Electric Drives and Controls | Hydraulics | Linear Motion and Assembly Technologies | Pneumatics | Service

Rexroth Bosch Group

Rexroth IndraLogic VEP System Description

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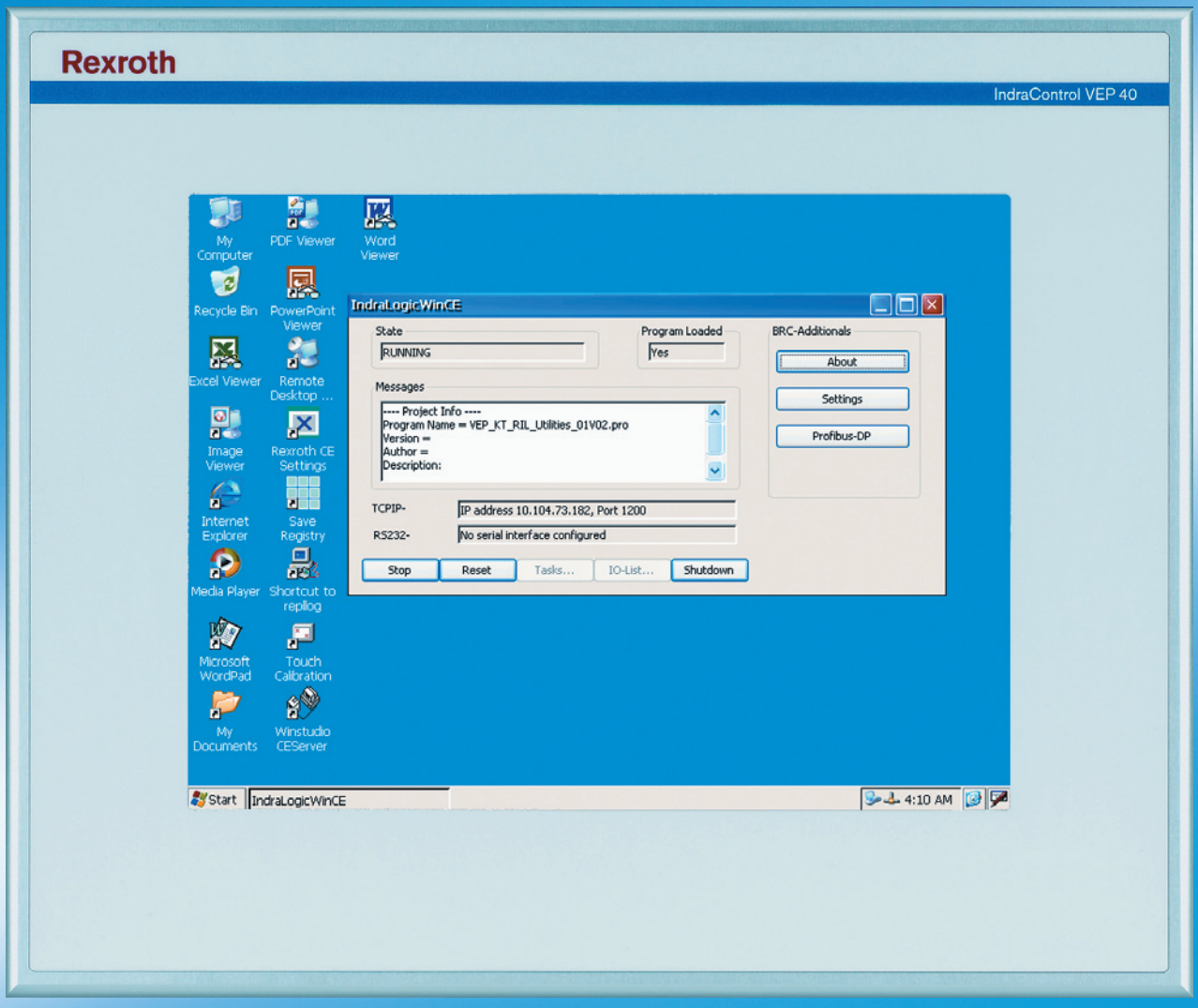
Edition 02

Operating and Programming Guide



Title
Rexroth IndraLogic VEP
System Description

Type of Documentation
Operating and Programming Guide

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DOK-CONTRL-IL*VEP*****-AW02-EN-P

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Purpose of Documentation
This documentation provides an overview of the system components belonging to the terminals of the IndraLogic VEP series and describes their project planning and programming.

Record of Revisions

Description	Release Date	Notes
120-0401-B324-02/EN	07/05	First English Edition

Validity
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Note
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Contents

1 System Overview

1.1 Components

Hardware

Control IndraLogic VEP is composed of the following components:

- IndraControl VEP (hardware)
- IndraLogic VEP firmware (FWC-IL*VE*-RUN-01VRS-NN) on compact flash

The IndraControl VEP-devices are embedded terminals using the operating system WinCE 4.2. As universal hardware platform for visualization applications they can be used in combination with the IndraLogic VEP firmware as soft control also for PLC applications.

Software

The software "IndraWorks Logic" serves to commission and project the IndraLogic VEP. Please, install the software on the engineering PC. It consists of the following components:

- **IndraWorks:** Project planning, configuration
- **IndraLogic:** PLC programming
- **IndraWorks WinStudio:** Engineering tool to create user screens on the IndraControl VEP.
- **IndraLogic VEP TSP:** Target files (Target Support Package) are installed required to edit the IndraLogic VEP with IndraWorks and IndraLogic.
- **Target Manager:** Management of TSP files, e. g., for service updates of control functions.

All components are automatically installed. Additionally, WinStudio "lite" is installed.

The IndraLogic VEP saved on the compact flash can only be activated by an enabling code. The IndraLogic VEP is enabled, when the corresponding SWL is ordered ex works.

1.2 Related Documentation

No.	Title	Identification
/1/	Rexroth IndraControl VEP / VEH, Project Planning Manual	DOK-SUPPL*-VEH/VEP****-PR..-EN-P
/2/	PLC Programming with Rexroth IndraLogic 1.2; Operating and Programming Guide	DOK-CONTRL-IL**PRO*V02-AW..-EN-P
/3/	Rexroth Inline PROFIBUS DP; Application Manual	DOK-CONTRL-R-IL*PBSSYS-AW..-EN-P
/4/	Rexroth Inline PROFIBUS DP Terminal and Module Supply; Functional Description	DOK-CONTRL-R-IL*PB*-BK-FK..-EN-P
/5/	Rexroth IndraWorks; Operating and Programming Guide	In preparation. Preliminary, in IndraWorks the following Online help files can be called via the help contents under "Working with IndraWorks": - IndraLogic: PLC projecting in IndraWorks - I/O configuration: I/O configuration in IndraWorks – IndraWorks diagnostic (ProVi)
/6/	Rexroth IndraWorks HMI; Operating and Programming Guide	DOK-IWORKS-HMI*V03****-AW01-EN-P
/7/	Rexroth WinStudio; Overall View and Functional Description	DOK-CONTRL-WIS*PC**V06-KB..-EN-P
/8/	Rexroth IndraLogic; Field bus drive according to PLCOpen, Operating and Programming Guide	In preparation. Preliminary documentation is available.

Fig. 1-1: Related publications

2 Important Directions for Use

2.1 Appropriate Use

Introduction

Rexroth products represent state-of-the-art developments and manufacturing. They are tested prior to delivery to ensure operating safety and reliability.

The products may only be used in the manner that is defined as appropriate. If they are used in an inappropriate manner, then situations can develop that may lead to property damage or injury to personnel.

Note: Bosch Rexroth, as manufacturer, is not liable for any damages resulting from inappropriate use. In such cases, the guarantee and the right to payment of damages resulting from inappropriate use are forfeited. The user alone carries all responsibility of the risks.

Before using Rexroth products, make sure that all the pre-requisites for appropriate use of the products are satisfied:

- Personnel that in any way, shape or form uses our products must first read and understand the relevant safety instructions and be familiar with appropriate use.
- If the product takes the form of hardware, then they must remain in their original state, in other words, no structural changes are permitted. It is not permitted to decompile software products or alter source codes.
- Do not mount damaged or faulty products or use them in operation.
- Make sure that the products have been installed in the manner described in the relevant documentation.

Areas of Use and Application

The embedded terminals IndraControl VEP are PC-based machine operator terminals, that can – in combination with the IndraLogic VEP firmware – also perform control functionalities.

Note: The embedded terminals IndraControl VEP may only be used with the accessories and parts specified in this document. If a component has not been specifically named, then it may not be either mounted or connected. The same applies to cables and lines.

Operation is only permitted in the specified configurations and combinations of components using the software and firmware as specified in the relevant function descriptions.

In case of non-observance the warranty claim expires automatically.

The embedded terminals IndraControl VEP have been developed as visualization terminals as well as for use in control tasks.

Typical applications of the IndraLogic VEP soft PLC are:

- Handling and assembly systems,
- Packaging and foodstuff machine,
- Printing and paper processing machines
- Machine tools.

The IndraControl VEP-devices may only be operated under the assembly, installation and ambient conditions as described here (temperature, system of protection, humidity, EMC requirements, etc.) and in the position specified.

In residential areas as well as in business and commercial areas Class A devices may be used with the following note:

Note: This is a Class A device. In a residential area, this device may cause radio interferences. In such a case, the user may be required to introduce suitable countermeasures at his own cost.

2.2 Inappropriate Use

Using the embedded terminals IndraControl VEP outside of the above-referenced areas of application or under operating conditions other than described in the document and the technical data specified is defined as “inappropriate use".

The embedded terminals IndraControl VEP may not be used, if

- they are subject to operating conditions, that do not meet the above specified ambient conditions. This includes, for example, operation under water, in the case of extreme temperature fluctuations or extremely high maximum temperatures, or if
- Bosch Rexroth has not specifically released them for that intended purpose. Please note the specifications outlined in the general Safety Guidelines!

3 Safety Instructions for Electric Drives and Controls

3.1 Introduction

Read these instructions before the initial startup of the equipment in order to eliminate the risk of bodily harm or material damage. Follow these safety instructions at all times.

Do not attempt to install or start up this equipment without first reading all documentation provided with the product. Read and understand these safety instructions and all user documentation of the equipment prior to working with the equipment at any time. If you do not have the user documentation for your equipment, contact your local Bosch Rexroth representative to send this documentation immediately to the person or persons responsible for the safe operation of this equipment.

If the equipment is resold, rented or transferred or passed on to others, then these safety instructions must be delivered with the equipment.

WARNING

Improper use of this equipment, failure to follow the safety instructions in this document or tampering with the product, including disabling of safety devices, may result in material damage, bodily harm, electric shock or even death!

3.2 Explanations

The safety instructions describe the following degrees of hazard seriousness in compliance with ANSI Z535. The degree of hazard seriousness informs about the consequences resulting from non-compliance with the safety instructions.

Warning symbol with signal word	Degree of hazard seriousness according to ANSI
 **DANGER**	Death or severe bodily harm will occur.
 **WARNING**	Death or severe bodily harm may occur.
 **CAUTION**	Bodily harm or material damage may occur.

Fig. 3-1: Hazard classification (according to ANSI Z535)

3.3 Hazards by Improper Use

DANGER

High voltage and high discharge current! Danger to life or severe bodily harm by electric shock!

DANGER

Dangerous movements! Danger to life, severe bodily harm or material damage by unintentional motor movements!

WARNING

High electrical voltage due to wrong connections! Danger to life or bodily harm by electric shock!

WARNING

Health hazard for persons with heart pacemakers, metal implants and hearing aids in proximity to electrical equipment!

CAUTION

Surface of machine housing could be extremely hot! Danger of injury! Danger of burns!

CAUTION

Risk of injury due to improper handling! Bodily harm caused by crushing, shearing, cutting and mechanical shock or incorrect handling of pressurized systems!

CAUTION

Risk of injury due to incorrect handling of batteries!

3.4 General Information

- Bosch Rexroth AG is not liable for damages resulting from failure to observe the warnings provided in this documentation.
- Read the operating, maintenance and safety instructions in your language before starting up the machine. If you find that you cannot completely understand the documentation for your product, please ask your supplier to clarify.
- Proper and correct transport, storage, assembly and installation as well as care in operation and maintenance are prerequisites for optimal and safe operation of this equipment.
- Only persons who are trained and qualified for the use and operation of the equipment may work on this equipment or within its proximity.
  - The persons are qualified if they have sufficient knowledge of the assembly, installation and operation of the equipment as well as an understanding of all warnings and precautionary measures noted in these instructions.
  - Furthermore, they must be trained, instructed and qualified to switch electrical circuits and equipment on and off in accordance with technical safety regulations, to ground them and to mark them according to the requirements of safe work practices. They must have adequate safety equipment and be trained in first aid.
- Only use spare parts and accessories approved by the manufacturer.
- Follow all safety regulations and requirements for the specific application as practiced in the country of use.
- The equipment is designed for installation in industrial machinery.
- The ambient conditions given in the product documentation must be observed.
- Use only safety features and applications that are clearly and explicitly approved in the Project Planning Manual.
  For example, the following areas of use are not permitted: construction cranes, elevators used for people or freight, devices and vehicles to transport people, medical applications, refinery plants, transport of hazardous goods, nuclear applications, applications sensitive to high frequency, mining, food processing, control of protection equipment (also in a machine).
- The information given in the documentation of the product with regard to the use of the delivered components contains only examples of applications and suggestions.
  The machine and installation manufacturer must
  - make sure that the delivered components are suited for his individual application and check the information given in this documentation with regard to the use of the components,
  - make sure that his application complies with the applicable safety regulations and standards and carry out the required measures, modifications and complements.
- Startup of the delivered components is only permitted once it is sure that the machine or installation in which they are installed complies with the national regulations, safety specifications and standards of the application.
- Technical data, connections and operational conditions are specified in the product documentation and must be followed at all times.

- Operation is only permitted if the national EMC regulations for the application are met.
  The instructions for installation in accordance with EMC requirements can be found in the documentation "EMC in Drive and Control Systems".
  The machine or installation manufacturer is responsible for compliance with the limiting values as prescribed in the national regulations.

3.5 Protection Against Contact with Electrical Parts

Note: This section refers to equipment and drive components with voltages above 50 Volts.

Touching live parts with voltages of 50 Volts and more with bare hands or conductive tools or touching ungrounded housings can be dangerous and cause electric shock. In order to operate electrical equipment, certain parts must unavoidably have dangerous voltages applied to them.

DANGER

High electrical voltage! Danger to life, severe bodily harm by electric shock!

⇒ Only those trained and qualified to work with or on electrical equipment are permitted to operate, maintain or repair this equipment.

⇒ Follow general construction and safety regulations when working on high voltage installations.

⇒ Before switching on power the ground wire must be permanently connected to all electrical units according to the connection diagram.

⇒ Do not operate electrical equipment at any time, even for brief measurements or tests, if the ground wire is not permanently connected to the points of the components provided for this purpose.

⇒ Before working with electrical parts with voltage higher than 50 V, the equipment must be disconnected from the mains voltage or power supply. Make sure the equipment cannot be switched on again unintended.

⇒ The following should be observed with electrical drive and filter components:

⇒ Wait five (5) minutes after switching off power to allow capacitors to discharge before beginning to work. Measure the voltage on the capacitors before beginning to work to make sure that the equipment is safe to touch.

⇒ Never touch the electrical connection points of a component while power is turned on.

⇒ Install the covers and guards provided with the equipment properly before switching the equipment on. Prevent contact with live parts at any time.

⇒ A residual-current-operated protective device (RCD) must not be used on electric drives! Indirect contact must be prevented by other means, for example, by an overcurrent protective device.

⇒ Electrical components with exposed live parts and uncovered high voltage terminals must be installed in a protective housing, for example, in a control cabinet.

To be observed with electrical drive and filter components:

DANGER

High electrical voltage on the housing!
High leakage current! Danger to life, danger of injury by electric shock!

⇒ Connect the electrical equipment, the housings of all electrical units and motors permanently with the safety conductor at the ground points before power is switched on. Look at the connection diagram. This is even necessary for brief tests.

⇒ Connect the safety conductor of the electrical equipment always permanently and firmly to the supply mains. Leakage current exceeds 3.5 mA in normal operation.

⇒ Use a copper conductor with at least 10 mm² cross section over its entire course for this safety conductor connection!

⇒ Prior to startups, even for brief tests, always connect the protective conductor or connect with ground wire. Otherwise, high voltages can occur on the housing that lead to electric shock.

3.6 Protection Against Electric Shock by Protective Low Voltage (PELV)

All connections and terminals with voltages between 0 and 50 Volts on Rexroth products are protective low voltages designed in accordance with international standards on electrical safety.

WARNING

High electrical voltage due to wrong connections! Danger to life, bodily harm by electric shock!

⇒ Only connect equipment, electrical components and cables of the protective low voltage type (PELV = Protective Extra Low Voltage) to all terminals and clamps with voltages of 0 to 50 Volts.

⇒ Only electrical circuits may be connected which are safely isolated against high voltage circuits. Safe isolation is achieved, for example, with an isolating transformer, an opto-electronic coupler or when battery-operated.

3.7 Protection Against Dangerous Movements

Dangerous movements can be caused by faulty control of the connected motors. Some common examples are:

- improper or wrong wiring of cable connections
- incorrect operation of the equipment components
- wrong input of parameters before operation
- malfunction of sensors, encoders and monitoring devices
- defective components
- software or firmware errors

Dangerous movements can occur immediately after equipment is switched on or even after an unspecified time of trouble-free operation.

The monitoring in the drive components will normally be sufficient to avoid faulty operation in the connected drives. Regarding personal safety, especially the danger of bodily injury and material damage, this alone cannot be relied upon to ensure complete safety. Until the integrated monitoring functions become effective, it must be assumed in any case that faulty drive movements will occur. The extent of faulty drive movements depends upon the type of control and the state of operation.

DANGER

Dangerous movements! Danger to life, risk of injury, severe bodily harm or material damage!

⇒ Ensure personal safety by means of qualified and tested higher-level monitoring devices or measures integrated in the installation. Unintended machine motion is possible if monitoring devices are disabled, bypassed or not activated.

⇒ Pay attention to unintended machine motion or other malfunction in any mode of operation.

⇒ Keep free and clear of the machine's range of motion and moving parts. Possible measures to prevent people from accidentally entering the machine's range of motion:

- use safety fences
- use safety guards
- use protective coverings
- install light curtains or light barriers

⇒ Fences and coverings must be strong enough to resist maximum possible momentum, especially if there is a possibility of loose parts flying off.

⇒ Mount the emergency stop switch in the immediate reach of the operator. Verify that the emergency stop works before startup. Don't operate the machine if the emergency stop is not working.

⇒ Isolate the drive power connection by means of an emergency stop circuit or use a starting lockout to prevent unintentional start.

⇒ Make sure that the drives are brought to a safe standstill before accessing or entering the danger zone. Safe standstill can be achieved by switching off the power supply contactor or by safe mechanical locking of moving parts.

⇒ Secure vertical axes against falling or dropping after switching off the motor power by, for example:
- mechanically securing the vertical axes
- adding an external braking/ arrester/ clamping mechanism
- ensuring sufficient equilibration of the vertical axes

The standard equipment motor brake or an external brake controlled directly by the drive controller are not sufficient to guarantee personal safety!

⇒ Disconnect electrical power to the equipment using a master switch and secure the switch against reconnection for:
- maintenance and repair work
- cleaning of equipment
- long periods of discontinued equipment use

⇒ Prevent the operation of high-frequency, remote control and radio equipment near electronics circuits and supply leads. If the use of such equipment cannot be avoided, verify the system and the installation for possible malfunctions in all possible positions of normal use before initial startup. If necessary, perform a special electromagnetic compatibility (EMC) test on the installation.

3.8 Protection Against Magnetic and Electromagnetic Fields During Operation and Mounting

Magnetic and electromagnetic fields generated near current-carrying conductors and permanent magnets in motors represent a serious health hazard to persons with heart pacemakers, metal implants and hearing aids.

WARNING

Health hazard for persons with heart pacemakers, metal implants and hearing aids in proximity to electrical equipment!

⇒ Persons with heart pacemakers, hearing aids and metal implants are not permitted to enter the following areas:
- Areas in which electrical equipment and parts are mounted, being operated or started up.
- Areas in which parts of motors with permanent magnets are being stored, operated, repaired or mounted.

⇒ If it is necessary for a person with a heart pacemaker to enter such an area, then a doctor must be consulted prior to doing so. Heart pacemakers that are already implanted or will be implanted in the future, have a considerable variation in their electrical noise immunity. Therefore there are no rules with general validity.

⇒ Persons with hearing aids, metal implants or metal pieces must consult a doctor before they enter the areas described above. Otherwise, health hazards will occur.

3.9 Protection Against Contact with Hot Parts

CAUTION

Housing surfaces could be extremely hot! Danger of injury! Danger of burns!

⇒ Do not touch housing surfaces near sources of heat! Danger of burns!

⇒ After switching the equipment off, wait at least ten (10) minutes to allow it to cool down before touching it.

⇒ Do not touch hot parts of the equipment, such as housings with integrated heat sinks and resistors. Danger of burns!

3.10 Protection During Handling and Mounting

Under certain conditions, incorrect handling and mounting of parts and components may cause injuries.

CAUTION

Risk of injury by incorrect handling! Bodily harm caused by crushing, shearing, cutting and mechanical shock!

⇒ Observe general installation and safety instructions with regard to handling and mounting.

⇒ Use appropriate mounting and transport equipment.

⇒ Take precautions to avoid pinching and crushing.

⇒ Use only appropriate tools. If specified by the product documentation, special tools must be used.

⇒ Use lifting devices and tools correctly and safely.

⇒ For safe protection wear appropriate protective clothing, e.g. safety glasses, safety shoes and safety gloves.

⇒ Never stand under suspended loads.

⇒ Clean up liquids from the floor immediately to prevent slipping.

3.11 Battery Safety

Batteries contain reactive chemicals in a solid housing. Inappropriate handling may result in injuries or material damage.

CAUTION

Risk of injury by incorrect handling!

⇒ Do not attempt to reactivate discharged batteries by heating or other methods (danger of explosion and cauterization).

⇒ Never charge non-chargeable batteries (danger of leakage and explosion).

⇒ Never throw batteries into a fire.

⇒ Do not dismantle batteries.

⇒ Do not damage electrical components installed in the equipment.

Note: Be aware of environmental protection and disposal! The batteries contained in the product should be considered as hazardous material for land, air and sea transport in the sense of the legal requirements (danger of explosion). Dispose batteries separately from other waste. Observe the legal requirements in the country of installation.

3.12 Protection Against Pressurized Systems

Certain motors and drive controllers, corresponding to the information in the respective Project Planning Manual, must be provided with pressurized media, such as compressed air, hydraulic oil, cooling fluid and cooling lubricant supplied by external systems. Incorrect handling of the supply and connections of pressurized systems can lead to injuries or accidents. In these cases, improper handling of external supply systems, supply lines or connections can cause injuries or material damage.

CAUTION

Danger of injury by incorrect handling of pressurized systems !

⇒ Do not attempt to disassemble, to open or to cut a pressurized system (danger of explosion).

⇒ Observe the operation instructions of the respective manufacturer.

⇒ Before disassembling pressurized systems, release pressure and drain off the fluid or gas.

⇒ Use suitable protective clothing (for example safety glasses, safety shoes and safety gloves)

⇒ Remove any fluid that has leaked out onto the floor immediately.

Note: Environmental protection and disposal! The media used in the operation of the pressurized system equipment may not be environmentally compatible. Media that are damaging the environment must be disposed separately from normal waste. Observe the legal requirements in the country of installation.

Notes

4 Projecting and Programming

4.1 Overview

Requirements

To project an IndraLogic VEP the installation of "IndraWorks Logic" on an engineering PC is required. The installation program is available on CD-ROM. During the installation also the required target information (Target Support Package) of the IndraLogic VEP are transferred to the target computer (engineering PC).

Processing Steps

The project planning process is divided into the following steps:

- Project planning and I/O configuration with IndraWorks
- PLC program generation with IndraLogic
- Download and commissioning
- Operation, visualization and diagnosis with IndraWorks HMI and IndraWorks WinStudio, see /5/.

4.2 Projecting with IndraWorks

Start IndraWorks

IndraWorks can be started by clicking on the desktop icon "IndraWorks Engineering" or via "Programs, Rexroth, IndraWorks, Engineering" (see figure below).

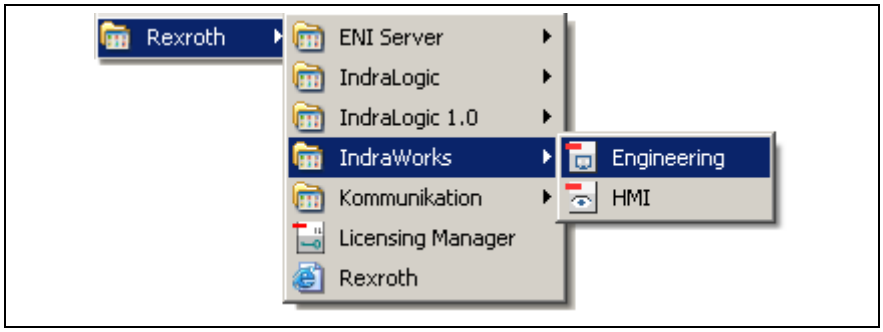


Fig. 4-1: Start IndraWorks

Create New IndraLogic VEP Project

For further information refer to the documentation or online help of IndraWorks /5/.

A new project can be created with menu function "File", "New", "Project". A dialog box appears, in which the project name can be entered.

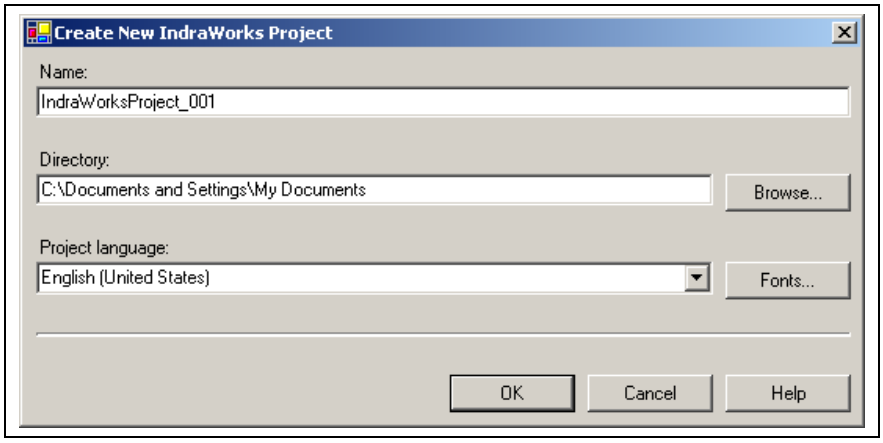


Fig. 4-2: Create new project

The IndraLogic VEP can be inserted per Drag & Drop from the device library under "Rexroth", "Controls" in the current IndraWorks project.

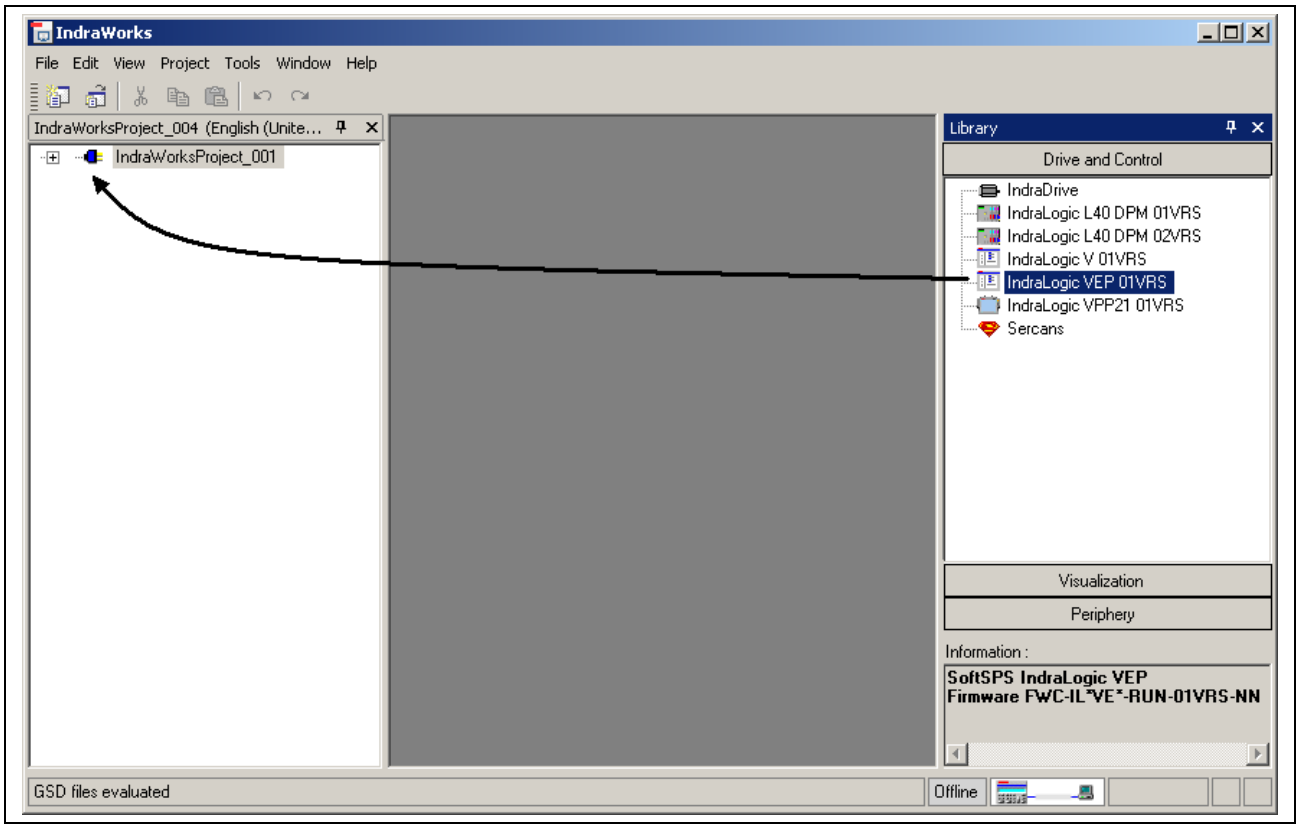


Fig. 4-3: Insertion of the IndraLogic VEP in the project explorer

After inserting a device in the project explorer a wizard appears, with which the project settings can be changed, see "Inputs in the Wizard".

Then, the device is integrated in the project explorer.

Inputs in the Wizard

Device Settings

The device settings contain general data of the IndraLogic project.

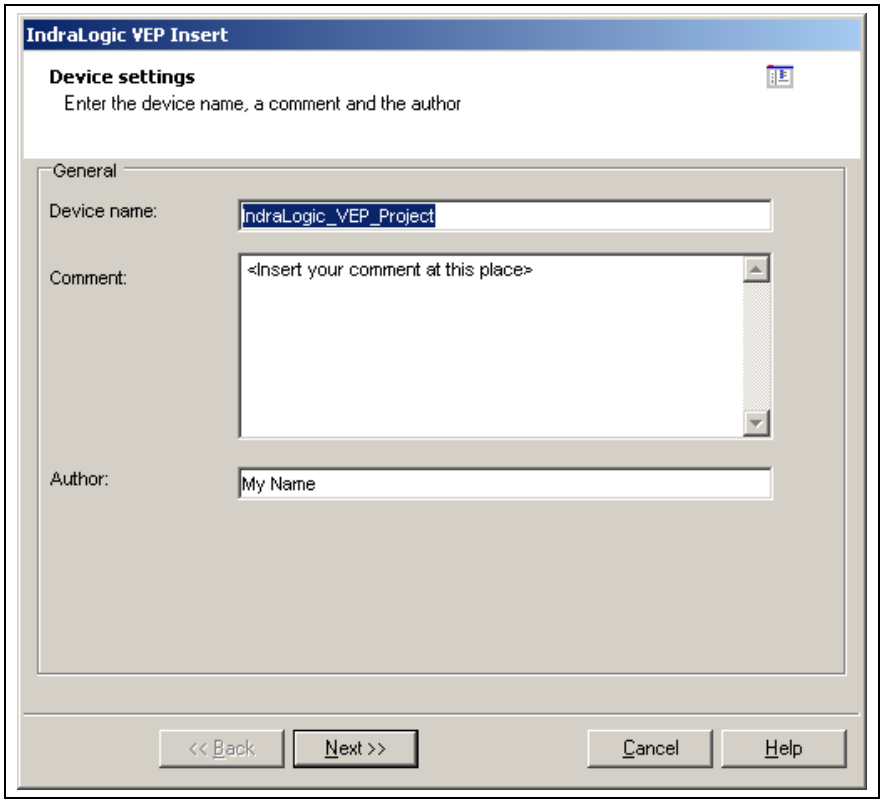


Fig. 4-4: Device settings

The inputs are confirmed via button "Next >>" and the dialog box "Communication Parameters" appears.

Communication Settings

Here, the settings for the communication between IndraWorks and the IndraLogic VEP can be assigned. To open this dialog the IndraLogic Gateway server is automatically started, when it is not already active. A dialog box appears, in which a communication channel can be created via button "New...".

Select here the desired communication channel from, e. g. TCP/IP.
The settings of the IP address must correspond to the settings of the IndraLogic VEP.
You will find further information in the IndraLogic help about the topic "Communication parameters", or in the IndraLogic manual /2/.

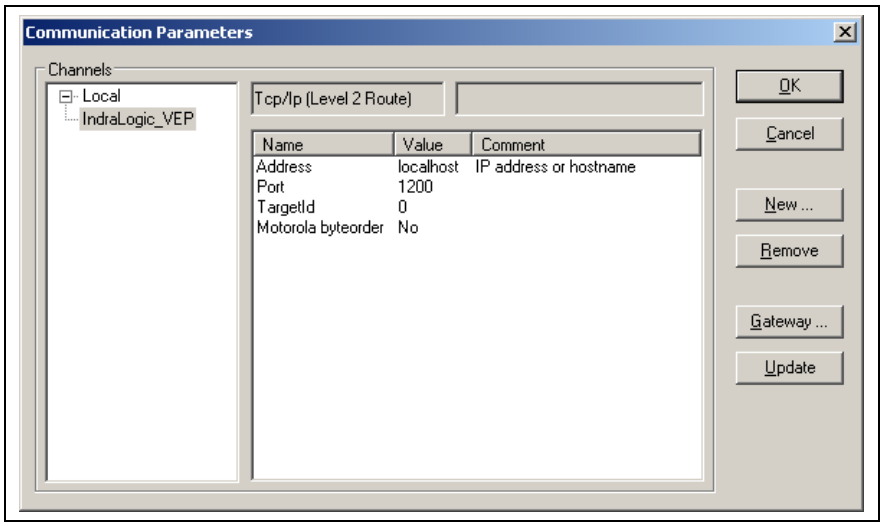


Fig. 4-5: IndraLogic communication parameters

In the following dialog box of the communication settings you can select the available channels (communication instances) and thus assign these channels to the current IndraLogic VEP project:

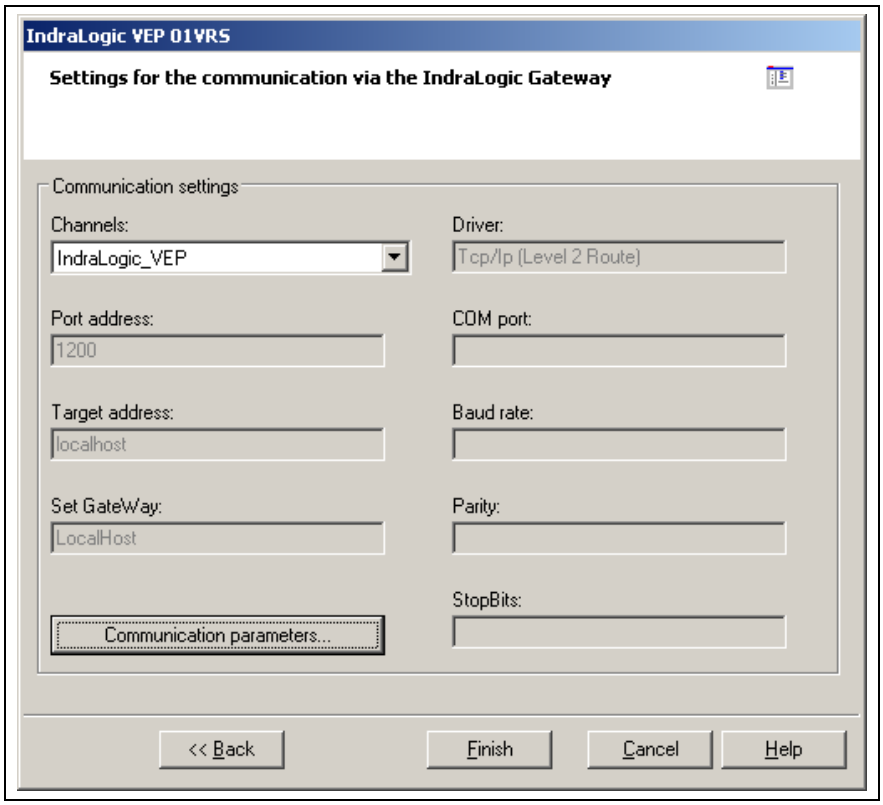


Fig. 4-6: Communication settings

The adaptation of the communication parameters or the creation of new communication channels is executed via button "Communication parameters".

The inputs are confirmed via button "Finish". Then, an IndraLogic VEP project is created in the project explorer.

Change Settings

The settings can be changed subsequently via the context menu (right mouse key):

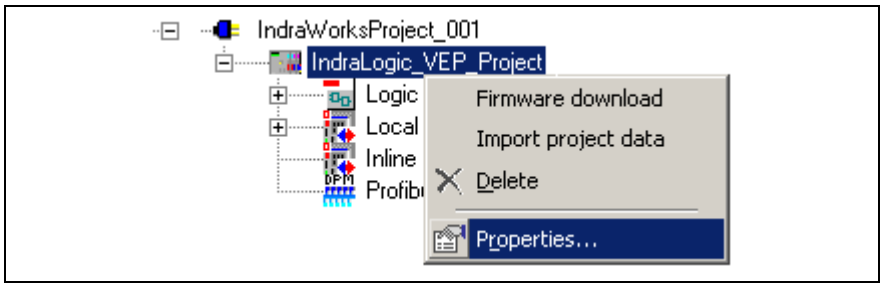


Fig. 4-7: Context menu, device properties of the IndraLogic VEP

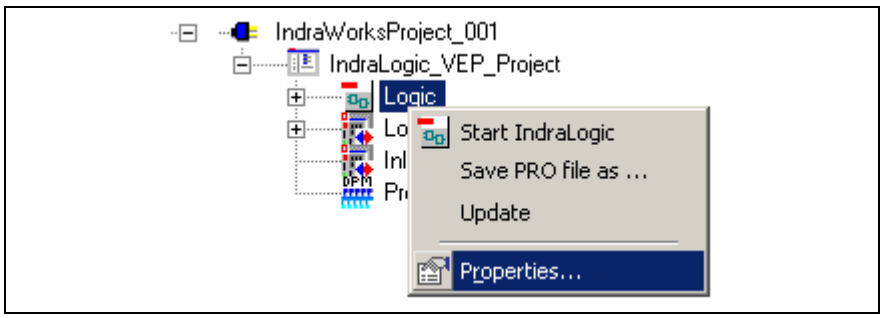


Fig. 4-8: Context menu, communication properties of the IndraLogic VEP

Further Information

For further information refer to the documentation or online help of IndraWorks /5/.

Configuring Profibus DP

The IndraLogic VEP provides a PROFIBUS DP interface with bus master functionality according to DIN EN 50170, Part 2. The Profibus configuration provides the following features:

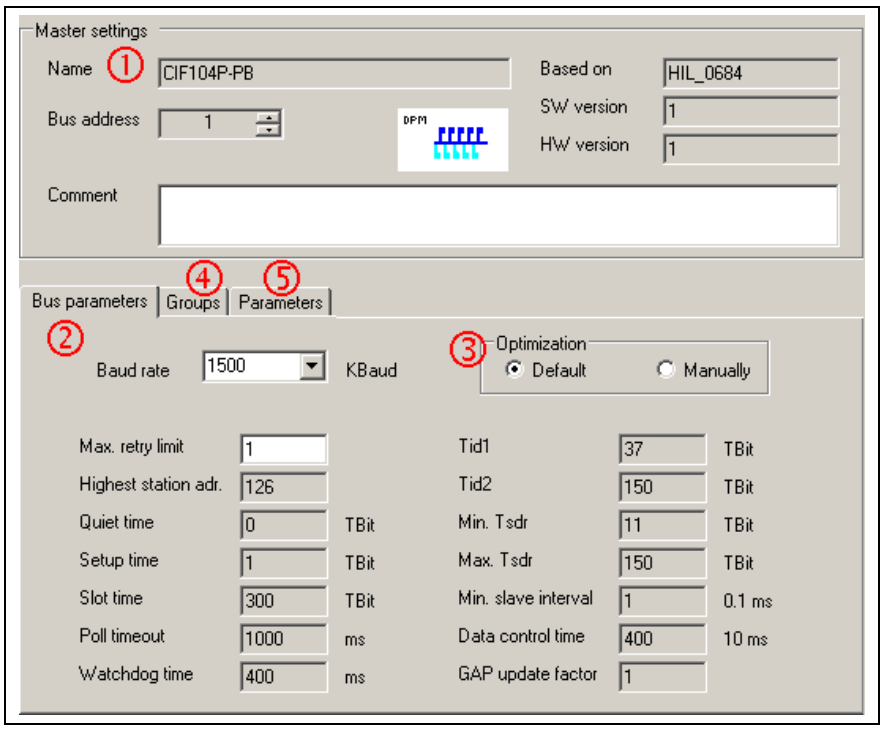
- Slave configuration
- Processing of vendor-specific data
- Modifying bus-specific settings

After finishing the Profibus configuration the data are transferred to the target device with the help of IndraLogic.

Note: Modified settings are only activated in the PLC with the next download, see section "Download and Commissioning"!

Master Settings

Operation parameters of the bus system can be defined for Profibus DP. For this, open the master information by double-clicking on node "Profibus/M" in the project explorer.



(1) Master settings
(2) Bus parameters
(3) Optimization
(4) Groups
(5) Parameters

Fig. 4-9: Master settings

Master Settings (1)

The following data are indicated. Some data cannot be changed:

Name: Device name of the internal bus master of the IndraLogic VEP

Based on: Ident number according to the GSD file

SW version: Software version according to the GSD file

HW version: Hardware version according to the GSD file

Bus address: Here, bus address 1 (FDL address) is automatically entered. The address can be overwritten or modified by means of key "...". Address 0 is reserved for engineering devices and cannot be used here.

Note: Always use for the master bus addresses being as low as possible, as for high bus addresses the bus performance (concerning the token ring management) deteriorates.

Comment: Please enter here any comment about the master.

Bus Parameters (2)(3)

The bus parameters important for the operation of the Profibus DP are indicated here. If the **Optimization** (3) is set to **Default**, only the boxes "Baud rate" and "Max. retry limit" can be edited. All other parameters are default values, that are optimized to the current baud rate. These default values correspond to a recommendation of the Profibus user organization and is suitable for the majority of applications. Only for special exceptional cases it is necessary to modify a few parameters manually. For this, activate the **Optimization: Manually** (in preparation).

CAUTION

Modifications of the default bus parameters can cause an unpredictable behavior of the Profibus DP!

⇒ The bus parameters may only be modified by instructed Profibus DP specialists, who are aware of the effects of this modifications!

Groups (4)

Not available!

Parameters (5)

Here, vendor-specific parameters of the master can be displayed or edited.

Parameter "EnableDiags" of the IndraLogic VEP has no function.

Note: Modified settings are only activated in the PLC with the next download, see section "Download and Commissioning"!

Further Information

For further information refer to the documentation or online help of IndraWorks /5/.

Insert Slaves

All Profibus DP slaves provided for the IndraLogic VEP are archived in the device library under "Periphery", "Profibus DP". Insert a slave from the device library per Drag & Drop below the object node "Profibus/M" in the project explorer. New slaves can be positioned between already inserted slaves.

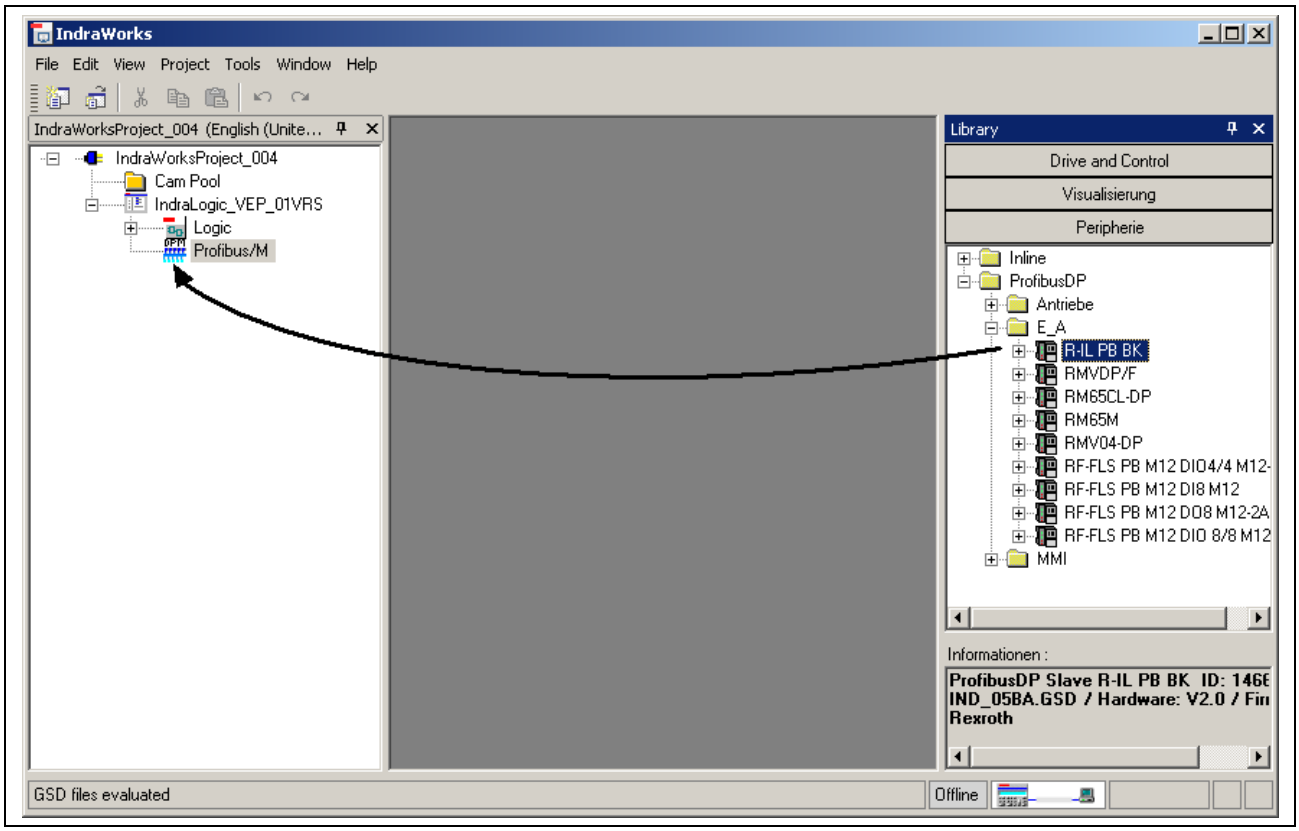


Fig. 4-10: Insert Profibus DP slave

Insert Further Slaves

Via the Profibus/M context menu (see figure below) further slaves can be archived in the device library by importing GSD files. One or several GSD files can be selected in a file selection box. These files are then archived in the device library. Depending on the slave family the new slaves are assigned to the files under "ProfibusDP". For further information also refer to the documentation or online help of IndraWorks /5/.

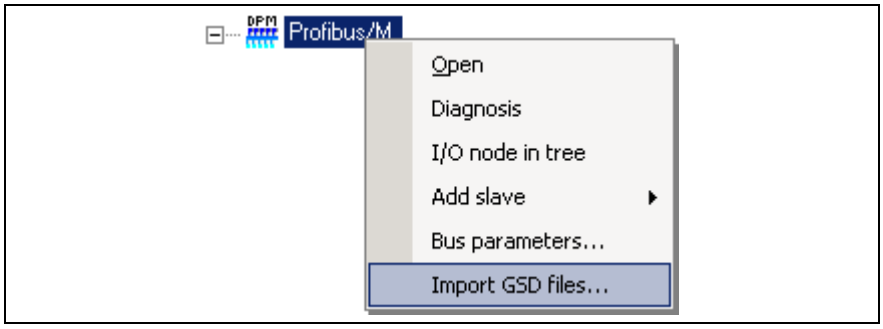
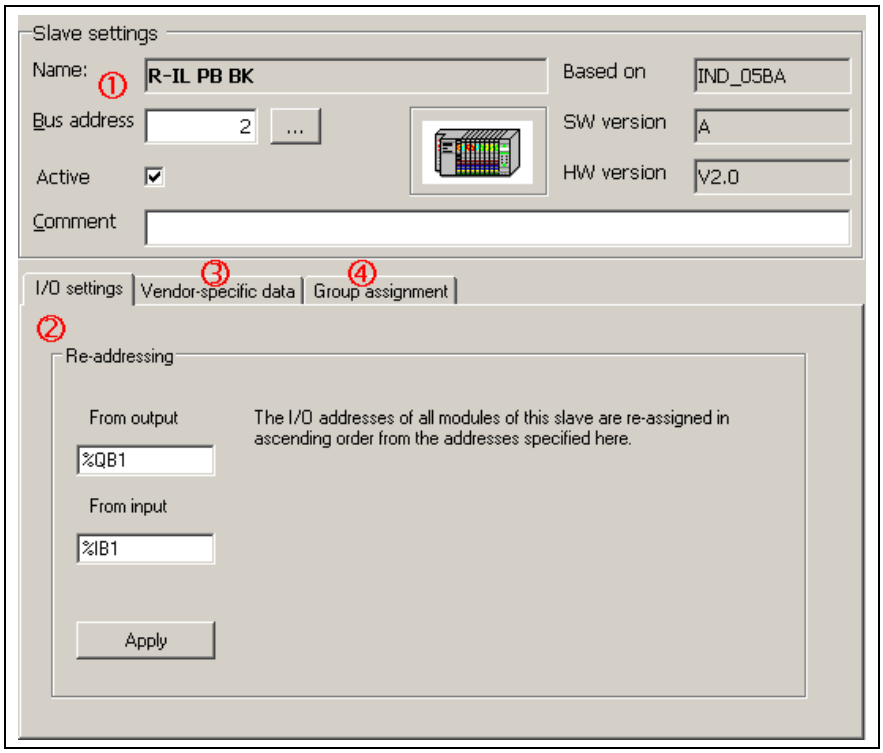


Fig. 4-11: Context menu, Import GSD files

While inserting a slave in the project explorer, the general slave data are indicated in a dialog box (wizard). Some data cannot be changed. All entries made in the wizard can be also changed later, see the following figure. For this, double-click on the desired slave in the project explorer.



(1) Slave settings
(2) Automatic addressing
(3) Vendor-specific data
(4) Group assignment

Fig. 4-12: Slave settings

Slave Settings (1)

Name: Device name of the slave according to the GSD file

Based on: Ident number according to the GSD file

SW version: Software version according to the GSD file

HW version: Hardware version according to the GSD file

Bus address: Here, the next free bus address (FDL address) is automatically entered. The address can be overwritten or modified by means of button "...".

The bus address of the slave is also displayed in the project explorer. It is set in front of the slave name.

Example, see figure below: Slave "R-IL PB BK" with bus address 2 is indicated in the project explorer as "**2**-R-IL PB BK".

Active: Activate this option, so that the slave is transferred to the master parameter set and thus prepared for the operation at the Profibus for the next download. Deactivate this option to configure and archive the slave, but it is not commissioned at the Profibus. The switch-over Active/Passive can be also executed in the project explorer at the slave, see figure below.

(A) Slave is in operation
(B) Slave is not in operation

Fig. 4-13: Active/Passive switch-over in the project explorer

Note: Modified settings are only activated in the PLC with the next download, see section "Download and Commissioning"!

Comment: Please enter here any comment about the device.

I/O Settings (2)

The modules can be automatically addressed in consecutive order. Enter the desired start address in the input box **From output** or **From input**. The automatic addressing is started with **Apply**. Thereby, all modules are sequentially provided with PLC addresses in consecutive order. In the event of address overlappings with already assigned addresses the next connected free address area is searched. In this case a dialog box appears with the request, if this free area is to be used for the addressing. The new addresses are applied to column "Address" of the module data.

The addressing can also be executed manually in the module data or can be modified subsequently, see "Insert Modules".

Vendor-Specific Data (3)

With register "Vendor-specific data" further data can be displayed or edited. For further information refer to the documentation or online help of IndraWorks /5/.

Group Assignment (4)

With register "Group assignment" definitions are specified for the sync and freeze commands. For further information refer to the documentation or online help of IndraWorks /5/.

The sub-division within a slave is comprised to modules. The I/O areas of the modules are assigned to the physical addresses (e. g. I/O addresses of the PLC).

Insert Modules

Profibus DP distinguishes between two slave types:

- **Compact:** A compact slave has a firmly defined module structure.
- **Modular:** However, for a modular slave the modules can be individually assigned depending on the fitting specification.

After inserting a slave in the project explorer (see "Insert Slaves") the modules below the slave object node are already completely available for slaves in compact design. However, for modular slaves the modules have to be manually assigned.

The modules suitable for the respective slave are archived in the device library below the slave ("+" opens the module list). Insert a module from the device library per Drag & Drop below the slave in the project explorer. New modules can be positioned between already inserted modules.

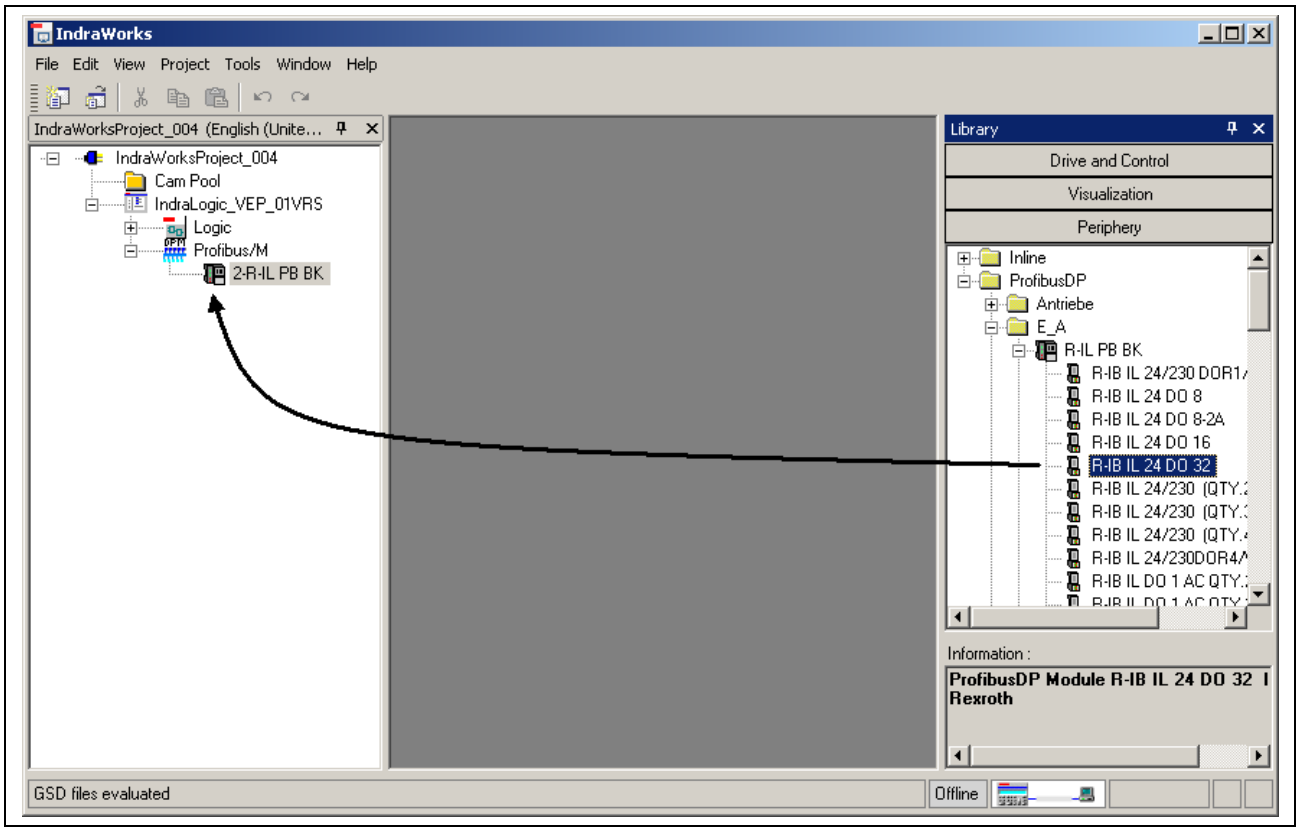
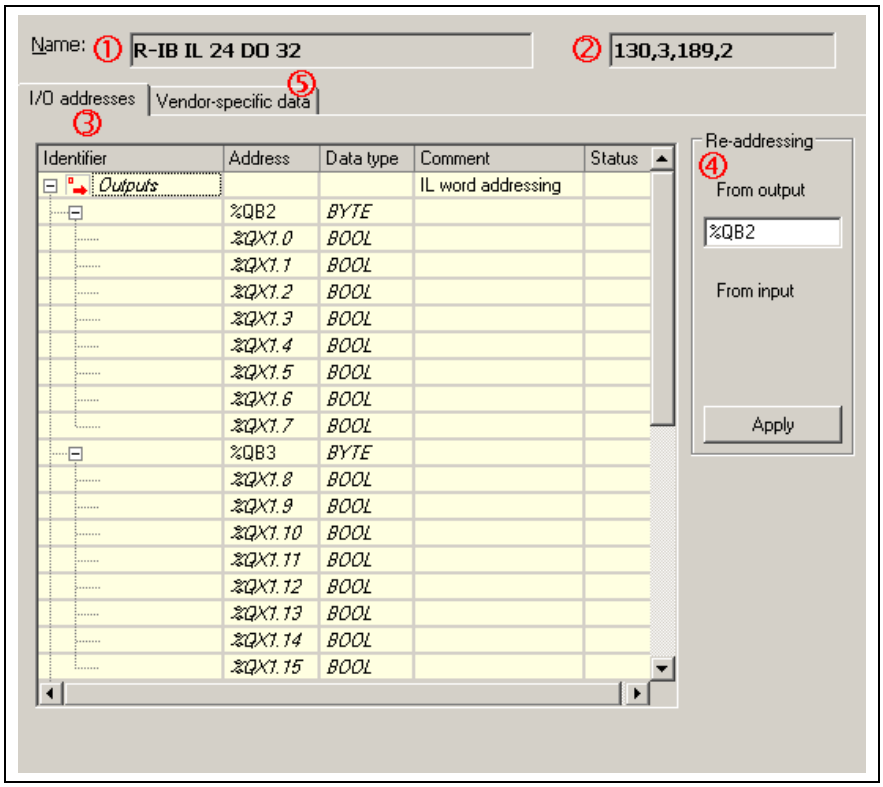


Fig. 4-14: Insert a Profibus slave module

While inserting a slave module in the project explorer, the module data are indicated in a dialog box (wizard). Some data cannot be changed.

All entries made in the wizard can be also changed later, see figure below. For this, double-click on the desired module in the project explorer.



(1) Module name
(2) Internal module identification
(3) I/O addresses
(4) Automatic addressing
(5) Vendor-specific data

Fig. 4-15: Module data

Name (1) Module name according to the GSD file

Configuration Bytes (2) Internal module identification: Extract from the GSD file

I/O Addresses (3) The I/O areas of the modules are assigned to the physical addresses (I/O addresses of the PLC).

Identifier: This column shows the individual input and output modules. With symbol +/– the bitwise illustration can be shown or hidden. Furthermore, a symbolic identifier can be assigned. The variable name, that shall be classified in the PLC project as global variable, is entered as symbolic address.

Example: The figure shows the symbolic identifiers Output01 and Output02. They are assigned to the byte addresses %QB2 and %QB3, see column "Address". This outputs can be addressed in the PLC project (IndraLogic) via the names Output01 or Output02 .

Address: Here, the I/O address can be edited bytewise (e. g. %QB4). The bit addresses indicated in italics serve only for display and cannot be edited.

Comment: Please enter here any comment.

Status: Here, the real physical status of the input or output in the diagnostic mode is displayed (in preparation).

Re-addressing (4) The modules can also be automatically addressed in consecutive order. Enter the desired start address in the input box **From output** or **From input**. The automatic addressing is started with **Apply**. Thereby, all modules are sequentially provided with PLC addresses in consecutive order. In the event of address overlappings with already assigned addresses the next connected free address area is searched. In this case a dialog box appears with the request, if this free area is to be used for the addressing. The new addresses are applied to column "Address".

Vendor-Specific Data (5) With register "Vendor-specific data" further data can be displayed or edited. For further information refer to the documentation or online help of IndraWorks /5/.

Sync and Freeze Functions

The IndraLogic VEP does not support any sync and freeze function of Profibus DP!

4.3 PLC Programming with IndraLogic

Overview

For the PLC project planning the following functions can be executed via the program integrated in IndraWorks:

- Target Settings: Settings of the IndraLogic VEP
- Task Configuration: Control of the program processing
- PLC Configuration: The PLC configuration is not generated within IndraLogic, but in IndraWorks.
- Library Manager: Manage PLC block libraries
- Create a PLC Program: Create blocks in PLC programming languages.

The PLC project planning with IndraLogic is activated via the object node "Logic" in the project explorer.

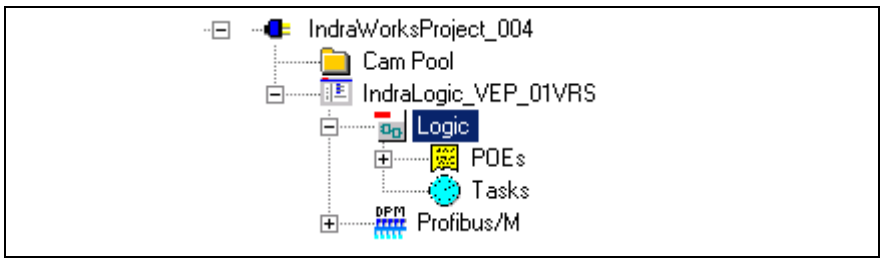


Fig. 4-16: Logic node in the project explorer

- By double-clicking on "Logic" IndraLogic is started with the target system "IndraLogic VEP".
- By double-clicking on an entry below POUs" (e. g. PLC_PRG) the corresponding block is opened in IndraLogic for further editing, see "Create a PLC Program".
- By double-clicking on "Tasks" the task configuration is started in IndraLogic, see "Task Configuration".

Update Project

All blocks generated in IndraLogic as well as the modifications of the settings are applied in the IndraWorks project explorer as soon as the context menu function "Update" is selected in the object node "Logic":

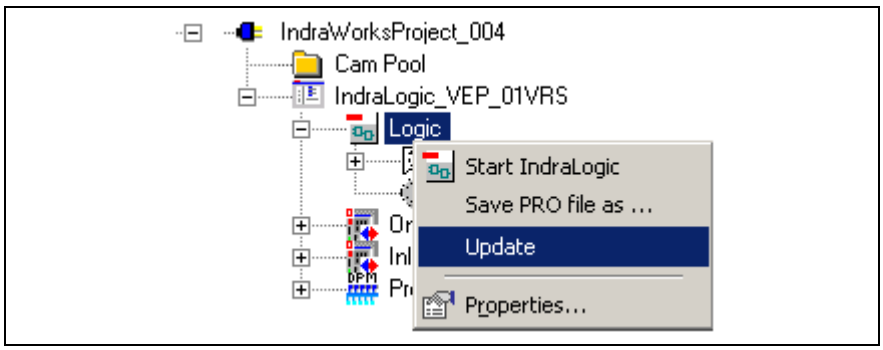


Fig. 4-17: Update logic node

Target Settings

The target settings are optimized to the most frequently used applications. For special applications the settings can be adapted. For further information about the target settings refer to the documentation or online help of IndraLogic /2/.

The target settings can be reached in IndraLogic by clicking on "Target settings" in register "Resources".

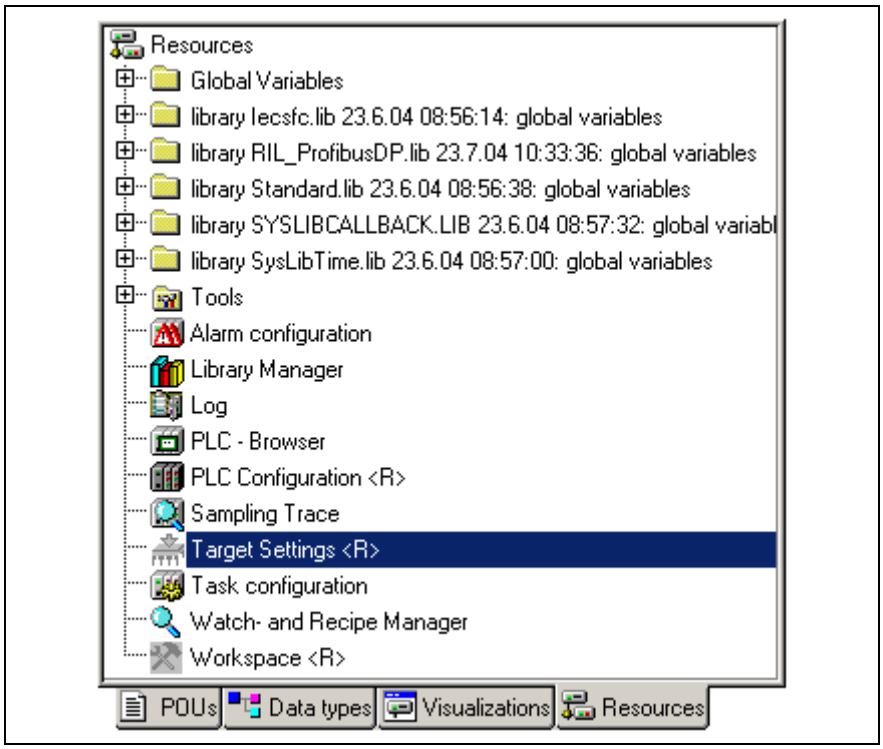


Fig. 4-18: IndraLogic, resources, target settings

CAUTION

Each modification of the preset target configuration can have serious effects on the behavior of the target system!

⇒ The target settings may only be modified by instructed specialists, who are aware of the effects of this modifications!

Interrupting the Data Base Link

Usually, a connection to the data base server is active. If a connection is active, you can recognize by the designation **<R>** in the object node of the target settings. To be able to modify the target settings, at first, the connection to the data base has to be interrupted. Using command **Check Out** in the context menu the data base link can be interrupted, see figure below. After changing the target settings the data base link can be re-established via menu function **Check In**.

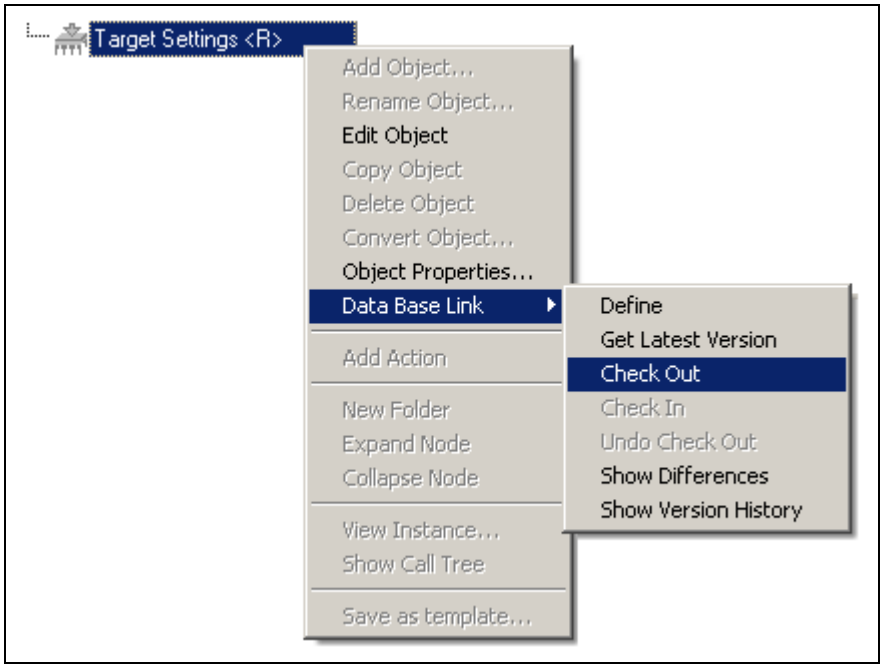


Fig. 4-19: Target settings: Check out from the data base

Task Configuration

Via the task configuration the user program can be distributed to several tasks.

If you do not use a special task configuration, the program is processed via the main program PLC_PRG. But the cycle time of 10 ms must not be exceeded, as otherwise the cycle time monitoring is actuated (not changeable). PLC_PRG is automatically generated as block of type program. PLC_PRG is called up exactly one time in each control cycle.

The task configuration can be called by

- double-clicking on "Tasks" in the object node "Logic" in the IndraWorks project explorer

- or -

- by clicking on "Task configuration" in register "Resources" in IndraLogic.

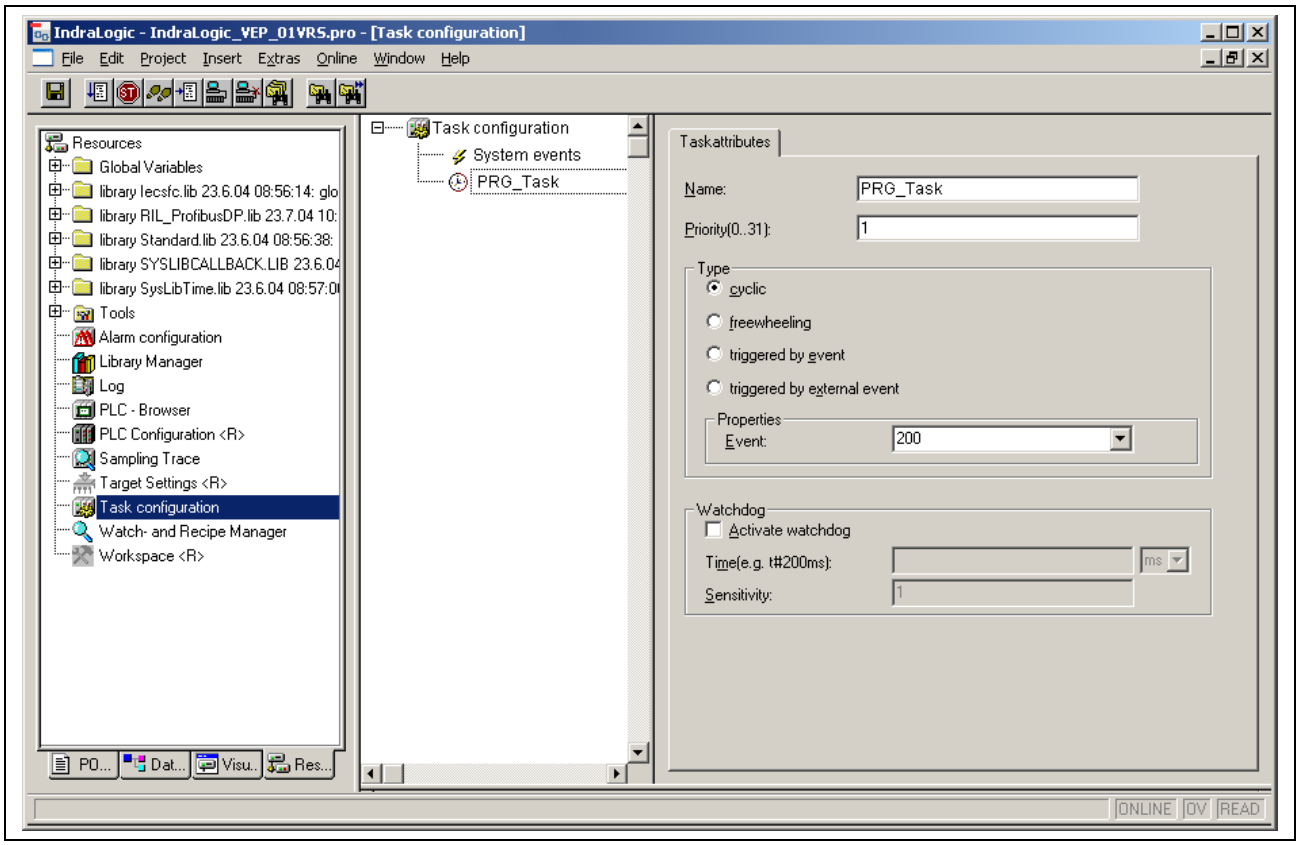


Fig. 4-20: IndraLogic task configuration

For further information about the task attributes refer to the documentation or online help of IndraLogic /2/.

PLC Configuration

The PLC configuration is not generated within IndraLogic, but in IndraWorks. All input boxes of the IndraLogic PLC configuration are deactivated and cannot be changed.

Concerning the PLC configuration please consider section "Projecting with IndraWorks".

Library Manager

For further information about the library manager refer to the documentation or online help of IndraLogic /2/.

For information about the libraries of the IndraLogic VEP refer to section "Libraries".

With the IndraLogic VEP already a few libraries are indicated in IndraLogic in register "Resources". To link further libraries with the current project, menu function "Insert further library" is provided. After calling up this function, a file selection dialog indicating the current IndraWorks project path appears, see figure below:

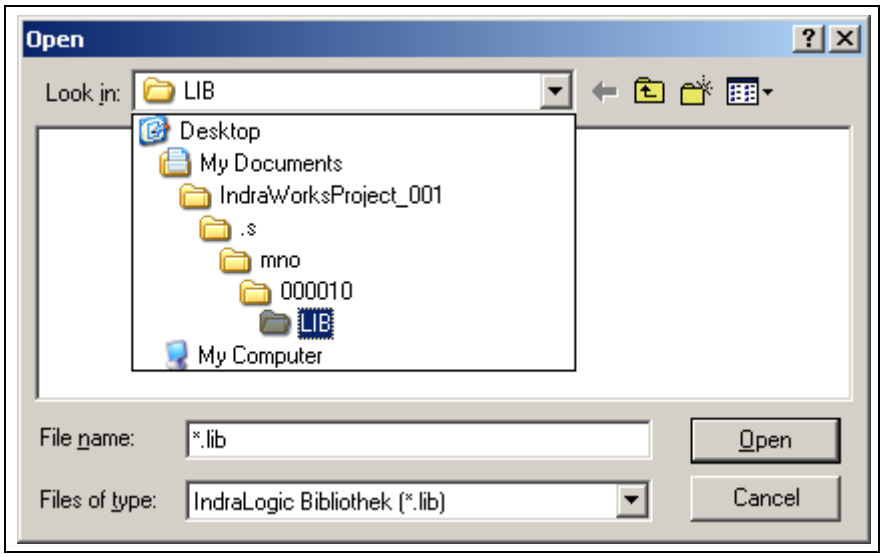


Fig. 4-21: Insert further library: IndraWorks project path

Select here the library directory of the installed target files (target files) of the IndraLogic VEP. The target files are to find in a sub-directory of the IndraWorks installation:

...\IndraWorks\IndraLogic\Targets

Example Example for the library directory of the IndraLogic VEP 01VRS (see also figure below).

C:\Program Files\Rexroth\IndraWorks\IndraLogic\Targets\IndraLogic_VEP_01VRS\lib\

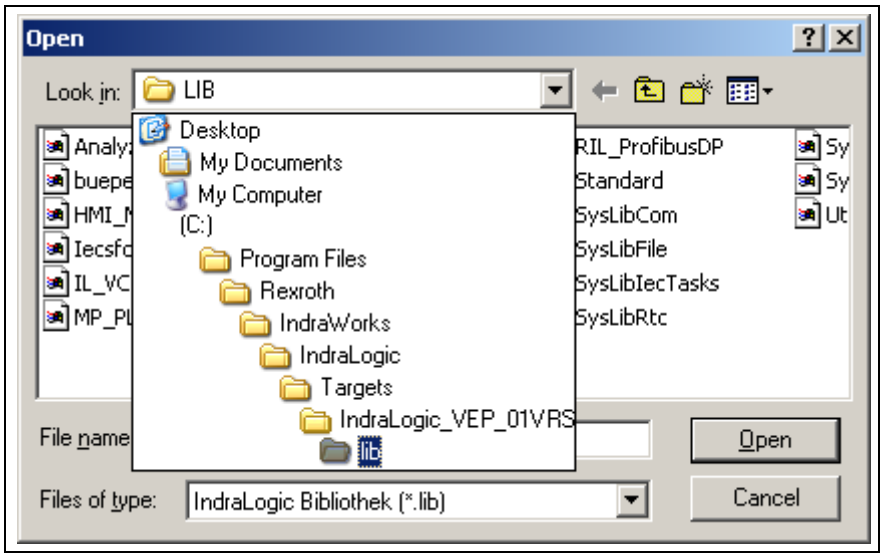


Fig. 4-22: Library directory of the IndraLogic VEP target

Create a PLC Program

Create the PLC program in IndraLogic.

For further information refer to the documentation or online help of IndraLogic /2/.

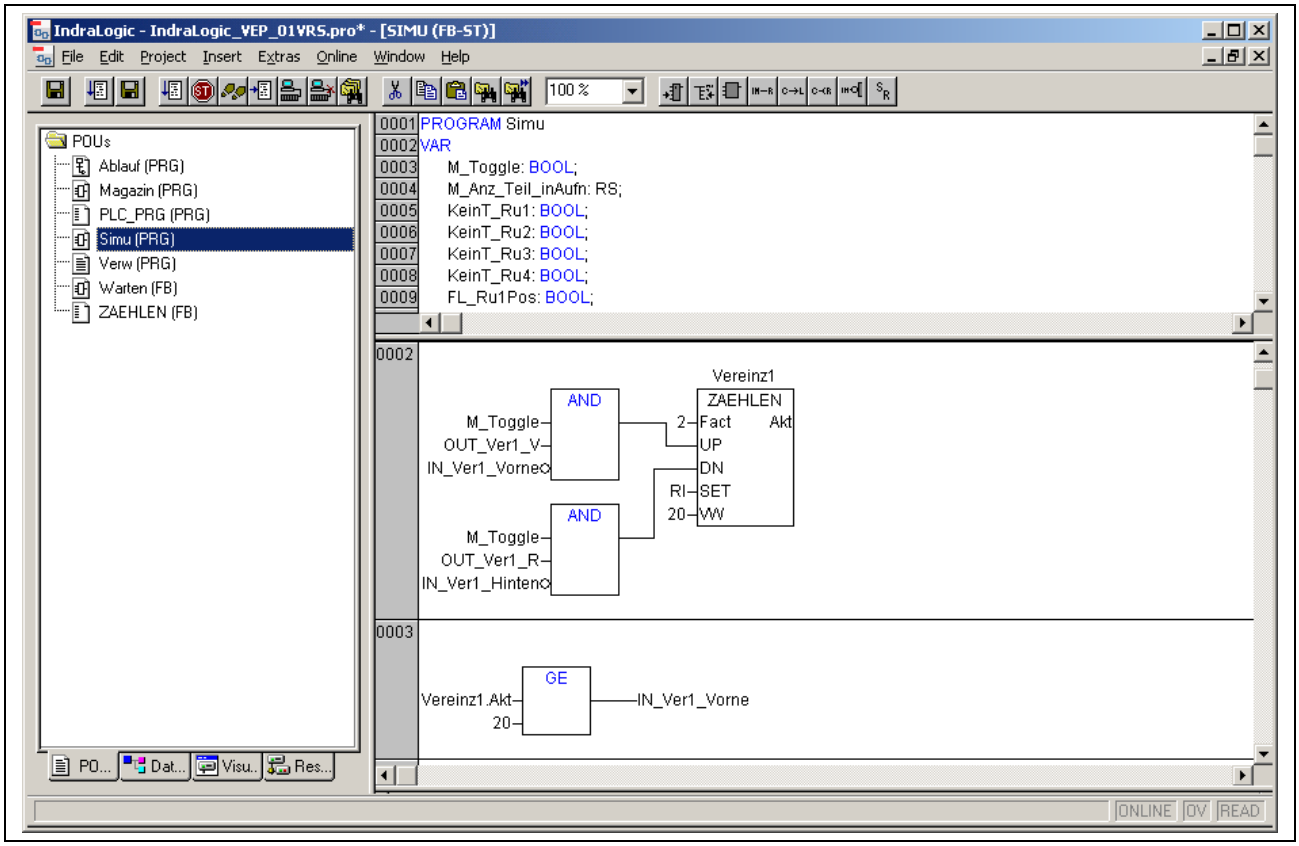


Fig. 4-23: PLC program example

Save IndraLogic Project Data

With menu function "File, Save" all settings executed in IndraLogic and all edited blocks can be saved.

Note: Always save the IndraLogic project data at first, before you change the current project in IndraWorks.

4.4 Compatible IEC Programming between Different Controls

Overview

To ensure a compatible programming between the systems, consider the following features: It is described, which programming methods can be used, so that no incompatibilities may occur and, thus, the programs can be ported between the systems:

- Use of pointers within structures
- Memory alignment for I/O addresses, compatibility to the IndraControl L20.

Use of Pointers within Structures

If structures are created in the IEC program, the compiler maps this structures during the compilation process in the data memory of the control. The compiler recognizes exactly the possible restrictions of the used processor platform and archives the elements of the structure in the memory by using only addresses, that the processor can utilize for the corresponding data types.

If structures with elements containing different data types are created, the compiler inserts, e. g., for the IndraControl L20 filling bytes, that are not visible for the user.

```
TYPE OutStruct :
STRUCT
      Out01 : BYTE;
      Out02 : WORD;
      Out03 : BYTE;
      Out04 : DWORD;
END_STRUCT
END_TYPE
```

Fig. 4-24: Example of a structure declaration in the IEC program

Depending on the platform this structure is mapped to the memory as follows (here a comparison between the controls IndraLogic VPP 21 and L20):

IndraLogic VPP 21	**IndraControl L20**
ADR0 Out01 : BYTE; ADR1 Out02 : WORD; ADR3 Out03 : BYTE; ADR4 Out04 : DWORD; ADR8 :	ADR0 Out01 : BYTE; ADR1 (filling byte) ADR2 Out02 : WORD; ADR4 Out03 : BYTE; ADR5 (filling byte) ADR6 (filling byte) ADR7 (filling byte) ADR8 Out04 : DWORD; ADR12 :

Fig. 4-25: Mapping of the memory

The structure elements are differently mapped, so that a compatible programming method being independent of the control's mapping must be used when accessing the structure elements.

Permissible Addressing

The compatible use of structures provides for a direct addressing of the elements via the point operator:

```
Structure name.Element name := Element value;
```

If the address of a structure shall be transferred to subfunctions via a pointer, the addressing of the elements is also only permissible by the offset calculation of the compiler:

```
Structure pointer^.Element name := Element value;
```

```
StructInst : OutStruct;            (* Declaration structure instance *)
pt : POINTER TO StructInst;        (* Declaration pointer to structure instance *)

StructInst.Out03 := 2#11110000;    (* Access to structure element *)

pt := ADR (StructInst);            (* Pointer initialization *)
pt^.Out02 := 16#FF00;              (* Access to structure element by pointer *)
```

Fig. 4-26: Examples

Impermissible Addressing

The addressing of a structure element by calculations in the code is **impermissible**:

```
Structure element pointer := ADR (Structure name.Element);
Structure element pointer := Structure element pointer + n;
Structure element pointer^ := value;
```

This is impermissible and causes incompatibilities, as it is not ensured, that the offset creation to address a structure element by calculation in the code is reliable. The number of filling bytes is different for the platforms.

Alignment for I/O Addresses (IndraControl L20)

Please consider the following notes for addressing, if you want to develop programs compatible to the IndraLogic L20.

The memory organization of the IndraControl L20 allows only one memory alignment for the declaration of I/O addresses on the basis of the used data types. I/O addresses must be assigned to start addresses having the same data capacity as the data type. The following table shows the factor for the start address to be considered for the respective data type:

Data type	Factor = Data capacity (bytes)
BYTE	1
WORD	2
DWORD	4

Fig. 4-27: Factor for start addresses for the IndraControl L20

Example

When a byte is addressed, a DWORD-type I/O address may only be aligned with positions being divisible by 4:

```
Out01  AT %QB0 : DWORD;
Out02  AT %QB4 : DWORD;
```

The following declaration is not allowed:

```
Out03  AT %QB7 : DWORD;
```

The alignment with %QB7 is not allowed, as this I/O address is not divisible by 4. The compiler indicates an error.

4.5 Download and Commissioning

Load Configurations and PLC Program into the Control

Verify to Exclude Errors

After finishing the programming the project can be verified in IndraLogic with menu function "Project, Rebuild all".

Download and Online Mode

With menu function "Online, Log-in" the communication between programming system and the IndraLogic VEP is started, and a change to the online mode occurs. If the current project was not compiled after opening it or after the last modification, it is compiled now (as for "Project, compile"). If errors occur during the compilation, IndraLogic does not change to the online mode.

If the current project was modified after the last download on the control, but not closed, and if the last download information was not deleted with command "Project, Clear all", a dialog with the following request is opened:

"The program has been changed. Load changes? (Online Change)"

By answering <Yes> you confirm during logging-in, that the changed parts of the project are to be loaded into the control. With <Load all> the complete project is reloaded into the control. With <No> a logging-in occurs, but the changes made after the last download are not loaded into the control.

For this, refer also to the "Online Functions" in the IndraLogic documentation or help /2/.

Online Functions

With the IndraLogic information about the status of the control can be retrieved with the help of the "Online Function", see IndraLogic documentation or help /2/.

5 Further Functions

5.1 Import IndraLogic Project File

Via the context menu of the device an existing IndraLogic project can be imported. Thus, projects can be edited in IndraWorks, that have been created with IndraLogic stand-alone (version without IndraWorks) or with CoDeSys. You can also import projects created within IndraWorks.

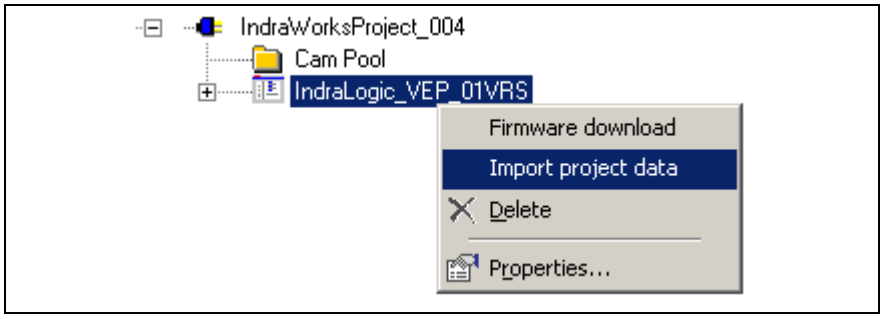


Fig. 5-1: Context menu, device

For further information refer to the documentation or online help of IndraWorks /5/.

5.2 IndraLogic Functions

If IndraLogic is started, the context menu changes. Now, it is possible to

- translate the IndraLogic project (compile)
- shut down IndraLogic
- log-in or log-out the control
- save project files with a new name
- update all blocks created in IndraLogic as well as modifications of configuration settings in the IndraWorks project explorer.

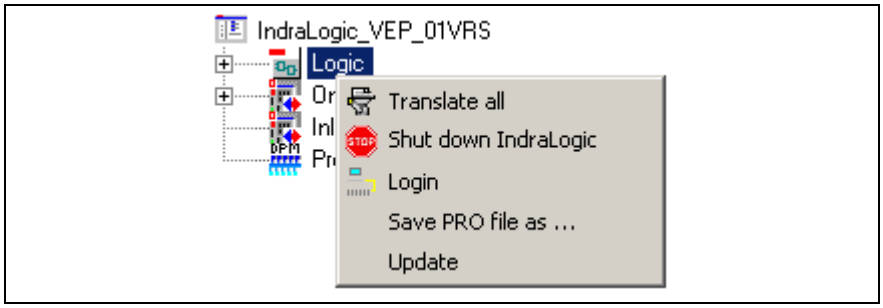


Fig. 5-2: IndraLogic project: Context menu, if IndraLogic is started

Notes

6 Libraries

6.1 Overview

The following table contains all general libraries as well as the libraries especially provided for the IndraLogic VEP.

To link libraries with the current project, please consider under "PLC Programming with IndraLogic" section "Library Manager".

Name of the library	Function	See
AnalyzationNew	Blocks to analyze expressions	/2/
BusDiag	Diagnostic information of the Hilscher DP bus master	In this chapter
Iecsfc	– Internal use –	–
MP_PLCopen	MotionControl blocks	/8/
NetVarUdp_LIB_V23	Library with blocks for the application of network variables and the parameter manager, i. e. for data exchange between two or more controls	Networkfunctionality.pdf
PLCOpenFieldBus	MotionControl on the basis of the PLCOpen	/7/
ProViDiagnosis	Access to the PLC diagnosis (ProVi)	/5/
RIL_Check	Automatic monitoring of over-ranges	In this chapter
RIL_CommonTypes	– Internal use –	–
RIL_ProfibusDP	Profibus-DPV1 services, diagnostic interface between Profibus master and PLC program, sync and freeze	In this chapter
RIL_Utilities	General functions and function blocks	In this chapter
Default	Default FBs and functions of the IEC 61131-3	/2/
SysLibCom	Serial communication with the IndraLogic VEP	SysLibCom.pdf
SysLibEvent	Synchronizing and controlling the operating process between two (IEC) tasks	SysLibEvent.pdf
SysLibFile	File system support on the IndraLogic VEP	SysLibFile.pdf
SysLibFileAsync	Asynchronous file accesses from the IEC application	SysLibFileAsync.pdf
SysLibIecTasks	Management of IEC tasks	SysLibIecTasks.pdf
SysLibMem	Memory management, e. g. to reserve memory space, to define memory, to compare, to copy or move, or to swap.	SysLibMem.pdf
SysLibNetConnect		SysLibNetConnect.pdf
SysLibPlcCtrl	Verifying the control, handling of Retain variables and activating the watchdog	SysLibPlcCtrl.pdf
SysLibProjectInfo	Retrieving project information	SysLibProjectInfo.pdf
SysLibRtc	Access to the real-time clock of the IndraLogic VEP	SysLibRtc.pdf
SysLibSem	Generating and applying semaphore for the synchronization of tasks	SysLibSem.pdf
SysLibSockets	Access to sockets for the communication via TCP/IP and UDP	SysLibSockets.pdf
SysLibSocketsAsync		SysLibSocketsAsync.pdf
SysLibStr	Functions to operate with strings (character strings)	SysLibStr.pdf
SysLibTasks	Task management	SysLibTasks.pdf
SysLibTime	Retrieve real-time clock of the IndraLogic VEP	SysLibTime.pdf

Util	As supplement to the Default.lib Blocks for BCD converting, bit/byte functions, mathematic help functions, controllers, signal generators, function manipulators and analog value processing	/2/

Fig. 6-1: Overview of IndraLogic VEP libraries

Note: Libraries for internal use are automatically loaded as soon as they are referenced. Therefore, they must not be inserted in the library manager.

You will find an overview of related documentations in chapter 1. Concerning the system and firmware libraries please also consider the online help of IndraLogic. The documentation about the system libraries (SysLibXXX.pdf) you will find in a sub-directory of IndraLogic, e. g.:

C:/Program Files/Rexroth/IndraWorks/IndraLogic/Documents/German

6.2 BusDiag

This library allows to read the specific diagnostic information of the Hilscher DP bus master.

Note: We recommend to use the more comprehensive library RIL_ProfibusDP.lib instead of the BusDiag.lib.

You will find further information on the BusDiag.lib in the description of the Hilscher bus card.

6.3 RIL_Check

Faulty accesses (accidentally) programmed outside of the ranges of arrays and subrange types of variables, as well as the division by zero, are not compensated by the IndraLogic compiler and/or the runtime system and cause partly unpredictable errors during program processing. If you insert library RIL_Check.lib such over-ranges are monitored and prevented. Thereby, the access for arrays and subrange system types are limited to the smallest or highest possible value. Thus, e. g. concerning an array, the element with highest indices is accessed, even if a higher index value was specified in the PLC program. For a division by zero the divisor is replaced by "1".

Note: If the RIL_Check.lib library is integrated in the PLC project, before each testable operation the corresponding test function is automatically inserted (invisible for the user).

Further function calls are not necessary!

Note: If library RIL_Check.lib is integrated in the PLC project, the PLC cycle time is charged, as each testable operation is automatically monitored. With respect to the robustness of a PLC project and the safety of the whole system we recommend to use the RIL_Check.lib in the PLC project.

When using the MP_PLCOpen.lib library, the RIL_Check.lib is required. In this case the RIL_Check.lib must be integrated in the PLC project.

Functions All functions contained in the RIL_Check (see Fig. 6-2) are automatically integrated in the PLC program and must not be explicitly called.

Designation	Description
CheckBounds	Automatic verification, if the permissible indices of the access to array elements is exceeded or fallen below the minimum value.
CheckDivByte	Automatic verification on division by zero (BYTE access).
CheckDivDWord	Automatic verification on division by zero (DWORD access).
CheckDivReal	Automatic verification on division by zero (REAL access).
CheckDivWord	Automatic verification on division by zero (WORD access).
CheckRangeSigned	Automatic verification, if the permissible value range of a signed variable is exceeded or fallen below the minimum value.
CheckRangeUnsigned	Automatic verification, if the permissible value range of an unsigned variable is exceeded or fallen below the minimum value.

Fig. 6-2: Funktions of RIL_Check

CheckExceedingOccurred

You can exactly determine the error cause by directed requesting of the bits in the global variable „CheckExceedingOccurred“. All error accesses are prevented by RIL_Check, so that the permissible value range is not exceeded or fallen below the minimum value and that no division by zero occurs. The single bits have the following meaning:

Bit variable	Value	Meaning
CheckExceedingOccurred.0	16#01	CheckBoundsLowerLimitation: The permissible indices of the access to array elements are fallen below the minimum value.
CheckExceedingOccurred.1	16#02	CheckBoundsUpperLimitation: The permissible indices of the access to array elements are exceeded.
CheckExceedingOccurred.2	16#04	CheckBoundsExceedingLimitation: The permissible indices of the access to array elements are exceeded or fallen below the minimum value.
CheckExceedingOccurred.3	16#08	CheckRangeLowerLimitation: The permissible value range of a variable is fallen below the minimum value.
CheckExceedingOccurred.4	16#16	CheckRangeUpperLimitation: The permissible value range of a variable is exceeded.
CheckExceedingOccurred.5	16#32	CheckRangeExceedingLimitation: The permissible value range of a variable is exceeded or fallen below the minimum value.
CheckExceedingOccurred.6	16#64	DivisionByZeroPrevention: Division by zero.

Fig. 6-3: CheckExceedingOccurred

Sample Program

The following PLC sample program shows the use of the variable CheckExceedingOccurred. The limitation of arrays with CheckBounds, always sets the respective bit in error case, when the permissible value range is exceeded or fallen below the minimum value (CheckBoundsLowerLimitation or CheckBoundsUpperLimitation) and the general bit of the access violation (CheckBoundsExceedingLimitation). Thus, a general or detailed verification, if a limit value was exceeded, can be realized.

```
CheckExceedingOccurred := 16#00;        (* Resetting the variable *)

IF Axis_Data[AxisNo].bCheckAccessOK     (* Array access *)
THEN
...

IF CheckExceedingOccurred.2 (* Array access violation detected? *)
THEN
          IF CheckExceedingOccurred.0 (* Bit set, if value below specified range? *)
          THEN
                  String := 'Access below the possible array range'
                  ...

          END_IF
          IF CheckExceedingOccurred.0 (* Bit set, if value above specified range? *)
          THEN
                  String := 'Access above the possible array range'
                  ...

          END_IF
ELSE
  String := 'Access successful'
END_IF
```

Fig. 6-4: Sample program: over-range for arrays

6.4 RIL_ProfibusDP

Overview

When using this library, not only DPV1 services of the Profibus master (DP master class 1) are provided, but also a diagnostic interface between Profibus master and PLC program is created. Additionally, sync and freeze control commands can be realized.

DPV1 Services

Function Blocks

The function blocks serve for reading and writing access for the acyclic data exchange (DPV1):

- DP_RDREC
- DP_WRREC

Functions

Moreover, help functions for slot addressing are available:

- DP_ADDR
- DP_ID
- DP_SLOT

Diagnostic Information

Diagnostic information can be determined via function blocks. The diagnosis differs in

- Slave Diagnostic Data According to the Profibus DP Standard: "DP_RDIAG" and "DP_RDIAG_EXT"
- General Field Bus Diagnosis: "fbd..."

Data Types

Some of these data are administrated in special data types (arrays, structures):

- tFBD_BM_INFO
- tFBD_BIT_LIST
- tFBD_KSD_LIST

Function Blocks

- DP_RDIAG
- DP_RDIAG_EXT
- fbdBaudrateGet
- fbdBmErrorGet
- fbdBmInfoGet
- fbdBmStateGet
- fbdKsdListGet
- fbdPdTypeGet
- fbdPrjSlaveListGet
- fbdSlaveDiagListGet

Functions

Moreover, help functions for addressing are available:

- DP_ADDR
- DP_ID
- DP_SLOT

Slave Diagnostic Data According to the Profibus DP Standard

Profibus-specific diagnostic information according to the Profibus DP standard can be read via the following function blocks:

- DP_RDIAG
- DP_RDIAG_EXT

The slave diagnostic data are available with the parameters DINFO or DINFO_PTR. While for "DINFO" all diagnostic data are archived in an array, "DINFO_PTR" is a pointer to the diagnostic data.

The slave diagnostic data are subdivided into two parts:

- general part with a fixed length of 6 bytes
- extended diagnosis (slave-specific, with variable length)

Offset	Type	Designation	Description
0	BYTE	Station status_1	See below
1	BYTE	Station status_2	See below
2	BYTE	Station status_3	See below
3	BYTE	Master_Add	Bus address of the master having parameterized the slave
4	WORD	Ident_Number	Ident_Number of the slave
6 – 243		Ext_Diag_Data	Extended slave diagnosis according to Profibus DP standard

Fig. 6-5: Slave diagnostic data

The following description of the station status 1 to 3 is an extract from the Profibus DP standard.

Bit	Designation	Description
7	Master_Lock	The DP slave was parameterized by another master. This bit is set by the DP master (class 1), if the address in octet 4 is not equal to 255 and not equal to the own address. The DP slave sets this bit permanently to zero.
6	Prm_Fault	This bit is set by the DP slave, if the last parameter telegram was faulty, e. g., wrong length, wrong Ident_Number, invalid parameters.
5	Invalid_Slave_Response	This bit is set by the DP master, as soon as one of the addressed DP slaves receives an implausible response. The DP slave sets this bit permanently to zero.
4	Not_Supported	This bit is set by the DP slave, as soon as a function was requested, that is not supported by this DP slave.
3	Ext_Diag	This bit is set by the DP slave. If the bit is set, a diagnostic entry must be available in the slave-specific diagnostic area (Ext_Diag_Data). If the bit is not set, a status message might be present in the slave-specific diagnostic area (Ext_Diag_Data). The meaning of this status message must be defined according to the respective application.
2	Cfg_Fault	This bit is set by the DP slave, as soon as the configuration data lastly received by the DP master do not correspond to the data determined by the DP slave.
1	Station_Not_Ready	This bit is set by the DP slave, if the DP slave is not yet ready for data exchange.
0	Station_Non_Existent	This bit is set by the DP master, if this DP slave can not be reached via the bus. If this bit is set, the diagnostic bits contain the status of the last diagnostic message or the initial value. The DP slave sets this bit permanently to zero.

Fig. 6-6: Station status_1

Bit	Designation	Description
7	Deactivated	This bit is set by the DP master, as soon as the DP slave in the DP slave parameter set is not indicated as active and was removed from the cyclic processing. The DP slave sets this bit permanently to zero.
6	Reserved	-
5	Sync_Mode	This bit is set by the DP slave, as soon as it received the sync control command.
4	Freeze_Mode	This bit is set by the DP slave, as soon as it received the freeze control command.
3	WD_On (Watchdog)	This bit is set by the DP slave, as soon as its response monitoring is activated.
2	1	The DP slave sets this bit permanently to zero.
1	Stat_Diag (static diagnosis)	If the DP slave sets this bit, the DP master has to retrieve diagnostic information as long as this bit is deleted again. The DP slave sets this bit, for example in the case, if it can't provide any valid user data.
0	Prm_Req	If the DP slave sets this bit, it must be re-parameterized and re-configured. The bit remains set, as long as a parameterization occurred. This bit is set by the DP slave.

Fig. 6-7: Station status_2

Bit	Designation	Description
7	Ext_Diag_Overflow	If this bit is set, there're more diagnostic information as specified in Ext_Diag_Data. The DP slave sets this bit, for example, if there're more channel diagnoses than the DP slave can enter in its transmitter buffer; or the DP master sets this bit, if the DP slave sends more diagnostic information than the DP master is able to enter in its diagnostic buffer.
6	Reserved	-
5	Reserved	-
4	Reserved	-
3	Reserved	-
2	Reserved	-
1	Reserved	-
0	Reserved	-

Fig. 6-8: Station status_3

You will find further information on the diagnostic functions in the description of the Function Blocks.

General Field Bus Diagnosis

The general field bus diagnosis provides the following data areas:

- BmState: Bus master status word, see "tFBD_BM_INFO"
- BmError: Bus master error word, see "tFBD_BM_INFO"
- SD: Slave diagnostic list, see "tFBD_BIT_LIST"
- KSD: Classified slave diagnosis, see "tFBD_KSD_LIST"
- Projected slave list, see "tFBD_BIT_LIST"

Bus Master Status Word

"BmState" provides an overview of the status of the bus master and the slaves at the field bus. Here, you can recognize for example, if at least for one slave a diagnosis is applied.

Bus Master Error Word

In "BmError" fatal errors rendering the operation at the field bus impossible are indicated.

Slave Diagnostic List

SD indicates which slaves signal diagnosis.

Classified Slave Diagnosis

KSD provides detailed information. It indicates, which slaves signal diagnosis and divides the diagnosis into error classes.

Projected Slave List

The projected slave list contains all available slaves according to the master configuration file. For example, with this list projected slaves can be compared with the slaves currently available at the field bus.

You will find further information on the data areas in the description of the Data Types and on the diagnostic functions in the description of the Function Blocks.

Data Types

tFBD_BM_INFO

This structure combines the variables "PdType", "BmStatus" and "BmError". It is used in function block "fbdBmInfoGet".

```
0001 TYPE tFBD_BM_INFO :
0002 STRUCT
0003     PdType  : INT;
0004     BmState : WORD;
0005     BmError : WORD;
0006 END_STRUCT
0007 END_TYPE
```

Fig. 6-9: tFBD_BM_INFO

PdType: Peripheral Driver

Function block "fbdBmInfoGet" determines the type of the installed peripheral driver and indicates it in "PdType":

Driver	Description
PDT_NONE	No peripheral driver installed
PDT_PCI_BMDP	Peripheral driver: Profibus DP
PDT_PCI_BMCAN	Peripheral driver: CAN Open (at present, not available)
PDT_PCI_BMIBS	Peripheral driver: Interbus (at present, not available)

Fig. 6-10: Installed peripheral driver in "PdType"

BmState: Bus Master Status Word

The bus master status word "BmState" provides an overview of the status of the bus master and the slaves at the field bus. Here, you can recognize for example, if at least for one slave a diagnosis is applied. Each set bit (TRUE) in "BmState" represents a status:

Bit	Status	Description
0	BMS_BMF	Bus master error: This bit indicates, that there's a bus master error. In this case, the bus master error word contains more detailed information
1	BMS_KSD	Classified slave diagnosis: If this bit is set, at least one slave indicates a classified diagnosis. Which classified diagnosis/diagnoses is/are set, can be determined by the bits 8 to 13.
2	BMS_SD	Slave diagnosis: If this bit is set, at least one slave indicates a slave diagnosis.
3	-	- Reserved -
4	-	- Reserved -
5	-	- Reserved -
6	-	- Reserved -
7	BMS_AKTIV	Active identification: This bit must always have value 1. If this is not the case, there's a fatal error in the software of the bus master.

Bit	Status	Description
8	BMS_SNE	One or several slaves are not accessible via the bus
9	BMS_SKF	One or several slaves indicate configuration errors
10	BMS_DPS	One or several slaves indicate static diagnosis
11	BMS_EXD	One or several slaves indicate extended diagnosis
12	BMS_SNB	One or several slaves are not ready for the cyclic data exchange
13	BMS_SF	One or several slaves indicate another error
14	-	- Reserved -
15	-	- Reserved -

Fig. 6-11: Status coding in "BmState"

BmState is used in the following function blocks:

- fbdBmInfoGet
- fbdBmStateGet

BmError: Bus Master Error Word

In the bus master error word "BmError" fatal errors rendering the operation at the field bus impossible are indicated. Each set bit (TRUE) in "BmError" represents an error:

Bit	Error	Description
0	BMF_HW_ERR	Hardware error
1	BMF_MPS_ERR	Master parameter set (field bus configuration file) is missing or faulty
2	BMF_BUS_ERR	Error at the field bus (e. g. short-circuit, ...)
3	BMF_SW_ERR	System error in the peripheral driver (i. e. the driver software has detected a fatal error)

* "BMF_OK" indicates, that no error occurred

Fig. 6-12: Error coding in "BmError"

BmError is used in the following function blocks:

- fbdBmErrorGet
- fbdBmInfoGet

tFBD_BIT_LIST

The bit list "tFBD_BIT_LIST" has a defined length of 16 bytes (128 bits).

```
0001 TYPE tFBD_BIT_LIST :
0002     ARRAY [0..15] OF BYTE;
0003 END_TYPE
```

Fig. 6-13: tFBD_BIT_LIST

Each bit of the bit list is assigned to a bus address of the slave (Profibus: FDL address). Thus, e. g. the lowest-order bit in the first array element (ARRAY[0]) is assigned to the Profibus device with address 0:

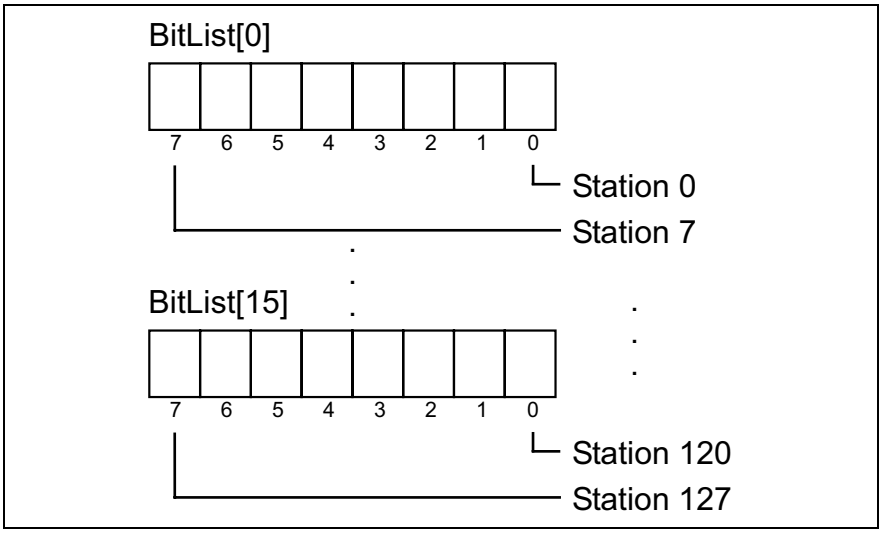


Fig. 6-14: Coding of the bit list

The bit list is used in the following function block:

- fbdPrjSlaveListGet
- fbdSlaveDiagListGet

Additionally, the bit list is used in the tFBD_KSD_LIST (classified slave diagnosis).

tFBD_KSD_LIST

The list of the classified slave diagnosis (KSD list) consists of six bit lists. Thus, a bit list exists for each error type.

```
0001 TYPE tFBD_KSD_LIST :
0002     STRUCT
0003         SNE : tFBD_BIT_LIST;
0004         SKF : tFBD_BIT_LIST;
0005         DPS : tFBD_BIT_LIST;
0006         EXD : tFBD_BIT_LIST;
0007         SNB : tFBD_BIT_LIST;
0008         SF  : tFBD_BIT_LIST;
0009     END_STRUCT
0010 END_TYPE
```

Fig. 6-15: tFBD_KSD_LIST

Classified Slave Diagnosis (KSD)

The classified slave diagnosis distinguishes the following error types:

SNE	Slave not accessible. The slave is not accessible at the bus. Possible causes: – Slave not available – Voltage at the slave switched off – Faulty bus installation – Physical malfunctions
SKF	Slave configuration error. The slave type or the I/O configuration of the slave does not correspond to the projected values in the field bus configuration file of the master.
DPS	Slave indicates static diagnosis: The slave can't provide valid user data. The application layer of the slave is not ready for data exchange with the master.
EXD	Slave indicates extended diagnosis. The extended diagnosis is slave-specific and can be taken from the description of the slave. Possible causes: – Load voltage missing/switched off (e. g. in case of Emergency Stop) – Short-circuit at one output – Overload – Over-temperature – Line break
SNB	Slave is not ready. The slave is not ready for data exchange, as it is not yet put into operation by the master (message from the protocol layer of the slave).
SF	Slave indicates another error.

Fig. 6-16: Classified slave diagnosis

Each bit of a bit list is assigned to a bus address of the slave (Profibus: FDL address). Thus, the lowest-order bit in the first array element (ARRAY[0]) is assigned to the Profibus device with address 0:

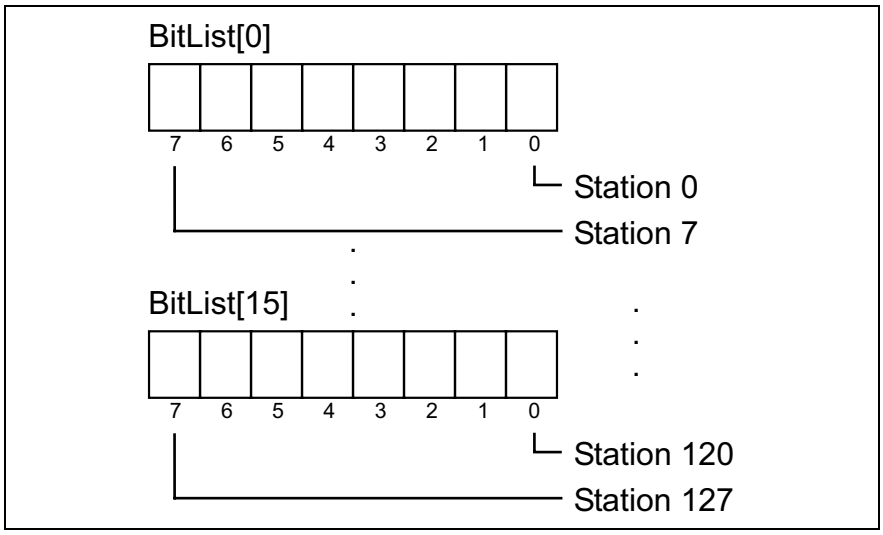


Fig. 6-17: Coding of the bit list

Bit[x] = FALSE	Slave[x] has no diagnosis
Bit[x] = TRUE	Slave[x] has diagnosis

Fig. 6-18: Bit list: Classified slave diagnosis

Function Blocks

DP_RDIAG

The diagnostic data of a slave are read from the DP master (DPM1) using function block DP_RDIAG. The data buffer of the diagnostic data must be provided to address it via a POINTER.

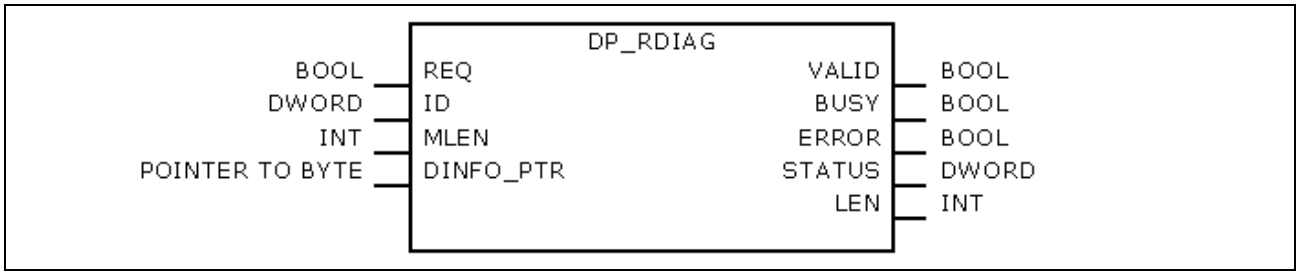


Fig. 6-19: DP_RDIAG

	Name	Type	Comment
VAR_INPUT	REQ	BOOL	TRUE: Start reception
	ID	DWORD	Slot handle, see the following table
	MLEN	INT	Maximum length of the data to be read
	DINFO_PTR	POINTER TO BYTE	Pointer to the data buffer of the Slave Diagnostic Data According to the Profibus DP Standard
VAR_OUTPUT	VALID	BOOL	TRUE: New, valid diagnostic data available
	ERROR	BOOL	TRUE: Error/s occurred
	BUSY	BOOL	TRUE: The function block is busy. As long as BUSY = TRUE, the data can not yet be evaluated.
	STATUS	DWORD	Lastly defined status
	LEN	INT	Length of the diagnostic data in bytes

Fig. 6-20: Interface of DP_RDIAG

Bytes	Contents	Description
0	MASTER	ID of the DP system: Has permanently value 0, as the IndraLogic VEP contains exactly one DP master.
1	SEGMENT	Number of the DP segment
2	STATION	Number of the DP slave (bus address).
3	SLOT	Number of the slot within the slave

Fig. 6-21: Slot handle: Parameter "ID"

Example: To address the slave with bus address 12, the ID has value 16#000C0000.

Function DP_ID serves for creating the ID from the individual components.

DP_RDIAG_EXT

The diagnostic data of a slave are read from the DP master (DPM1) using function block DP_RDIAG_EXT. The diagnostic data are stored in an ARRAY.

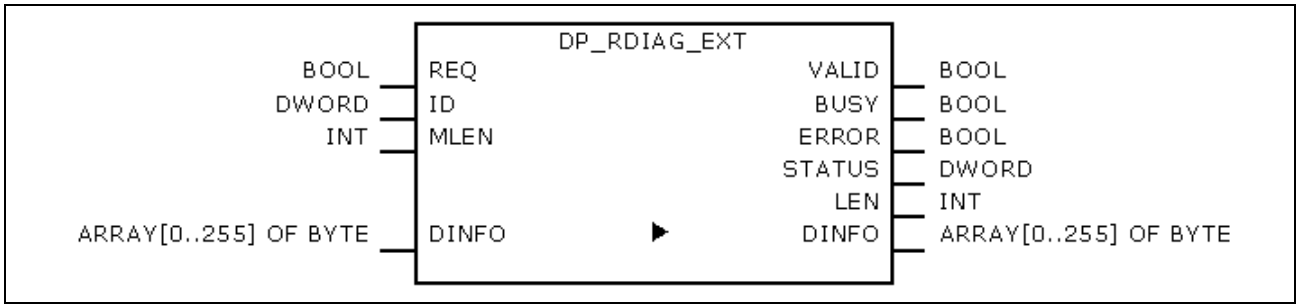


Fig. 6-22: DP_RDIAG_EXT

	Name	Type	Comment
VAR_INPUT	REQ	BOOL	TRUE: Start reception
	ID	DWORD	Slot handle, see the following table
	MLEN	INT	Maximum length of the data to be read
VAR_IN_OUT	DINFO	ARRAY [0..255] OF BYTE	Slave Diagnostic Data According to the Profibus DP Standard
VAR_OUTPUT	VALID	BOOL	TRUE: New, valid diagnostic data available
	ERROR	BOOL	TRUE: Error/s occurred
	BUSY	BOOL	TRUE: The function block is busy. As long as BUSY = TRUE, the data can not yet be evaluated.
	STATUS	DWORD	Lastly defined status
	LEN	INT	Length of the diagnostic data in bytes

Fig. 6-23: Interface of DP_RDIAG_EXT

Bytes	Contents	Description
0	MASTER	ID of the DP system: Has permanently value 0, as the IndraLogic VEP contains exactly one DP master.
1	SEGMENT	Number of the DP segment
2	STATION	Number of the DP slave (bus address).
3	SLOT	Number of the slot within the slave

Fig. 6-24: Slot handle: Parameter "ID"

Example: To address the slave with bus address 12, the ID has value 16#000C0000.

Function DP_ID serves for creating the ID from the individual components.

DP_RDREC

Function block DP_RDREC serves for reading access for the acyclic data exchange (DPV1). For the process data to be read a target area must be defined via a pointer addressing (POINTER).

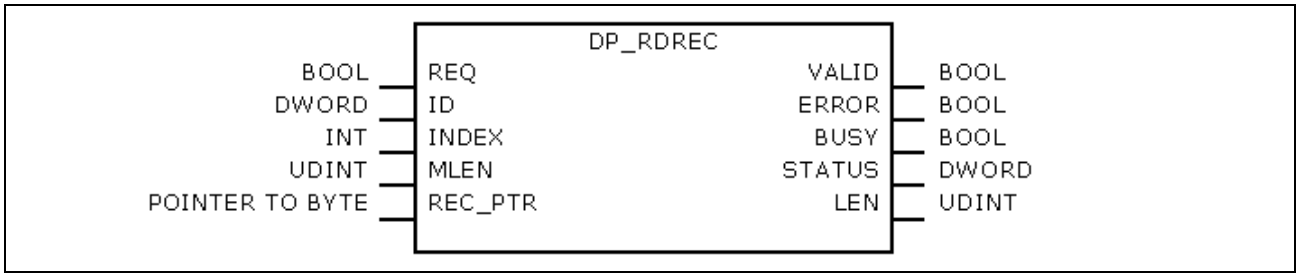


Fig. 6-25: DP_RDREC

	Name	Type	Comment
VAR_INPUT	REQ	BOOL	TRUE: Start reading
	ID	DWORD	Slot handle, see the following table
	INDEX	INT	Index of the process data (offset)
	MLEN	UDINT	Maximum length of the process data in bytes
	REC_PTR	POINTER TO BYTE	Pointer to the target area
VAR_OUTPUT	VALID	BOOL	TRUE: New, valid data available
	ERROR	BOOL	TRUE: Error/s occurred
	BUSY	BOOL	TRUE: The function block is busy. As long as BUSY = TRUE, the data can not yet be evaluated.
	STATUS	DWORD	Lastly defined status
	LEN	UDINT	Length of the process data in bytes

Fig. 6-26: Interface of DP_RDREC

Bytes	Contents	Description
0	MASTER	ID of the DP system: Has permanently value 0, as the IndraLogic VEP contains exactly one DP master.
1	SEGMENT	Number of the DP segment
2	STATION	Number of the DP slave (bus address).
3	SLOT	Number of the slot within the slave

Fig. 6-27: Slot handle: Parameter "ID"

Example: To address the slave with bus address 12, the ID has value 16#000C0000.

Function DP_ID serves for creating the ID from the individual components.

DP_WRREC

Function block DP_WRREC serves for reading access for the acyclic data exchange (DPV1). The process data to be written must provided via a pointer addressing (POINTER).

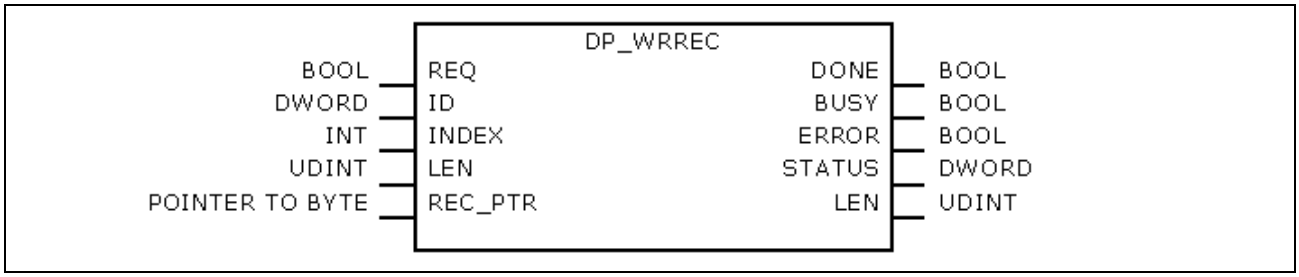


Fig. 6-28: DP_WRREC

	Name	Type	Comment
VAR_INPUT	REQ	BOOL	TRUE: Start writing
	ID	DWORD	Slot handle, see the following table
	INDEX	INT	Index of the process data (offset)
	LEN	UDINT	Length of the process data in bytes
	REC_PTR	POINTER TO BYTE	Pointer to the process data to be written
VAR_OUTPUT	DONE	BOOL	TRUE: Call completed
	ERROR	BOOL	TRUE: Error/s occurred
	BUSY	BOOL	TRUE: The function block is busy. As long as BUSY = TRUE, the data can not yet be evaluated.
	STATUS	DWORD	Lastly defined status

Fig. 6-29: Interface of DP_WRREC

Bytes	Contents	Description
0	MASTER	ID of the DP system: Has permanently value 0, as the IndraLogic VEP contains exactly one DP master.
1	SEGMENT	Number of the DP segment
2	STATION	Number of the DP slave (bus address).
3	SLOT	Number of the slot within the slave

Fig. 6-30: Slot handle: Parameter "ID"

Example: To address the slave with bus address 12, the ID has value 16#000C0000.

Function DP_ID serves for creating the ID from the individual components.

fbdBaudrateGet

Function block fbdBaudrateGet reads the baud rate of the connected field bus. The baud rate is indicated in bits per second.

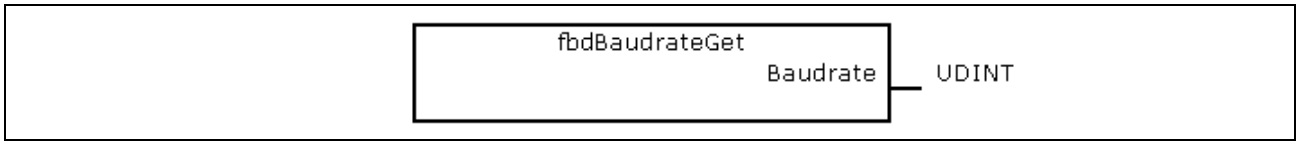


Fig. 6-31: fbdBaudrateGet

	Name	Type	Comment
VAR_OUTPUT	Baud rate	UDINT	Baud rate at the field bus (bit/s)

Fig. 6-32: Interface of fbdBaudrateGet

fbdBmErrorGet

Function block fbdBmErrorGet reads the current bus master error word.

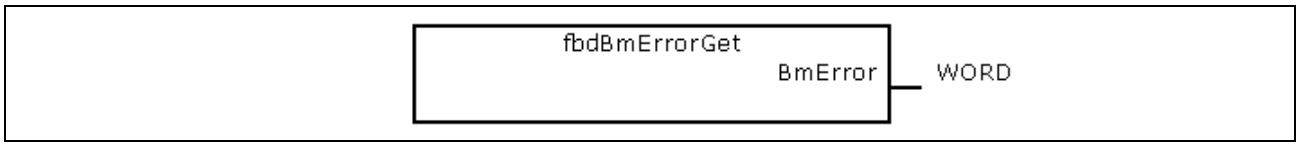


Fig. 6-33: fbdBmErrorGet

	Name	Type	Comment
VAR_OUTPUT	BmError	WORD	See tFBD_BM_INFO

Fig. 6-34: Interface of fbdBmErrorGet

fbdBmInfoGet

Function block fbdBmInfoGet provides the tFBD_BM_INFO structure. This structure contains PdType, BmStatus and BmError. Thus, the information is provided by one single call, instead of calling several differing functions.

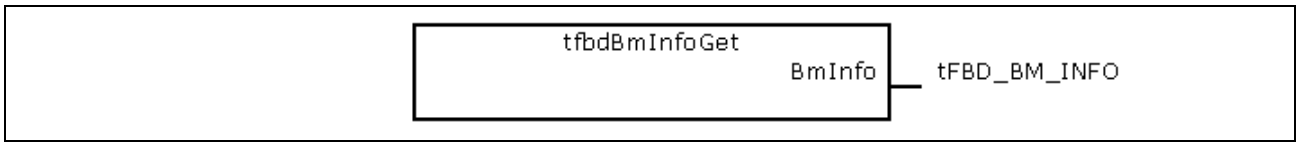


Fig. 6-35: fbdBmInfoGet

	Name	Type	Comment
VAR_OUTPUT	BmInfo	tFBD_BM_INFO	See tFBD_BM_INFO

Fig. 6-36: Interface of fbdBmInfoGet

fbdBmStateGet

Function block fbdBmStateGet reads the current bus master status word.

Fig. 6-37: fbdBmStateGet

	Name	Type	Comment
VAR_OUTPUT	BmState	WORD	See tFBD_BM_INFO

Fig. 6-38: Interface of fbdBmStateGet

fbdKsdListGet

Function block fbdKsdListGet reads the current KSD list.

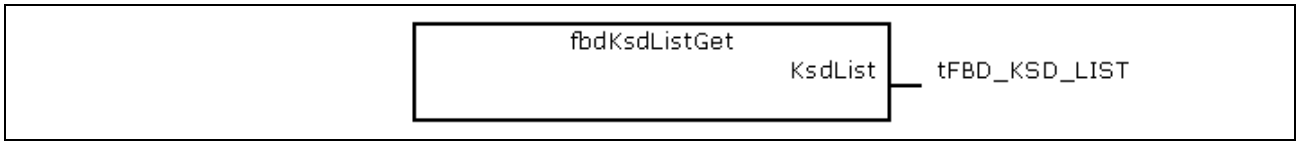


Fig. 6-39: fbdKsdListGet

	Name	Type	Comment
VAR_OUTPUT	KsdList	tFBD_KSD_LIST	See tFBD_KSD_LIST

Fig. 6-40: Interface of fbdKsdListGet

fbdPdTypeGet

Function block fbdPdTypeGet determines the type of the installed peripheral driver.

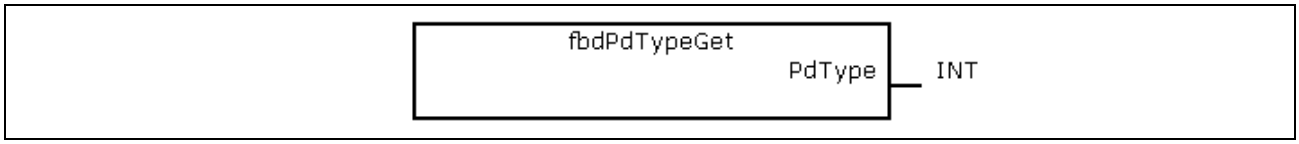


Fig. 6-41: fbdPdTypeGet

	Name	Type	Comment
VAR_OUTPUT	PdType	INT	Peripheral driver type: PDT_NONE: No peripheral driver installed PDT_PCI_BMDP: PROFIBUS DP PDT_PCI_BMCAN: CAN Open PDT_PCI_BMIBS: INTERBUS S

Fig. 6-42: Interface of fbdPdTypeGet

fbdPrjSlaveListGet

Function block fbdPrjSlaveListGet reads the list of the projected slaves. The list contains all available slaves according to the master configuration file.

Fig. 6-43: fbdPrjSlaveListGet

	Name	Type	Comment
VAR_OUTPUT	PrjSlaveList	tFBD_BIT_LIST	See tFBD_BIT_LIST

Fig. 6-44: Interface of fbdPrjSlaveListGet

Each bit of the bit list is assigned to a bus address of the slave:

Bit[x] = TRUE	Slave[x] is projected
Bit[x] = FALSE	Slave[x] is not projected

Fig. 6-45: Bit list: Projected slaves

fbdSlaveDiagListGet

Function block fbdSlaveDiagListGet reads the current slave diagnostic list.

Fig. 6-46: fbdSlaveDiagListGet

	Name	Type	Comment
VAR_OUTPUT	SlaveDiagList	tFBD_BIT_LIST	See tFBD_BIT_LIST

Fig. 6-47: Interface of fbdSlaveDiagListGet

Each bit of the bit list is assigned to a bus address of the slave:

Bit[x] = TRUE	Slave[x] has diagnosis
Bit[x] = FALSE	Slave[x] has no diagnosis

Fig. 6-48: Bit list: slave diagnosis

DP_SYCFR

The IndraLogic VEP does not support any sync and freeze function of Profibus DP.

Functions

DP_ADDR

This function is not realized. This function can be called up as it is compatible to Profibus Guideline 2182, but it passes a handle unchanged.

Fig. 6-49: DP_ADDR

	Name	Type	Comment
VAR_INPUT	ID	DWORD	Slot handle
Function value		DWORD	

Fig. 6-50: Interface of DP_ADDR

DP_ID

This function considers Profibus Guideline 2182. It provides the handle for a physical address of a slot.

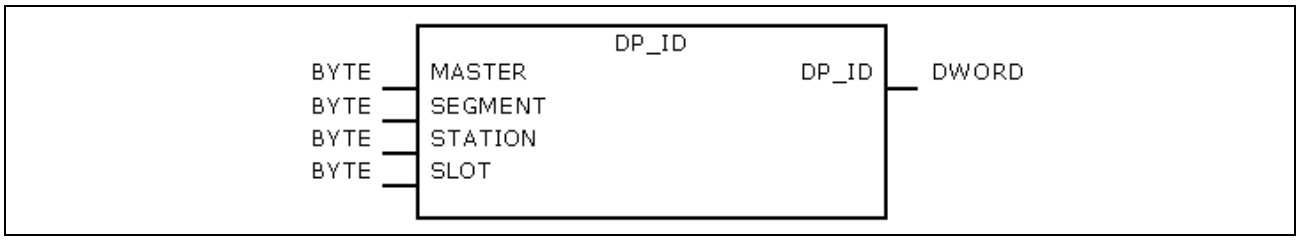


Fig. 6-51: DP_ID

	Name	Type	Comment
VAR_INPUT	MASTER	BYTE	ID of the DP system: Has permanently value 0, as the IndraLogic VEP contains exactly one DP master.
	SEGMENT	BYTE	Number of the DP segment
	STATION	BYTE	Number of the DP slave (bus address): If the command is to be valid for only one special slave, then the bus address of the slave must be entered here (0..125). Only for DP_SYCFR: However, if the command is to be entered for all slaves of a group, a global address (= 127) must be entered here.
	SLOT	BYTE	Number of the slot within the slave
Function value		DWORD	Slot handle

Fig. 6-52: Interface of DP_ID

DP_SLOT

This function considers Profibus Guideline 2182. It sets the slot number defined in the slot handle.

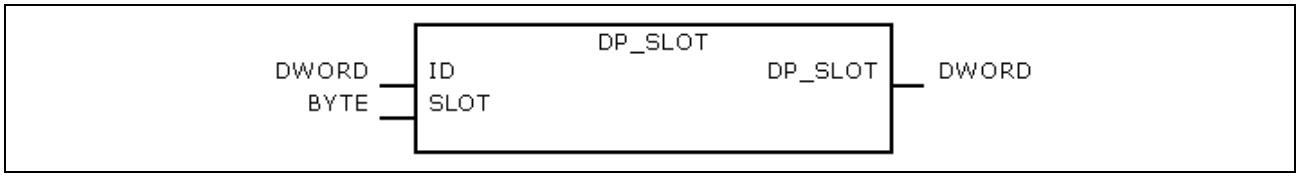


Fig. 6-53: DP_SLOT

	Name	Type	Comment
VAR_INPUT	ID	DWORD	Slot handle
	SLOT	BYTE	Slot number
Function value		DWORD	Slot handle

Fig. 6-54: Interface of DP_SLOT

6.5 RIL_Utilities

Overview

Designation	Type	Description
Version_RIL_Utilities_01V*	FNC	Function Version_RIL_Utilities_01V* serves for the version management of library RIL_Utilities.lib.
IL_HighResTimeTick	FNC	Function IL_HighResTimeTick reads the high resolution time tick of the system.
IL_HighResTimeDiff	FNC	Function IL_HighResTimeDiff calculates the time difference of two high resolution time ticks of the system in microseconds.
IL_Date	FNC	Function IL_Date reads the current date of the system.
IL_TimeOfDay	FNC	Function IL_TimeOfDay reads the current system time.
IL_DateAndTime	FNC	Function IL_DateAndTime reads the current system date and time.
IL_SysTime64	FB	Function block IL_SysTime64 reads the current system date and time.
IL_SysTimeDate	FB	Function block IL_SysTimeDate reads the current system date and time.
IL_ExtSysTimeDate	FB	Function block IL_ExtSysTimeDate reads the current system date and time.
IL_SysTime64ToSysTimeDate	FB	Function block IL_SysTime64ToSysTimeDate converts the format of the system date and time.
IL_SysTimeDateToSysTime64	FB	Function block IL_SysTimeDateToSysTime64 converts the format of the system date and time.

Fig. 6-55: Overview of the function blocks and functions contained in library RIL_Utilities.lib

Designation	Type	Description
n/a	n/a	n/a

Fig. 6-56: Overview of the data types contained in library RIL_Utilities.lib

Designation	Type	Description
n/a	n/a	n/a

Fig. 6-57: Overview of the global variables contained in library RIL_Utilities.lib

Data Types

Library RIL_Utilities.lib does not contain any separate data types.

Global Variables

Library RIL_Utilities.lib does not contain any separate global variables.

Version_RIL_Utilities_01V*

Function Version_RIL_Utilities_01V*[1] serves for version management of library RIL_Utilities.lib.

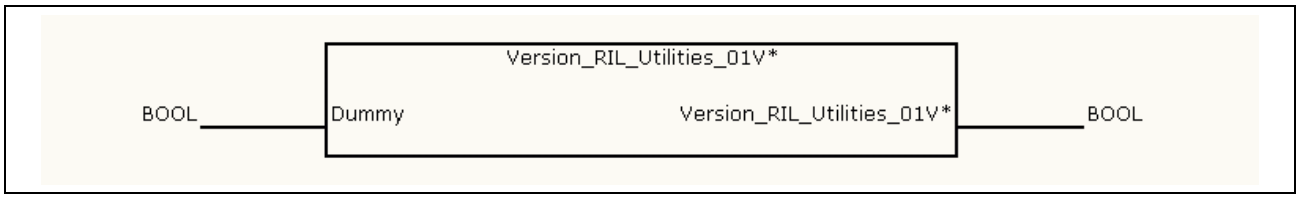


Fig. 6-58: Interface of: Version_RIL_Utilities_01V*

	Name	Type	Comment
VAR_INPUT	Dummy	BOOL	Dummy
Function value	Version_ RIL_Utilities_01V*	BOOL	Acknowledgment that the library is valid

Fig. 6-59: Interface of version_RIL_Utilities_01V*

Specification

Function Version_RIL_Utilities_01V* restricts the use of library RIL_Utilities.lib to the valid system as well as to a certain number of valid releases.

Function Version_RIL_Utilities_01V* also shows the user the current release status of library RIL_Utilities.lib and contains an overview of all previously made modifications.

Note: Library RIL_Utilities.lib is available on several platforms (systems) in the programming system "IndraLogic; its functional range is adapted to the respective system.

Functional Description

If library RIL_Utilities.lib is integrated in a project, function Version_RIL_Utilities_01V* restricts the download of the whole project to the valid system as well as to a valid release. If a system or a release is invalid, the corresponding system function is not available and, thus, cannot be addressed (Fig. 6-60).

Note: The verification of the system and the releases is also active, if function Version_RIL_Utilities_01V* is not used.

[1] (*) Release

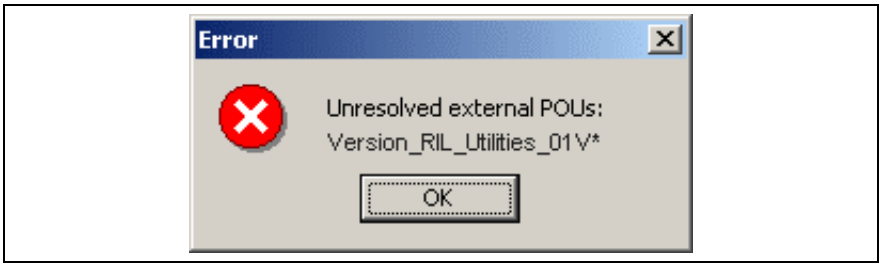


Fig. 6-60: Message: version check of the system failed

Note: Generally, besides the version function also further functions are indicated as not existing and, thus, cannot be integrated in the project.

If function Version_RIL_Utilities_01V* is error-free addressed, it signals permanently TRUE as return value.

Note: Function Version_RIL_Utilities_01V* has no functional meaning for parts of the library and must not be used in the project.

IL_HighResTimeTick

Function IL_HighResTimeTick reads the high resolution time tick of the system.

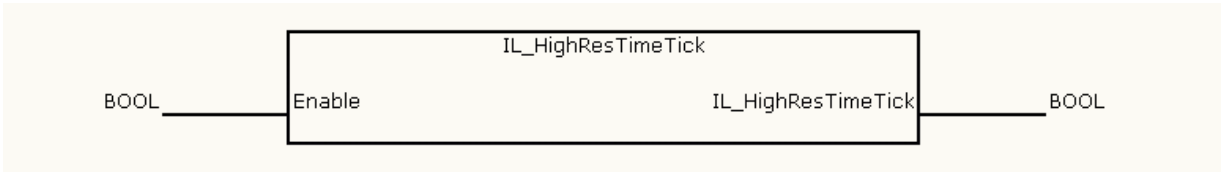


Fig. 6-61: IL_HighResTimeTick

	Name	Type	Comment
VAR_INPUT	Enable	BOOL	Processing enable of the function (cyclic, status-controlled)
Function value	IL_HighResTimeTick	UDINT	High resolution time tick of the system

Fig. 6-62: Interface of IL_HighResTimeTick

Specification

Function IL_HighResTimeTick in combination with function IL_HighResTimeDiff is used to determine the runtime of a code segment (Fig. 6-63).

Note: The return value of function IL_HighResTimeTick should not be used as time value due to the special system-specific time basis.

Functional Description After the processing enable with "Enable" function IL_HighResTimeTick retrieves cyclically the high resolution time tick of the system.

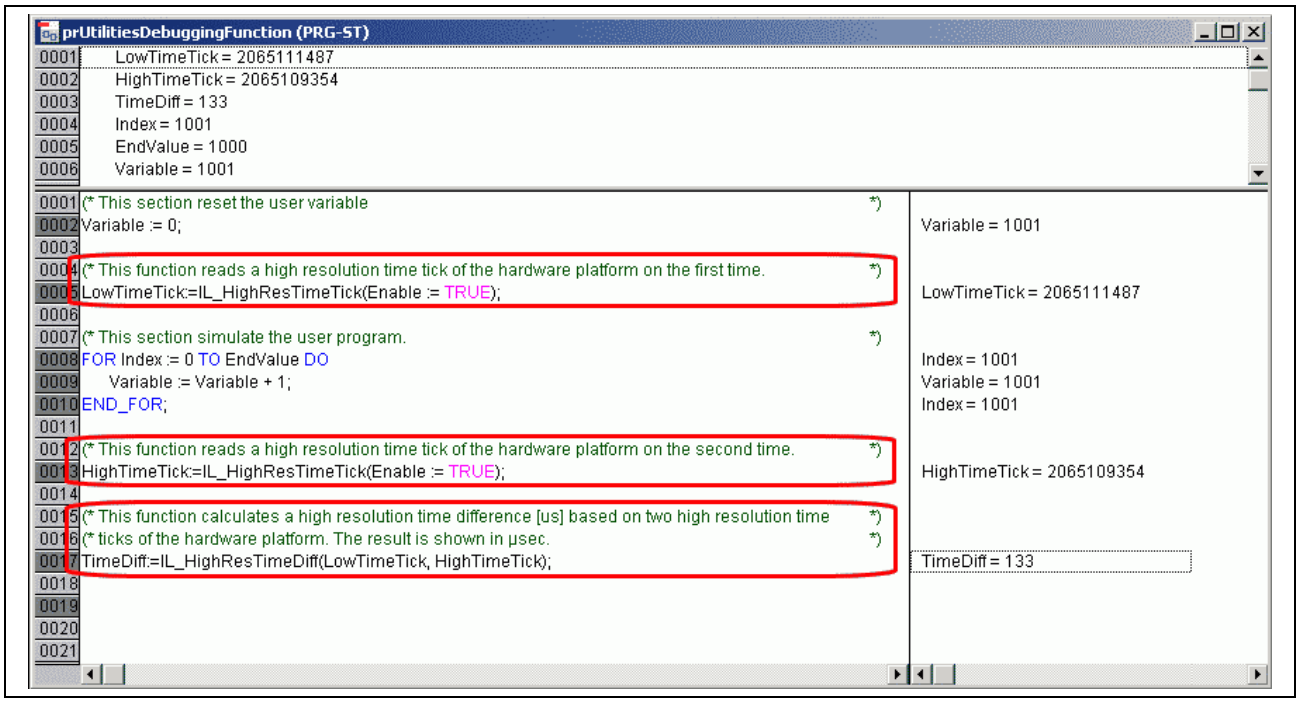


Fig. 6-63: Application example of function IL_HighResTimeTick

IL_HighResTimeDiff

Function IL_HighResTimeDiff calculates the time difference of two high resolution time ticks of the system in microseconds.

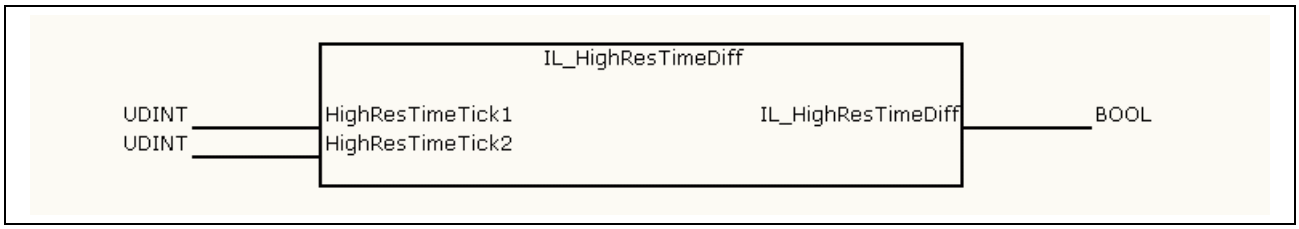


Fig. 6-64: IL_HighResTimeDiff

	Name	Type	Comment
VAR_INPUT	Enable	BOOL	Processing enable of the function (cyclic, status-controlled)
	HighResTimeTick1	UDINT	High resolution time tick of the system before the code segment
	HighResTimeTick2	UDINT	High resolution time tick of the system after the code segment
Function value	IL_HighResTimeDiff	UDINT	Time difference of two high resolution time ticks of the system in [us]

Fig. 6-65: Interface of IL_HighResTimeDiff

Specification Function IL_HighResTimeDiff in combination with function IL_HighResTimeTick is used to determine the runtime of code segment (Fig. 6-63).

Note: Reading out the high resolution time tick requires approx. one to two microseconds depending on the system. If necessary, the user can add this time, when he determines the time difference.

Functional Description After the processing enable with "Enable" function IL_HighResTimeDiff calculates cyclically the time difference of two high resolution time ticks of the system in microseconds.

IL_Date

Function IL_Date reads the current system date.

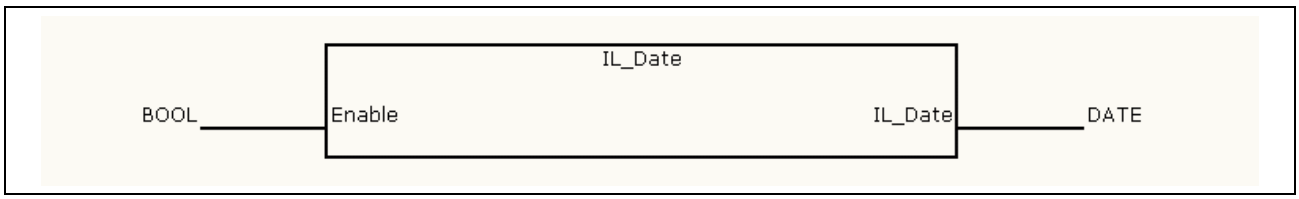


Fig. 6-66: IL_Date

	Name	Type	Comment
VAR_INPUT	Enable	BOOL	Processing enable of the function (cyclic, status-controlled)
RETURN	IL_Date	DATE	Current system date according to IEC61131-3

Fig. 6-67: Interface of IL_Date

Functional Description After the processing enable with "Enable" function IL_Date retrieves cyclically the system date formatted according to IEC61131-3.

IL_TimeOfDay

Function IL_TimeOfDay reads the current system time.

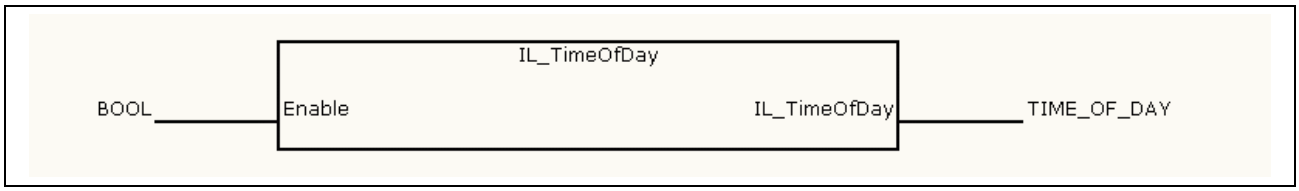


Fig. 6-68: IL_TimeOfDay

	Name	Type	Comment
VAR_INPUT	Enable	BOOL	Processing enable of the function (cyclic, status-controlled)
RETURN	IL_TimeOfDay	TOD	Current system time according to IEC61131-3

Fig. 6-69: Interface of IL_TimeOfDay

Functional Description After the processing enable with "Enable" function IL_TimeOfDay retrieves cyclically the system time formatted according to IEC61131-3.

IL_DateAndTime

Function IL_DateAndTime reads the current system date and time.

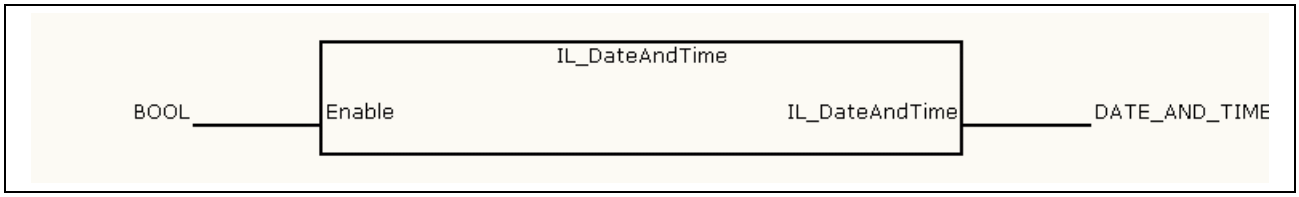


Fig. 6-70: IL_DateAndTime

	Name	Type	Comment
VAR_INPUT	Enable	BOOL	Processing enable of the function (cyclic, status-controlled)
RETURN	IL_DateAndTime	DT	Current system date and time according to IEC61131-3

Fig. 6-71: Interface of IL_DateAndTime

Functional Description

After the processing enable with "Enable" function IL_DateAndTime retrieves cyclically the current system date as well as the current system time in formatted manner according to IEC61131-3.

IL_SysTime64

Function block IL_SysTime64 reads the current system date and time.

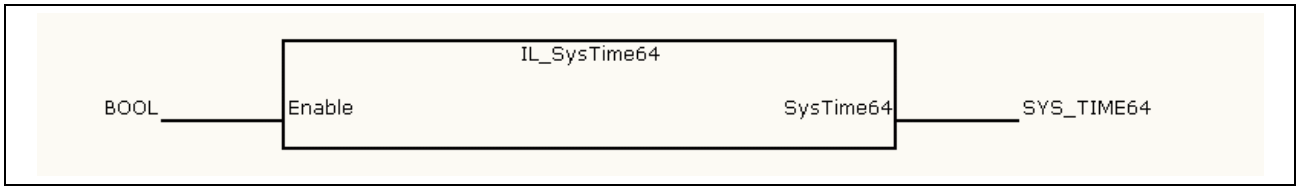


Fig. 6-72: IL_SysTime64

	Name	Type	Comment
VAR_INPUT	Enable	BOOL	Processing enable of the function block (cyclic, status-controlled)
VAR_OUTPUT	SysTime64	SYS_TIME64	Current system date and time in microseconds since 1970-01-01

Fig. 6-73: Interface of IL_SysTime64

Functional Description

After the processing enable with "Enable" function block IL_SysTime64 retrieves cyclically the current system date and time in microseconds since 1970-01-01.

IL_SysTimeDate

Function block IL_SysTimeDate reads the current system date and time.

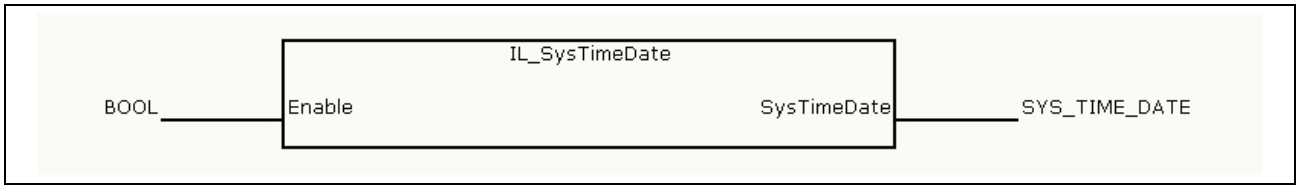


Fig. 6-74: IL_SysTimeDate

	Name	Type	Comment
VAR_INPUT	Enable	BOOL	Processing enable of the function block (cyclic, status-controlled)
VAR_OUTPUT	SysTimeDate	SYS_TIME_DATE	Current system date and time in system format

Fig. 6-75: Interface variables – function block: IL_SysTimeDate

Functional Description

After the processing enable with "Enable" function block IL_SysTimeDate retrieves cyclically the current system date and time in system format.

IL_ExtSysTimeDate

Function block IL_ExtSysTimeDate reads the current system date and time.

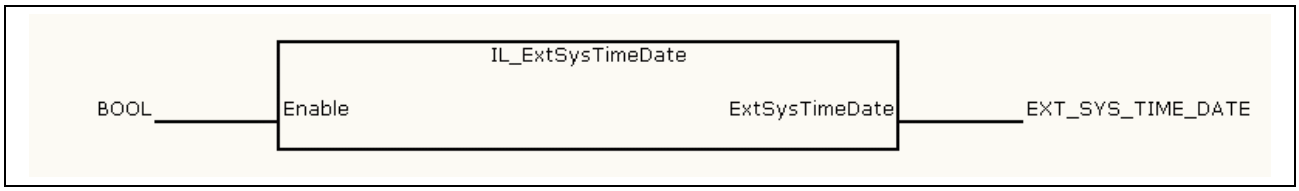


Fig. 6-76: IL_ExtSysTimeDate

	Name	Type	Comment
VAR_INPUT	Enable	BOOL	Processing enable of the function block (cyclic, status-controlled)
VAR_OUTPUT	ExtSysTimeDate	EXT_SYS_ TIME_DATE	Current system date and time in extended system format

Fig. 6-77: Interface variables – function block: IL_ExtSysTimeDate

Functional Description

After the processing enable with "Enable" function block IL_ExtSysTimeDate retrieves cyclically the current system date and time in extended system format.

Note: The extended system format consists of the system formats SYS_TIME64 as well as SYS_TIME_DATE.

IL_SysTime64ToSysTimeDate

Function block IL_SysTime64ToSysTimeDate converts the format of the system date and time.

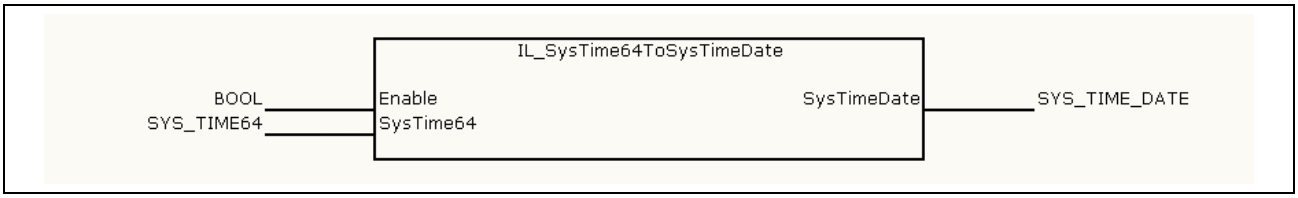


Fig. 6-78: IL_SysTime64ToSysTimeDate

	Name	Type	Comment
VAR_INPUT	Enable	BOOL	Processing enable of the function block (cyclic, status-controlled)
	SysTime64	SYS_TIME64	System date and time in microseconds since 1970-01-01
VAR_OUTPUT	SysTimeDate	SYS_TIME_DATE	System date and time in system format

Fig. 6-79: Interface variables – function block: IL_SysTime64ToSysTimeDate

Functional Description

After the processing enable with "Enable" function block IL_SysTime64ToSysTimeDate converts cyclically the system date including system time in microseconds applied at input "SysTime64" (basis: 1970-01-01) into the system date and time in system format.

IL_SysTimeDateToSysTime64

Brief Description

Function block IL_SysTimeDateToSysTime64 converts the format of the system date and time.

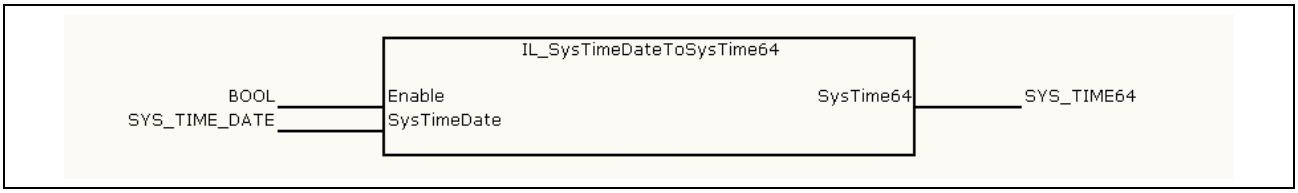


Fig. 6-80: IL_SysTimeDateToSysTime64

	Name	Type	Comment
VAR_INPUT	Enable	BOOL	Processing enable of the function block (cyclic, status-controlled)
	SysTimeDate	SYS_TIME_DATE	System date and time in system format
VAR_OUTPUT	SysTime64	SYS_TIME64	System date and time in microseconds since 1970-01-01

Fig. 6-81: Interface variables – function block: IL_SysTimeDateToSysTime64

Functional Description

After the processing enable with "Enable" function block IL_SysTimeDateToSysTime64 converts cyclically the system date including system time in microseconds applied at input "SysTimeDate" (basis: 1970-01-01).

7 IndraLogicWinCE

7.1 Overview

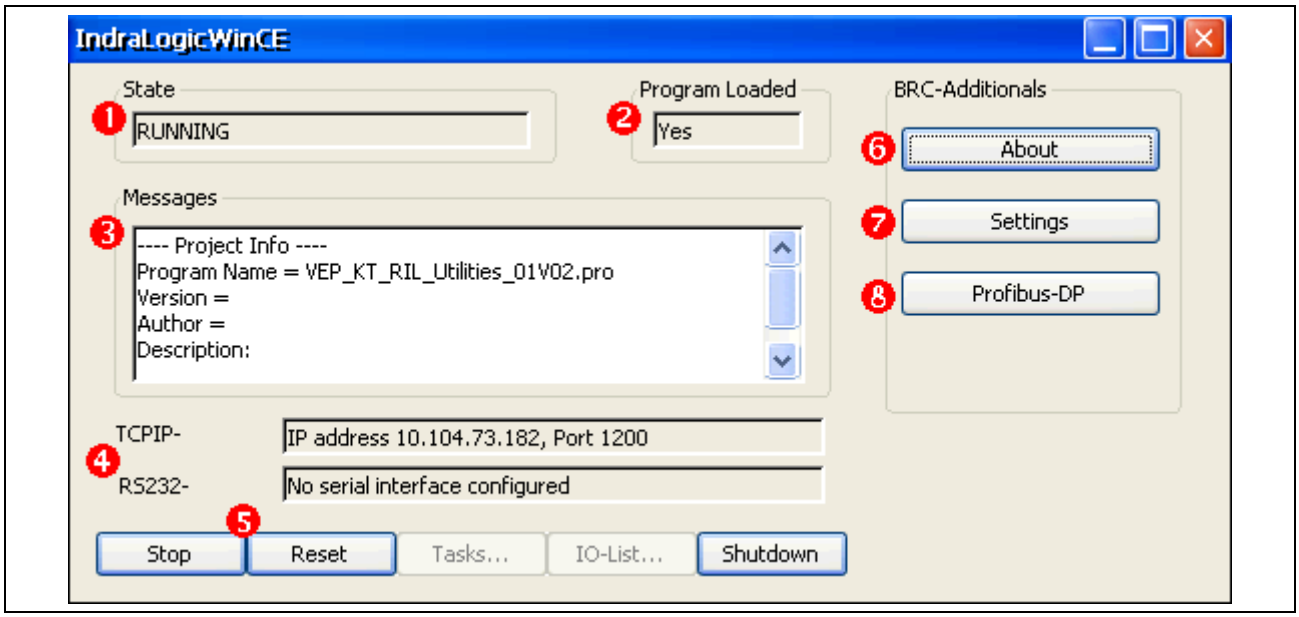
The IndraControl VEP-devices contain a soft PLC on the basis of Windows CE. This PLC is DIN EN 61131-3-compliant. The application IndraLogicWinCE represents the user interface of the soft PLC and serves to operate and monitor the control. To be able to use the IndraLogicWinCE, the license must be enabled. The license of the IndraLogic VEP-devices is already activated ex works.

Ordering designation	Part number	Description
SWL-VE**01-ILC-01VRS-NN	R911308258	IndraLogicWinCE license

Fig. 7-1: IndraLogicWinCE license

Start IndraLogicWinCE via "Start, Program files, Rexroth, IndraLogic, IndraLogicWinCE". After a restart of the IndraControl VEP the soft PLC is automatically started after its licensing.

Settings for IndraLogicWinCE can be made with program "IndraLogicWinCE Configurator", see chapter 8.



1: Status of the soft PLC
2: PLC project available: Yes/No
3: Messages
4: Interface settings
5: To change the control status, see 7.2
6: For further information see 7.5.
7: System parameters, see 7.3.
8: Profibus DP display, see 7.4

Fig. 7-2: IndraLogicWinCE

State (1) The status of the soft PLC is indicated here:

Display	Meaning
RUNNING	The control runs with the PLC project indicated in "Messages" (Program Name).
STOPPED	The control is in the STOP mode
--	No program available in the control

Fig. 7-3: Status of the soft PLC

Program Loaded (2) In this dialog box is indicated, if a PLC program is loaded in the soft PLC:

- Yes: A PLC program is loaded
- No: No PLC program is loaded

Messages (3) In this dialog box messages and notes about the project are output.

Interface Settings (4) **TCPIP:** Display of the IP address via which the Gateway communicates with the PLC. If DHCP is used, the IP address is automatically specified. The network parameters can be manually set with program "Rexroth CE Settings", see /3/.

RS232: at present, not supported.

7.2 Changing the Control Status

Stop/Run You can stop or start the program processing with the buttons "Stop" or "Start".

1: Control is in the Run mode (see below) -> change to the Stop mode
2: Control is in the Stop mode -> change to the Run mode

Fig. 7-4: Button "Stop" or "Start"

Note: The switch status must not correspond with the current status of the control. Thus, the soft PLC can remain in the STOP status, e. g. caused by an error in the application program, although the switch was set to "Start". The current status is displayed in the "State" box.

Reset Reset resets the control as menu function "Reset" under IndraLogic.

Shutdown Shutdown causes a directed shutdown of the PLC. At first, the program processing is stopped, the remanent data are saved on the compact flash memory and the assigned resources are released again. Also after a voltage breakdown the remanent data are saved on the compact flash memory. These data are reloaded in the PLC during its next start-up.

If the PLC is shut down, the operating mode of the PLC is saved, so that this status is restored with the next start. Example: Before the shut down, the soft PLC was in the stop mode. When IndraLogicWinCE is recalled, the stop mode is active again.

7.3 Settings (System Parameters)

The system parameters determine the relation of the assigned computing time between the soft PLC and the other Windows CE applications.

CAUTION

Modifications of the system parameters can cause unpredictable behavior of the soft PLC or the Windows CE operating system!

⇒ The system parameters may only be modified by instructed specialists and only after prior agreement with the Bosch Rexroth Support!

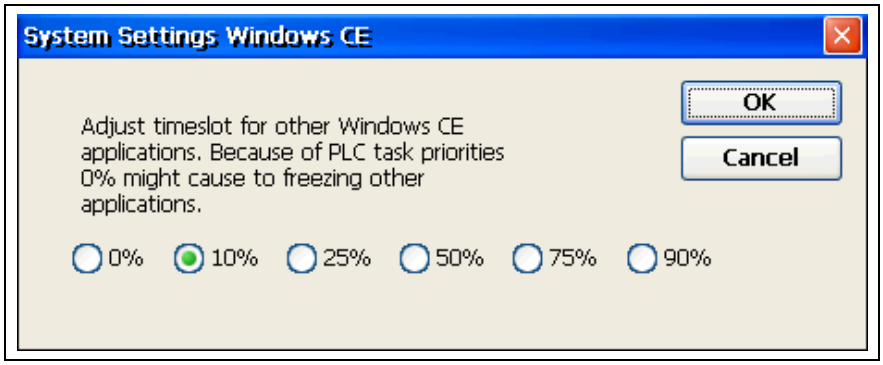


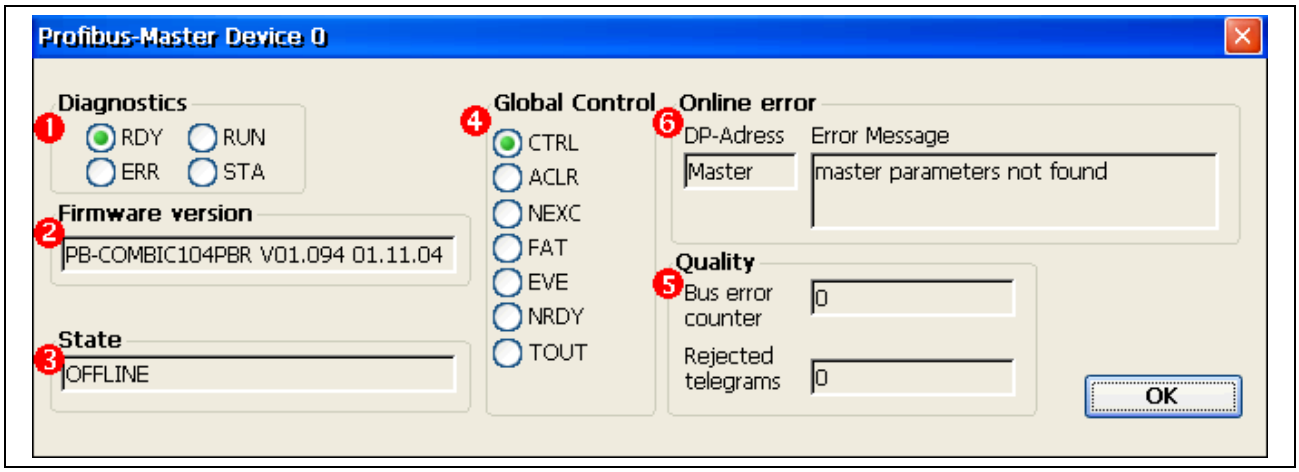
Fig. 7-5: IndraLogicWinCE: Settings

The default value is 10%. The lower the value, the less computing time is assigned to further Windows applications, and the performance is optimized for the soft PLC. 0% can cause a stand still of Windows CE! To optimize the computing time for visualization applications, e. g. WinStudio operating screens, when using the soft PLC at the same time, you can select a greater value. However, this charges the PLC.

Note: Due to the real time requirement of the soft PLC, it might occur, that Windows reacts delayed. You can e. g. recognize this, if a movement of the mouse is not floating, but jerkily. This behavior represents no disturbance or malfunction!

7.4 Profibus DP Display

The Profibus DP display indicates information on the integrated Profibus DP master. The validity of the data depends on the status displayed in dialog box "State".



1: Diagnostic status of the Profibus DP master
2: Firmware version of the Profibus DP master
3: Status of the Profibus DP master
4: Global Control commands
5: Detailed diagnostic/error message
6: Data transmission quality

Fig. 7-6: IndraLogicWinCE: Profibus DP settings

Diagnostics (1)

During the startup of the Profibus DP master it performs a self-test. After the initialization phase (2-3 seconds) the two indicators ERR and STA turn dark and RDY lights, if the test is completed successfully. In error case RDY starts flashing and the processing of the program is stopped. The further meanings of the display during the initialization phase are listed below:

Display	Status	Meaning
RDY (Ready)	On	Profibus DP master ready for operation
	Flashes cyclically	Bootstrap loader active
	Flashes irregularly	Hardware or system error
	Off	Hardware defective
RUN	On	Communication running
	Flashes cyclically	Ready for communication
	Flashes irregularly	Improper configuration
	Off	No communication
ERR (Error)	On	Communication interface error
	Off	Communication interface OK
STA (Status)	On	Data exchange with slaves active (master) Data exchange with master active (slave)
	Off	No data exchange

Fig. 7-7: Profibus DP master: Diagnostic status

Firmware Version (2)

The firmware version is retrieved from the interface of the field bus connection.

State (3)

Status of the Profibus DP master:

- Online: The indicated data and states are valid
- Offline: The indicated data and states are **not** valid

Global Control (4) Cyclic status of the bus status and the connected devices:

Display	Meaning
CTRL	CONTROL-ERROR: Parameterization error
ACLR	AUTO-CLEAR-ERROR: The master has stopped the communication to all slaves and reached the end status of the autoclear mode.
NEXC	NON-EXCHANGE-ERROR: At least one slave has no cyclic data exchange with the DP master.
FAT	FATAL-ERROR: Due to a fatal bus error no further communication is possible.
EVE	EVENT-ERROR: The master has detected short-circuits on the Profibus. The number is indicated in the "Quality, Bus error counter" box. The status is set, as soon as the first short-circuit was detected and is not reset again.
NRDY	HOST-NOT-READY-NOTIFICATION: Indicates, if the application is ready for operation or not. If the status is set, the application is not ready to receive data.
TOUT	TIMEOUT-ERROR: The master has detected, that the monitoring time is exceeded; the Profibus telegrams could not be transmitted within this time. This is a display for, e. g. short-circuits and disturbances, on the Profibus interrupting the communication with the master. The number of interrupts is indicated in the "Quality, Rejected telegrams" box. The status is set, as soon as the first interrupt was detected and is not reset again.

Fig. 7-8: Profibus DP master: Global Control

Quality (5) Bus error counter: See Fig. 7-8, "EVE"

Rejected telegrams: See Fig. 7-8, "TOUT"

Online Error (6) In this dialog box detailed diagnostic and error messages about the DP master or a slave are output.

If the messages refer to the DP master, "MASTER" is indicated in the **DP Address** dialog box. The following list shows all messages and the possibility to eliminate errors.

Messages (Error Message)	Remedy
no error	- No error -
USR_INTF-Task not found	Please contact the technical support
no global data-field	Please contact the technical support
FDL-Task not found	Please contact the technical support
PLC-Task not found	Please contact the technical support
master parameters not found	Please repeat the download of the configuration data
faulty parameter-value in the master parameters data file	Please contact the technical support
non existing slave parameters	Please repeat the download of the configuration data
faulty parameter-value in a slave parameters data file	Please contact the technical support
double slave address	Verify the projected slave addresses
projected send process data offset address out of range 0..255	Verify the projected slave addresses
projected receive process data offset address out of range 0..255	Verify the projected slave addresses
data-areas of slaves are overlapping in the send process data	Verify the projected slave addresses

data-areas of slaves are overlapping in the receive process data	Verify the projected slave addresses
unknown process data handshake	Please contact the technical support
free RAM exceeded	Please contact the technical support
faulty slave parameter data sets	Please contact the technical support
no segment for the treatment free	Please contact the technical support
faulty reading of a data base	Please repeat the download of the configuration data
structure-surrender to operating system faulty	Please contact the technical support
software watchdog error	Please contact the technical support
no data acknowledge in process data handshake mode 0	Please contact the technical support
master in Auto_Clear	The monitoring of the "Autoclear Mode" has responded, as a slave could not be reached.
no further segments	Please contact the technical support

Fig. 7-9: Profibus DP master: Online error for DP master

If the messages refer to a DP slave, the bus address (FDL address) of the slave is indicated in the **DP Address** dialog box. The following list shows all messages and the possibility to eliminate errors.

Messages (Error Message)	**Remedy**
no error	- No error -
station reports overflow master telegram	Verify the length of the projected configuration or parameter data of the slave
request function of master is not activated in the station	Verify, if the slave corresponds to the Profibus DP standard
no answer-data, although the slave must response with data	Verify the projected configuration data and compare them with the real length of the I/O data
no response of the station slave	Verify the bus cable, verify the bus address of the slave
master not into the logical token ring	Verify the bus address (FDL address) of the master or the HSA (highest station address) of another participating master. Check the bus wiring for possible short-circuits.
faulty parameter in request master telegram	Please contact the technical support

Fig. 7-10: Profibus DP master: Online error for DP slaves

7.5 About

With "About" general information on IndraLogicWinCE are indicated.

8 IndraLogicWinCE Configurator

8.1 Overview

Settings for IndraLogicWinCE (see chapter 7) can be made via IndraLogicWinCE Configurator. Start IndraLogicWinCE via "Start, Program files, Rexroth, IndraLogic, ILConfigurator".

8.2 License

Add License

To be able to use the PLC functionality with IndraLogicWinCE, a software license is required. The license of the IndraLogic VEP-devices is already activated ex works. To activate a license subsequently, a dialog box to enter the license data is opened with "Add License".

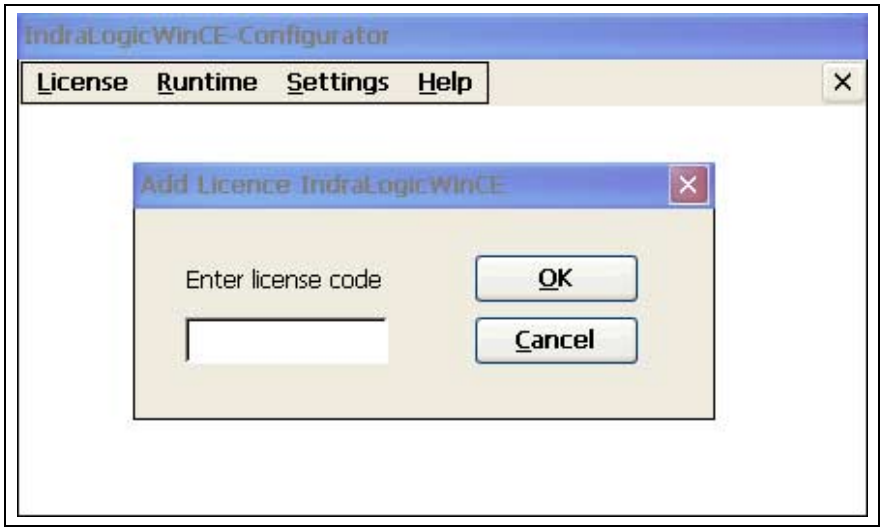


Fig. 8-1: IndraLogicWinCE, license data

After successful licensing the message "Licensing successful" and in error case "Illegal License Code" is indicated.

License Status

To be able to use the PLC functionality with IndraLogicWinCE, a software license is required. The license of the IndraLogic VEP-devices is already activated ex works. With menu function "License, License Status" the license status can be verified.

If a license is activated, "Valid license" is indicated.

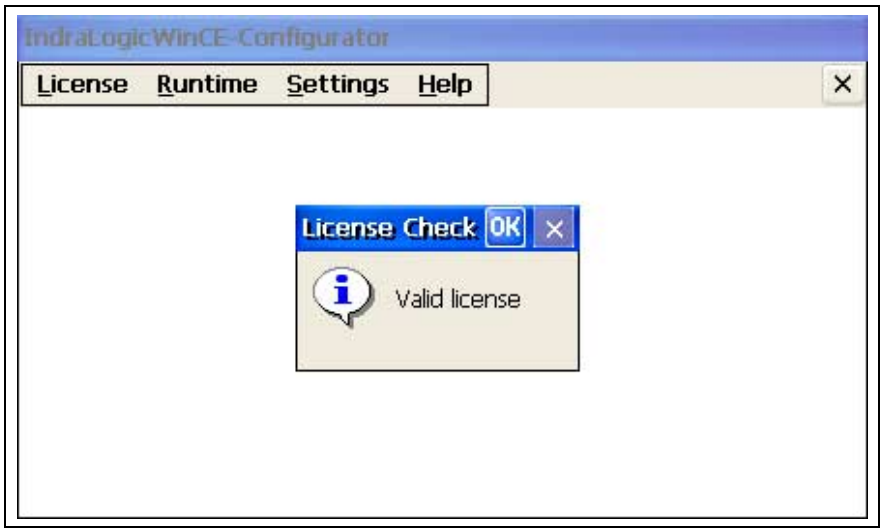


Fig. 8-2: IndraLogicWinCE, license status

8.3 Runtime

Update Firmware

With "Update Firmware" a new firmware can be loaded into the soft PLC. To update the firmware three files are necessary:

- IndraLogicWinCE.exe
- Rexroth.dll
- HilDPM3S.dll

Select in the dialog box (see Fig. 8-3) the directory containing these three files. Usually, it is the following directory:

My Computer/FTP_Public

This directory is generated during the first access to the IndraLogic VEP per FTP protocol.

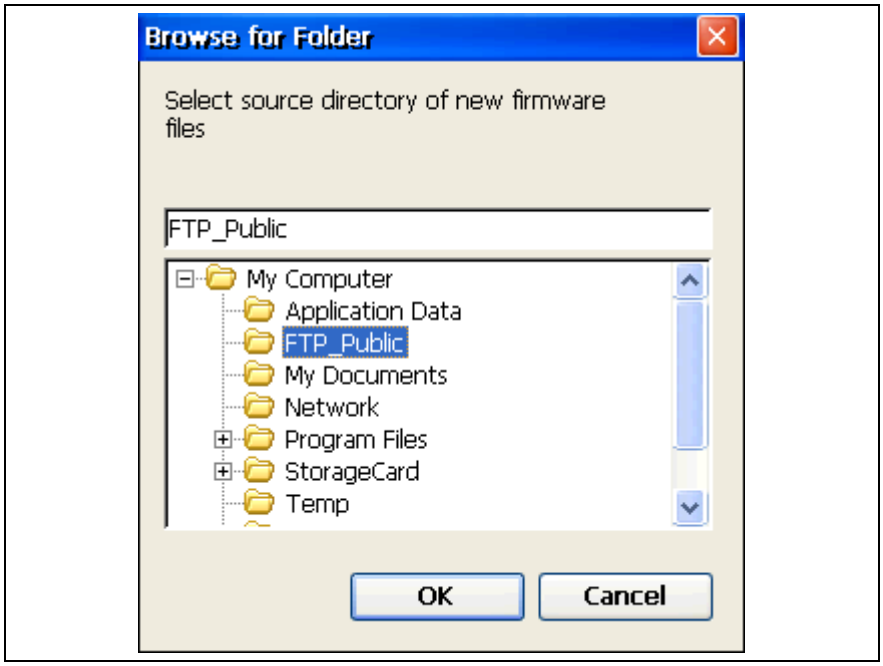


Fig. 8-3: Update firmware, directories

If one or several files are not found, a corresponding error message is indicated. If the firmware update was completed successfully, "Updating runtime succeeded" is indicated.

Disable Boot Project

If the control stops during program processing again and again because of the same error, the boot project can be deactivated. During the next start of the control, no boot project is loaded.

8.4 About

With "About" general information on IndraLogicWinCE Configurator are indicated.

Notes

9 Technical Data

9.1 Power Data

IndraLogic VEP 01VRS	
User memory for program code	4 Mbytes
User memory for data	8 Mbytes
Remanent memory	256 kbytes
Task number	16
Processing time, typical (1000 instructions in IL, bit and word commands mixed)	100 µs
Profibus DP master according to IEC 61158-3	

Fig. 9-1: Power data

Notes

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12 Service & Support

12.1 Helpdesk

Unser Kundendienst-Helpdesk im Hauptwerk Lohr am Main steht Ihnen mit Rat und Tat zur Seite. Sie erreichen uns

Our service helpdesk at our headquarters in Lohr am Main, Germany can assist you in all kinds of inquiries. Contact us

- telefonisch - by phone: **+49 (0) 9352 40 50 60**
  über Service Call Entry Center Mo-Fr 07:00-18:00
  - via Service Call Entry Center Mo-Fr 7:00 am - 6:00 pm
- per Fax - by fax: **+49 (0) 9352 40 49 41**
- per e-Mail - by e-mail: **service.svc@boschrexroth.de**

12.2 Service-Hotline

Außerhalb der Helpdesk-Zeiten ist der Service direkt ansprechbar unter

After helpdesk hours, contact our service department directly at

+49 (0) 171 333 88 26

oder - or **+49 (0) 172 660 04 06**

12.3 Internet

Unter **www.boschrexroth.com** finden Sie ergänzende Hinweise zu Service, Reparatur und Training sowie die **aktuellen** Adressen *) unserer auf den folgenden Seiten aufgeführten Vertriebs- und Servicebüros.

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Niederlassungen mit Kundendienst

Außerhalb Deutschlands nehmen Sie bitte zuerst Kontakt mit unserem für Sie nächstgelegenen Ansprechpartner auf.

*) Die Angaben in der vorliegenden Dokumentation können seit Drucklegung überholt sein.

At **www.boschrexroth.com** you may find additional notes about service, repairs and training in the Internet, as well as the **actual** addresses *) of our sales- and service facilities figuring on the following pages.

sales agencies
offices providing service

Please contact our sales / service office in your area first.

*) Data in the present documentation may have become obsolete since printing.

12.4 Vor der Kontaktaufnahme... - Before contacting us...

Wir können Ihnen schnell und effizient helfen wenn Sie folgende Informationen bereithalten:

1. detaillierte Beschreibung der Störung und der Umstände.
2. Angaben auf dem Typenschild der betreffenden Produkte, insbesondere Typenschlüssel und Seriennummern.
3. Tel.-/Faxnummern und e-Mail-Adresse, unter denen Sie für Rückfragen zu erreichen sind.

For quick and efficient help, please have the following information ready:

1. Detailed description of the failure and circumstances.
2. Information on the type plate of the affected products, especially type codes and serial numbers.
3. Your phone/fax numbers and e-mail address, so we can contact you in case of questions.

12.5 Kundenbetreuungsstellen - Sales & Service Facilities

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