

Rexroth IndraControl IndraLogic L40 System Description

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Operating and Programming Guide



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Purpose of Documentation This documentation gives an overview of the system components belonging to the control IndraLogic L40 and describes its projecting and programming.

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Contents

1	System Overview	1-1
1.1	Components	1-1
1.2	Further Documentation	1-1
2	Important Directions for Use	2-1
2.1	Appropriate Use	2-1
	Introduction	2-1
	Areas of Use and Application	2-2
2.2	Inappropriate Use	2-2
3	Safety Instructions for Electric Drives and Controls	3-1
3.1	Introduction	3-1
3.2	Explanations	3-1
3.3	Hazards by Improper Use	3-2
3.4	General Information	3-3
3.5	Protection Against Contact with Electrical Parts	3-4
3.6	Protection Against Electric Shock by Protective Low Voltage (PELV)	3-5
3.7	Protection Against Dangerous Movements	3-6
3.8	Protection Against Magnetic and Electromagnetic Fields During Operation and Mounting	3-8
3.9	Protection Against Contact with Hot Parts	3-9
3.10	Protection During Handling and Mounting	3-9
3.11	Battery Safety	3-10
3.12	Protection Against Pressurized Systems	3-10
4	Projecting and Programming	4-1
4.1	Overview	4-1
4.2	Projecting with IndraWorks	4-1
	Start IndraWorks	4-1
	Create New IndraLogic L40 Project	4-2
	Inputs in the Wizard	4-4
	Configure Onboard I/O	4-7
	Projecting Inline Modules	4-9
	Configuring Profibus DP	4-11
4.3	PLC Programming with IndraLogic	4-19
	Overview	4-19
	Target Settings	4-20
	Task Configuration	4-21
	PLC Configuration	4-22

Library Manager.....	4-23
Create a PLC Program	4-24
Save IndraLogic Project Data.....	4-24
4.4 Download and Commissioning	4-25
Load Configurations and PLC Program in the Control.....	4-25
Online Functions.....	4-25
5 Further Functions	5-1
5.1 Firmware Management.....	5-1
5.2 Import IndraLogic Project File.....	5-1
5.3 IndraLogic Functions	5-2
6 Libraries	6-1
6.1 Overview.....	6-1
6.2 BuepE_Client.....	6-2
General	6-2
BuepE_Client.....	6-2
6.3 IL_VCP_DP.....	6-5
Overview.....	6-5
VCP_PBS16_A4096.....	6-5
VCP_PBS32_A4096.....	6-6
VCP_PBS32_A65536.....	6-7
6.4 RIL_L40_Util	6-8
Overview.....	6-8
IL_GetStateFan	6-8
IL_GetTemp.....	6-8
IL_GetTempWarning	6-9
6.5 RIL_ProfibusDP	6-10
Overview.....	6-10
Slave Diagnostic Data According to the Profibus DP Standard	6-11
General Field Bus Diagnosis	6-13
Data Types	6-14
Function Blocks	6-18
Functions	6-27
7 Display and Operating Components	7-1
7.1 Display and Operator Keys.....	7-1
7.2 Reset Button and Light-Emitting Diode	7-2
7.3 Display Possibilities	7-3
Default and Status Displays	7-3
Default Menu	7-5
PLC Menu.....	7-8
Inline Menu	7-9
PROFIBUS DP Menu	7-9
Special Cases.....	7-9

8	Technical Data	8-1
8.1	Equipment.....	8-1
8.2	Power Data	8-1
9	List of Figures	9-1
10	Index	10-1
11	Service & Support	11-1
11.1	Helpdesk.....	11-1
11.2	Service-Hotline	11-1
11.3	Internet.....	11-1
11.4	Vor der Kontaktaufnahme... - Before contacting us... ..	11-1
11.5	Kundenbetreuungsstellen - Sales & Service Facilities	11-2

1 System Overview

1.1 Components

Hardware Control IndraLogic L40 is composed of the following components:

- IndraControl L40 (hardware)
- Firmware IndraLogic L40 on Memory Card
- Connector set for IndraControl L40

The IndraControl L40 is a modular and scalable control. It is a universal hardware platform, that can be used in combination with the IndraLogic L40 firmware for PLC applications.

Software The software "IndraWorks Logic" serves to commission and project the IndraLogic L40. It consists of the following components:

- **IndraWorks:** Project planning, configuration
- **IndraLogic:** PLC programming
- **IndraWorks HMI:** Visualization and user interface as well as diagnostic functions (ProVi)
- **IndraWorks WinStudio:** Engineering tool to create user screens for IndraWorks HMI
- **IndraLogic L40 TSP:** Target files (Target Support Package) are installed required to edit the IndraLogic L40 with IndraWorks and IndraLogic.
- **Target Manager:** Management of TSP files, e. g., while updating control functions.

All components are automatically installed. IndraWorks WinStudio is installed as demo version.

1.2 Further Documentation

No	Title	Document name
/1/	Rexroth IndraControl L40, Project Planning Manual	DOK-CONTRL-IC*L40****-PR..-EN-P
/2/	PLC Programming with 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 - HMI: IndraWorks HMI - IndraWork diagnosis (ProVi)
/6/	Rexroth WinStudio; Overall View and Functional Description	DOK-CONTRL-WIS*PC**V06-KB..-EN-P

Fig. 1-1: Further documentation

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 IndraLogic L40 of Rexroth is suitable for logic applications.

Note: The IndraLogic L40 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.

Typical applications of the IndraLogic 40 are:

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

The IndraLogic L40 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 IndraLogic L40 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 IndraLogic L40 may not be used, if

- it is 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.



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
<p>DANGER</p>	Death or severe bodily harm will occur.
<p>WARNING</p>	Death or severe bodily harm may occur.
<p>CAUTION</p>	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. If this is not the case, they are excluded.

The following areas of use and application, for example, include safety features and applications: 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 in which electrical devices with vital functions can be electromagnetically disturbed, 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 thirty (30) 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.

4 Projecting and Programming

4.1 Overview

- Requirements** To project an IndraLogic L40 the installation of "IndraWorks Logic" is required. The installation program is available on CD-ROM. During the installation also the required target information (Target Support Package) of the IndraLogic L40 are transferred to the target computer.
- 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 symbol "IndraWorks Engineering" or via "Programs, Rexroth, IndraWorks, Engineering" (see figure below).

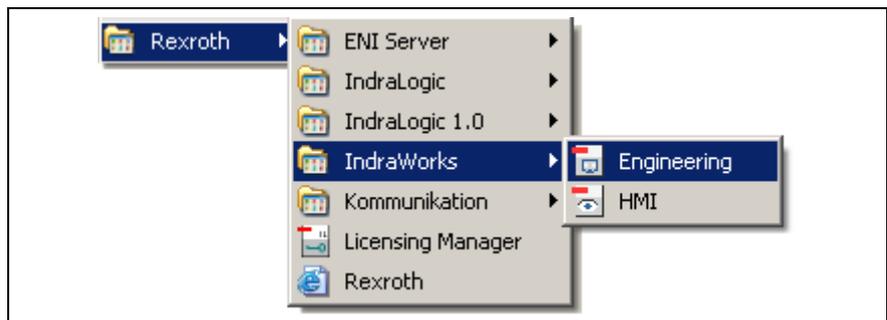


Fig. 4-1: Start IndraWorks

Create New IndraLogic L40 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.

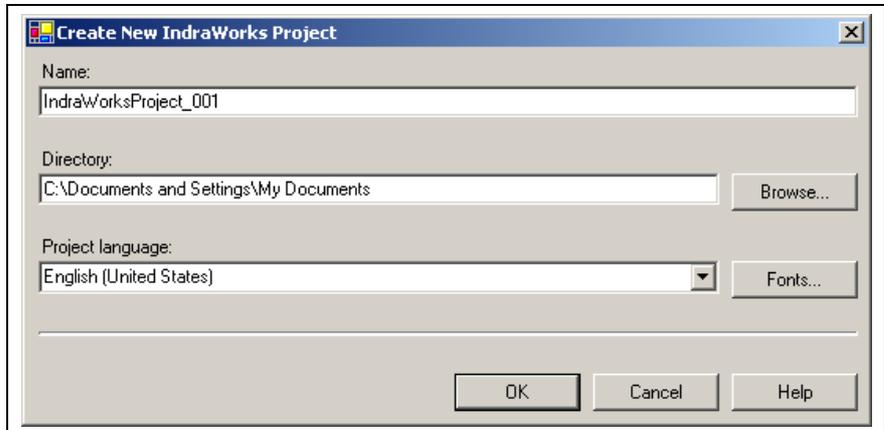


Fig. 4-2: Create new project

The IndraLogic L40 can be inserted per Drag & Drop from the device library under "Rexroth", "Controls" in the current IndraWorks project.

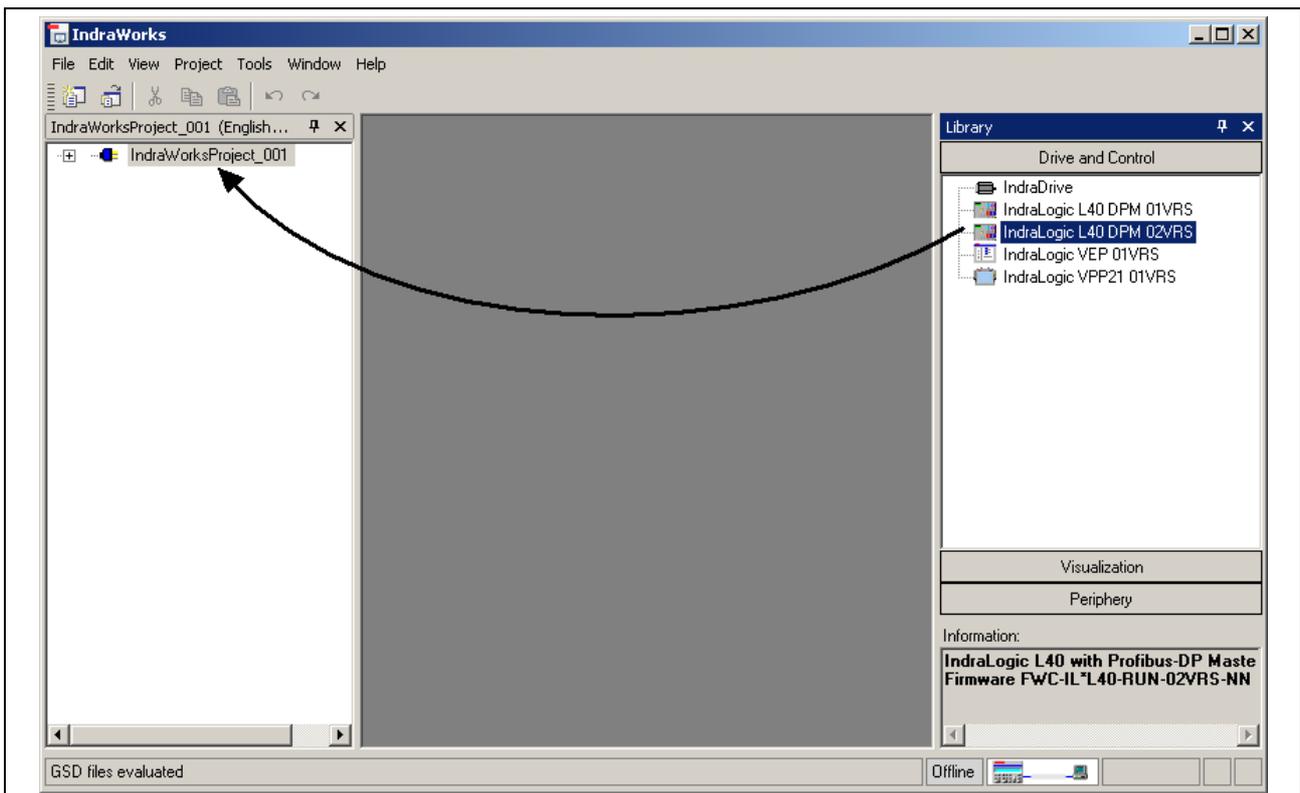
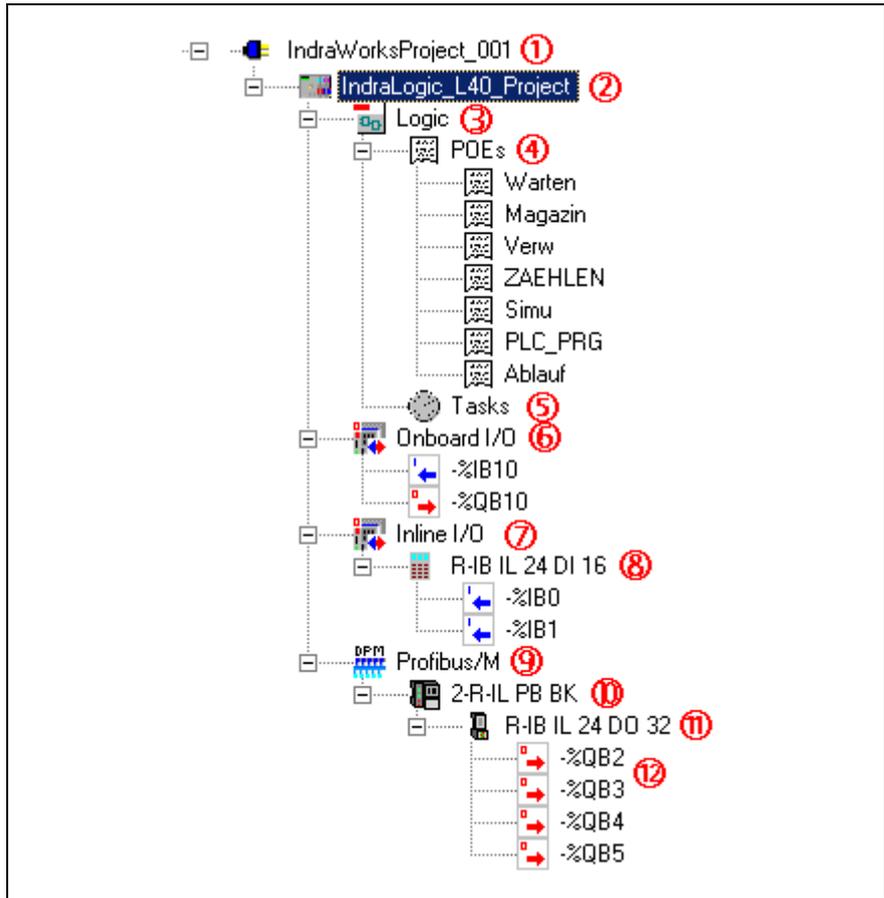


Fig. 4-3: Insertion of the IndraLogic L40 in the project explorer

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.

The following figure shows a completely configured and programmed IndraLogic L40 project example:



- (1) IndraWorks project
- (2) Device name
- (3) Logic object node (PLC project)
- (4) PLC blocks (POU)
- (5) PLC task management
- (6) Local I/O area of the IndraLogic L40 (Onboard I/O)
- (7) Local Inline area of the IndraLogic L40
- (8) Rexroth Inline module
- (9) Internal Profibus DP master of the IndraLogic L40 DPM
- (10) DP slave at the internal Profibus DP master
- (11) Module of the DP slave
- (12) PLC addresses of the slave module, here outputs

Fig. 4-4: Example: IndraLogic L40 DPM in the project explorer

Inputs in the Wizard

Device Settings The device settings contain general data of the IndraLogic project.

Fig. 4-5: Device Settings

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

Communication Settings Here, the settings for the communication between IndraWorks and the IndraLogic L40 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 setting of the IP address must correspond to the settings of the IndraLogic L40, see also "Default Menu" in section "Display Possibilities".

You will find further information in the IndraLogic help about the topic "Communication parameters", or in the IndraLogic manual /2/.

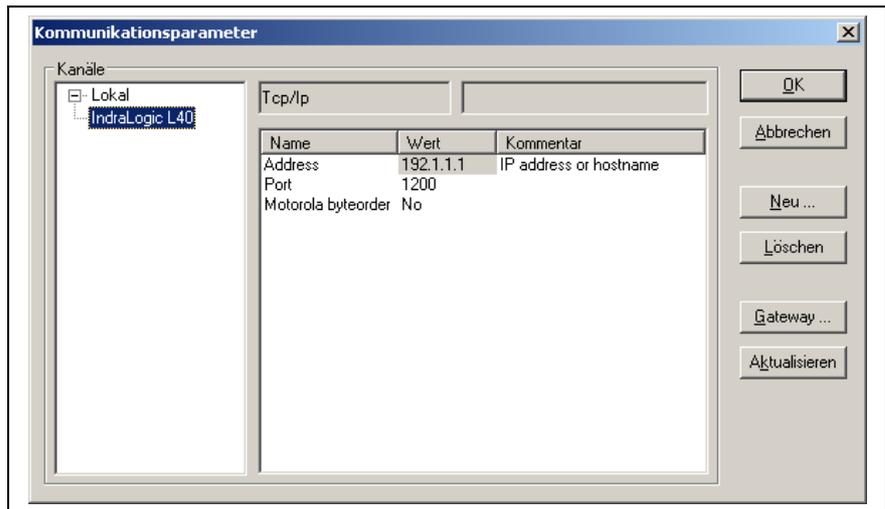


Fig. 4-6: IndraLogic communication parameter

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 L40 project:

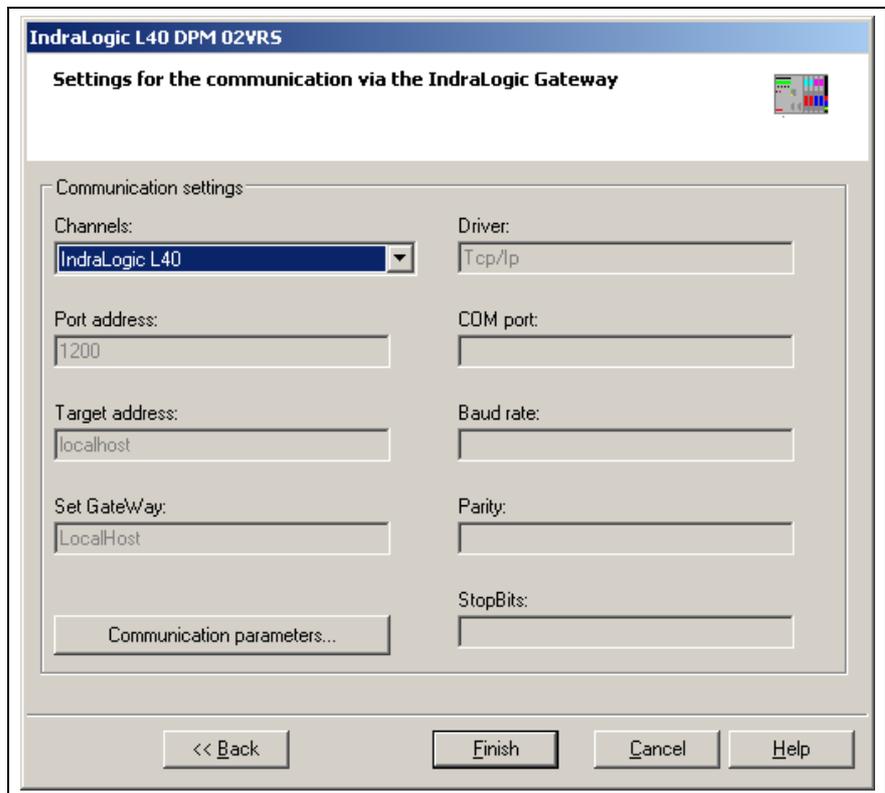


Fig. 4-7: Communication settings

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 L40 project is created in the project explorer.

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

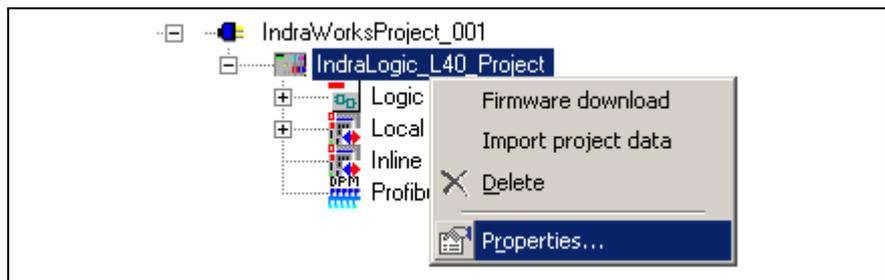


Fig. 4-8: Context menu, device properties of the IndraLogic L40

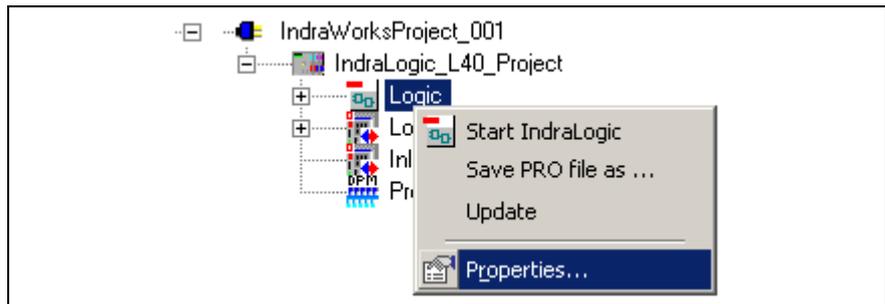
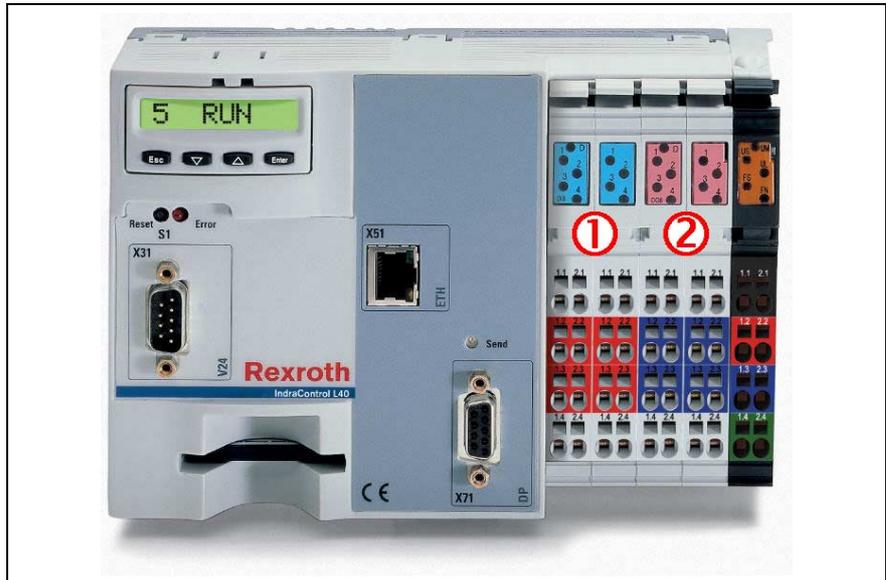


Fig. 4-9: Context menu, communication properties of the IndraLogic L40

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

Configure Onboard I/O

The IndraLogic L40 provides by default eight fast "Onboard" inputs and outputs.



- (1) Digital onboard inputs
- (2) Digital onboard outputs

Fig. 4-10: Onboard I/O of the IndraLogic L40

The project planning is executed by double-clicking on "Onboard I/O".

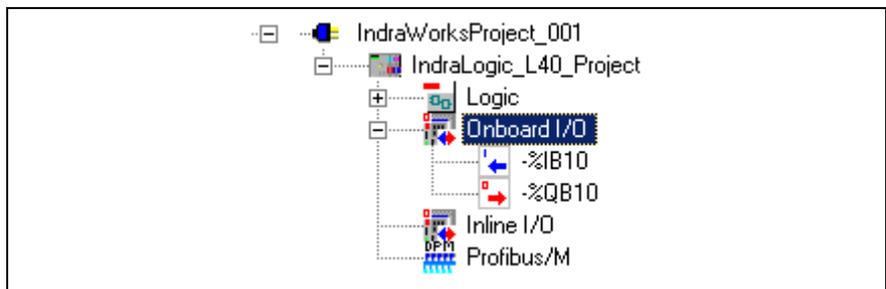


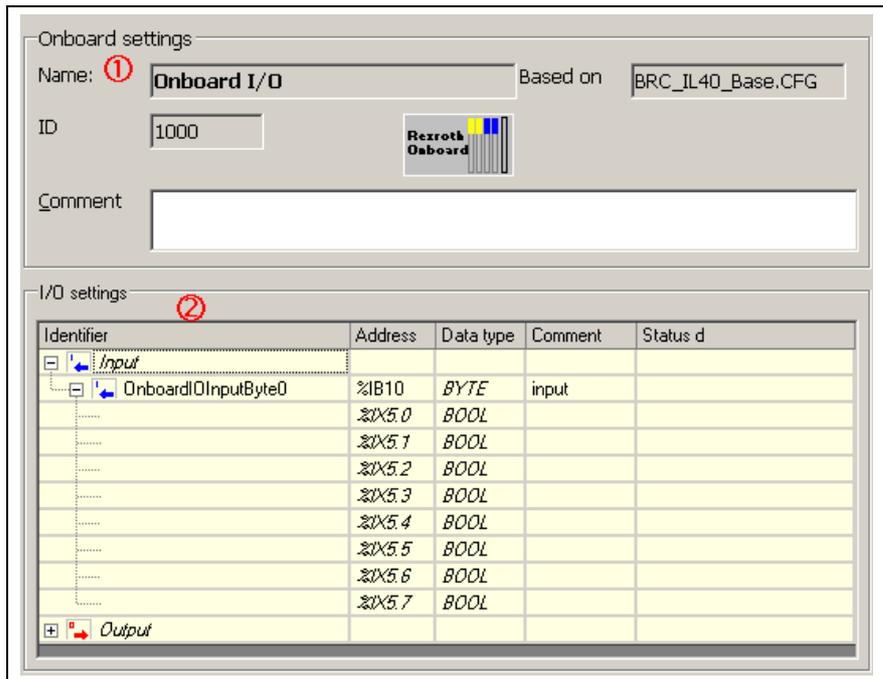
Fig. 4-11: Project explorer "Onboard I/O"

The eight digital inputs and outputs that are available on the slots 1 to 4 of the IndraControl L40 (from left to right) are assigned to light-emitting diodes and bit addresses according to the following table:

	Eight digital inputs								Eight digital outputs								
	Slot	1				2				3				4			
	Status LED	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Byte-bit view	Byte	IX0.0 – 0.7 (default)								QX0.0 – 0.7 (default)							
	Bit	0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7
Module	Terminal point (signal)	1.1	2.1	1.4	2.4	1.1	2.1	1.4	2.4	1.1	2.1	1.4	2.4	1.1	2.1	1.4	2.4
	Terminal point (24 V)	1.2	2.2	1.3	2.3	1.2	2.2	1.3	2.3	-	-	-	-	-	-	-	-
	Terminal point (last ground)	-	-	-	-	-	-	-	-	1.2	2.2	1.3	2.3	1.2	2.2	1.3	2.3

Fig. 4-12: Address assignment of inputs and outputs

The physical addresses (I/O addresses of the PLC) for the Onboard I/O are configured by means of dialog "Onboard settings" in the main window.



- (1) Onboard settings
 (2) I/O settings

Fig. 4-13: Onboard settings of the IndraLogic L40

Onboard Settings (1)

Name: Onboard inputs and outputs

Based on: The device description file is a fixed part of the installed target system (IndraLogic L40 target).

ID: Identification for internal purposes

Comment: Please enter here any comment about the Onboard I/O.

I/O Settings (2)

Identifier: This column shows the two input and output modules. With symbol +/- the bitwise illustration can be faded in or out. 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 identifier OnboardIInputByte0 suggested by the system. It is assigned to the byte address %IB10, see column "Address". This inputs can be addressed in the PLC project (IndraLogic) via the names OnboardIInputByte0.

Address: Here, the I/O address can be edited bytewise (e. g. %IB10). 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).

Interrupt Capability

The Onboard inputs and outputs of the IndraLogic L40 are interrupt-compliant, i. e.: you can react to an interrupt event. For this, consider the configuration of "external system events" in the Task Configuration in section "PLC Programming with IndraLogic".

Further Information

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

Projecting Inline Modules

The locally available I/O units can be extended by the Rexroth Inline I/O system, just by simply mounting the components at the right side of the IndraLogic L40.

- Such modules permit extension of the local I/O unit to up to 32-byte inputs and 32-byte outputs.
- The maximum number of Rexroth Inline modules that can be connected is 63.
- The modules can be connected in any order.

Insert Modules

All Inline modules provided for the IndraLogic L40 are archived in the device library under "Periphery", "Inline", "Rexroth Inline". Insert an Inline module from the device library per Drag & Drop below the object node "Inline I/O" of the project explorer. New modules can be positioned between already inserted modules.

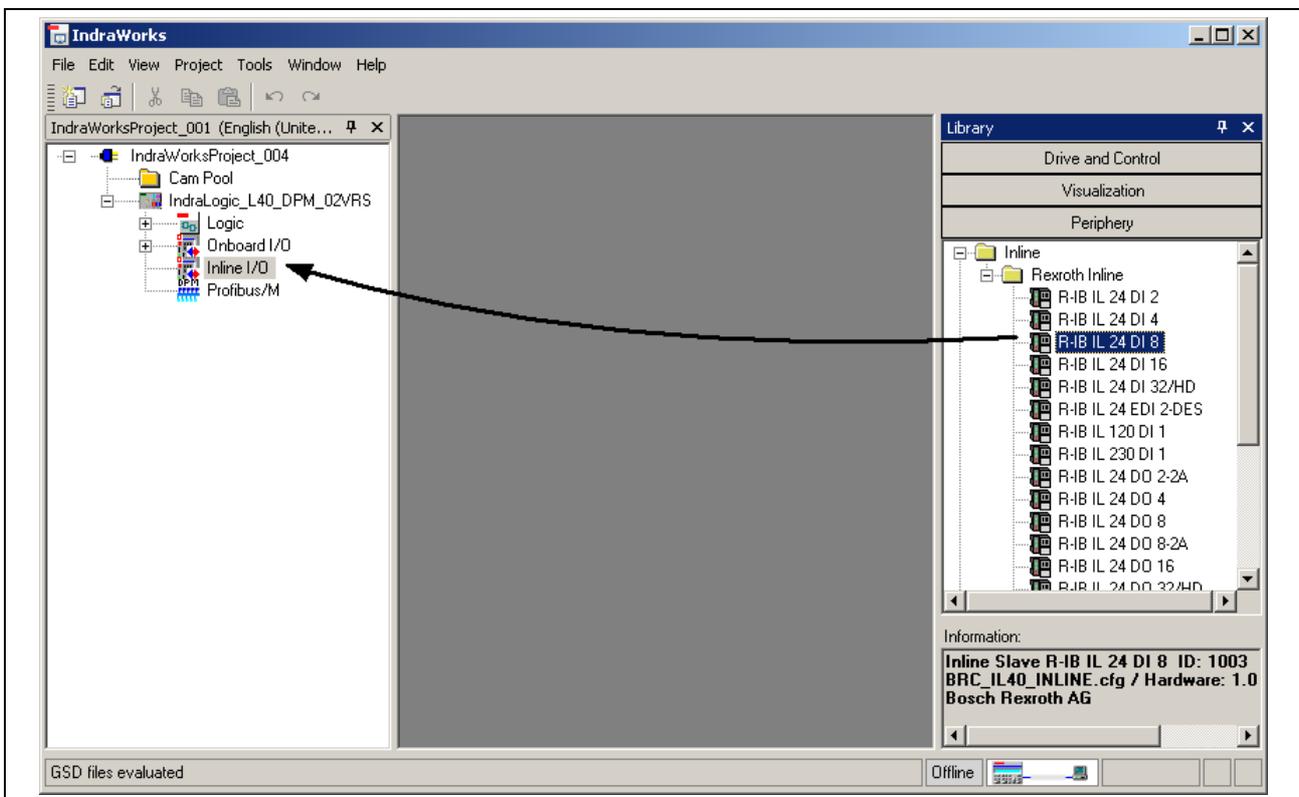
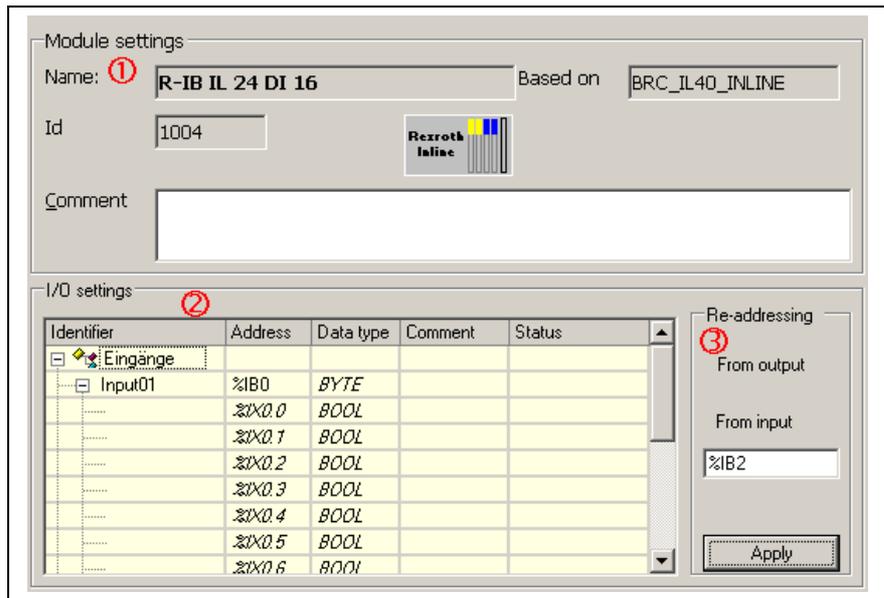


Fig. 4-14: Insert Inline module

While inserting an Inline 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. For this, double-click on the desired module in the project explorer.



- (1) Module settings
- (2) I/O settings
- (3) Automatic addressing

Fig. 4-15: Inline I/O of the IndraLogic L40

Module Settings (1)

Name: Module name

Based on: The device description file is a fixed part of the installed target system (IndraLogic L40 target).

ID: Identification for internal purposes.

Comment: Please enter here any comment about the Inline module.

I/O Settings (2)

The I/O areas of the Inline 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 fade in or out. 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 identifier Input01. It is assigned to the byte addresses %IB0, see column "Address". This output can be addressed in the PLC project (IndraLogic) via the name Input01.

Address: Here, the I/O address can be edited bitwise (e. g. %IB0). 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-address (3)

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, the inputs or outputs are sequentially provided with consecutive PLC addresses. 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".

Further Information

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

Configuring Profibus DP

The IndraLogic L40 DPM provides a PROFIBUS DP interface with bus master functionality according to DIN EN 50170, Part 2. The Profibus configuration provides the following features

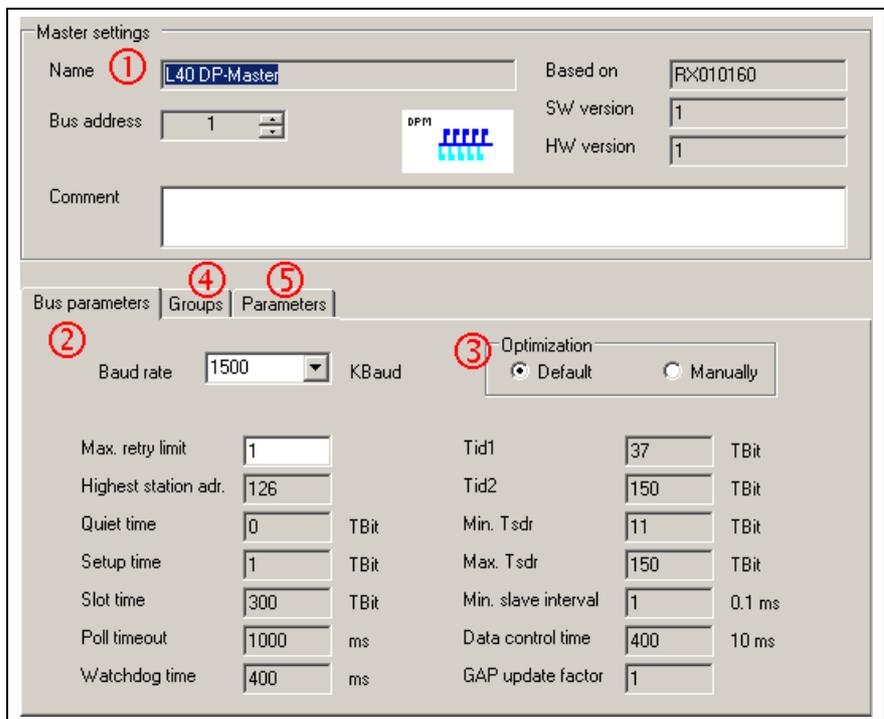
- Slave configuration
- Processing of vendor-specific data
- Modifying bus-specific settings

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

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

Master Settings

For Profibus DP operation parameters or the bus system can be defined. 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. 4-16: 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 L40
 - 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 the 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) With groups sync and freeze commands of the master can be assigned to certain slave groups.

Parameters (5) Here, vendor-specific parameters of the master can be displayed or edited.

The parameter "EnableDiags" of the IndraLogic L40 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 L40 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.

Further slaves can be archived in the device library by means of GSD files. For further information refer to the documentation or online help of IndraWorks /5/.

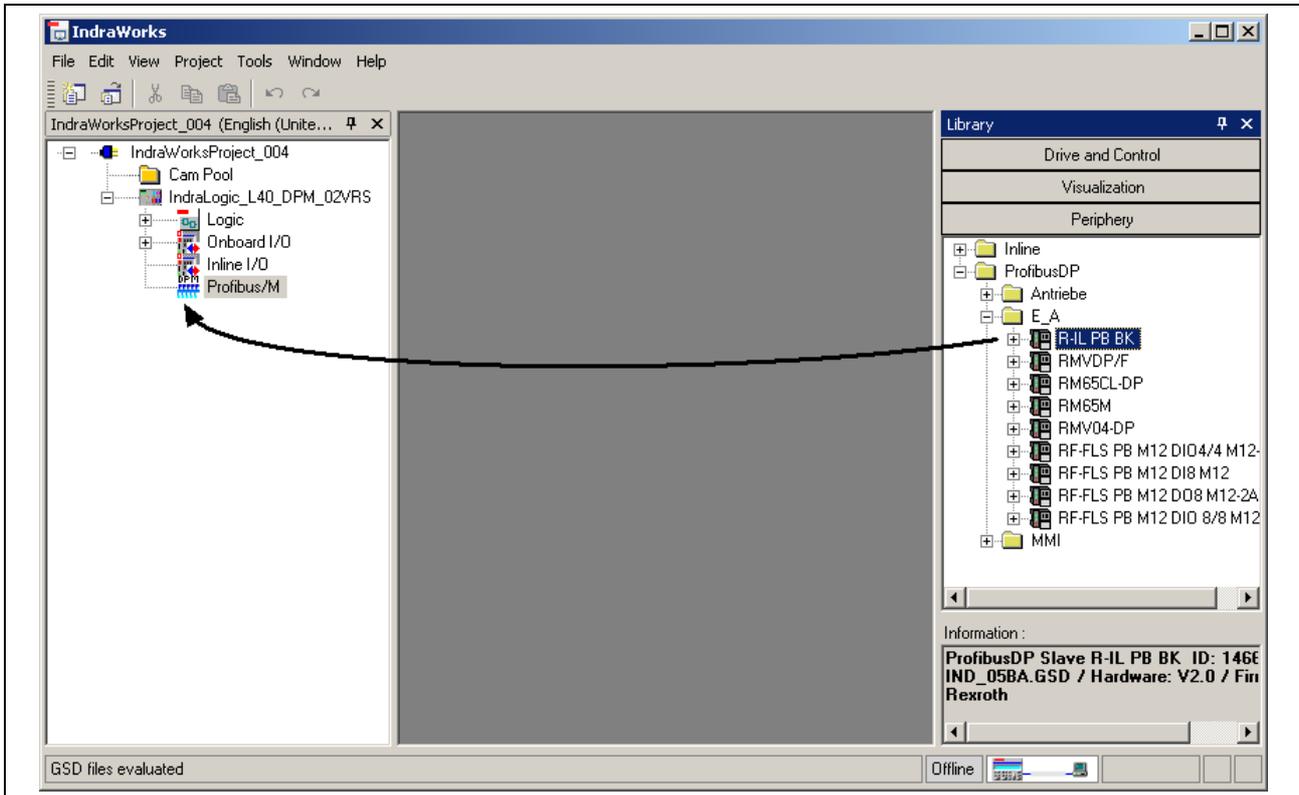


Fig. 4-17: Insert Profibus DP slave

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. 4-18: Slave settings

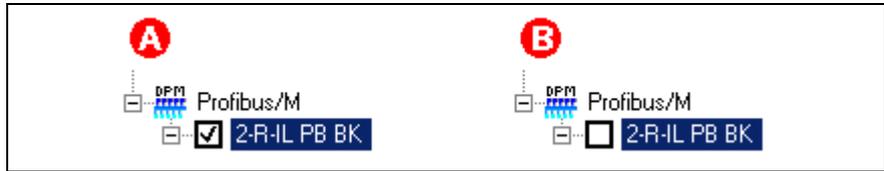
- Slave Settings (1)**
- Name:** Device name of the slave according to the GSD file
 - Based on:** Ident number according to the GSD file
 - SW version:** Software version according to the GSD file
 - HW version:** Hardware version according to the GSD file

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

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

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 after 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. 4-19: 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 modules 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 slaves ("+" 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.

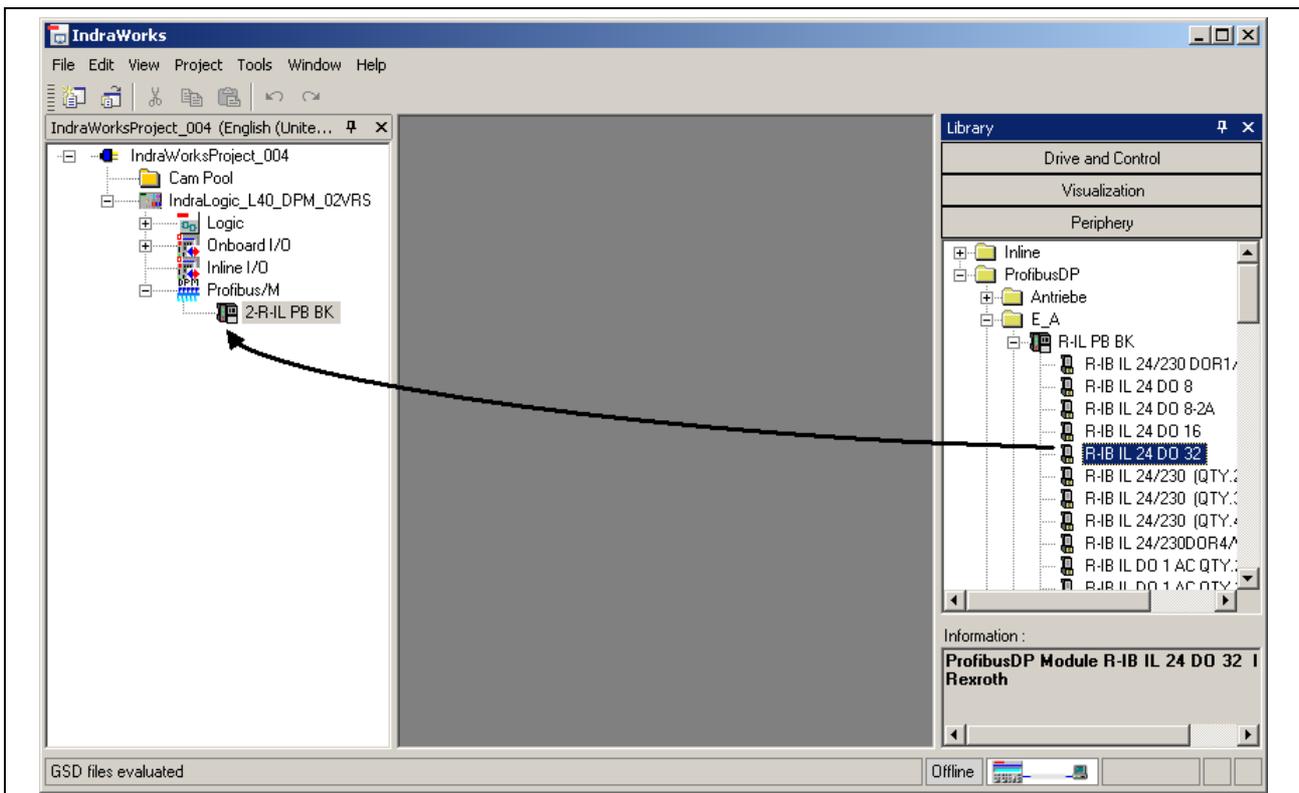
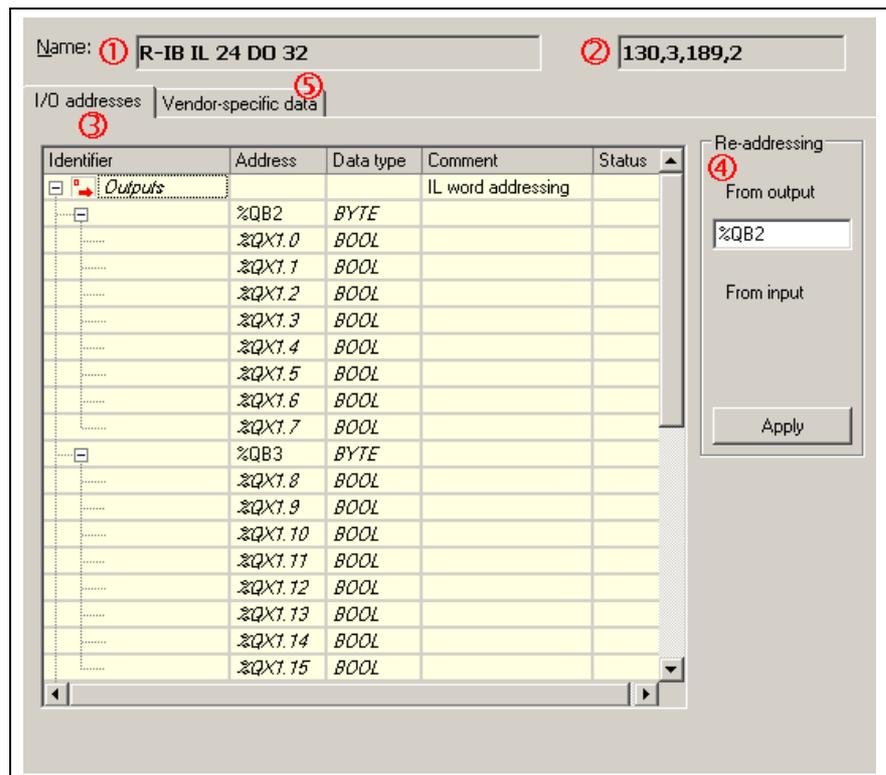


Fig. 4-20: Insert a Profibus slave module

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. 4-21: Module data

- Name (1)** Module name according to the GSD file
- Configuration Bytes (2)** Internal module identification: Extract from the GSD file
- I/O Settings (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 fade in or out. 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

As of version 02VRS, the IndraLogic L40 supports the Sync and Freeze function of Profibus DP. Using the Sync function, e. g. the outputs of several drives (e. g. Rexroth EcoDrive) can be synchronized.

To be able to execute the sync and freeze functions with the IndraLogic L40, function block DP_SYCFR in library RIL_ProfibusDP is provided, see corresponding section.

When using Sync or Freeze in the project explorer, an assignment of the groups at the master and the corresponding slaves must be set. For further information refer to the documentation or online help of IndraWorks /5/.

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 L40
- Task Configuration: Control of the program execution
- 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.

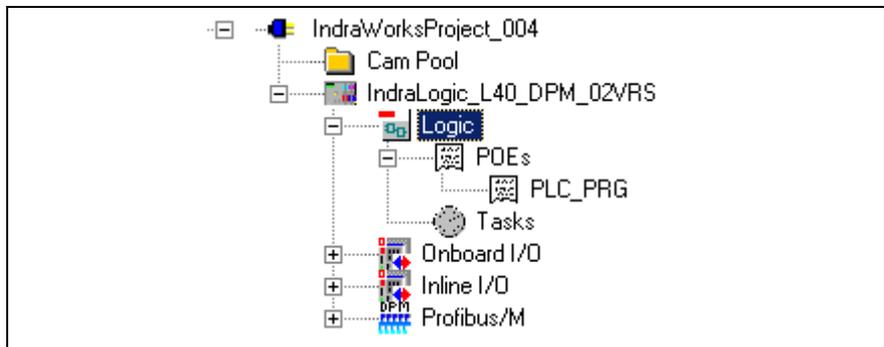


Fig. 4-22: Logic node in the project explorer

- By double-clicking on "Logic" IndraLogic is started with the target system "IndraLogic L40".
- By double-clicking on an entry below "POUs" (e.g. PLC_PRG) the corresponding block is opened in IndraLogic for further execution, 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":

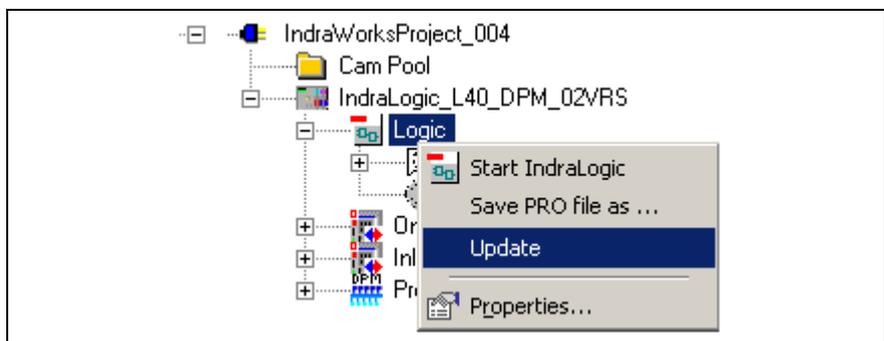


Fig. 4-23: Update logic node

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 IndraWorks /2/.

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

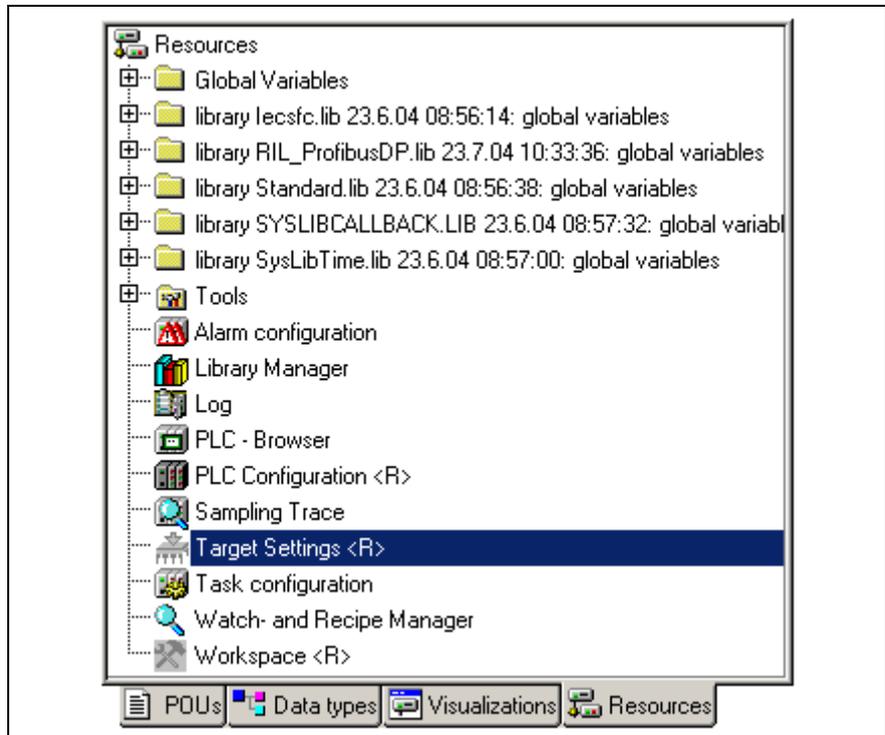


Fig. 4-24: IndraLogic, resources, target settings



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 the 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**.

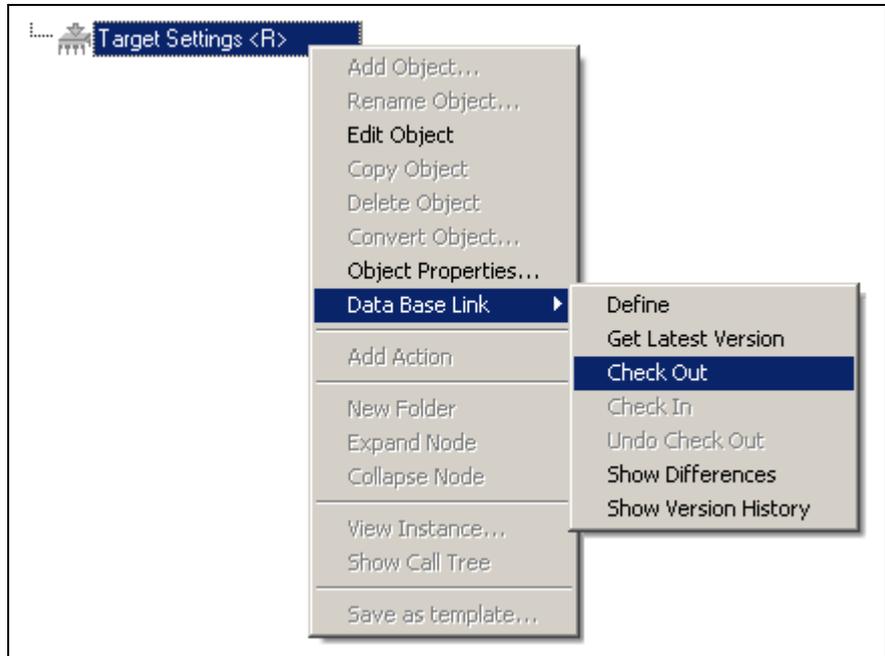


Fig. 4-25: Target settings: Check out from the data base

Task Configuration

For most of the application cases it is sufficient to execute the program without special task management. But it is possible to control the project execution via so-called tasks.

If you do not use a special task configuration, the program is executed via the main program PLC_PRG. 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.

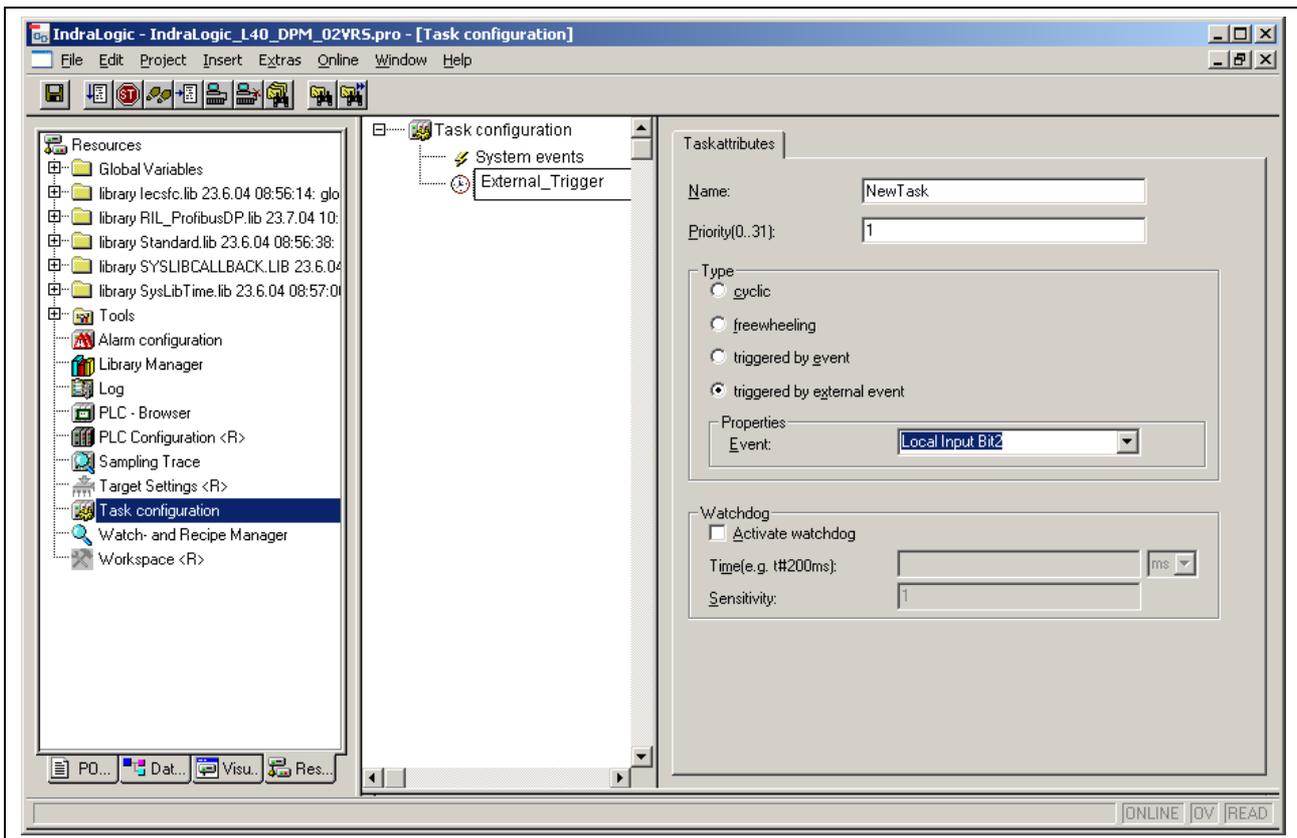


Fig. 4-26: IndraLogic task configuration

For further information about the task attributes refer to the documentation or online help of IndraWorks [2]. Furthermore, the IndraLogic L40 provides a special function "Triggered by external event":

Triggered by External Event

With the IndraLogic L40 a task can be started as soon as a rising edge is applied to one or more of the eight onboard inputs.

For this, select option **Triggered by external event** in the **Task attributes**. Select an event in box **Properties**:

- **Local Input 0 ... Local Input 7:** As soon as a rising edge is applied to the selected bit input of the onboard I/O, the task is started.
- **Local Input Byte:** As soon as a rising edge is applied to at least one of the eight onboard inputs, the task is started. Even if already positive edges are applied to some of the inputs, the task is started with each rising edge of an input. Simultaneously incoming rising edges are recognized as event and, thus, start the task only one time.

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 IndraWorks /2/.

For information about the libraries of the IndraLogic L40 refer to section "Libraries".

With the IndraLogic L40 already a few libraries are indicated in IndraLogic in register "Resources". To link further libraries with the current project, the 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:

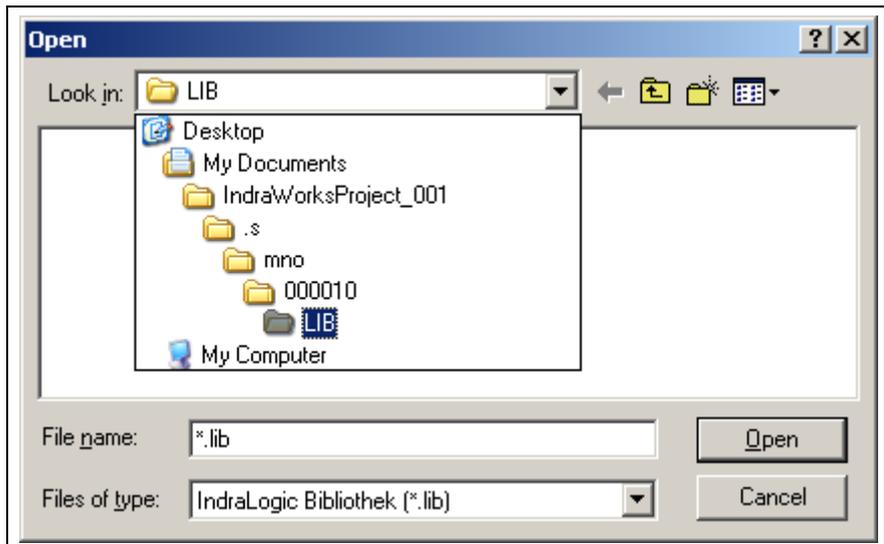


Fig. 4-27: Insert further library: IndraWorks project path

Select here the library directory of the installed target files (target files) of the IndraLogic L40. 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 L40 DPM 02VRS (see also figure below).

C:\Program Files\Rexroth\IndraWorks\IndraLogic\Targets\IndraLogic_L40_DPM_02VRS\lib\

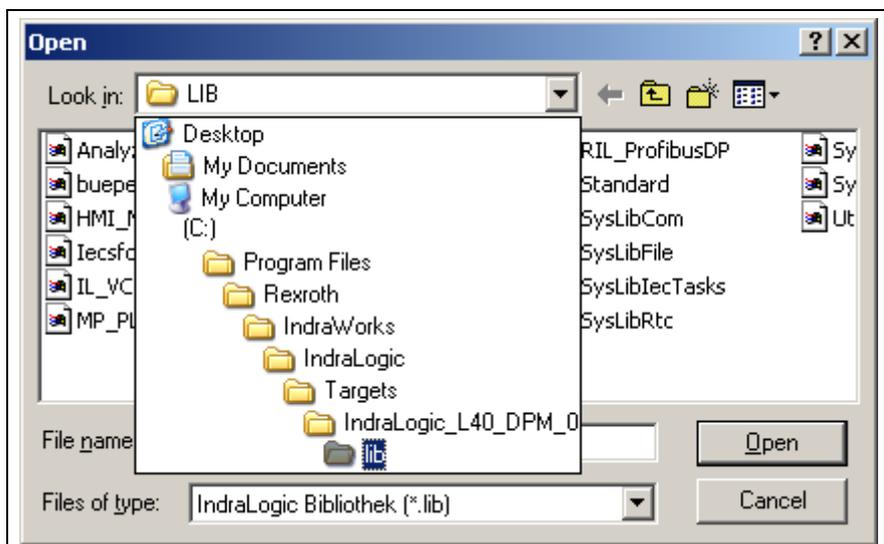


Fig. 4-28: Library directory of the IndraLogic L40 target

Create a PLC Program

Create a PLC program in IndraLogic.

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

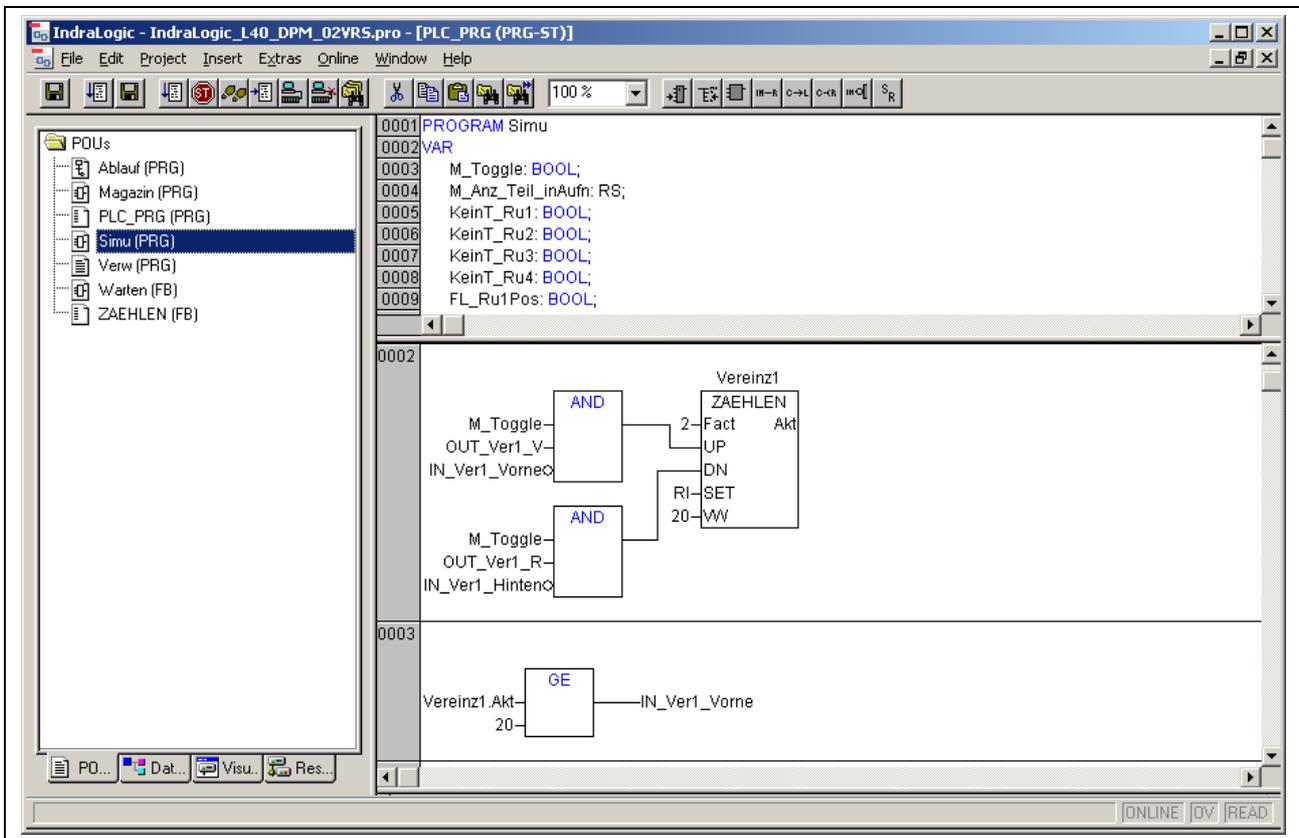


Fig. 4-29: PLC program example

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 Download and Commissioning

Load Configurations and PLC Program in 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 L40 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 on the control after the last download, 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, without the changes made after the last download are 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 Firmware Management

Firmware downloads can be executed, if the control is in the stop status.

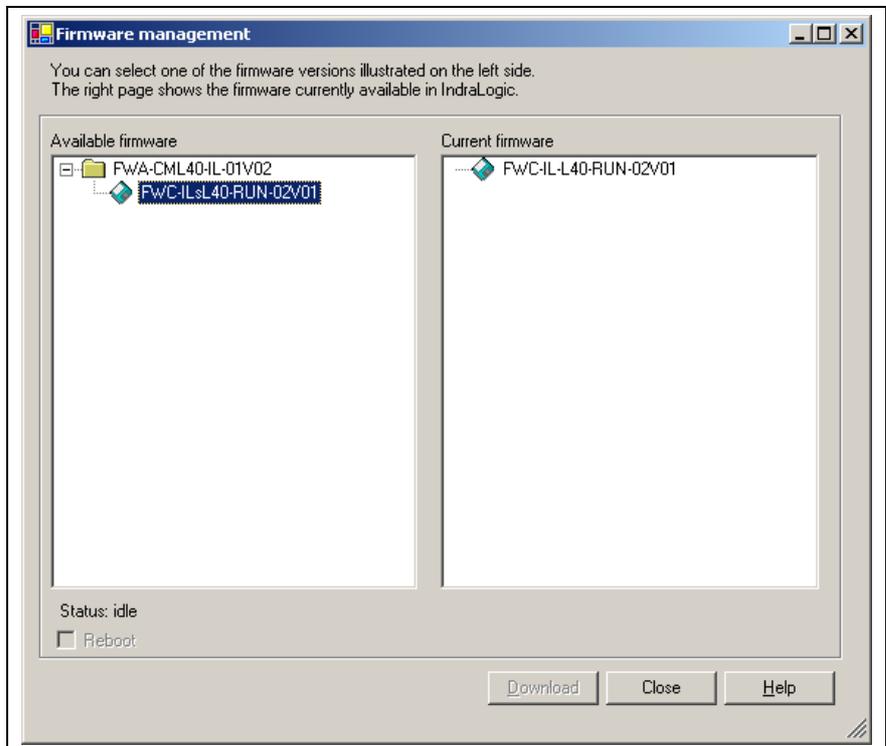


Fig. 5-1: Example for the dialog "Firmware management"

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

5.2 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.

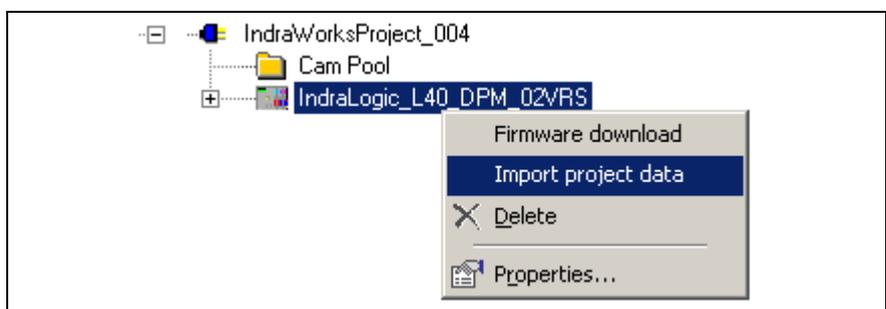


Fig. 5-2: Context menu device

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

5.3 IndraLogic Functions

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

- translate the IndraLogic project
- shut down IndraLogic
- login or logout 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.

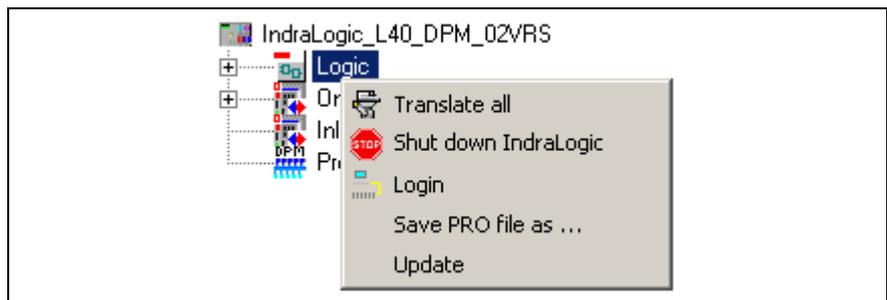


Fig. 5-3: IndraLogic project: Context menu if IndraLogic is started

6 Libraries

6.1 Overview

The following table contains all general libraries as well as the libraries especially provided for the IndraLogic L40.

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/
BuepE_Client	Communication of the IndraLogic L40 with the Bosch controls of the CL range	In this chapter
HMI_MKeys	M key functionalities of the HMI (IndraWorks HMI)	/5/
lecsfc	– Internal use –	–
IL_VCP_DP	Couple Rexroth small operator terminals "VCP" with Profibus connection to the PLC	In this chapter
MP_PLCOpen	– In preparation –	–
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	– In preparation –	–
ProViDiagnosis	Access to the PLC diagnosis (ProVi)	/5/
RIL_Check	– In preparation –	–
RIL_CommonTypes	– Internal use –	–
RIL_L40_Util	Blocks to the status of the IndraControl L40 (e. g. temperature, fan)	In this chapter
RIL_ProfibusDP	Profibus-DPV1 services, diagnostic interface between Profibus master and PLC program, Sync and Freeze	In this chapter
SpecificDiag	– Internal use –	–
Default	Default FBs and functions of the IEC 61131-3	/2/
SysLibCom	Serial communication with the IndraLogic L40	SysLibCom.pdf
SysLibFile	File system support on the IndraLogic L40	SysLibFile.pdf
SysLiblecTasks	Management of IEC tasks	SysLiblecTasks.pdf
SysLibRtc	Access to the real-time clock of the IndraLogic L40	SysLibRtc.pdf
SysLibSockets	Access to sockets for the communication via TCP/IP and UDP	SysLibSockets.pdf
SysLibTime	Read out real-time clock of the IndraLogic L40	SysLibTime.pdf
Util	As supplement to the Default.lib Blocks for BCD converting, bit/byte functions, mathematic help functions, controller, signal generators, function manipulators and analog value processing	/2/

Fig. 6-1: Overview of IndraLogic L40 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.

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 BuepE_Client

General

Library BuepE_Client serves for the communication of the IndraLogic L40 with the Bosch controls of the CL range.

The IndraLogic L40 maps the Client functionality. The CL control represents always the server.

BuepE_Client

Function block BuepE_Client can be simultaneously used several times. A new instance is required for every order.

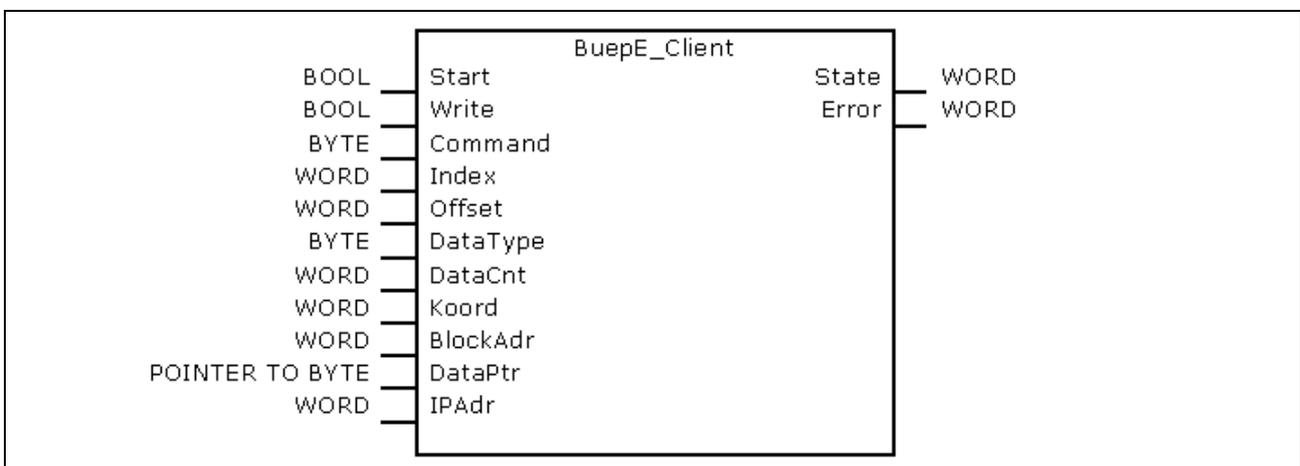


Fig. 6-2: BuepE_Client

	Name	Type	Comment
VAR_INPUT	Start	BOOL	TRUE: The transmission is started
	Write	BOOL	TRUE: Writing access FALSE: Reading access
	Command	BYTE	Field type of the Bosch command 16#44: Data block 16#43: Data field 16#4D: Flag
	Index	WORD	Number of the data block (only for field type "Data block")
	Offset	WORD	Byte offset address within the selected data field or data block
	DataType	BYTE	Data type: 0: BYTE 1: WORD
	DataCnt	WORD	Number of the data = f(DataType), depending on the setting in DataType
	Koord	WORD	Coordination flag 0: uncoordinated
	BlockAdr	WORD	Module block address, only for CL200, CL400 and CL500 16#FFFF: without block address
	DataPtr	POINTER TO BYTE	Pointer to the source data (for "Write"=TRUE), or pointer to the target data (for "Write"=FALSE)
	IPAdr	DWORD	IP address of the Bosch CL control
VAR_OUTPUT	State	WORD	Status: 0: Without errors 16#0100: Order in process 16#0305: Order faulty 16#0405: Order not started Further states are described in the documentation about the communication functionality of the respective control.
	Error	WORD	Error: 0: Without errors 16#FF04: No order in process 16#FF20: No UDP socket free (e. g. too many active instances at the same time) 16#FF21: Error during "bind" (e. g. too many active instances at the same time) 16#FF22: Error during "sendto" (e. g. wrong IP address or partner not activated) 16#FF23: Error during "UDP-receive" 16#FF24: Faulty UDP receive length 16#FF25: Too many repetitions (partner does not respond, e. g. wrong IP address) Further states are described in the documentation about the communication functionality of the respective control.

Fig. 6-3: Interface of BuepE_Client

The following program extract shows an example of the BuepE_Client call.

```
VAR
  Bclient : BuepE_Client;          (* Declare instance *)
  MyDB : ARRAY [0..511] OF BYTE;  (* Data block-data array*)
END_VAR

(* Example: Read a DB from a CL500-ZS1 *)
Bclient(
  Start := TRUE,                  (* Start transmission *)
  Write := FALSE,                 (* Reading access)
  Command := 16#44,               (* Data block *)
  Index := 0,                     (* DB number *)
  Offset := 0,                    (* No address offset *)
  DataType := 0,                  (* Byte *)
  DataCnt := 512,                 (* 512 bytes *)
  Koord := 0,                     (* Uncoordinated *)
  BlockAdr := 16#0008,            (* ZS 1 *)
  DataPtr := ADR(MyDB),           (* Pointer to data block-data array *)
  IPAdr := SysSockInetAddr('10.110.244.46'),
  (* State=> ,*)
  (* Error=>*) );
```

Fig. 6-4: Example for a BuepE_Client call

6.3 IL_VCP_DP

Overview

With this library the small operator terminals "VCP of Rexroth with Profibus connection are coupled to the PLC. For this, three function blocks can be alternatively used:

- VCP_PBS16_A4096
- VCP_PBS32_A4096
- VCP_PBS32_A65536

VCP_PBS16_A4096

This function block (FB) activates the Profibus DP protocol for the small operator terminals VCPxx. Additionally, the I/O image of the physical addresses between PLC and operator terminal is generated.

The data capacity of the data transmission is 16 bytes. The seize of the address area available via an ARRAY is 4096 bytes (inputs and outputs included).

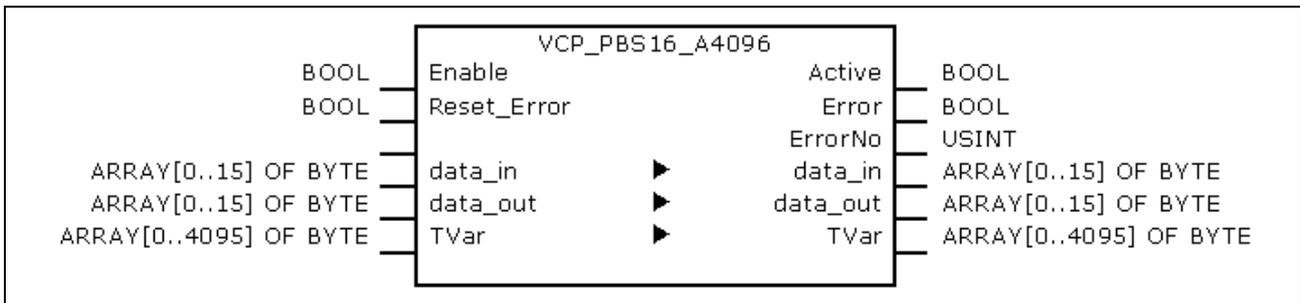


Fig. 6-5: VCP_PBS16_A4096

	Name	Type	Comment
VAR_INPUT	Enable	BOOL	TRUE: FB is executed FALSE: FB is not executed
	Reset_Error	BOOL	TRUE: Reset of "Error" (to FALSE) and "ErrorNo" is set to 0.
VAR_IN_OUT	Data_in	ARRAY [0..15] OF BYTE	Data to connect the physical inputs of the small operator terminal.
	Data_out	ARRAY [0..15] OF BYTE	Data to connect the physical outputs of the small operator terminal.
	TVar	ARRAY [0..4095] OF BYTE	Array to read from and write on the operator terminal.
VAR_OUTPUT	Active	BOOL	TRUE as long as "Enable" is also TRUE
	Error	BOOL	TRUE when an error occurs. Can be reset with "Reset-Error".
	ErrorNo	USINT	Error type: 2: InputRangeError 4: Calculation error

Fig. 6-6: Interface of VCP_PBS16_A4096

VI Composer During the configuration with the Rexroth VI Composer the addresses of the variable list refer to the respective byte in array "TVar", that is used in the PLC program to exchange data.

Error Handling As soon as an error occurs, the communication is interrupted and the display of the small operator terminal indicates "COMMUNICATION ERROR, ERROR CODE 110".

The error type (ErrorNo) shows, if there's an error in the address calculation (CalculationError), or if the selected data capacity for Data_in or Data_out is too high (InputRangeError).

VCP_PBS32_A4096

This function block (FB) activates the Profibus DP protocol for the small operator terminals VCPxx. Additionally, the I/O image of the physical addresses between PLC and operator terminal is generated.

The data capacity of the data transmission is 32 bytes. The seize of the address area available via an ARRAY is 4096 bytes (inputs and outputs included).

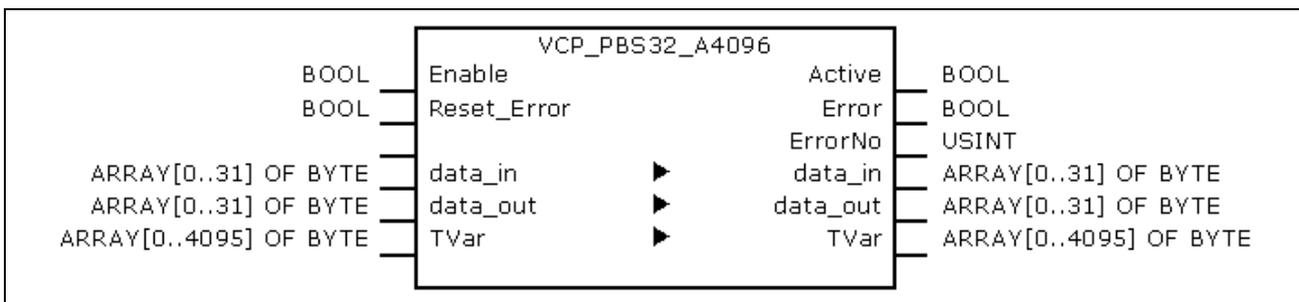


Fig. 6-7: VCP_PBS32_A4096

	Name	Type	Comment
VAR_INPUT	Enable	BOOL	TRUE: FB is executed FALSE: FB is not executed
	Reset_Error	BOOL	TRUE: Reset of "Error" (to FALSE) and "ErrorNo" is set to 0.
VAR_IN_OUT	Data_in	ARRAY [0..31] OF BYTE	Data to connect the physical inputs of the small operator terminal.
	Data_out	ARRAY [0..31] OF BYTE	Data to connect the physical outputs of the small operator terminal.
	TVar	ARRAY [0..4095] OF BYTE	Array to read from and write to the operator terminal.
VAR_OUTPUT	Active	BOOL	TRUE as long as "Enable" is also TRUE
	Error	BOOL	TRUE when an error occurs. Can be reset with "Reset-Error".
	ErrorNo	USINT	Error type: 4: Calculation error

Fig. 6-8: Interface of VCP_PBS32_A4096

VI Composer During the configuration with the Rexroth VI Composer the addresses of the variable list refer to the respective byte in array "TVar", that is used in the PLC program to exchange data.

Error Handling As soon as an error occurs, the communication is interrupted and the display of the small operator terminal indicates "COMMUNICATION ERROR, ERROR CODE 110".

The error type (ErrorNo) indicates that the error is an address calculation error (CalculationError).

VCP_PBS32_A65536

This function block (FB) activates the Profibus DP protocol for the small operator terminals VCPxx. Additionally, the I/O image of the physical addresses between PLC and operator terminal is generated.

The data capacity of the data transmission is 32 bytes. The seize of the address area available via an ARRAY is 65536 bytes (inputs and outputs included).

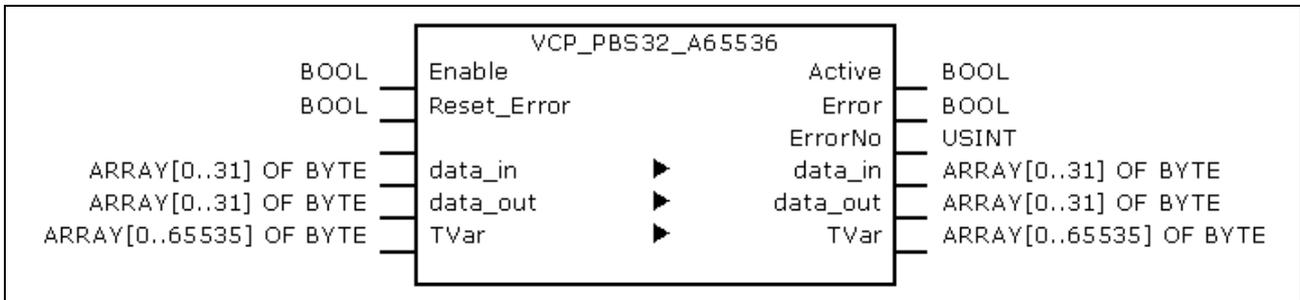


Fig. 6-9: VCP_PBS32_A65536

	Name	Type	Comment
VAR_INPUT	Enable	BOOL	TRUE: FB is executed FALSE: FB is not executed
	Reset_Error	BOOL	TRUE: Reset of "Error" (to FALSE) and "ErrorNo" is set to 0.
VAR_IN_OUT	Data_in	ARRAY [0..31] OF BYTE	Data to connect the physical inputs of the small operator terminal.
	Data_out	ARRAY [0..31] OF BYTE	Data to connect the physical outputs of the small operator terminal.
	TVar	ARRAY [0..65535] OF BYTE	Array to read from and write to the operator terminal.
VAR_OUTPUT	Active	BOOL	TRUE, as long as "Enable" is also TRUE
	Error	BOOL	TRUE when an error occurs. Can be reset with "Reset-Error".
	ErrorNo	USINT	Error type: 4: Calculation error

Fig. 6-10: Interface of VCP_PBS32_A65536

VI Composer During the configuration with the Rexroth VI Composer the addresses of the variable list refer to the respective byte in array "TVar", that is used in the PLC program to exchange data.

Error Handling As soon as an error occurs, the communication is interrupted and the display of the small operator terminal indicates "COMMUNICATION ERROR, ERROR CODE 110".

The error type (ErrorNo) indicates that the error is an address calculation error (CalculationError).

6.4 RIL_L40_Util

Overview

With library RIL_L40_Util the following functions to determine the status of the IndraControl L40 are provided:

- IL_GetStateFan: Fan status
- IL_GetTemp: Temperature in degree Celsius
- IL_GetTempWarning: Temperature warning

IL_GetStateFan

An integrated fan control with hysteresis activates the fan, if a critical internal temperature of 55 °C is reached; once the temperature falls below an uncritical temperature of 42 °C, the control deactivates the fan again.

With function IL_GetStateFan can be defined, if the fan of the control is activated/deactivated.

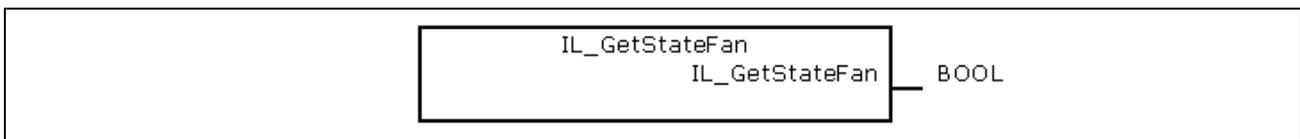


Fig. 6-11: IL_GetStateFan

	Name	Type	Comment
Function value		BOOL	TRUE: Fan is activated FALSE: Fan is deactivated

Fig. 6-12: Interface of IL_GetStateFan

IL_GetTemp

With function IL_GetTemp the internal temperature of the IndraControl L40 can be determined.

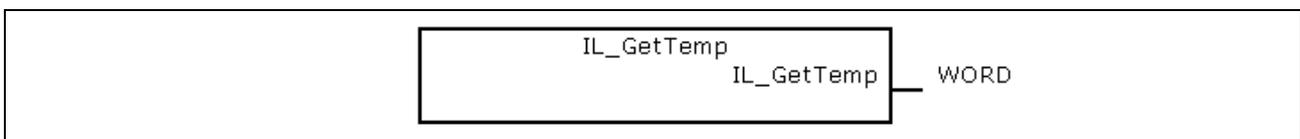


Fig. 6-13: IL_GetTemp

	Name	Type	Comment
Function value		WORD	Temperature: Bit 15: 0 = positive temperature 1 = negative temperature Bit 14 – 8: Temperature value in degree Celsius Bit 7: 1 = decimal place (half degree Celsius) 0 = no decimal place

Fig. 6-14: Interface of IL_GetTemp

Examples:

Function value	Temperature
2#00010100_10000000	+20,5 °C
2#01001011_00000000	+75,0 °C
2#10000101_10000000	-5,5 °C

Fig. 6-15: Examples for IL_GetTemp

IL_GetTempWarning

With function IL_GetTempWarning it is possible to determine, if the internal temperature of the IndraControl L40 has exceeded the critical value of **60 °C**.

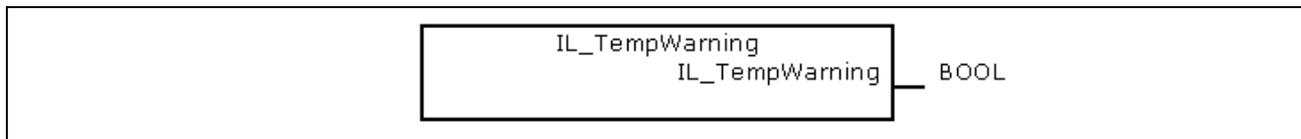


Fig. 6-16: IL_GetTempWarning

	Name	Type	Comment
Function value		BOOL	TRUE: Temperature warning FALSE: no temperature warning

Fig. 6-17: Interface of IL_GetTempWarning

Note: If the temperature reaches a value of 75 °C, the control is automatically entering a standby mode, so that damage is prevented. The outputs enter the safe status, and the warning "Temp !!!" appears on the display.

6.5 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 slot addressing are available:

- DP_ADDR
- DP_ID
- DP_SLOT

Sync and Freeze

Control commands to synchronize inputs or outputs.

- DP_SYCFR

Functions Moreover, help functions for slot 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. 6-18: 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 currently 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. 6-19: 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. 6-20: 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. 6-21: Station status_3

You will find further information about 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 about the data areas in the description of the Data Types and about 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. 6-22: 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. 6-23: 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. 6-24: 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. 6-25: 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. 6-26: 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:

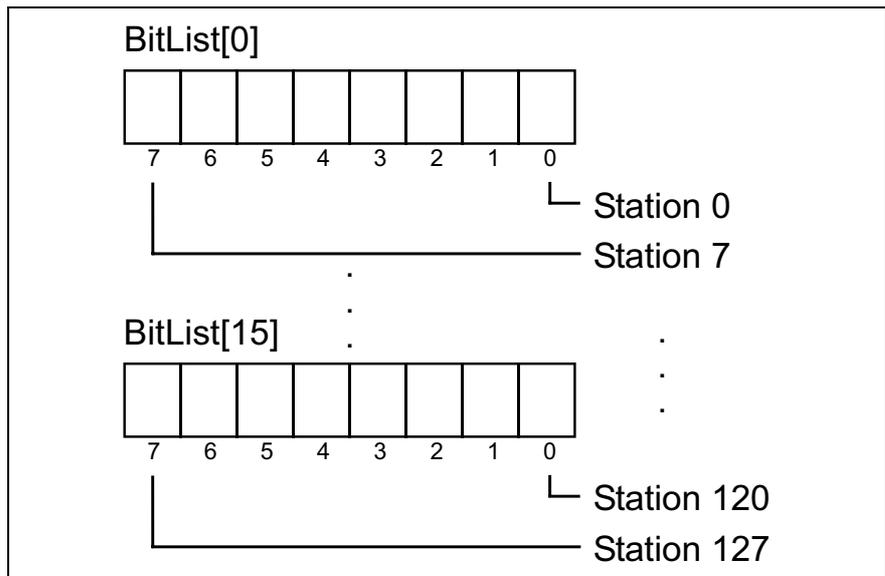


Fig. 6-27: Coding of the bit list

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. 6-28: 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. 6-29: 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:

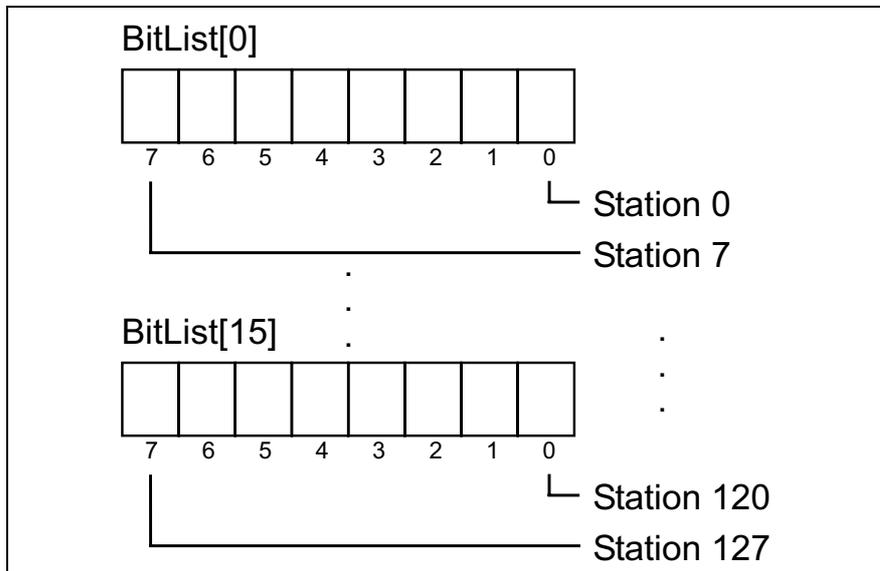


Fig. 6-30: Coding of the bit list

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

Fig. 6-31: 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.

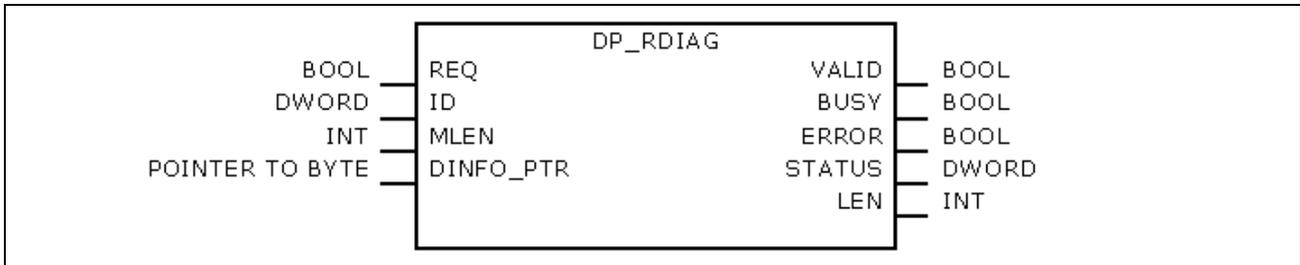


Fig. 6-32: DP_RDIAG

	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. 6-33: Interface of DP_RDIAG

Byte	Contents	Description
0	MASTER	ID of the DP system: Has permanently value 0, as the IndraLogic L40 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. 6-34: 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.

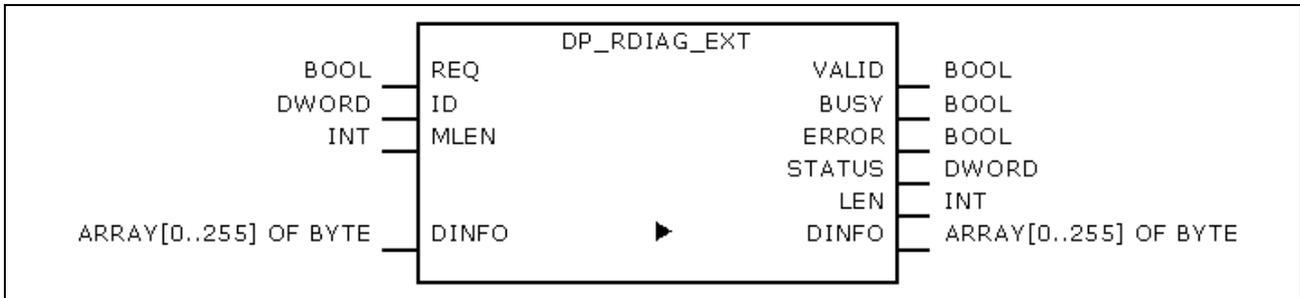


Fig. 6-35: DP_RDIAG_EXT

	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. 6-36: Interface of DP_RDIAG_EXT

Byte	Contents	Description
0	MASTER	ID of the DP system: Has permanently value 0, as the IndraLogic L40 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. 6-37: 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).

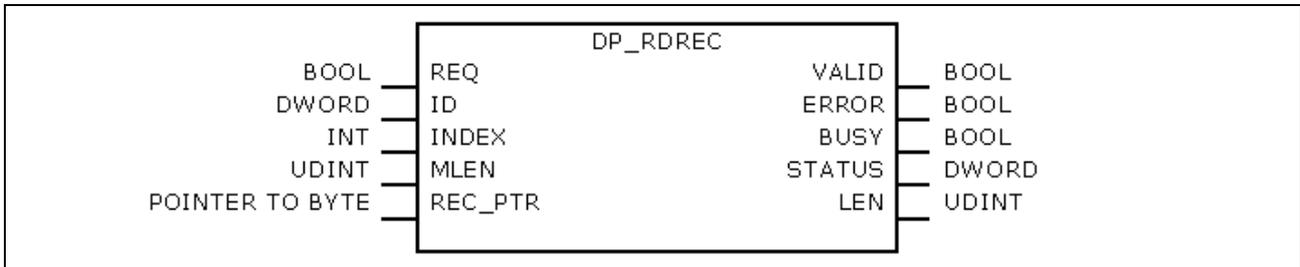


Fig. 6-38: DP_RDREC

	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. 6-39: Interface of DP_RDREC

Byte	Contents	Description
0	MASTER	ID of the DP system: Has permanently value 0, as the IndraLogic L40 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. 6-40: 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).

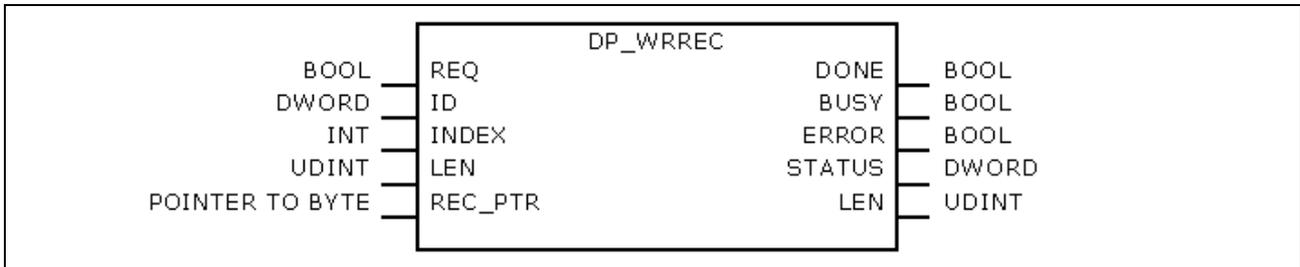


Fig. 6-41: DP_WRREC

	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. 6-42: Interface of DP_WRREC

Byte	Contents	Description
0	MASTER	ID of the DP system: Has permanently value 0, as the IndraLogic L40 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. 6-43: 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.

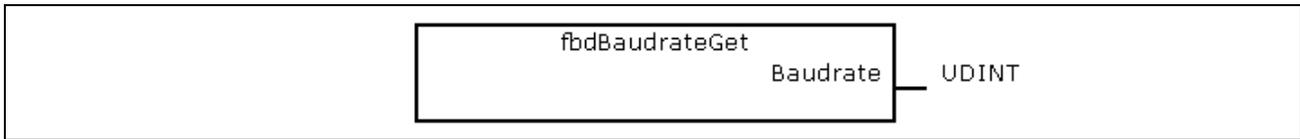


Fig. 6-44: fbdBaudrateGet

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

Fig. 6-45: Interface of fbdBaudrateGet

fbdBmErrorGet

Function block fbdBmErrorGet reads the current bus master error word.

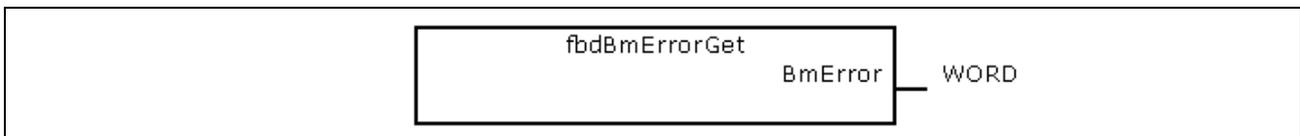


Fig. 6-46: fbdBmErrorGet

	Name	Type	Comment
VAR_OUTPUT	BmError	WORD	See tFBD_BM_INFO.

Fig. 6-47: 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.

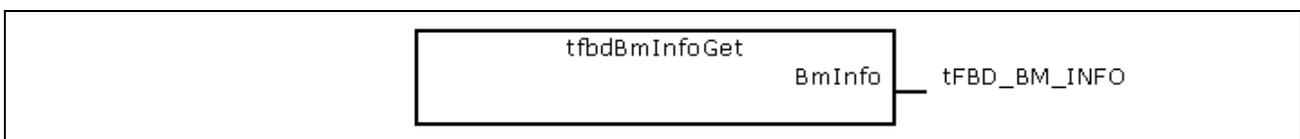


Fig. 6-48: fbdBmInfoGet

	Name	Type	Comment
VAR_OUTPUT	BmInfo	tFBD_BM_INFO	See tFBD_BM_INFO.

Fig. 6-49: Interface of fbdBmInfoGet

fbdBmStateGet

Function block fbdBmStateGet reads the current bus master status word.



Fig. 6-50: fbdBmStateGet

	Name	Type	Comment
VAR_OUTPUT	BmState	WORD	See tFBD_BM_INFO.

Fig. 6-51: Interface of fbdBmStateGet

fbdKsdListGet

Function block fbdKsdListGet reads the current KSD list.



Fig. 6-52: fbdKsdListGet

	Name	Type	Comment
VAR_OUTPUT	KsdList	tFBD_KSD_LIST	See tFBD_KSD_LIST.

Fig. 6-53: Interface of fbdKsdListGet

fbdPdTypeGet

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

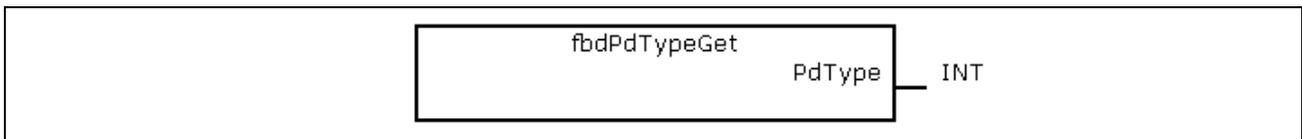


Fig. 6-54: fbdPdTypeGet

	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. 6-55: Interface of fbdPdTypeGet

fbdPrjSlaveListGet

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

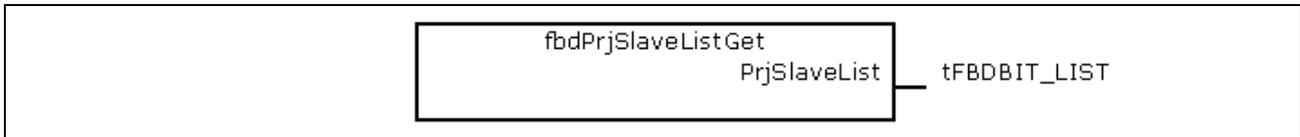


Fig. 6-56: fbdPrjSlaveListGet

	Name	Type	Comment
VAR_OUTPUT	PrjSlaveList	tFBD_BIT_LIST	See tFBD_BIT_LIST.

Fig. 6-57: 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. 6-58: Bit list: Projected slaves

fbdSlaveDiagListGet

Function block fbdSlaveDiagListGet reads the current slave diagnostic list.



Fig. 6-59: fbdSlaveDiagListGet

	Name	Type	Comment
VAR_OUTPUT	SlaveDiagList	tFBD_BIT_LIST	See tFBD_BIT_LIST.

Fig. 6-60: 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. 6-61: Bit list: Slave diagnosis

DP_SYCFR

Using function block DP_SYCFR control commands to synchronize inputs or outputs can be realized.

Profibus DP provides the possibility, that a master sends a so-called "Global Control Telegram" to a group of slaves. The Global Control Telegram contains a control command.

- Using the **Freeze** control command all slaves of the addressed group are storing the current **input data** at the same time (synchronize inputs).
- Using the **Sync** control command all slaves of the addressed group are applying the current **output data** at the same time (synchronize outputs).

As of version 02VRS, the IndraLogic L40 supports the Sync and Freeze function of Profibus DP. Using the Sync function, e. g. the outputs of several drives (e. g. Rexroth EcoDrive) can be synchronized.

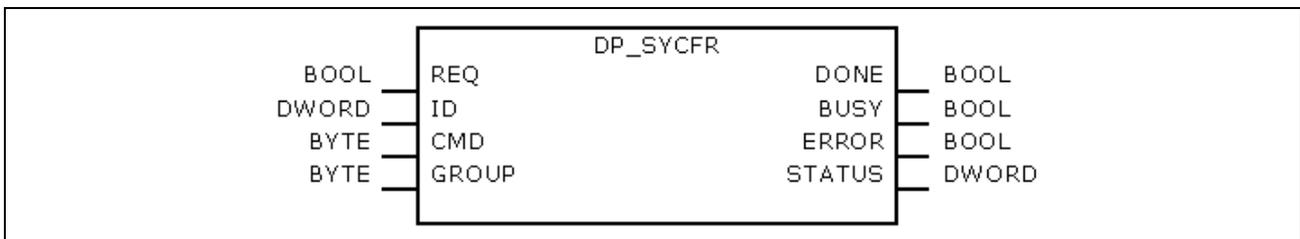


Fig. 6-62: DP_SYCFR

	Name	Type	Comment
VAR_INPUT	REQ	BOOL	TRUE: Execute the function
	ID	DWORD	Slot handle, see the following table
	CMD	BYTE	Control command
	GROUP	BYTE	Selects one or several groups, to which the command refers. Each bit is assigned to a group
VAR_OUTPUT	DONE	BOOL	TRUE: Call completed
	BUSY	BOOL	TRUE: The function block is busy. As long as BUSY = TRUE, the data can not yet be evaluated.
	ERROR	BOOL	TRUE: Error/s occurred
	STATUS	DWORD	Lastly defined status

Fig. 6-63: Interface of DP_SYCFR

Byte	Contents	Description
0	MASTER	ID of the DP system: Has permanently value 0, as the IndraLogic L40 contains exactly one DP master.
1	SEGMENT	Number of the DP segment
2	STATION	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). However, if the command is to be entered for all slaves of a group, a global address (= 127) must be entered here.
3	SLOT	Number of the slot within the slave

Fig. 6-64: Slot handle: Parameter "ID"

Example: To address all slaves of a group, the ID has value 16#007F0000.

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

Note: To synchronize the outputs, it has to be guaranteed, that, at first, all slaves have contained the current output data, before they receive the Sync command.

For this, call function block DP_SYCFR of the same PLC task, from which the output data of the slave/s are written:

In a PLC task, at first, the output data for the synchronized slaves are written. Then, the SYNC command is started with DP_SYCFR. As long as the Sync command is not terminated (BUSY), the output data must not be modified.

When using Sync or Freeze in the IndraWorks project explorer, an assignment of the groups at the master and the corresponding slaves must be set. For further information refer to the documentation or online help of IndraWorks /5/.

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 an unchanged handle.



Fig. 6-65: DP_ADDR

	Name	Type	Comment
VAR_INPUT	ID	DWORD	Slot handle
Function value		DWORD	

Fig. 6-66: Interface of DP_ADDR

DP_ID

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

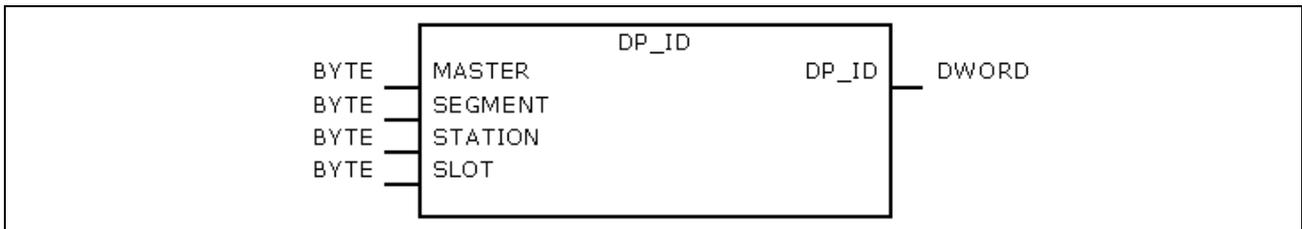


Fig. 6-67: DP_ID

	Name	Type	Comment
VAR_INPUT	MASTER	BYTE	ID of the DP system: Has permanently value 0, as the IndraLogic L40 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. 6-68: Interface of DP_ID

DP_SLOT

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

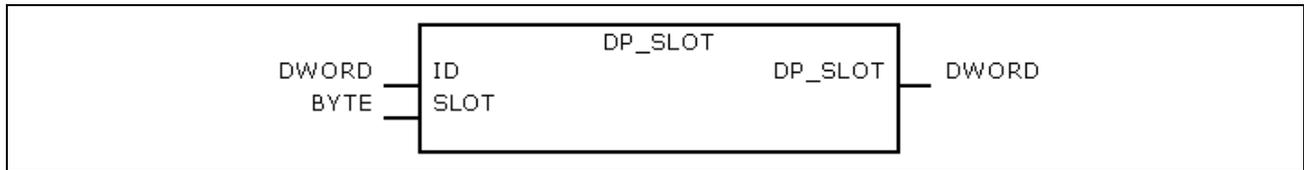


Fig. 6-69: DP_SLOT

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

Fig. 6-70: Interface of DP_SLOT

7 Display and Operating Components

On its front, the IndraLogic L40 is provided with the following display and operating components: a single-line display with four operator keys as well as a light-emitting diode and a Reset button.

7.1 Display and Operator Keys

Display The display is an LCD display comprising 8 digits (5 x 10 dot matrix).



Fig. 7-1: Display with four operator keys

Operator Keys The following functions are assigned to the four operator keys at the bottom of the display (from left to right):

- Esc
(Move back to the last lower level)
(Note: If you exit a menu with Esc, any changes you made in that menu will not be applied.)
- Down (arrow down)
(navigate within a menu (down) or decrement parameters to be set)
- Up (arrow up)
(navigate within a menu (up) or increment parameters to be set)
- Enter (confirm your entry or call the next higher menu level)

7.2 Reset Button and Light-Emitting Diode

The Reset button and a red light-emitting diode are arranged in the section below the display.



Fig. 7-2: Reset button and Stop LED

Reset Button The Reset button can only be actuated with a tool, for instance with the tip of a pencil.

Actuating the Reset button will reset the complete assembly and force a restart of the unit without the supply voltages having to be turned off. At the same time, the Ready contact will be opened (if present).

Note: Actuation of the Reset button will abort processing of a running program.

Light-Emitting Diode The light emitting diode serves for diagnosis. It shows the following states:

LED	IndraLogic L40
LED OFF	Normal state (Run, PLC program is running)
LED red	PLC stopped
LED red flashing	Outputs are disabled

Fig. 7-3: Designation of the LED

7.3 Display Possibilities

Via the display different information or settings can be realized.

Default and Status Displays

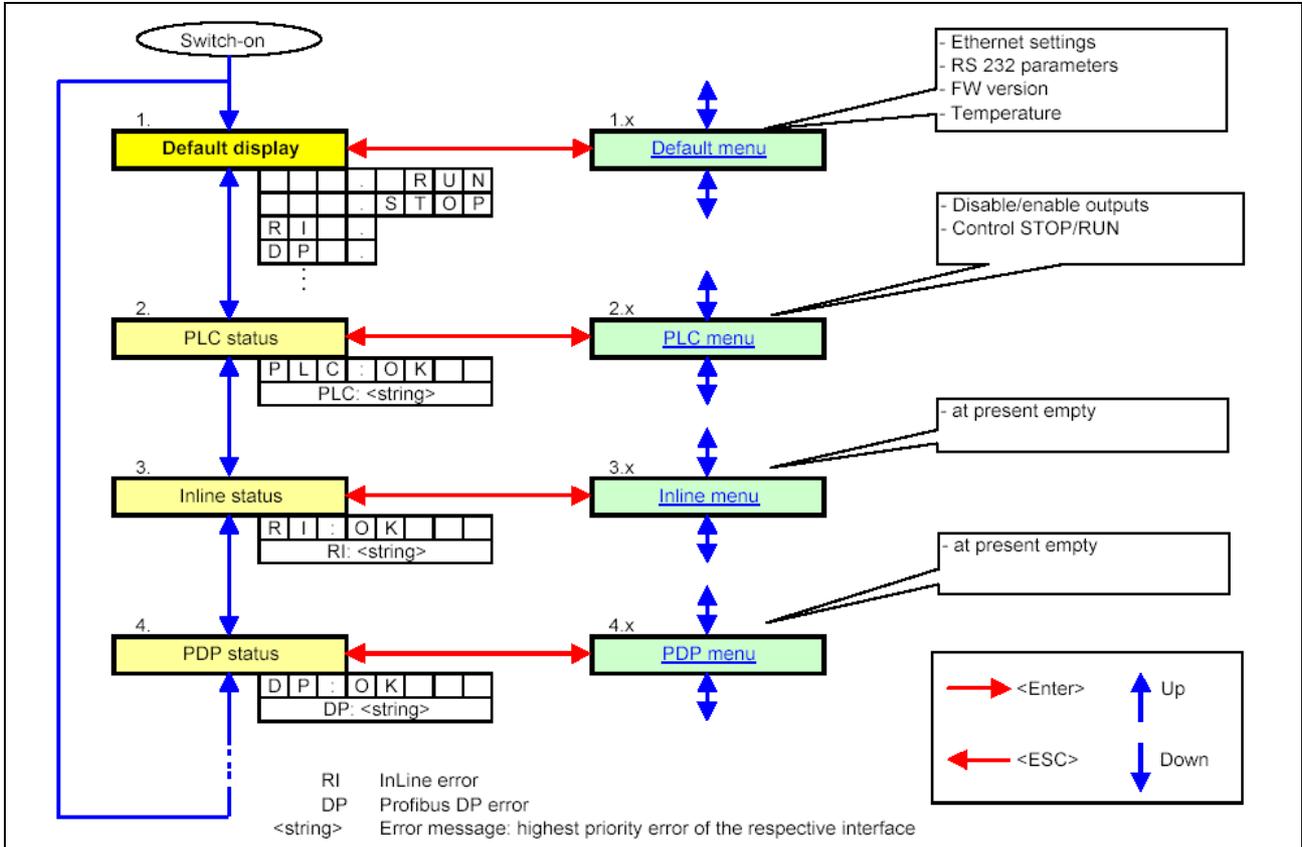


Fig. 7-4: Overview of the default and status displays

After switching on the IndraLogic L40 the default setting appears on the display. By pressing the <Up> or <Down> key it is possible to change cyclically between the status displays specified at the left side of the following table. By pressing <Enter> the submenu is called up in the last column. From the submenus you can switch back to the status displays by pressing <Esc> .

With <Up> and <Down> it is changed between the default display and the states								With <Enter> the respective submenu is called up	
Default display				.		R	U	N	Default menu
				.	S	T	O	P	
	R	I							
	D	P							
PLC status	P	L	:	C	:	O	K		PLC menu
Inline status	R	I	:	O	K				Inline menu
	R	I	:	<Error message>					
PDP status	D	P	:	O	K				PROFIBUS DP menu
	D	P	:	<Error message>					

Fig. 7-5: Default and status displays

Default Display

The flashing characters "RI" or "DP" are only indicated, if an error occurs. Details on this error, may be found in the Inline status in the case of an Inline error (RI) and in the PDP status in the case of a PROFIBUS DP error (DP). If several errors are applied, only the error with the highest priority (DP) is displayed.

Inline Status

In the Inline status an applied Rexroth Inline error is indicated. "RI: Rexroth-Inline configuration error at module: xxx"

PDP Status

The following error messages can be indicated in the PDP status:

- DP: DP slave error/diagnosis
- DP: DP hardware with error!
- DP: no MPS or MPS incorrect!
- DP: bus error!
- DP: fatal SW error

Default Menu

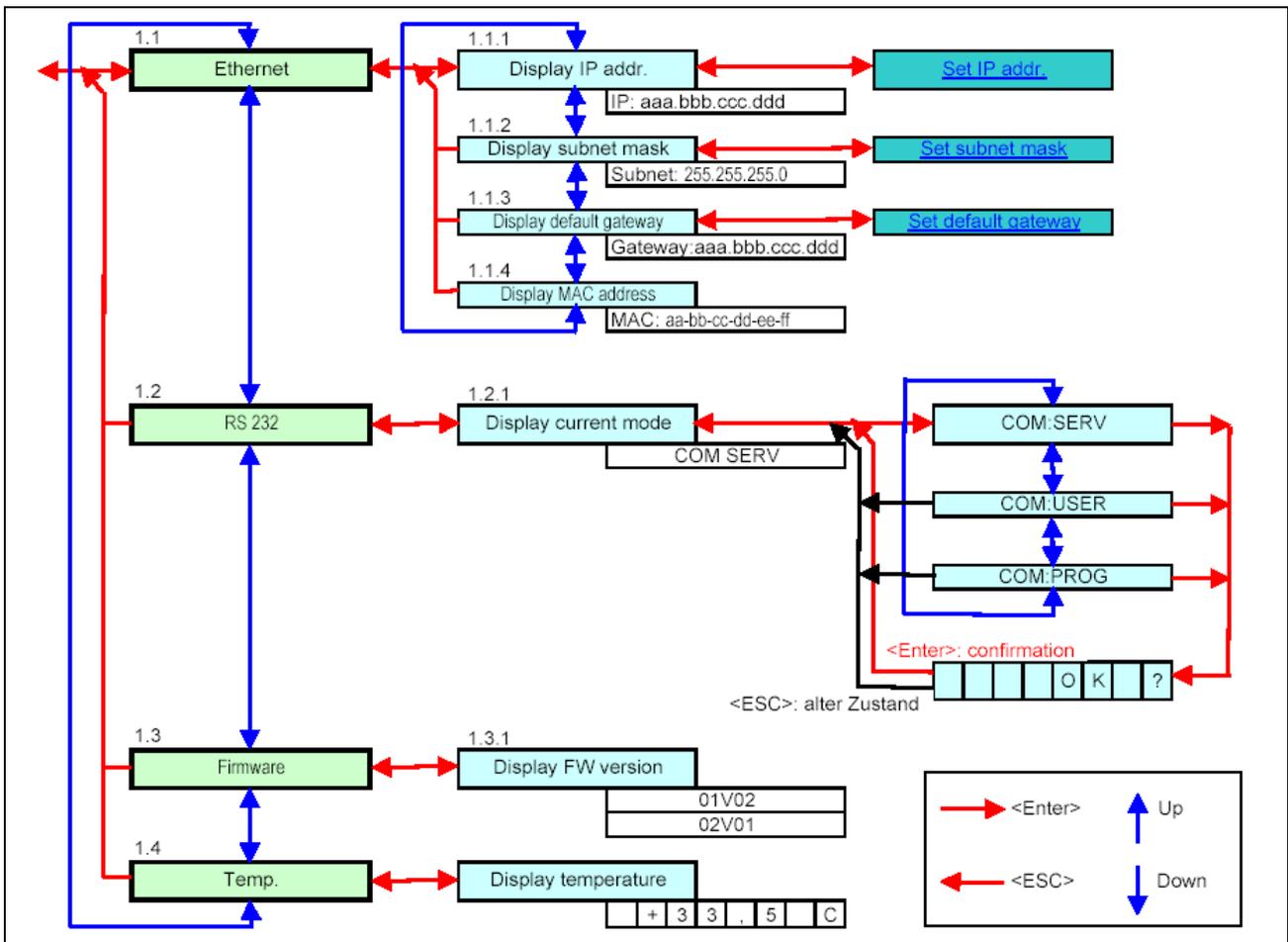


Fig. 7-6: Default menu

If the default menu is called up from the default display with <Enter>, the word "Ethernet" is indicated. According to the following table you can switch to the displays "RS232", "Firmware" and "Temp" by using the <Up> and <Down> keys. By pressing <Enter> you can open the specified submenus. Here, you can change between the different displays with <Up> and <Down>. You can exit the submenus with <Esc>.

With <Up> and <Down> it is changed between these displays	By pressing <Enter> submenus are called up; the different displays can be selected with <Up> and <Down>
Ethernet	(the IP address is displayed) IP: aaa.bbb.ccc.ddd
	(the subnet mask is displayed) SUB: 255.255.255.0
	(the default gateway is displayed) Gateway: aaa.bbb.ccc.ddd
	(the MAC address is displayed)
RS232	COM SERV
	COM USER
	COM PROG
Firmware	(the firmware version is displayed, e. g.:) 02V01
Temp.	(the internal temperature of the IndraControl L40 is displayed, e. g.:) +34,5 °C

Fig. 7-7: Default menu

Ethernet

To change an address activate the <Enter> key while the current address is displayed. Now, the letter sequence "AAA" is displayed to indicate the first byte of the address. Behind the characters, you will see the currently set address. You can increment or decrement this address by pressing the <Up> and <Down> key.

If the desired value has been reached, you can change with <Enter> to the next byte of the address specified by "BBB". This byte can be modified in the same way.

Proceed in the same manner with the next character sequences "CCC" and "DDD".

After having changed all 4 bytes of the address and after pressing the Enter key again you will be asked with the indication "OK", if the address just being edited, i. e. "Ethernet", "Subnet" or "Gateway" is to be applied. If you answer with <Esc>, all modifications are rejected. However, if you confirm your inputs with <Enter>, the entered address is indicated on the display written in the Compact Flash card. During the next start of the control this address is used.

RS232

If you have selected display "RS232" by the <Up> or <Down> key, the currently active mode of the interface is indicated by pressing <Enter> and "COM SERV", "COM USER" or "COM PROG". After pressing <Enter> again you can change between the three modes with the <Up> and <Down> keys. If the desired mode is indicated, confirm with <Enter>. If you confirm the now displayed request "OK ?" with <Enter>, this new mode is applied. You can cancel the selection anytime with <Esc>, the mode remains unchanged.

COM SERV: The RS232 interface is used to communicate with a small operator terminal, with which the interface is configured.

COM USER: The RS232 interface can either be configured via a lib function in the PLC program or it can be used with the default settings (38 400 bauds, no parity, 8 data bits, 1 stop bit) for the communication with a programming device.

COM PROG: The RS232 interface can be used by the programming device.

Note: After having changed this setting you have to deactivate and then activate the IndraLogic L40 again, so that the settings are applied.

Firmware

In this submenu the version number of the installed firmware is displayed.

Temperature Display

Here, the internal temperature of the IndraLogic L40 is indicated.



DANGER

Danger of destruction by overheating

- ⇒ Ensure an ambient temperature of less than 45 °C.
- ⇒ If the ambient temperature exceeds 45 °C, the optionally available fan must be used.

Also if the internal temperature exceeds 60 °C, the fan must be used.

An integrated fan control with hysteresis activates the fan if a critical internal temperature is reached; once the temperature falls below uncritical values, the control deactivates the fan again.

- ⇒ If the temperature reaches a value of 75 °C, the control is automatically entering a standby mode so that damage is prevented. The outputs enter the safe status, and the warning "Temp !!!" appears on the display.
 - ⇒ By means of a lib function, the application program can read the internal temperature of the IndraLogic L40, in order to trigger further reactions.
-

PLC Menu

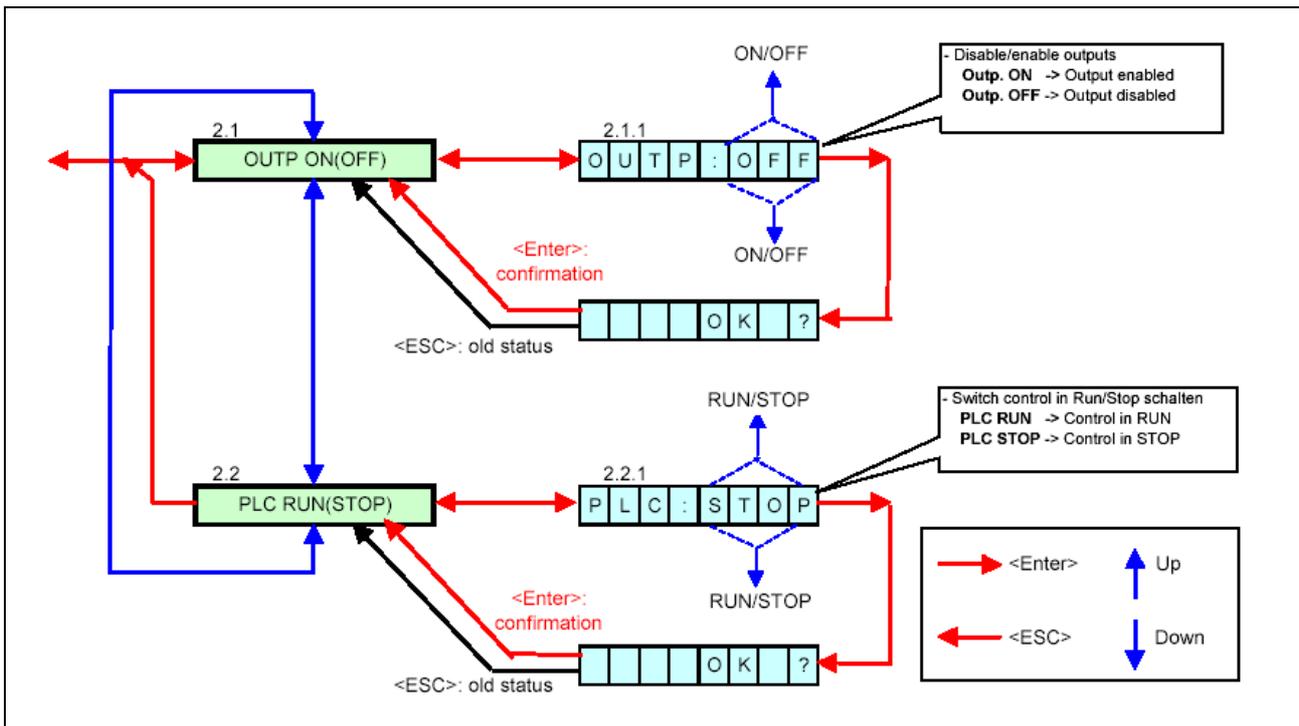


Fig. 7-8: PLC menu

In the PLC menu you can select two submenus by pressing the <Up> and <Down> keys.

Outputs

At first, "Outp. ON" or "Outp. OFF" is indicated in the PLC menu. If you want to change between these output states, press the <Enter> key. Now, you can toggle between the two displays "OUTP:OFF" and "OUTP:ON" with the <Up> and <Down> keys. If the desired status is indicated, confirm with <Enter>. With the display <OK ?> you are asked, if the selected status is to be applied. If you answer with <Esc>, your selection is rejected, with <Enter> your selection is applied.

Outp. ON: The local digital outputs of the IndraLogic L40, the outputs of the connected Rexroth Inline modules as well as the outputs activated via the PROFIBUS DP are enabled.

Outp OFF: The local digital outputs of the IndraLogic L40, the outputs of the connected Rexroth Inline modules as well as the outputs activated via the PROFIBUS DP are set to zero (safe status).

In the position "Outp. OFF" the STOP LED flashes, additionally.

PLC RUN and PLC STOP

By pressing the <Up> or <Down> key you reach a display "PLC RUN" or "PLC STOP". If you want to change between these states, press the <Enter> key. Now, you can toggle between the two displays "PLC:STOP" and "PLC:RUN" with the <Up> and <Down> keys. If the desired status is indicated, confirm with <Enter>. With the display <OK ?> you are asked, if the selected status is to be applied. If you answer with <Esc>, your selection is rejected, with <Enter> your selection is applied.

PLC RUN: Activate outputs and start the PLC program.

PLC STOP: Set the outputs into the safe status and stop the PLC program.

Note: The same functions are activated by "Start" and "Stop" by a connected programming device, so that e. g. the command PLC STOP entered via the IndraLogic L40 can be canceled by the programming device and vice versa.

Inline Menu

At present, this menu is empty.

PROFIBUS DP Menu

At present, this menu is empty.

Special Cases

If during the startup of the control the <ESC> key is pressed as long as "INIT" appears on the display, the boot project saved on the Compact Flash card is deleted corresponding to the IndraLogic function "Reset (origin)".

Note: This function should only be used in exceptional cases, e. g. if the control does not start because of a faulty boot project.

If the control switches off because of an over-temperature, the string "TEMP !!!" is indicated.

8 Technical Data

8.1 Equipment

IndraLogic L40-DPM-02VRS	
Processor	National Geode SC1200, at least with 266 MHz
Main memory	At least 32-Mbyte DRAM and at least. 64-kByte NvRAM
Interfaces:	
Interface to functional modules	<ul style="list-style-type: none"> • Bosch Rexroth PC104^{Plus}
Interface to I/O modules	<ul style="list-style-type: none"> • Rexroth Inline interface
Communication interfaces	<ul style="list-style-type: none"> • 1 x Ethernet connection (RJ 45, 10/100 Base-T) • 1 x serial RS232 interface • 1 x PROFIBUS DP master interface
Inputs and outputs	<ul style="list-style-type: none"> • 8 electrically isolated digital inputs • 8 electrically isolated digital outputs

Fig. 8-1: Equipment

8.2 Power Data

IndraLogic L40-DPM-02VRS	
User memory for program code	4-Mbyte
User memory for data	4-Mbyte
Remanent memory	64-kbyte
Task number	16
Processing time, typical (1000 instructions in IL, bit- and word commands mixed)	70 µs
Profibus DP master according to IEC 61158-3	

Fig. 8-2: Power data

9 List of Figures

- Fig. 1-1: Further documentation 1-1
- Fig. 3-1: Hazard classification (according to ANSI Z535) 3-1
- Fig. 4-1: Start IndraWorks 4-1
- Fig. 4-2: Create new project 4-2
- Fig. 4-3: Insertion of the IndraLogic L40 in the project explorer 4-2
- Fig. 4-4: Example: IndraLogic L40 DPM in the project explorer 4-3
- Fig. 4-5: Device Settings 4-4
- Fig. 4-6: IndraLogic communication parameter 4-5
- Fig. 4-7: Communication settings 4-5
- Fig. 4-8: Context menu, device properties to the IndraLogic L40 4-6
- Fig. 4-9: Context menu, communication properties to the IndraLogic L40 4-6
- Fig. 4-10: Onboard I/O of the IndraLogic L40 4-7
- Fig. 4-11: Project explorer "Onboard I/O" 4-7
- Fig. 4-12: Address assignment of inputs and outputs 4-7
- Fig. 4-13: Onboard settings of the IndraLogic L40 4-8
- Fig. 4-14: Insert Inline module 4-9
- Fig. 4-15: Inline I/O of the IndraLogic L40 4-10
- Fig. 4-16: Master settings 4-11
- Fig. 4-17: Insert Profibus DP slave 4-13
- Fig. 4-18: Slave settings 4-14
- Fig. 4-19: Active/Passive switch-over in the project explorer 4-15
- Fig. 4-20: Insert a Profibus slave module 4-16
- Fig. 4-21: Module data 4-17
- Fig. 4-22: Logic node in the project explorer 4-19
- Fig. 4-23: Update logic node 4-19
- Fig. 4-24: IndraLogic, resources, target settings 4-20
- Fig. 4-25: Target settings: Check out from the data base 4-21
- Fig. 4-26: IndraLogic task configuration 4-22
- Fig. 4-27: Insert further library: IndraWorks project path 4-23
- Fig. 4-28: Library directory of the IndraLogic L40 target 4-23
- Fig. 4-29: PLC program example 4-24
- Fig. 5-1: Example for the dialog "Firmware management" 5-1
- Fig. 5-2: Context menu device 5-1
- Fig. 5-3: IndraLogic project: Context menu if IndraLogic is started 5-2
- Fig. 6-1: Overview of IndraLogic L40 libraries 6-1
- Fig. 6-2: BuepE_Client 6-2
- Fig. 6-3: Interface of BuepE_Client 6-3
- Fig. 6-4: Example for a BuepE_Client call 6-4
- Fig. 6-5: VCP_PBS16_A4096 6-5
- Fig. 6-6: Interface of VCP_PBS16_A4096 6-5
- Fig. 6-7: VCP_PBS32_A4096 6-6

- Fig. 6-8: Interface of VCP_PBS32_A4096 6-6
- Fig. 6-9: VCP_PBS32_A65536 6-7
- Fig. 6-10: Interface of VCP_PBS32_A65536 6-7
- Fig. 6-11: IL_GetStateFan 6-8
- Fig. 6-12: Interface of IL_GetStateFan 6-8
- Fig. 6-13: IL_GetTemp 6-8
- Fig. 6-14: Interface of IL_GetTemp 6-8
- Fig. 6-15: Examples for IL_GetTemp 6-9
- Fig. 6-16: IL_GetTempWarning 6-9
- Fig. 6-17: Interface of IL_GetTempWarning 6-9
- Fig. 6-18: Slave diagnostic data 6-11
- Fig. 6-19: Station status_1 6-12
- Fig. 6-20: Station status_2 6-12
- Fig. 6-21: Station status_3 6-13
- Fig. 6-22: tFBD_BM_INFO 6-14
- Fig. 6-23: Installed peripheral driver in "PdType" 6-14
- Fig. 6-24: Status coding in "BmState" 6-15
- Fig. 6-25: Error coding in "BmError" 6-15
- Fig. 6-26: tFBD_BIT_LIST 6-16
- Fig. 6-27: Coding of the bit list 6-16
- Fig. 6-28: tFBD_KSD_LIST 6-16
- Fig. 6-29: Classified slave diagnosis 6-17
- Fig. 6-30: Coding of the bit list 6-17
- Fig. 6-31: Bit list: Classified slave diagnosis 6-17
- Fig. 6-32: DP_RDIAG 6-18
- Fig. 6-33: Interface of DP_RDIAG 6-18
- Fig. 6-34: Slot handle: Parameter "ID" 6-18
- Fig. 6-35: DP_RDIAG_EXT 6-19
- Fig. 6-36: Interface of DP_RDIAG_EXT 6-19
- Fig. 6-37: Slot handle: Parameter "ID" 6-19
- Fig. 6-38: DP_RDREC 6-20
- Fig. 6-39: Interface of DP_RDREC 6-20
- Fig. 6-40: Slot handle: Parameter "ID" 6-20
- Fig. 6-41: DP_WRREC 6-21
- Fig. 6-42: Interface of DP_WRREC 6-21
- Fig. 6-43: Slot handle: Parameter "ID" 6-21
- Fig. 6-44: fbdBaudrateGet 6-22
- Fig. 6-45: Interface of fbdBaudrateGet 6-22
- Fig. 6-46: fbdBmErrorGet 6-22
- Fig. 6-47: Interface of fbdBmErrorGet 6-22
- Fig. 6-48: fbdBmInfoGet 6-22
- Fig. 6-49: Interface of fbdBmInfoGet 6-22
- Fig. 6-50: fbdBmStateGet 6-23
- Fig. 6-51: Interface of fbdBmStateGet 6-23

- Fig. 6-52: fbdKsdListGet 6-23
- Fig. 6-53: Interface of fbdKsdListGet 6-23
- Fig. 6-54: fbdPdTypeGet 6-23
- Fig. 6-55: Interface of fbdPdTypeGet 6-23
- Fig. 6-56: fbdPrjSlaveListGet 6-24
- Fig. 6-57: Interface of fbdPrjSlaveListGet 6-24
- Fig. 6-58: Bit list: Projected slaves 6-24
- Fig. 6-59: fbdSlaveDiagListGet 6-24
- Fig. 6-60: Interface of fbdSlaveDiagListGet 6-24
- Fig. 6-61: Bit list: Slave diagnosis 6-24
- Fig. 6-62: DP_SYCFR 6-25
- Fig. 6-63: Interface of DP_SYCFR 6-25
- Fig. 6-64: Slot handle: Parameter "ID" 6-26
- Fig. 6-65: DP_ADDR 6-27
- Fig. 6-66: Interface of DP_ADDR 6-27
- Fig. 6-67: DP_ID 6-27
- Fig. 6-68: Interface of DP_ID 6-27
- Fig. 6-69: DP_SLOT 6-28
- Fig. 6-70: Interface of DP_SLOT 6-28
- Fig. 7-1: Display with four operator keys 7-1
- Fig. 7-2: Reset button and Stop LED 7-2
- Fig. 7-3: Designation of the LED 7-2
- Fig. 7-4: Overview of the default and status displays 7-3
- Fig. 7-5: Default and status displays 7-4
- Fig. 7-6: Default menu 7-5
- Fig. 7-7: Default menu 7-6
- Fig. 7-8: PLC menu 7-8
- Fig. 8-1: Equipment 8-1
- Fig. 8-2: Power data 8-1

10 Index

A

Appropriate use
Introduction 2-1
Uses 2-2

B

BmError 6-15
BMF_BUS_ERR 6-15
BMF_HW_ERR 6-15
BMF_MPS_ERR 6-15
BMF_SW_ERR 6-15
BMS_AKTIV 6-14
BMS_BMF 6-14
BMS_DPS 6-15
BMS_EXD 6-15
BMS_KSD 6-14
BMS_SD 6-14
BMS_SF 6-15
BMS_SKF 6-15
BMS_SNB 6-15
BMS_SNE 6-15
BmState 6-14
Bosch controls of the CL range 6-2
BuepE_Client 6-2
Bus master error word 6-15, 6-22
Bus master status word 6-14, 6-23

C

CL control 6-2
Classified slave diagnosis 6-17

D

Diagnostic information 6-10
Displays of the IndraLogic L40 7-3
DP_ADDR 6-27
DP_ID 6-27
DP_RDIAG 6-18
DP_RDIAG_EXT 6-19
DP_RDREC 6-20
DP_SLOT 6-28
DP_SYCFR 6-25
DP_WRREC 6-21
DPV1 services 6-10

F

fbdBaudrateGet 6-22
fbdBmErrorGet 6-22
fbdBmInfoGet 6-22
fbdBmStateGet 6-23
fbdKsdListGet 6-23
fbdPdTypeGet 6-23
fbdPrjSlaveListGet 6-24
fbdSlaveDiagListGet 6-24
Freeze 6-11
Further documentation 1-1

I

- IL_GetStateFan 6-8
- IL_GetTemp 6-8
- IL_GetTempWarning 6-9
- IL_VCP_DP 6-5
- Inappropriate use 2-2
 - Consequences, Discharge of liability 2-1
- IndraControl L40 1-1
- IndraLogic 1-1
- IndraLogic L40
 - Commissioning 4-25
 - Communication settings 4-4
 - Create a PLC program 4-24
 - Create project 4-2
 - Display 7-1
 - Download 4-25
 - Equipment 8-1
 - Field bus configuration 4-11
 - Field bus diagnosis 6-13
 - Firmware management 5-1
 - Freeze 4-18
 - Gateway server 4-4
 - Import IndraLogic Project File 5-1
 - Inline modules 4-9
 - Insert modules 4-9, 4-16
 - Insert slaves 4-13
 - Keys 7-1
 - Libraries 6-1
 - Library manager 4-23
 - Log-in 4-25
 - Module settings 4-10
 - Onboard I/O 4-7, 4-22
 - Online functions 4-25
 - Operator keys 7-1
 - PLC configuration 4-22
 - PLC Programming 4-19
 - Power Data 8-1
 - Profibus configuration 4-11
 - Project explorer 4-2
 - Projecting and Programming 4-1
 - Reset button 7-2
 - Slave Diagnosis 6-11
 - Stop LED 7-2
 - Sync 4-18
 - Synchronize drives 4-18
 - Target settings 4-20
 - Task configuration 4-21
 - Technical data 8-1
- IndraWorks 1-1
- IndraWorks HMI 1-1

K

- KSD 6-17

P

- PDT_NONE 6-14, 6-23
- PDT_PCI_BMCAN 6-14, 6-23
- PDT_PCI_BMDP 6-14, 6-23
- PDT_PCI_BMIBS 6-14, 6-23
- Profibus
 - Diagnostic information 6-10
 - Master 6-10
 - Sync and freeze 6-11

R

RIL_L40_Util 6-8
RIL_ProfibusDP 6-10

S

Safety Instructions for Electric Drives and Controls 3-1
Small operator terminals 6-5
Sync 6-11
System overview 1-1

T

Target Manager 1-1
Target Support Package 1-1
Target system files 1-1
tFBD_BIT_LIST 6-16
tFBD_BM_INFO 6-14
tFBD_KSD_LIST 6-16
TSP 1-1

U

Use *See appropriate use and inappropriate use*

V

VCP_PBS16_A4096 6-5
VCP_PBS32_A4096 6-6
VCP_PBS32_A65536 6-7
VI Composer 6-5, 6-6, 6-7

W

WinStudio 1-1

11 Service & Support

11.1 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:
über Service Call Entry Center
- via Service Call Entry Center **+49 (0) 9352 40 50 60**
Mo-Fr 07:00-18:00
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

11.2 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**

11.3 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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- offices providing service

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

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

11.4 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.

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