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Beijer ELECTRONICS X2-BoX2 Serial comms FBs Codesys Library User Guide

Contents

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Beijer ELECTRONICS X2-BoX2 Serial comms FBs Codesys Library

Product Information

The Serial comms FBs – CODESYS library is a library for serial communication that is compatible with X2Control and BoX2Control devices with embedded CODESYS runtime. This library simplifies serial communications from the X2 Control to serial devices such as barcode readers, weigh scales, and printers. Most parameters are set with ENUMs to reduce errors. The FB can act as a manager for send/receive (for devices that need a prompt) or just cause the port to listen (for unsolicited messages). Message termination can be by terminating characters or receiving a predefined number of characters. All three serial ports of an X2 / BoX2 control can be used (COM1, COM2, and COM3).

Product Usage Instructions

To use the Serial comms FBs – CODESYS library:

1. Install the library file (*.compiled-library) to the CODESYS software on your PC.
2. Access the FBs as any blocks by following guidelines and descriptions.
3. Set most parameters using ENUMs to reduce errors.
4. Select whether the FB should act as a manager for send/receive or just cause the port to listen.
5. Select message termination by termination characters or receiving a predefined number of characters.
6. Use all three serial ports of an X2 / BoX2 control (COM1, COM2and COM3) for serial communication.

Quick start guide

Serial comms FBs – CODESYS library

- SER0001 – Quick start Serial communication
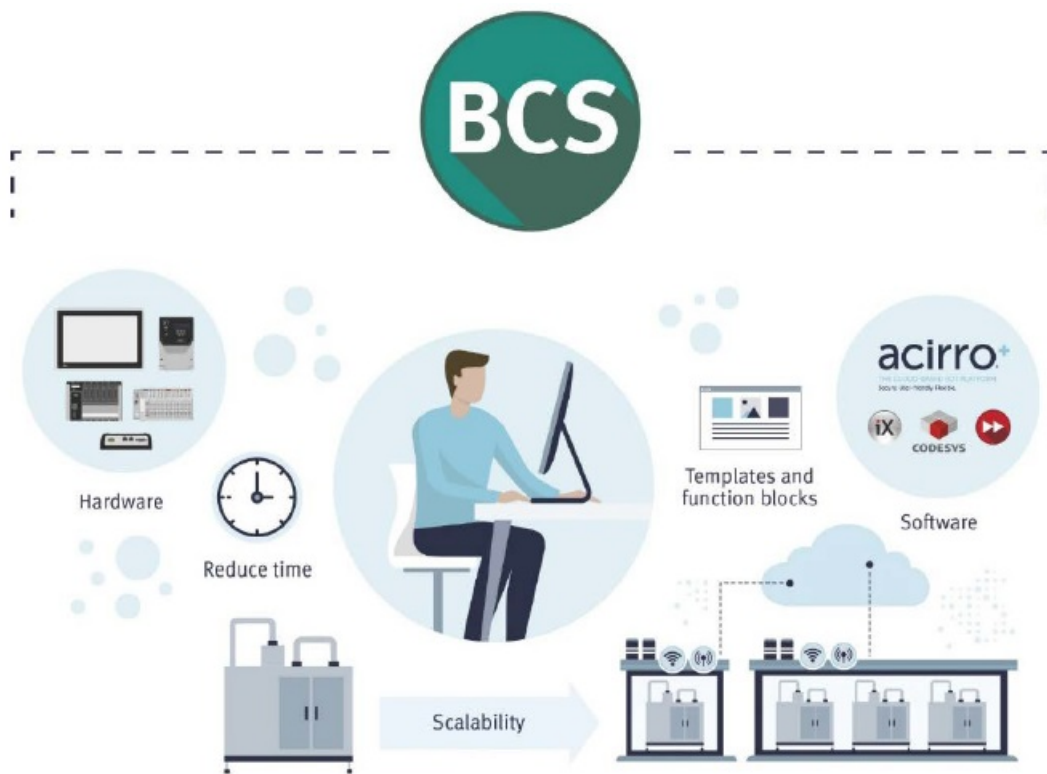
Function and area of use

- This document explains the CODESYS library for serial communication.
- Target device X2 / BoX2 control series, with embedded CODESYS runtime.

About this document

- This quick-start document should not be considered a complete manual. It is an aid to be able to start up a normal application quickly and easily.

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Use the following hardware, software, drivers, and utilities in order to obtain a stable application:

In this document, we have used the following software and hardware

- BCS Tools 3.34 or CODESYS 3.5 SP13 patch 3
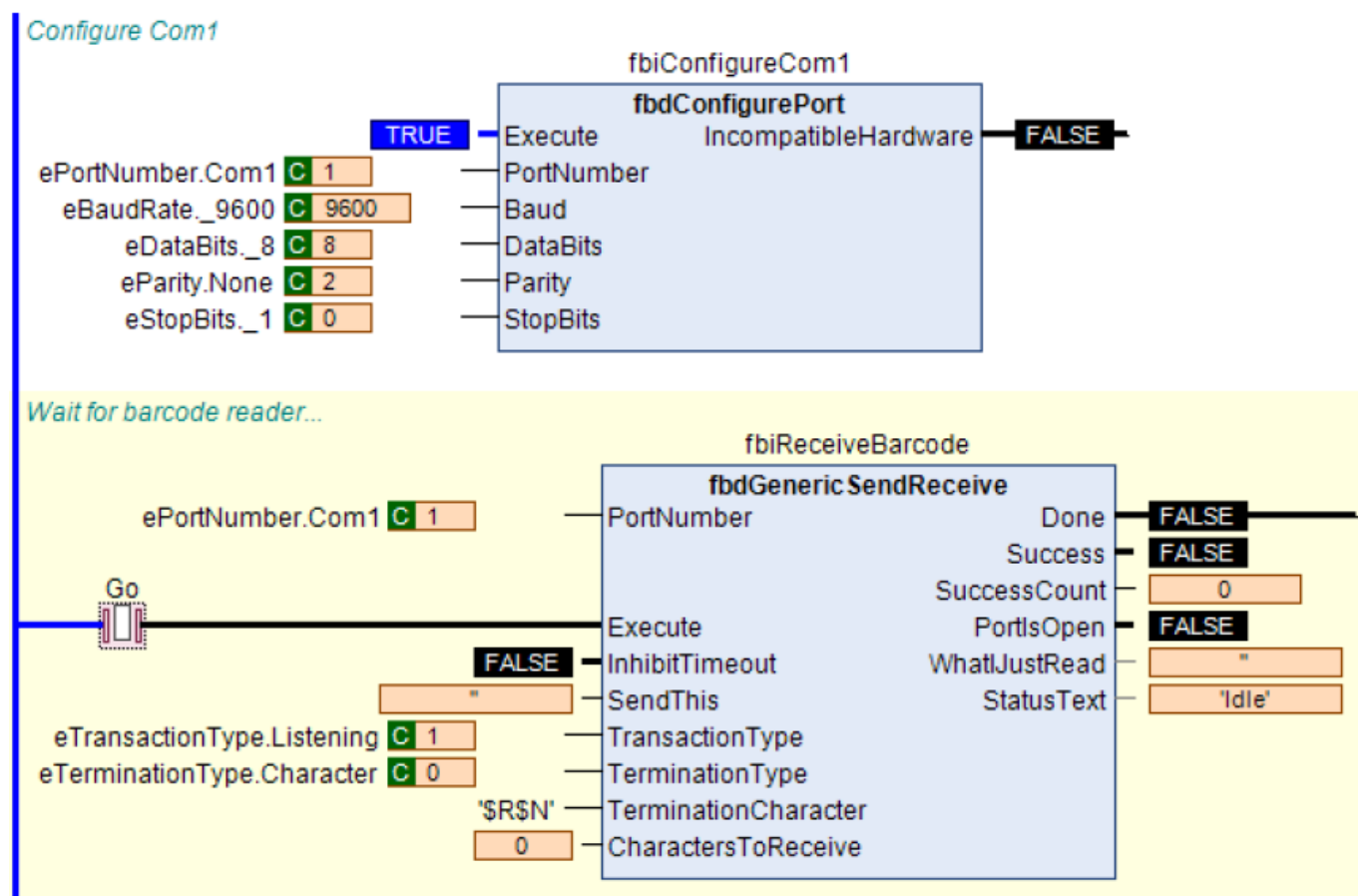- X2 control and BoX2 control devices

For further information refer to

- CODESYS online help
- Installation manual X2 control (MAxx202)
- Beijer Electronics knowledge database, HelpOnline

This document and other quick-start documents can be obtained from our homepage. Please use the address **support.europe@beijerelectronics.com** for feedback.

Serial communications with CODESYS function blocks

- This library is compatible with X2Control and BoX2Control devices (DeviceId 0x1024)
- This library simplifies serial communications from the X2 Control to serial devices such as barcode readers, weigh scales, and printers.
- Most parameters are set with ENUMs to reduce errors.
- The FB can act as a manager for send/receive (for devices that need a prompt) or just cause the port to listen (for unsolicited messages).
- Message termination can be by terminating characters or receiving a predefined number of characters.
- All three serial ports of an X2 / BoX2 control can be used (COM1, COM2, and COM3).
- The library file (*.compiled-library) can be installed on the CODESYS software on your PC and the FBs be accessed as any blocks, please follow the guidelines and description.

Configure Com1

```
                                                  fbiConfigureCom1
                                                  fbdConfigurePort
                            TRUE ─┤ Execute        IncompatibleHardware ├─ FALSE ─
ePortNumber.Com1  C  1  ────────── PortNumber
   eBaudRate._9600  C  9600 ─────── Baud
     eDataBits._8   C  8 ────────── DataBits
     eParity.None   C  2 ────────── Parity
    eStopBits._1    C  0 ────────── StopBits
```

Wait for barcode reader...

```
                                                  fbiReceiveBarcode
                                                  fbdGenericSendReceive
   ePortNumber.Com1  C  1  ───────── PortNumber              Done ─ FALSE ──
                                                          Success ─ FALSE
        Go                                            SuccessCount ─   0
       ┌┤├┐                                            PortIsOpen ─ FALSE
       └──┘─────────────────────────── Execute       WhatIJustRead ─   "
                             FALSE ─┤ InhibitTimeout     StatusText ─  'Idle'
                                "  ── SendThis
eTransactionType.Listening C 1 ──── TransactionType
eTerminationType.Character C 0 ──── TerminationType
                            '$R$N' ── TerminationCharacter
                               0 ─── CharactersToReceive
```

Preparing your editor

- The following chapter describes important procedures and settings needed for a well-functioning system.

Installation of the library to your editor

- The *.compiled-library needs to be made available in your system so it can be included in projects. This is done by accessing the 'Library Manager'→' Library Repository' and then 'Install'.
  Navigate to the folder where you have put the *.compiled-library. This procedure will need to be repeated if you use a new PC.
- **Note,** the location of the System path may differ depending if using BCS Tools or CODESYS software tool and what version of the software.
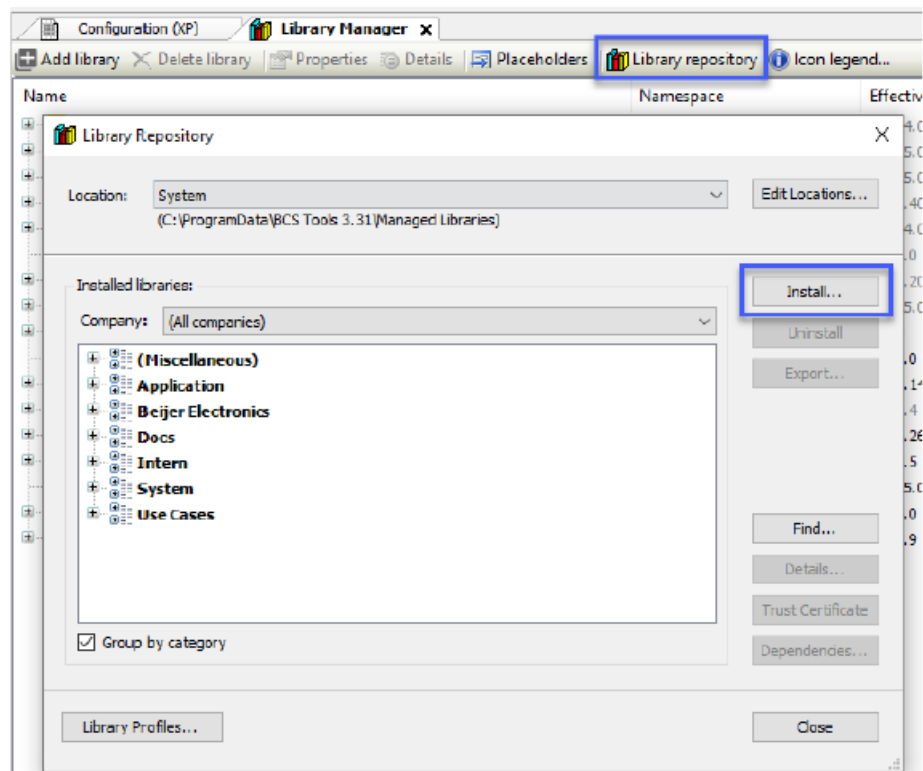
Add the library to your project

- The new library is now available for you to include in your specific project (example screenshot):
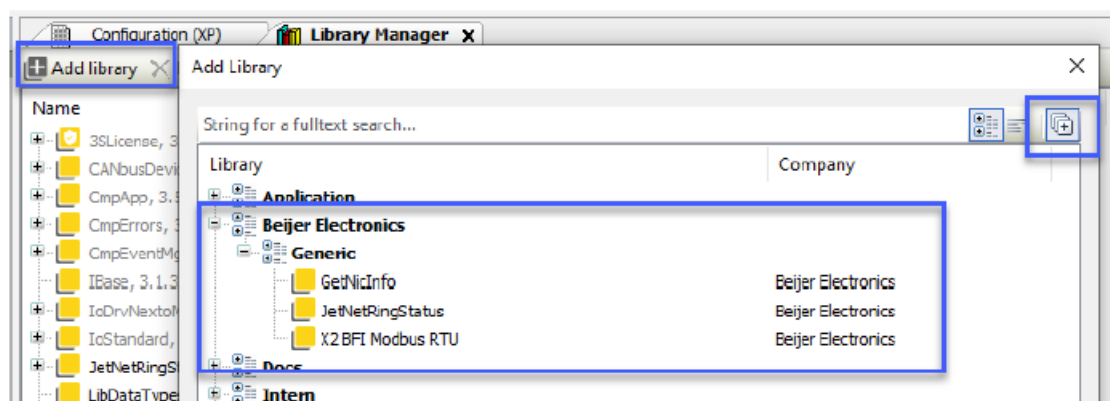
- The selected library is now visible in the Library Manager. Its public objects and supplementary help is available here.

Description of function blocks

fbdConfigurePort

- The FB fbdConfigurePort is required to set the port's parameters.
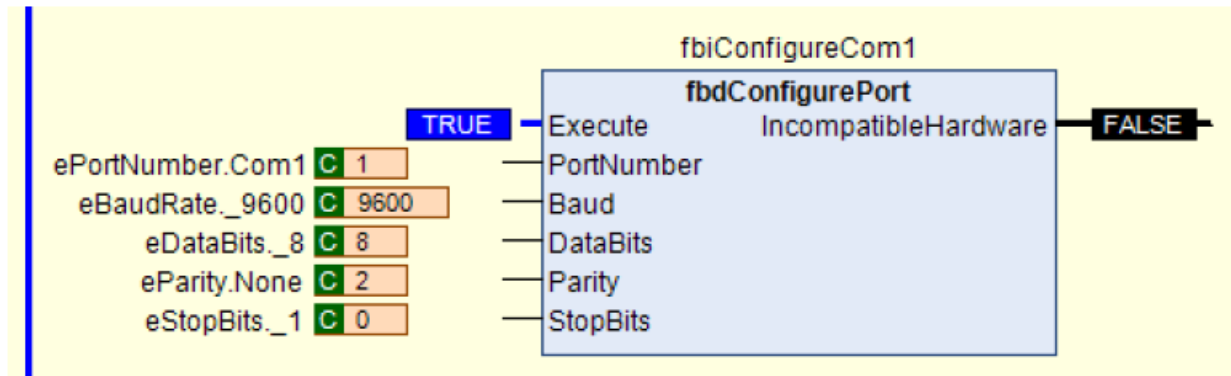- Match the port settings to the device you're talking to. Simply invoke and enter the appropriate port, baud, data bits, parity and stop bits.
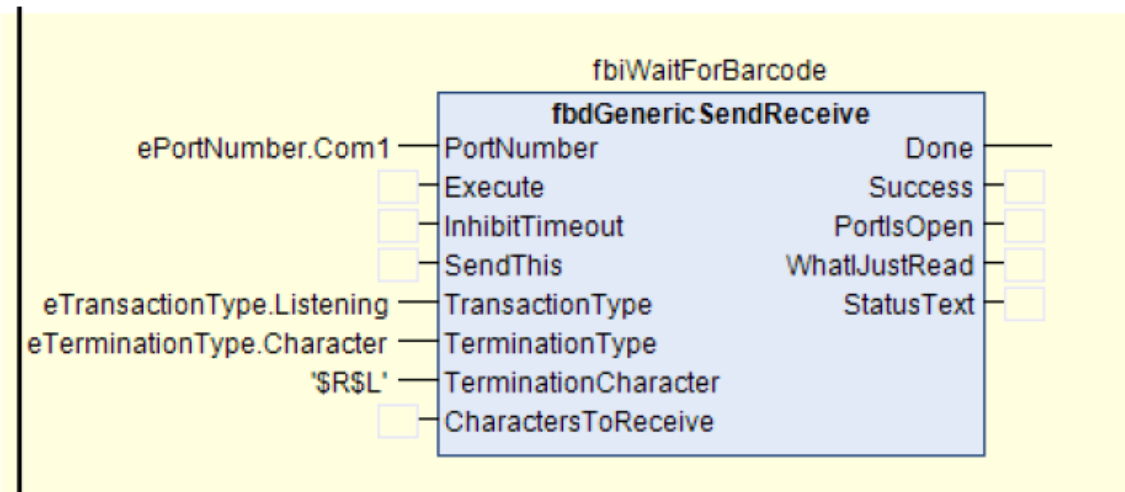- All parameters are ENUMs.

Name	Scope	Type	Comment
Execute	VAR_IN	BOOL	Configures the port's parameters on the rising edge
PortNumber	VAR_IN	report number	Choose the serial port
Baud	VAR_IN	ecaudate	
DataBits	VAR_IN	data bits	
Parity	VAR_IN	parity	
StopBits	VAR_IN	eStopBits	
IncompatibleHardware	VAR_OUT	BOOL	Target is not an X2Control or Bo X2Control device

fbdGenericSendReceive

- This FB provides functionality to interact via a com port to a device.
- The type can be 'Polled' or 'Listening'. Polled is used to send a request to a device and wait for a response (typically a weigh scale). Listening simply waits for an unsolicited incoming message (typically a barcode reader).
- The incoming message can be terminated in one of two ways:
    - Receiving a termination character (for example CRLF)
    - After receiving a predefined number of characters.
- BothTransactionTypes can be used with either TerminationTypes.
- It won't execute until that port's parameters have been set.

Examples

- This configuration will wait (as long as Execute is high) for an un-prompted frame which is terminated with special characters: <CR><LF>

fbiWaitForBarcode

fbdGeneric SendReceive

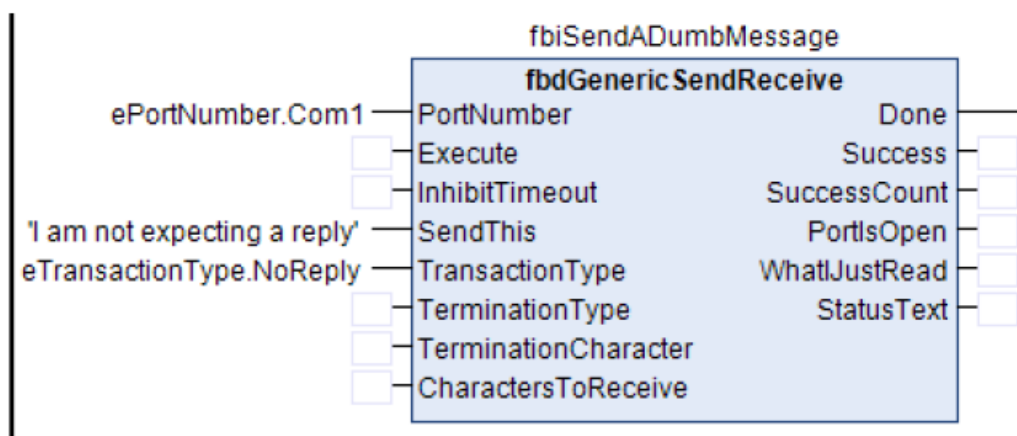| Inputs	Outputs
ePortNumber.Com1 — PortNumber	Done
— Execute	Success
— InhibitTimeout	PortIsOpen
— SendThis	WhatIJustRead
eTransactionType.Listening — TransactionType	StatusText
eTerminationType.Character — TerminationType	
'RL' — TerminationCharacter	
— CharactersToReceive	

- This configuration will (on the Execute rising edge) make a request and wait for a response, which is always padded to 10 characters.

fbiRequestStableWeight

fbdGeneric SendReceive

Inputs	Outputs
ePortNumber.Com1 — PortNumber	Done
— Execute	Success
— InhibitTimeout	PortIsOpen
'SWRL' — SendThis	WhatIJustRead
eTransactionType.Polling — TransactionType	StatusText
eTerminationType.Count — TerminationType	
— TerminationCharacter	
10 — CharactersToReceive	
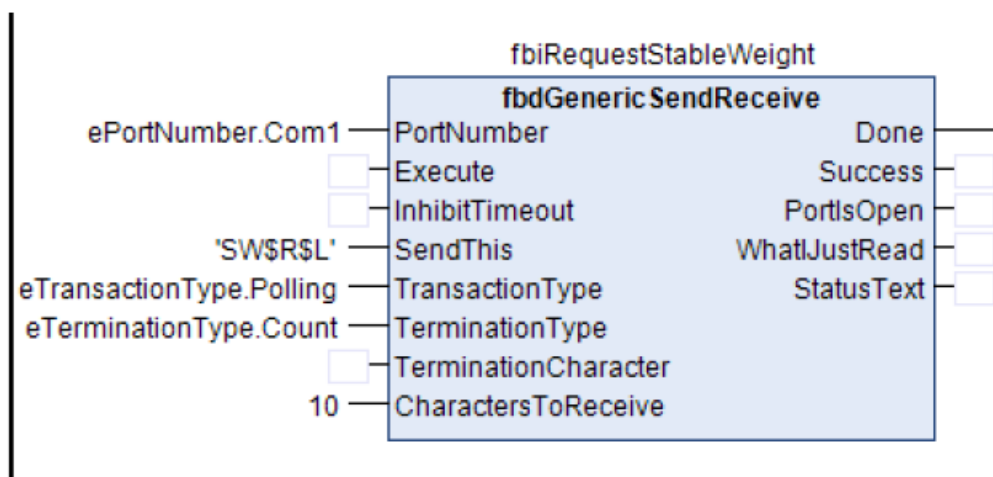
- This configuration will (on the Execute rising edge) send a message and not wait for a reply.

fbiSendADumbMessage

fbdGeneric SendReceive

Inputs	Outputs
ePortNumber.Com1 — PortNumber	Done
— Execute	Success
— InhibitTimeout	SuccessCount
'I am not expecting a reply' — SendThis	PortIsOpen
eTransactionType.NoReply — TransactionType	WhatIJustRead
— TerminationType	StatusText
— TerminationCharacter	
— CharactersToReceive	

fbdGenericSendReceive (datatypes)

```
                    fbdGenericSendReceive
──PortNumber ePortNumber                        BOOL Done──
──Execute BOOL                                BOOL Success──
──InhibitTimeout BOOL                    UDINT SuccessCount──
──SendThis STRING(255)                     BOOL PortIsOpen──
──TransactionType eTransactionType   STRING(255) WhatIJustRead──
──TerminationType eTerminationType    STRING(255) StatusText──
──TerminationCharacter STRING(255)
──CharactersToReceive INT
```

Input	Type	Initial	Comment
PortNumber	report number		Choose the serial port
Execute	BOOL		If the transaction type is 'Polling' this rising edge initiates the send/receive. In 'Listening' mode, the port listens for as long as the flag is high
InhibitTimeout	BOOL		For debugging comms only. Normally FALSE
SendThis	STRING(255)		In 'Polling' mode, this is the request sent to the device
TransactionType	transaction type	eTransactionType.Polling	Used to choose the transaction type.
TerminationType	eTerminationType	determination pe.Character	Used to choose the termination type
TerminationCharacter	STRING(255)	'RN'	Valid if TerminationType is eTerminationType.Character
CharactersToReceive	INT		Valid if TerminationType is eTerminationType.Count

Output	Type	Initial	Comment
Done	BOOL		Indicates completion
Success	BOOL		Indicate a successful completion i.e. the termination character has been received
SuccessCount	UDINE		
PortIsOpen	BOOL		
WhatIJustRead	STRING(255)		The received string available for subsequent processing
StatusText	STRING(255)		See below for possibilities

Status Text	Meaning
Idle	Waiting for instruction
Opening port	Opening the port. This would indicate the port is already in use by another application
Clearing buffer	Removing old characters from the buffer
Sending	Sending the 'SendThis' string
Looking for a termination character	When the TerminationType is 'Character'
Waiting for 10 characters	When the TransactionType is 'Count'
Done, request high	For TransactionTypes 'Polling' or 'NoReply' this indicates the sequence is finished and waiting for a new rising edge
Invalid parameters	In TerminationMode 'Character', no termination character has been specified. In TerminationMode 'Count', the count is 0 or greater than 255

Special characters

- Codesys identifies special characters (non-printable) with escape sequences.
- This is a snippet from Codesys Help Online.

Hexadecimal code

String with $ code	Interpretation
'$<8-bit code>'	8-bit code: Two-digit hexadecimal number that is interpreted according to ISO/IEC 8859-1.
'$41'	A
'$A9'	©
'$40'	@
'$0D'	Control character: Line break (corresponds to '$R')
'$0A'	Control character: New line (corresponds to '$L' and '$N')

Special cases

String with $ code	Interpretation
'$L' , ' $l'	Control character: Line feed (corresponds to '$0A')
'$N' , '$n'	Control character: New line (corresponds to '$0A')
'$P' , '$p'	Control character: Form feed
'$R' , '$r'	Control character: Line break (corresponds to '$0D')
'$T' , '$t'	Control character: Tab
'$$'	Dollar sign: §
'$''	Single straight quotation mark: '

About Beijer Electronics

- Beijer Electronics is a multinational, cross-industry innovator that connects people and technologies to optimize processes for business-critical applications. Our offer includes operator communication, automation solutions, digitalization, display solutions, and support. As experts in user-friendly software, hardware, and services for the Industrial Internet of Things, we empower you to meet your challenges through leading-edge solutions.
- Beijer Electronics is a BEIJER GROUP company. Beijer Group has sales of over 1.6 billion SEK in 2021 and is listed on the Nasdaq Stockholm Main Market under the ticker BELE. **www.beijergroup.com**.

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References

- **Innovations in industrial digital technology | Ependion**
- **Contact us - Beijer Electronics**
- **Help online - tree view - Beijer Electronics**