzwerke ermöglicht.	otokoli rui wAN-Netzweike, das den erschiedene, miteinander verbundene	
Symbol bei Verbindung Benachrichtigen, wenn keine Konnektivität bes	im Infobereich anzeigen diese Verbindung eingeschränkte od itzt	ler
-77		
	OK Abbred	chen

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4.1 XML Converter

Since the X-GO EtherCAT Master uses a native parameter format, the XML (ESI) device information has to be converted. The tool ECATVERIFY has implemented a XML parser which allows converting XML device information into native parameter information and save it into the file ECATDEVICE.PAR (to be placed in the directory \WINDOWS\SYSTEM32). For conversion the XML files must be placed in the directory where ECATVERIFY is located. The device which is to be converted may be searched within an XML file by its Name, Product Code, Vendor ID or Revision Number. It is also possible to convert the whole XML file to the native format. Devices which are already present in ECATDEVICE.PAR will be updated.

EL3102		
/endorID (hex)	ProductCode (hex)	Rev. Number (hex)
00000002	0c1e3052	0000000
		Curved 1
Conv	Convert File	

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4.2 PDO Configurator

The integrated PDO configurator allows easy determination of the EtherCAT PDO mapping. The PDO Configurator allows adding, removing, and deleting PDO mapping objects. With the PDO-Configurator devices located in the file ECATDEVICE.PAR can be listed or searched for editing the PDO mappings.

File			
C:\Windows\System32\ea	catdevice.par		Load
Name			
			Search
VendorID (hex)	ProductCode (hex)	Rev. Number (hex)	
PDO (RX)		PD0 (TX)	
Select Device			
	m	ОК АЫ	brechen
			_
Index (hex) PDO (hex)	BitSize (hex) Dir	isign TX isign RX	

Note:

Existing PDO-Mappings need to have an already listed PDO assignment (1C12 / 1C13). Otherwise the PDO mapping has to setup newly.

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New PDO mappings are entered by index, PDO and bit size for assigning it to the corresponding PDO mapping list (TX / RX).

File	Venetale in an		
L. Windows (Systems2	vecaluevice.pai		Load
SLVD-N-1 riple			Search
VendorID (hex)	ProductCode (hex)	Rev. Number (hex)	
10100089	100030001	J000003e8	
PDO [RX]		PDO [TX]	
 Index: [1603] · Valu Index: [1643] · Valu Index: [1643] · Valu Index: [1683] · Valu Index: [1683] · Valu 	e: [607a] - Size: [0020] e: [6840] - Size: [0010] e: [687a] - Size: [0020] e: [7040] - Size: [0010] e: [707a] - Size: [0020]	 Index: [1a03] - Value: [60] Index: [1a43] - Value: [68] Index: [1a43] - Value: [68] Index: [1a83] - Value: [70] Index: [1a83] - Value: [70] Index: [1a03] - Value: [60] 	64] - Size: [0020] 41] - Size: [0010] 64] - Size: [0020] 41] - Size: [0010] 64] - Size: [0020] ff] - Size: [0020]
Index (hex) PDO (he 1a03 60FF	x) BitSize (hex) Dir 20 • As: C As:	sign TX sign RX	

Selected PDO mappings may be deleted by pressing the key "DELETE".

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The new PDO mapping entries can be moved to the appropriate position. For this, the corresponding entry is selected to be moved and swapped with the entry of the desired position by clicking on it.

	ol		
L: \Windows\System3	ZNecatdevice.par		Load
Name			
SLVD-N-Triple			Search
/endorID (hex)	ProductCode (hex)	Rev. Number (hex)	
01000089	00030001	000003e8	
PDO (RX)		PDO [TX]	
 Index: [1603] - Va Index: [1643] - Va Index: [1643] - Va Index: [1683] - Va Index: [1683] - Va 	lue: [607a] - Size: [0020] lue: [6840] - Size: [0020] lue: [687a] - Size: [0020] lue: [7040] - Size: [0010] lue: [707a] - Size: [0020]	 Index: [1a03] · Value: [60] Index: [1a43] · Value: [68] Index: [1a43] · Value: [68] Index: [1a83] · Value: [68] Index: [1a83] · Value: [70] Index: [1a83] · Value: [70] Index: [1a03] · Value: [50] 	64] - Size: [0020] 41] - Size: [0020] 41] - Size: [0020] 41] - Size: [0020] 64] - Size: [0020] 64] - Size: [0020]
ndex (hex) PDO (h 1a03 60FF	ex) BitSize (hex) Dir 20	ign TX ign RX	

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Once configured, the device located in the file ECATDEVICE.PAR file is automatically updated and the value "length" of the corresponding FMMU-, SYNCMAN- and INPUT / OUTPUT descriptor entries is automatically updated.

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4.3 Device Parameter File

Usually device information is provided by a corresponding XML configuration file. Since the development of software with the EtherCAT Master Library has special needs for programming, the XML file must be parsed and translated into a native format. Therefore a configuration file named **ECATDEVICE.PAR** has to be generated with the tool **ECATVERIFY** and placed into the directory **\windows\system32**. The ECATDEVICE.PAR is a text based file with sections for Product Code, Name, SYNC Manager, FMMU Manager, SDO and Data Description. A new device description must start with the signature ">>>"

Sample:

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Note: With newer devices the configuration is stored inside the EEPROM. The EtherCAT Master Library is able to configure the devices by parsing the EEPROM information, even without XML file or Native file. But without using the configuration file, the configuration time increases by parsing EEPROM information. The Software ECATVERI-FY parses XML information and EEPROM information and converts it into the native format and gives additional help for configuration.

4.3.1 Section [NAME]

This section contains the name of the device:

[NAME] EL3102

4.3.2 Section [VENDOR]

This section contains the vendor ID of the device:

[VENDOR] 00000002

4.3.3 Section [CODE]

This section contains the product code of the device:

[CODE] 0C1E3052

4.3.4 Section [REVISION]

This section contains the revision number of the device:

[CODE] 00100000

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4.3.5 Section [SYNCMAN]

This section contains the binary data for the synchronisation manager of the device:

[SYNCMAN] 00 18 F6 00 26 00 01 00 F6 18 F6 00 22 00 01 00 00 10 00 00 24 00 00 00 00 11 06 00 20 00 01 00

Meaning:

Ad	dr	L	en	Cnt	r	ChE	ln		
					Sta	at	Res		
1									
00	18	F6	00	26	00	01	00	<-	SYNMAN0
F6	18	F6	00	22	00	01	00	<-	SYNMAN1
00	10	00	00	24	00	00	00	<-	SYNMAN2
00	11	06	00	20	00	01	00	<-	SYNMAN3

Parameter	relative address (offset)	Data type	Access type	Access type PDI	Value/description
Physical start address	0x0000	WORD	RW	R	
Length	0x0002	WORD	RW	R	
Buffer type	0x0004	Unsigned2	RW	R	0x00: buffered
					0x02: mailbox
Direction	0x0004	Unsigned2	RW	R	0x00: area shall be read from the master
			6		0x01: area shall be written by the master
reserved	0x0004	Unsigned1	RW	R	0x00
DLS-user event enable	0x0004	Unsigned1	RW	R	0x00: DLS-user event is not active
					0x01: DLS-user event is active (when area was accessed and is no longer locked)
Watchdog enable	0x0004	Unsigned1	RW	R	0x00: watchdog disabled
					0x01: watchdog enabled
reserved	0x0004	Unsigned1	RW	R	0x00
Write event	0x0005	Unsigned1	R	R	0x00: no write event
					0x01: write event
Read event	0x0005	Unsigned1	R	R	0x00: no read event
					0x01: read event

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reserved	0×0005	unsigned1	R	R	0x00
Mailbox state	0×0005	Unsigned1	R	R	0x00: mailbox empty
					0x01: mailbox full
Buffered state	0x0005	Unsigned2	R	R	0x00: first buffer
					0x01: second buffer
					0x02: third buffer
					0x03: buffer locked
reserved	0×0005	Unsigned2	R	R	0x00
Channel enable	0×0006	Unsigned1	RW	R	0x00: channel disabled
					0x01: channel enabled
Repeat	0×0006	Unsigned1	RW	R	
reserved	0×0006	Unsigned4	RW	R	0x00
DC Event 0 with Bus	0×0006	Unsigned1	RW	R	0x00: no Event
write					0x01: DC Event if master writes complete buffer
DC Event 0 with local	0×0006	Unsigned1	RW	R	0x00: no Event
write			← I→		0x01: DC Event if DL- user writes complete buffer
Channel enable PDI	0×0007	Unsigned1	R	RW	0x00: channel disabled
					0x01: channel enabled
RepeatAck	0×0007	Unsigned1	R	RW	shall follow repeat after data recovery
reserved	0×0007	Unsigned6	R	RW	0×00

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4.3.6 Section [FMMU]

This section contains the binary data for the FMMU manager of the device:

[FMMU] 06 00 00 01 00 00 00 0D 08 00 01 01 00 00 00 00 00 00 00 06 00 00 07 00 11 00 01 01 00 00 00

Meaning:

	Log	Addı	r(Of	fs)	L	en	Log	Star	tBit		Phy	vsSta	rtBi	t				
								Log	EndB	it		RdW	rEna	ble				
									Phy	sAdd	r		ChE	nabl	е			
0	0	00	00	00	01	00	00	00	0 D	08	00	01	01	00	00	00	<-	FMMU0
0	0	00	00	00	06	00	00	07	00	11	00	01	01	00	00	00	<-	FMMU1

Parameter	relative address (offset)	Data type	Access type	Access type PDI	Value/description
Logical start address	0x0000	DWORD	RW	R	
Length	0x0004	WORD	RW	R	
Logical start bit	0x0006	Unsigned3	RW	R	
reserved	0x0006	Unsigned5	RW	R	0x00
Logical end bit	0x0007	Unsigned3	RW	R	
reserved	0x0007	Unsigned5	RW	R	0x00
Physical start address	0x0008	WORD	RW	R	
Physical start bit	0x000A	Unsigned3	RW	R	
reserved	0x000A	Unsigned5	RW	R	0x00
Read enable	0x000B	Unsigned1	RW	R	0x00: entity will be ignored for read service
					0x01: entity will be used for read service
Write enable	0x000B	Unsigned1	RW	R	0x00: entity will be ignored for write service
					0x01: entity will be used for write service
reserved	0x000B	Unsigned6	RW	R	0x00
Enable	0x000C	Unsigned1	RW	R	0x00: entity not active
					0x01: entity active
reserved	0x000C	Unsigned15	RW	R	0x0000
reserved	0x000E	WORD	RW	R	0x0000

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4.3.7 Section [SDO]

This section contains the binary SDO data of the device:

[SDO] 00 20 2F 12 1C 00 00 00 00 00 00 20 2F 13 1C 00 00 00 00 00 20 2B 13 1C 01 00 1A 00 00 00 20 2B 13 1C 02 01 1A 00 00 00 20 2F 13 1C 00 02 00 00

Meaning:

NumServ Cmd Index					Sub	Inde	х					
						Dat	a					
00	20	2F	12	1C	00	00	00	00	00	<-	COE	Cmd0
00	20	2F	13	1C	00	00	00	00	00	<-	COE	Cmd1
00	20	2В	13	1C	01	00	1A	00	00	<-	COE	Cmd2
00	20	2В	13	1C	02	01	1A	00	00	<-	COE	Cmd3
00	20	2F	13	1C	00	02	00	00	00	<-	COE	Cmd4

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SDO Header Word and Command Byte

Frame part	Data Field	Data Type	Value/Description
CANopen Header	Number	Unsigned9	0x00
	Reserved	Unsigned3	0x00
	Service	Unsigned4	0x02: SDO Request
SDO	Size Indicator	Unsigned1	0x00: size of Data (14) unspecified
			0x01: size of Data in Data Set Size specified
	Transfer Type	Unsigned1	0x01: Expedited transfer
	Data Set Size	Unsigned2	0x00: 4 Octet Data
			0x01: 3 Octet Data
			0x02: 2 Octet Data
			0x03: 1 Octet Data
	Complete Access	Unsigned1	0x00
	Command	Unsigned3	0x01: Initiate Download Request

Sample:

COE Header 2000h :	SDO Request
SDO Cmd 2Fh :	Data in Data Set Size, exp. Transfer, 1 Oct. Data, Download Req.
Index 1C10h :	Sync Manager 0 PDO Assignment (UNSIGNED16)
Index 1C11h :	Sync Manager 1 PDO Assignment (UNSIGNED16)
Index 1C12h :	Sync Manager 2 PDO Assignment (UNSIGNED16)
Index 1C13h :	Sync Manager 3 PDO Assignment (UNSIGNED16)

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4.3.8 Section [OUTPUT] / [INPUT]

This section contains the output/input data description of the device:

[OUTPUT] 01 01 01 00 00 02 02 02 00 00 01 01 01 00 00 02 02 02 00 00 03 02 02 00 00

Meaning:

The output data is based on 6 data items:

Item Type (01 : DATA_ITEM_STATUS)
(02 : DATA_ITEM_VALUE)
(03 : DATA_ITEM_SCALE)

Data Type (01 : DATA_TYPE_U8) (02 : DATA_TYPE_U16)

Item Type

	Data	а Тур	е				
		Data	Ler	L			
				FMMU	JIr	ndex	
01	01	01	00	00	<-	Item	0
02	02	02	00	00	<-	Item	1
01	01	01	00	00	<-	Item	2
02	02	02	00	00	<-	Item	3
03	02	02	00	00	<-	Item	4
03	02	02	00	00	<-	Item	5

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5 ProfiNET

When using X-GO ProfiNET following parameters have to be used:

1. NIC [07]	Test	THE REAL PROPERTY OF	
Period [µsec] 100			
		A	
Master Stack	Configuration File		1
Master Stack C EtherCAT ProfiNET C Ethernet/IP	Configuration File C:\EIP\StationList.par LogicFile		Select
Master Stack C EtherCAT C ProfiNET C Ethernet/IP C SERCOS III	Configuration File C:\EIP\StationList.par LogicFile C:\XGO\Logic (Buffer).par		Select Select

1.NIC Index of the first realtime Ethernet driver (typically 0)

Period Sampling period (typically 100 µsec)

Configuration File Path to configuration file (e.g. STATIONLIST.PAR)

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Note: ProfiNET requires the Host PC to have a valid IP-Address. So, check the netadapter setting.

agement	
IP-Einstellungen können automat Netzwerk diese Funktion untersti Netzwerkadministrator, um die ge	isch zugewiesen werden, wenn das ützt. Wenden Sie sich andernfalls an der eeigneten IP-Einstellungen zu beziehen.
O IP-Adresse automatisch bez	riehen i
Folgende IP-Adresse verwe	nden:
IP-Adresse:	192.168.1.2
Subnetzmaske:	255.255.255.0
Standardgateway:	2 2 2
DNS-Serveradresse automa	tisch beziehen
Folgende DNS-Serveradress	sen verwenden:
Bevorzugter DNS-Server:	28 (34) Si
Alternativer DNS-Server:	
Einstellungen beim Beender	n überprüfen
	Frweitert

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5.1 Creating a configuration file

A ProfinetIO fieldbus system consists of several station devices (typically buscoupler devices). A station consists at least of one module (SLOT) and a module consists at least of one submodule (SUBSLOT). For proper operation the ProfinetIO devices needs first to be configured (by Station Name and IP) and a native STATIONLIST for operating the ProfiNET realtime library has to be created. Therefore SYBERA provides a program called PNIOVERI-FY.EXE.

nioVerify, Host IP: 192.168.1.80		×
Module Catalog	Configuration List	
Module Catalog Image: Construct of the state	Configuration List O RT (T_ID_ABS_PIR_V2_RT) O station5 ABS-PIR HMS Industrial Networks Vendor ID [0x010c] Device ID [0x0006] O Device ID [0x0006] O Device ID [0x0006] O Device ID [0x0006] O Device ID [0x00006] O Device ID [0x0000] Gateway [0.0.0] MAC [00.30-11-04-bd-90] Clock Factor: 32 Reduction Ratio: 8 Phase: 8 Watchdog Factor: 24 Datahold Factor: 24 Send Offset: fffffff Module ID [0x0000000] SlotNum [0x0000] SlotNum [0x0000] Submodule ID [0x00000003] Submodule ID [0x00000003] Submodule ID [0x00000003] Submodule ID [0x00000003] Submodule ID [0x00000003] SlotNum [0x0001] SlotNum [0x0001] SlotNum [0x0001] SlotNum [0x0001] SlotNum [0x0000] SlotNum [0x000] SlotNum [0x000] SlotNum [0x000] SlotNum [0x000] SlotNum [0x000] SlotNum [0x000] Sl	× 00
Scan Setup Diag	Connect Cancel	ок

Note: Make shure a valid IP address is provided for the network connection.

Note: If the application fails to run, check if the lastest Microsoft XML Parser has been installed. If not, install in the directory \APP\MSXML\MSXML6

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PNIOVERIFY allows creating a native stationlist by selecting modules from a module catalog (leftside view). The catalog get its entries by the provides GSDML files which must be present in the same directory as PNIOVERIFY. A module is inserted to the station list configuration (rightside view) by a DRAG and DROP operation (just drag a module from the catalog to the station list configuration). There are two types of modules:



5.2 Accesspoint Module

The accesspoint module keeps all information required for connecting to the fieldbus, as station name, IP parameters, MAC address, timing parameters. Therefore first task is to collect information about the ProfinetIO configuration by scanning the bus.

1odule Catalog		Configuration List	
	^	⊕ -	
⊞			
⊞ ⊡ DI 16			
		⊕ - 0: UNIGATE-CL-Profinet	
🖽 🖬 INPUT: 1 byte		⊕… 🖪 0: INPUT: 8 bytes	
🕀 🖪 INPUT: 2 bytes		⊕ I: OUTPUT: 8 bytes	
🕀 📑 INPUT: 4 bytes		⊕ -{D 0: ILB PN 24 DI16 DI016-2TX	
🕀 📑 INPUI: 8 bytes		E - E 0: DIU 16	
🖅 📑 INPUI: 16 bytes			
🖅 📑 INPUT: 32 bytes			
🕀 📲 INPUT: 64 bytes			
🕀 📑 UUIPUI: 1 byte			
🗄 🛄 UUIPUI: 16 bytes			
🗄 🖬 OUTPUT: 32 bytes			
🗄 🛄 UUIPUI: 64 bytes			
HIM INVUUT: 2 bytes			
HIM IN/UUI: 4 bytes			
HIM INVOLT: 3 Dytes			
□ - BT (FW V\-2 00)			
E BT IN 001 bute			
E BT IN 002 butes			
E BT IN 004 bytes	~		
		· · · · · · · · · · · · · · · · · · ·	
		DevNum 0 Period 100	
~			

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5.3 Station Settings

The scan gets information about manufacturer name and MAC address. Now individual assignment must set (e.g. IP address, station name, timings). On a right button click at the accesspoint module a dialog appears, which allows setting of station name, IP and timing parameters.

PnioVerify, Host IP: 192.168.1.80	l,	×
Module Catalog	-2TX /	Configuration List
Image: Constraint of the set station information Image: Constraint of the set station Image: Constraint of the set station Image: Constraint of the set station	tation5 Permanent	×
Image: Constraint of the second sec	92.168.1.5 55.255.255.0 .0.0.0 Permanent	(z.B. 192.168.0.2) (z.B. 255.255.255.0) (z.B. 0.0.0.0)
Image: Constraint of the sector Ima	0-30-11-04-bd-90 2 (z.B. 32) 4 (z.B. 24)	(z.B. 00-A0-45-03-96-90) (z.B. 8) Reduction Ratio 8 Phase 8 Datahold Factor 24 (z.B. 24)
		Cancel OK
	tup Diag	DevNum 0 Period 100 Connect OK

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The timing settings of each station are based on a clock unit of 31,25 µsec. The synchronisation period is calculated as follow:

SyncTime = 31,25 µsec * ClockFactor * ReductionRatio

(e.g. 31,25 µsec * 32 * 8 = 8000 µsec = 8 msec)

WatchdogTime = SyncTime * WatchdogFactor

(e.g. 8 msec * 24 = 192 msec)

The SendOffset must be set to 0xFFFFFFF

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5.4 Functional Module

Each station typically consists of multiple functional modules (SLOT 1..n). Function Modules have to be inserted from the catalog by DRAG and DROP operations. As well the nmodules may be sorted below the AccessPoint. A station configuration should contain all functional modules (in the order these modules are physically connected). When inserting a new module from the catalog, after dropping, it appears at the end of the configuration list and may be pushed to the correct slot location.

m PnioVerify, Host IP: 192.168.1.80	×
Module Catalog Configuration List	
Image: Second Secon	
DevNum 0 Period 100	
Scan Setup Diag Connect Cancel OK	

When the settings are done, the station my be initialized by pressing the button [Setup]

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The resulting stationlist is stored to a choosen text file (sample):

Sample:

> Station

00

>> Module

[NAME] T_ID_ABS_PIR_V2_RT [MOD_ID] 00 00 00 d0 [MOD_TYPE] 00 00 [SLOT_NUM] 00 00

>>> Submodule

>>> Submodule

>>> Submodule

[SUBMOD_ID]

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>>> Submodule

>> Module

>>> Submodule

>> Module

>>> Submodule

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5.5 Station Diagnostics

The station diagnostics allows gathering of I&M data, as well as reading and writing acyclic information (by API, SlotNum, SubSlotNum and RecordIndex). Therefore select an AccessPoint and press button [Diag].

] ≪_D ILB PN 24 DI16 DIO] 🖪 DIO 16] 🖪 DI 16	16-2TX	▲ E	D_ABS_PIR_V2_RT) ! bytes 102 bytes			
	et					
- BINPUT: 2 bytes	Diagnostics					
- 🖪 INPUT: 4 bytes	Chabian				Fuer Cada	
🗏 🖪 INPUT: 8 bytes	Station	station5	APHD	10	Effor Code	0x00
MINPUT: 16 bytes	Vendor ID	0x010c	Slot	0	Error Decode	0×00
- 🖪 INPUT: 32 bytes		1000100		1.		10.000
INPUT: 64 Dytes	Order ID	ABS-PIR	SubSlot	1	Error Code 1	0x00
	Serial Number	A0124ED0	Becord Index	0	Error Code 2	0.00
- BOUTPUT: 4 bytes	o ondi ri dimbor	A0124FD6	Theodel Index	Joxano	21101 0000 2	loxoo
- 🖪 OUTPUT: 8 bytes	Hardware Rev.	0x0004	Record Length	60		
- 🖪 OUTPUT: 16 bytes		-	D 10.			
🗏 🖪 OUTPUT: 32 bytes	Software Rev.	56-02-02-02	Record Data			
- 🖪 OUTPUT: 64 bytes	Rev. Counter	0,0000	00,20,00,38,01,	00.01.0c.41.42.	53,24,50,49,52,20,20,2	20,20,20,20
]~ 🖪 IN/OUT: 2 bytes		100000	20,20,20,20,20,20,	20,20,41,30,31,. 02.02.02.00.00.0	32,34,46,44,36,20,20,2	20,20,20,2 e
INTOUT: 4 Dytes	Profile ID	0xf600				63)
⊢∎ IN/001. 0 bytes ⊢∎ IN/011T: 16 butes	Drafile Tune					
IN/OUT: 32 bytes	Frome Type	U×UUU4	1			
	IM Version	0x0101				
🗠 🖪 IN/OUT: 64 bytes		1		Bead	Write	ПК
I⊷ 🖪 IN/OUT: 64 bytes I⊷ 🖪 IN/OUT: 128 bytes		0.001		incua .		OIX
🖪 IN/OUT: 64 bytes 🖪 IN/OUT: 128 bytes 🖪 BIDIR256	IM Supported	Juxuute				
IN/OUT: 64 bytes IN/OUT: 128 bytes IN/OUT: 128 bytes BIDIR256 BIDIR512	IM Supported	JUXUUTe				
IN/OUT: 64 bytes IN/OUT: 128 bytes IN/OUT: 128 bytes BIDIR256 BIDIR512 BIDIR1024	IM Supported					
	IM Supported					
- 11 IN/OUT: 64 bytes - 11 IN/OUT: 128 bytes - 12 BIDIR256 - 11 BIDIR512 - 11 BIDIR1024 - 12 RT (T_ID_ABS_PIR - 13 RT (FW V>=2.00) - 14 RT (T ID ABS PIR	IM Supported _V1) _V2 BT)					
	IM Supported _V1) _V2_RT)					
IN/OUT: 64 bytes IN/OUT: 128 bytes	IM Supported _V1) _V2_RT)					
IN/OUT: 64 bytes IN/OUT: 128 bytes	IM Supported _V1) _V2_RT]					
IN/OUT: 64 bytes IN/OUT: 128 bytes IDIR256 BIDIR512 BIDIR1024 BIDIR1024 RT (T_ID_ABS_PIR_ RT FO RT IN 001 byte RT IN 002 bytes RT IN 004 bytes	IM Supported _V1) _V2_RT]	juxuute				
IN/OUT: 64 bytes IN/OUT: 128 bytes	IM Supported _V1) _V2_RT]					

To read or write acyclic information, put in the API-ID, Slot, SubSlot and Record Index. If the function fails, you'll get the corresponding PNIO error code.

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6 Ethernet/IP

When using X-GO SERCOS III following parameters have to be used:

1. NIC [07]	Test	Create Brachalop Besson	T
Period [µsec]	-		
100		Are Disc Cross-Convector	
		Forward Crose Re	quest
Master Stack	Configuration File	3	
Master Stack	Configuration File C:\EIP\StationList.par	Select	1
Master Stack C EtherCAT C ProfiNET	Configuration File C:\EIP\StationList.par LogicFile	Select	
Master Stack C EtherCAT C ProfiNET C Ethernet/IP C SERCOS III	Configuration File C:\EIP\StationList.par LogicFile C:\XGO\Logic (Buffer).par	Select Select	

1.NIC	Index of the first realtime Ethernet driver (typically 0)
Period	Sampling period (typically 100 µsec)
Configuration File	Path to configuration file (e.g. STATIONLIST.PAR)

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Note: ProfiNET requires the Host PC to have a valid IP-Address. So, check the ethnet adapter setting.

IP-Einstellungen können autom Netzwerk diese Funktion unters Netzwerkadministrator, um die	atisch zugewiesen werden, wenn das stützt. Wenden Sie sich andernfalls an der geeigneten IP-Einstellungen zu beziehen.
O IP-Adresse automatisch b	eziehen
Folgende IP-Adresse verv	venden:
IP-Adresse:	192.168.1.2
Subnetzmaske:	255.255.255.0
Standardgateway:	2 4 4
DNS-Serveradresse auton	natisch beziehen
Folgende DNS-Serveradre	ssen verwenden:
Bevorzugter DNS-Server:	28 82 82
Alternativer DNS-Server:	
Einstellungen beim Beend	en überprüfen
	Frugitart

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6.1 Creating a configuration file

A Ethernet/IP fieldbus configuration consists typically of several station devices. A station device owns at least one connection. For proper operation the Ethernet/IP device needs first to be configured and a configuration file must be created. Therefore SYBERA provides a program called EIPCONFIG.EXE. When starting the program you will be asked for a already existing configuration file. If a file is present, choose it, otherwise just cancel the dialog.



Note: If the program fails to run, check if the latest Microsoft XML Parser has been installed. If not, install in the directory \APP\MSXML\MSXML6

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EIPCONFIG allows creating a configuration file by selecting devices and corresponding connections from a module catalogue (left side view). The catalogue gets its entries by the provided ESD files. A module is inserted to the configuration (right side view) by a DRAG and DROP operation (just drag a module from the catalogue to the station list configuration). There are two types of modules:

DipConfig	×
Wodule Catalog Image: Standard Structure Image: Standard	Station List
Scan Diag	Refresh Cancel OK


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6.1.1 Device Module

The device module keeps all information required for identifying to the fieldbus, such as station name, product code IP parameters, MAC address. Therefore, the first task is to collect information about the available devices by scanning the bus.

👔 EipConfig	
Module Catalog	Station List
Scanning stations	
Diag	Refresh Cancel OK

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6.1.2 Device Settings

The scan gets all information to identify the device. Now individual assignment must set (e.g. IP address and station name). On a right button click at the device module the "Set Device Information" dialog appears.

Module Catalog 	AENT Ethernet A Pack Exclusive Owne Pack Listen Only (8-b bly Exclusive Owner	dapter er (8-bit per slot) it per slot)	Station List	<mark>/B Ethernet Adapter</mark> Ethernet Adapter	Right Click
	et Device Informati Unique Name	ion Station2		x	
	Serial Number	1615014011			
	IP Address Subnet Mask Default Router	192.168.1.6 255.255.255.0 0.0.0.0	(z.B. 192.168.0.2) (z.B. 255.255.255.0) (z.B. 0.0.0.0)	 HARDWARE BOOTP DHCP 	
	MAC Address TCP Port	e4-90-69-9f-95-b4	(z.B. 00-A0-45-03-96-90) (z.B. 0xAF12)		
			Cancel	Set	
	S	can Diag	Refresh	Cancel	ОК

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6.1.3 Connection Module

Each device typically owns at least one connection module. Connection modules have to be inserted from the catalogue by DRAG and DROP operations. A station configuration must contain all functional modules in the correct order (the modules will be addressed in this order). When inserting a module from the catalogue, after dropping, it appears at the end of the configuration list and must be pushed to the correct location.



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6.1.4 Connection Settings

On a right button click at the device module the "Set Connection Information" dialog appears. Within the connection typically 3 elements need to be adjusted:

- RPI (Requested Packet Interval)
- Payload Size
- Chassis Size

EipConfig	9				X	
Module C	atalog 1 734-AENT Etherne .ogix Rack Exclusive O .ogix Rack Listen Only I Assembly Exclusive Owr Assembly Listen-Only	t Adapter wner (8-bit per slot) 8-bit per slot) ner	Station List • • • • • • • • • • • • •	ernet Adapter ^{her} net Adapter ner	_	
	Set Connection Info	rmation				×
	Name Path	Assembly Exclusive Owner				
	Trigger / Transpo	ort	Connection Param	eters		Default Assembly (Target)
	Supp. Class Trigger Type Transport Type	 Class 0 : NULL ✓ Class 1 : Duplicate Class 2 : Acknowledged Class 3 : Verified Class 3 : Verified Class 4 : Non-Blocking Class 5 : Non-Blocking, Frag Class 6 : Multicast, Fragmen ✓ Cyclic Change of State Application Listen Only Input Only ✓ Exclusiv Owner ⊂ Redundant Owner 	Supp. Size Header Type Inting Connection Type Priority	O2T ✓ fixed ✓ variable ✓ Modeless ✓ Zero Data Heartbeat ✓ 32Bit Run/Idle ✓ NULL ✓ Multicast ✓ Point to Point ✓ Low High ✓ Scheduled	T2O	[32 Bit] : 1 [16 Bit] Chassis Size : 1 [8 Bit] T2O Alignment : 0 [8 Bit] T2O Fixed Size per Slot : 1 [8 Bit] O2T Alignment : 0 [8 Bit] O2T Fixed Size per Slot : 1
	Direction TimeOut	☐ Server	RPI [usec] Size	0	8	Selected Value
	TickTime ☐ 1 msec ☐ 4 msec ☑ 1K msec	Multiplier TickNun	n 3			Cancel SET

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6.1.5 Device Diagnostics

The device diagnostics allows gathering all available attributes. Therefore, select a device within the configuration and press button [DIAG]. Now, the attribute information can be read or write to the device by its class ID, instance ID and attribute ID. For instance, reading or writing the device name has class ID : 0xF5, instance ID: 0x01 and attribute ID: 0x06 (see Ethernet/IP specification).

DipConfig	X
Module Catalog	Station List
Diagnostics: 1734-AENTR/B Ethernet Adapter IP: Class (hex) Instance (hex) Attribute (hex) F5 1 6 Data Binary (z.B. 00,11,22,33) 08 00 53 74 61 74 69 6f 6e 32 Offset Data ASCII -1 Read Write Only Bi Only AS	192.168.1.6
Scan Diag	Refresh Cancel OK

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Reading of attributes will be shown as binary data. Some attributes consist of a structured data. For instance string data consist typically of 2 bytes size trailing information and the ASCII chars following. Therefore an offset can be set, to separate these structure elements.

Class (he) F5	i) Instance (hi	ex) Attrib	ute (hex) —	
Data Binary 08 00	(z.B. 00,11,22,33	3)		
Offset	Data ASCII Station2			
Read		rite	Only Binary : Offset = -1 Only ASCIL - Offset = -0	ОК

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When pressing the button [OK] the configuration file will be saved. The resulting configuration is stored in a text file which must be provided to the Ethernet/IP Master for operation.

📄 StationList (AB1734).par - Editor	×
Datei Bearbeiten Format Ansicht ?	
 > Device	-
<pre>[UNIQUE_NAME] Station2 [PRODUCT_NAME] 1734-AENTR/B Ethernet Adapter [SERIAL_NUM] 7b 28 43 60 [TCP_PORT] af 12 [MAC_ADDR] e4 90 69 9f 95 b4 [IP_PARAMS] c0 a8 01 06 ff ff ff 00 00 00 00 00 [VENDOR_ID] 01 00 [DEVICE_TYPE] 0c 00 [PRODUCT_CODE] c4 00 [REVISION]</pre>	II.
04 03 >> Connection [NAME] Assembly Exclusive Owner [TICK_TIME] 0a [TICK_NUM] 03 [MULTIPLIER] 00 [TRANSPORT] 01 [02T_PARAMS] 07 48 [02T_FORMAT] 04 [02T_RPI] d0 07 00 00 [T20_PARAMS] 0c 28 [T20_FORMAT] 00 [T20_RPI] d0 07 00 00 [T20_SIZE] 01 00 00 00 [T20_SIZE] 03 00 00 00 [T20_SIZE] 04 00 00 00 [T20_SIZE] 05 00 00 [T20_SIZE] 05 00 00 [T20_SIZE] 06 00 00 [T20_SIZE] 07 00 00 [T20_SIZE] 08 00 19 00 10 00 00 [T20_SIZE] 09 00 10 00 00 10 0 10 0	
20 04 24 66 2c 64 2c 65 [ASSEMBLY_PATH]	
> Device	
4	

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7 SERCOS III

When using X-GO SERCOS III following parameters have to be used:

1. NIC [07]	2. NIC [07] (optional) Test 1 Test	
	Sync Period [µsec] 2000	
Master Stack C EtherCAT C ProfiNET	LogicFile	
SERCOS III	C:\XGO\Logic (Buffer).par	Select
		Cancel OK

1.NICIndex of the first realtime Ethernet driver (typically 0)2.NICIndex of the second realtime Ethernet driver (typically 1)Sync PeriodSynchronisation (Update) Period (typically 2000 µsec)

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Note: For proper operation of Sercos III its recommended to use the SERCOS III network as a standalone network. This requires to turn off the Windows protocols for this network connection:

Netzwerk	verbindungen	
Datei Bearbe	eiten Ansicht Favoriten Extras Erweitert ?	
G Zurück	- 🕥 - 🏂 🔎 Suchen 🍋 Ordner	≶ 🔀 🗙 🍤 🛄∙
Adresse 🛸 Ne	etzwerkverbindungen	💌 🄁 Wechseln zu
Name	Typ Status	Gerätename
Assistent fü	ir neue V Assistent	
🕹 LAN-Verbind 🔔 LAN-Verbind	dung 55 LAN oder Verbindung hergestellt dung 58 LAN oder Verbindung hergestellt dung 59 LAN oder Netzwerkkabel wurde entferr	Intel(R) PRO/100 M Desktop Adapter #3 X-Realtime ETH-Core [REA8168] #10 nt Intel(R) PRO/1000 GT Desktop Adapter #10
N	Eigenschaften von LAN-Verbindung 58 Allgemein Erweitert Verbindung berstellen über:	
	B X-Realtime ETH-Core [REA8168] #10 Konf	igurieren
	Diese Verbindung verwendet folgende Elemente:	ischaften das den bundene
	 Syntoi dei verbindung im modereich anzeigen Benachrichtigen, wenn diese Verbindung eingeschr. keine Konnektivität besitzt 	änkte oder
	OK	Abbrechen

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7.1 Sercos III Check

The tool SC3CHECK allows the adjustment of Addresses for Sercos III modules

NICO Index	NIC1 Index	Cycle Period [µsec]	
0	1	2000	Connect
Slave Index	Slave Address		
1	8		Update
Name			
Name NXIO_100-RE DevicelD	_S3S_FIXCFG		
Name NXIO_100-RE, DeviceID NXIO_100-RE,	_S3S_FIXCFG _S3S_FIXCFG		

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7.2 Configuration Parameter File

Usually device information is provided by a corresponding XML configuration file. Since the development of software with the SERCOS III Master Library has special needs for programming, the XML file must be parsed and translated into a native format. Therefore the SERCOS III Master Library provides a configuration file called **SC3CONFIG.PAR**, which is located in the directory **\windows\system32** after installation. The SC3CONFIG.PAR is a text based file with sections for Device Name, Device ID, configuration parameters and data description. All sections of a device must follow the item order:

NAME -> DEVICEID -> PARAM -> CONFIG -> DESC

00 01 04 03 04 00

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7.2.1 Section [NAME]

This section contains the name of the device:

[NAME] HCS01.1E-W0003-A-02-E-S3-EC-NN-NN-FW

7.2.2 Section [DEVICEID]

This section contains the device ID of the station:

```
[DEVICEID]
FWA-INDRV*-MPE-16
```

7.2.3 Section [PARAM]

This section contains the IDN and binary data for configuration:

[PARAM] S-0-32.0.0 (02 00)

7.2.4 Section [CONFIG]

This section contains the IDN list for the connections:

[CONFIG] S-0-0134.0.0 <0,0> S-0-0036.0.0 <0,0> S-0-0047.0.0 <0,0> S-0-0135.0.0 <1,1> S-0-0040.0.0 <1,1> S-0-0386.0.0 <1,1>

IDN

Connection Index
Telegam Type
<1,1>

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7.2.5 Section [DESC]

This section contains the output/input data description of the device:

[DESC] 00 00 01 01 02 00 00 00 04 02 02 00 00 00 04 03 04 00 00 00 04 03 04 00 00 01 01 01 02 00 00 01 04 02 02 00 00 01 04 03 04 00

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Telegram Type 00 : MDT (Output) 01 : AT (Input) Data Item 00 : DATA ITEM NONE 01 : DATA_ITEM_CCON 02 : DATA_ITEM_IOCTRL 03 : DATA_ITEM_IOSTAT 04 : DATA_ITEM_VALUE 05 : DATA ITEM SCALE 06 : DATA_ITEM_DIAG 07 : DATA ITEM NAME Data Type 00 : DATA TYPE NONE 01 : DATA TYPE $U\overline{8}$ 02 : DATA TYPE U16 03 : DATA TYPE U32 04 : DATA TYPE U64 05 : DATA TYPE 18 06 : DATA TYPE 116 07 : DATA TYPE I32 08 : DATA TYPE 164 09 : DATA TYPE F32 10 : DATA TYPE F64 Connection Index | Telegram Type | | Data Item | | | Data Type | | | Data Len 00 00 01 01 02 00 <- Desc 0 00 00 02 01 02 00 <- Desc 1 00 00 04 02 02 00 <- Desc 2 00 01 01 01 02 00 <- Desc 3 00 01 03 01 02 00 <- Desc 4 00 01 04 02 02 00 <- Desc 5 00 01 04 02 02 00 <- Desc 6

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8 Error Handling

X-GO and all implemented Master Stacks provides an error handling and tracing mechanism.

8.1 Debug LOG File

On execution X-GO creates sequence files in Text-Format:

EtherCAT:	ECATDBG.LOG
ProfiNET:	PNTDBG.LOG
Ethernet/IP:	EIPDBG.LOG
Sercos III:	SC3DBG.LOG

Note: These files are not accessible while X-GO is running

8.2 Event File

On execution X-GO logs error event to the Windows Event Manager. The X-GO software logs Application and System events. These events can be exported to a file and provided for support purposes.

🖥 Ereignisanzeige 🔲 🔲 🔀					
Datei Aktion Ansicht ?					
Ereignisanzeige (Lokal) Anwendung Sicherheit System ACEEventLog ASI Internet Explorer	Anwendung 3 Ereignis(se)				
	Тур	Datum	Uhrzeit	Quelle	Kategorie
	Fehler	10.12.2010	10:42:40	ETHDLL	(66)
	Informatio Informatio	10.12.2010 10.12.2010	09:48:17 09:29:41	MSSQL\$SQLEXPRESS MSSQL\$SQLEXPRESS	(2) (2)
	<). HII			>