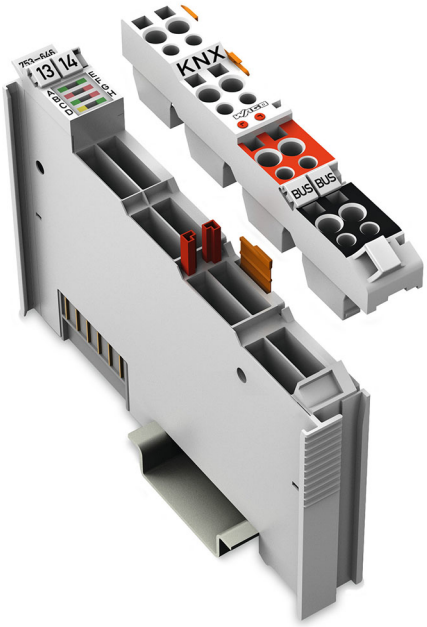
WAGO I/O System 750/753

KNX/EIB/TP1 Interface

753-646



Product manual | Version 2.0.0

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Every conceivable measure has been taken to ensure the accuracy and completeness of this documentation. However, as errors can never be fully excluded, we always appreciate any information or suggestions for improving the documentation.

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Table of Contents

Provisions

1.1 Scope of Applicability

This document applies to the following product:

753-646 (KNX/EIB/TP1 Modules) KNX/EIB/TP1 Interface.

Product detail page	www.wago.com/753-646

ⓘ Note

Note applicable documents!

The complete operating instructions for the product consists of several documents. The product must only be installed and operated in accordance with the complete operating instructions. Knowledge of the entire operating instructions is required for proper use. You can find all documents and information on the detailed product page.

Applicable document

📖 System Manual I/O System 750/753

- Provisions
- Safety
- Transport and Storage
- Assembly and Disassembly
- Conductor Termination
- Decommissioning

Overview

The 753-646 KNX/EIB/TP1 Interface, also knows as a KNX module, provides the integration of 2-wire TP1 networks or individual KNX devices into all WAGO fieldbus controllers relevant for building automation.

The KNX module supports two different functions or operating modes. A fieldbus controller sets each operating mode; the user cannot configure operating modes:

- **Device mode**
  In the “Device” operating mode, the KNX module allows all programmable fieldbus controllers relevant for building automation to be connected to a KNX/TP1 network. In a KNX network, the KNX module appears as a standard KNX device and is linked via ETS 3 Professional Commissioning Tool. The KNX module supports a maximum of 253 communication objects with any DPTs, 254 group addresses and 254 associations. The application is programmed via WAGO I/O *PRO* Software. An ETS plug-in, which is included in the WAGO product database, is required so that the data from the application program can be allocated to the group addresses.
- **Router mode**
  On a KNX IP controller (Item No.: 750-889) the **first** KNX module of a fieldbus node always works in the “Router” operating mode; all other KNX modules in the “Device” operating mode. In the router function, the KNXnet/IP routing and tunneling protocols are used.

When using other WAGO fieldbus controllers, the KNX module only works in the “Device” operating mode; gateway functionalities to other fieldbuses such as LON, PROFIBUS, etc. can be implemented.

The KNX module cannot be used on couplers.

The fieldbus controller and the KNX module are coupled via the local bus.
The KNX module has four connections for the bus line for connecting the KNX bus.

The KNX module has two programming button connections for parameterization in the “Device” operating mode. Actuation of the buttons is requested by the engineering tool software (ETS) during startup of the KNX module. And, together with the WAGO-specific ETS plug-in, this software is used for activating and configuring KNX devices. ETS 6 is supported in compatibility mode in Firmware 05 or higher.
In the “Router” operating mode, you can also enable the programing mode using a programming button on the KNX IP controller.

8 colored indicators on the housing of the I/O module signal active and inactive operating modes, data transfer via KNX and the local bus, the presence of a KNX bus voltage as well as internal states or error states of the KNX module.

WAGO's 753 Series Pluggable Connector with internally bridged contacts (3/7 and 4/8) is included with the delivery.

Properties

> **Note**
>
> **Read system manual!**
>
> You can find cross-product information on the topic of System Features in the
> 🕮 **System Manual I/O System 750/753**.

3.1 View

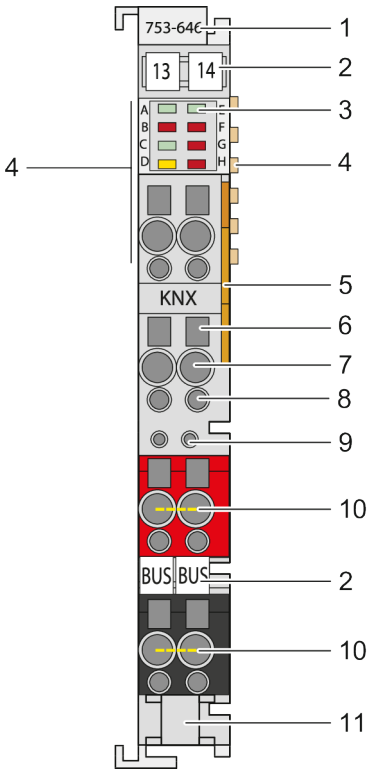

Figure 1: View

1	Item number	**Scope of Applicability [▶ 4]**
2	Marking possibility with Mini-WSB (optional)	---
3	Indicators	**Indicators [▶ 7]** and **Diagnostics via Indicators [▶ 23]**
4	Data contacts	🕮 **System Manual I/O System 750/753**
5	Release tab	🕮 **System Manual I/O System 750/753**
6	Access to open the associated CAGE CLAMP® connection	🕮 **System Manual I/O System 750/753**
7	CAGE CLAMP® connection	**Wiring Interface [▶ 8]** and 🕮 **System Manual I/O System 750/753**
8	Test slot for associated CAGE CLAMP® connection	🕮 **System Manual I/O System 750/753**
9	Coding option via coding keys	🕮 **System Manual I/O System 750/753**
10	Internal bridge in plug	**Wiring Interface [▶ 8]**

11	Fastening tab for cable ties	🕮 System Manual I/O System 750/753

3.2 Indicators

8 colored indicators on the housing of the I/O module signal active and inactive operating modes, data transfer via KNX and the local bus, the presence of a KNX bus voltage as well as internal states or error states of the KNX module.

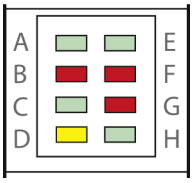

Figure 2: Indicators

LED	Designation	Function
A	Router Mode	Status indicator for “Router” operating mode
B	KNX programming mode	Status indicator for Programming mode
C	Data transfer local bus	Status indicator for data transfer (local bus)
D	Data transfer KNX	Status indicator for data transfer (KNX)
E	Device Mode	Status indicator for “Device” operating mode
F	Buffer overflow	Status indicator for buffer
G	Internal error	Error indicator
H	KNX bus voltage	Status indicator for bus voltage

The meaning of the status indications is described section **Diagnostics via Indicators [▶ 23]**.

3.3 Wiring Interface

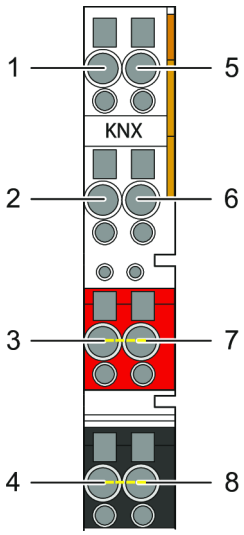

Figure 3: CAGE CLAMP® Connections

Termination	Designation	Function
1	--	*not assigned*
2	Programming button connection	Connection option for programming button (see **Control Elements [▶ 9]**).
3	+KNX bus	Connection of the KNX line “+” Note: Internal bridge between connection 3 and 7 because the bus lines must not be interrupted when loosening the cabling.
4	−KNX bus	Connection of the KNX line “–” Note: Internal bridge between connection 4 and 8 because the bus lines must not be interrupted when loosening the cabling.
5	--	*not assigned*
6	Programming button connection	Connection option for programming button (see **Control Elements [▶ 9]**).
7	+KNX bus	Connection of the KNX line “+” Note: Internal bridge between connection 3 and 7 because the bus lines must not be interrupted when loosening the cabling.
8	−KNX bus	Connection of the KNX line “–” Note: Internal bridge between connection 4 and 8 because the bus lines must not be interrupted when loosening the cabling.

NOTICE

Only use a KNX plug on 753-646 KNX/EIB/TP1 interface!

The KNX plug is intended exclusively for the KNX/EIB/TP1 interface (Item No.: 753-646), as the plug is bridged internally between the two KNX bus lines “+” and the two “–” KNX bus lines. If the plug is operated on a different I/O module, a short circuit may occur.

3.4 Control Elements

The I/O module has two programming button connections to configure the KNX module in Device mode:

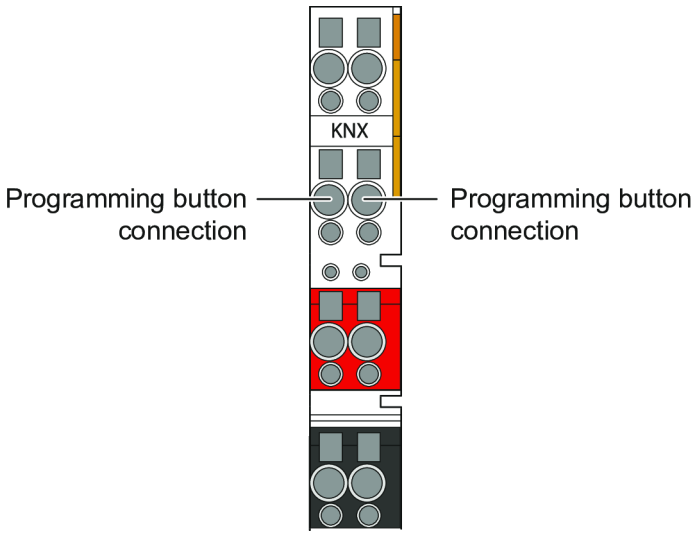

Figure 4: Programming Button Connections

Actuation of the buttons is requested by the engineering tool software (ETS) during startup of the I/O module.

If a temporary electrical connection is established between these two programming connections (CAGE CLAMP® Connections 2 and 6) (e.g., via a jumper wire), which activities the programming mode.

3.5 Circuit Diagram

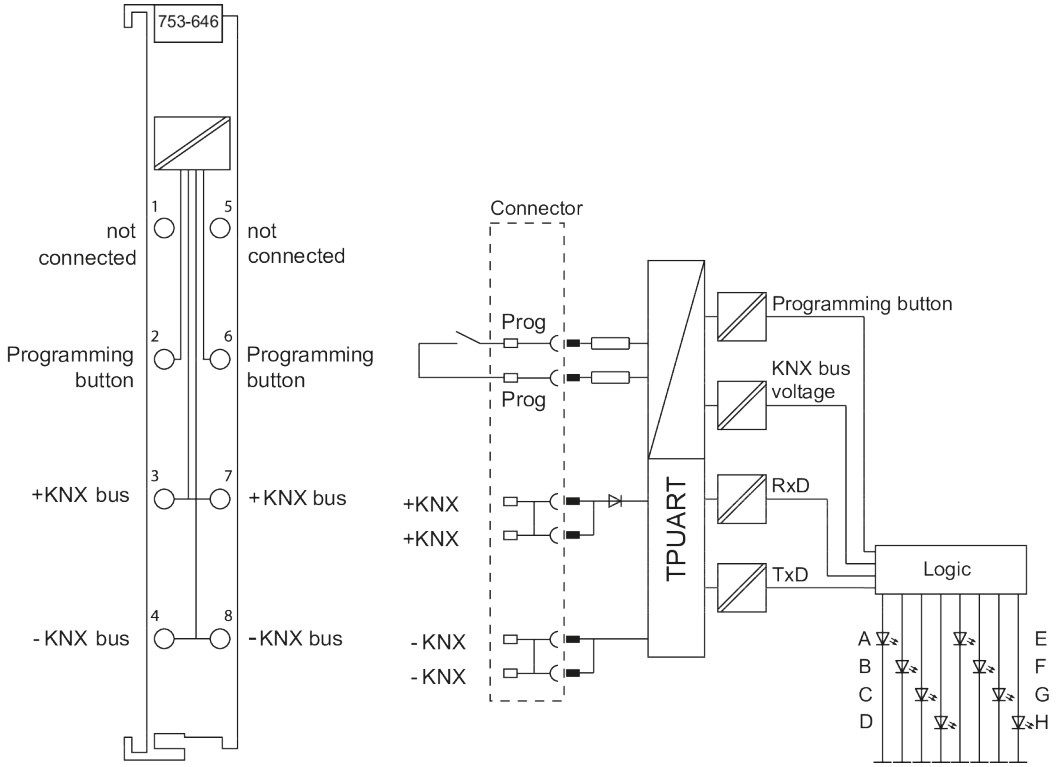

Figure 5: Circuit Diagram

For information on the system power supply, please see 🕮 **System Manual I/O System 750/753**

Functions

4.1 Operating Modes

4.1.1 Device Mode

If the KNX module is operated in the “Device” operating mode, KNX telegrams are exchanged between the KNX module and IEC 61131-3 application. Special function blocks are required for communication between the IEC and the KNX application programs, creating the interface between the KNX objects and the application variables. One master function block processes the protocol to be used for communication with the corresponding I/O module via the local bus. The function blocks are made available in a library.

The KNX module supports acyclic services and acknowledgments. In addition, opcodes are used as write and read commands for data and to trigger certain functions. With the opcodes defining the structure and content of the data bytes via their value.

The data transfer via the KNX module is bidirectional via confirmed services with integrated flow control. Because KNX is a multi-master system, not only are commands passed on from the fieldbus controller to the I/O module, but also sent actively and internally from the I/O module to the fieldbus controller. This is the case, for example, when the event of a button connected to the KNX module is sent internally via the local bus to the PFC application of the fieldbus controller.

4.1.1.1 Using the KNX/EIB/TP1 Interface on Programmable Fieldbus Controller

The function blocks provide the interface between the KNX communication objects of the KNX module and IEC application.

The data formats of the function blocks are represented by data point types (DPT's). A DPT_SWITCH function module (1 bit format) may be used for, e.g., switch objects (on/off). For each DPT a separate function block is available. This enables not only the scaling, but also the individual input and output of the DPT datasets. Depending on the application, these modules may be used in the IEC application. The WAGO ETS plug-in filters the addresses of these function blocks from the SYM_XML file generated by the WAGO-I/O-PRO. Thus, an assignment between KNX group addresses and DPT function blocks can be created in the ETS plug-in.

There is a master function block in the library that controls communication between the KNX module and IEC application. The data of the previously mentioned DPT modules are processed here.

4.1.1.2 Interworking Datapoint Types

The KNX module supports the following EIB data widths:

- 1 … 7 bit
- 1 … 4 bytes
- 6 bytes
- 8 bytes
- 10 bytes
- 14 bytes

Additional information about “Interworking Datapoint Types” can be found at www.konnex.org.

4.1.1.3 Data Exchange between KNX/EIB/TP1 Interface and IEC Application

The KNX module and IEC application differ in their communication method. To ensure data exchange, the KNX module must be configured.

In the IEC application, special function blocks are created for the KNX communication and their variables are imported in the KNX configuration tool ETS. Using this tool, KNX group addresses and application variables are connected and loaded into the I/O module as a mapping table. This configures the IEC application and KNX module/TP1 network for common communication.

4.1.2 Router Mode

If the KNX module is operated as the **first** I/O module of this type on the KNX IP controller (Item No.: 750-889), it works in the “Router” operating mode. In this way, data can be exchanged between the TP1 network of the KNX module and the IP network of the fieldbus controller. Thus, even devices of different TP1 networks can communicate with each other if they are connected via an IP backbone.

On a KNX IP controller, the **first** plugged-in KNX module is automatically set to Router mode. It does not matter how many other analog, digital and complex I/O modules you have previously plugged in. An IEC application is not required for this routing function.

KNX IP controller and KNX module are designated as the **KNXnet/IP Router**. As such, they can be used as line couplers or backbone couplers and as an interface between the IP and TP1 networks.

The KNXnet/IP router uses the KNXnet/IP routing and tunneling protocols:

- The **KNXnet/IP Routing Protocol** enables KNX telegrams to be passed from one TP1 IP sub-network to one or more additional sub-networks of the same project over an IP network. The router can be used as a line or backbone coupler.
- The **KNX IP Tunneling Protocol** provides the configuration “Engineering Tool Software” (ETS) with IP network access; this enables connectivity, even over long distances such as the Internet.

The KNXnet/IP router requires an IP address for communication via the IP network. This IP address can be assigned automatically via a DHCP service or manually in the ETS. ETS 6 is supported in compatibility mode in Firmware 05 or higher.

In the “Router” operating mode, the KNX module requires information about the physical addresses of the KNXnet/IP router and tunneling server, the filter table for forwarding telegrams and some basic routing parameters. This configuration data is primarily kept in the KNX IP controller. During initialization of the KNXnet/IP router, this data is transferred

from the fieldbus controller to the KNX module. After each access to the configuration data, router operation is stopped and the configuration in the KNX module is compared. Due to the large scope of the configuration data, this may take some time, during which the router will not be in operation.

Router mode is enabled as soon as the KNX IP controller is supplied with power. Only the configuration and downloading of the filter table to the router must be carried out via the ETS and WAGO ETS plug-in.

During initial commissioning, a node can be set up completely with all required I/O modules. If a KNX module is available, the KNX IP controller and I/O module can be used as routers immediately after the I/O module configuration – even without the IEC application. Only in a later step is the IEC application programmed for communication with any I/O modules that may be plugged in later.

4.1.2.1 Network Structure

In a conventional two-wire TP1 network (see figure), a distinction is made between backbone, ranges and lines. Up to 15 ranges can be coupled at a KNX backbone using backbone couplers. Each of these ranges, in turn, is broken down into a maximum of 15 lines that are connected to the range line via line couplers. Lines can accommodate up to 64 subscribers (see Konnex Standard 3/1/1).

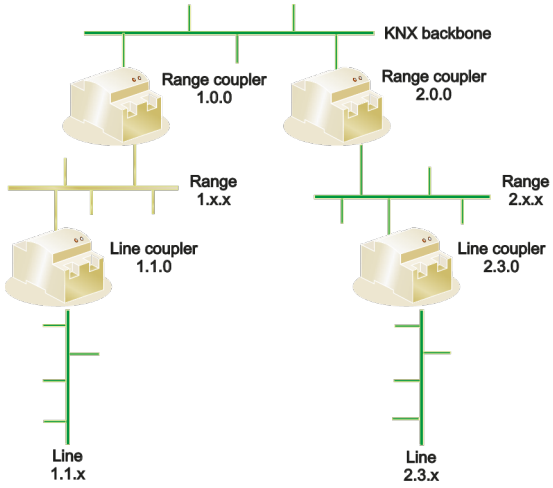

Figure 6: Traditional TP1 Network

Because there can be significant data traffic on the KNX backbone (range line) and the transmission speed for twisted pair lines is a maximum of 9,600 baud, it makes sense to flatten the network topology and replace the KNX backbone with an IP backbone. Doing so makes much higher transmission speeds possible.

4.1.2.1.1 KNXnet/IP Router as Backbone Coupler

If the KNXnet/IP router is used as backbone coupler, lines and main lines are structured in the usual way. Instead of a backbone coupler, the KNXnet/IP router is now employed which uses the IP network as a range line.

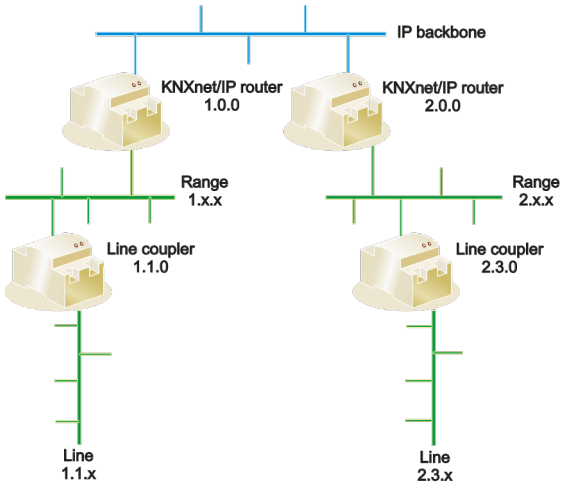

Figure 7: KNXnet/IP Router as Backbone Coupler

Using a KNXnet/IP router as an backbone coupler enables transmission speeds of up to 100 Mbit/s in the IP backbone. The number of ranges that can be created in the ETS is limited to 15.

4.1.2.1.2 KNXnet/IP Router as Line Coupler

The KNXnet/IP router acts as a link between the IP backbone and the lines when it is used as a line coupler.

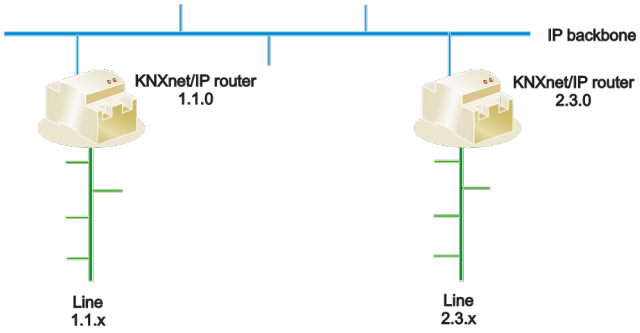

Figure 8: KNXnet/IP Router as Line Coupler

The number of lines that can be created in the ETS is limited to 15 per range (backbone).

4.1.2.1.3 KNXnet/IP Router in a Mixed Topology

If required, routers can also be used as range and line couplers together in a network. In this example, the KNXnet/IP router with the physical address 1.1.0 fulfills the function of a line coupler, while the KNXnet/IP router with the physical address 2.0.0 corresponds to an backbone coupler.

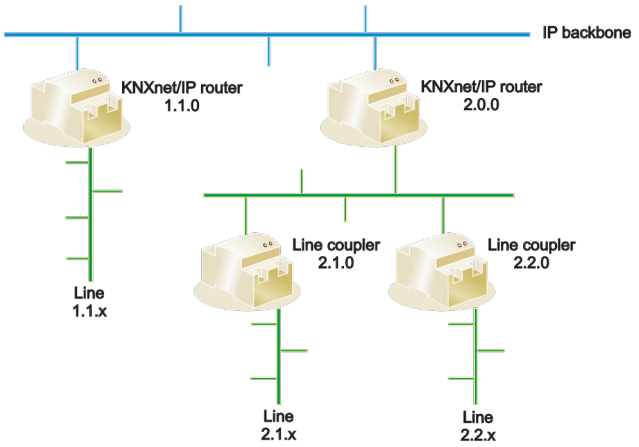

Figure 9: KNXnet/IP Router in a Mixed Topology

A backbone coupler is not possible below a KNXnet/IP router, i.e., if a line is connected directly to the IP backbone via a KNXnet/IP router, there must be no backbone coupler for the area of this line. In the topology of the example figure, no backbone coupler with the address 1.0.0 is possible on the IP backbone.

4.1.2.2 Installation Instructions

- **Commissioning and configuration via KNX IP controller!**
  Commissioning and configuration of the KNX/EIB/TP1 interface in Router mode is carried out using the KNX IP controller (Item No.: 750-889).
- **Use tunneling address from router line!**
  Use an address from the line in which the router is located as the tunneling address (e.g., router 1.1.0, tunneling 1.1.250).
- **IEC application not required for routing!**
  No IEC application is required in the fieldbus controller for the routing function. You only have to configure using the ETS. The IEC application cannot access the KNX module directly, since the telegrams are tunneled and forwarded transparently via the first KNX module to any subsequent I/O modules.
- **When a KNX backbone coupler is used, a KNX line coupler must not be used in that area!** Backbone couplers have the physical address x.0.0 and line couplers the address x.y.0, where x and y can have the values 1 to 15. If the KNXnet/IP router is used as backbone coupler (e.g., 1.0.0), no other KNXnet/IP router may be used as a line coupler (e.g., 1.3.0) in this area.

4.2 Process Image

The KNX module provides the fieldbus controller with a 24-byte input and output process image via a logical channel. 2 status bytes and 2 control bytes are used to control the data flow. The byte length of purely KNX telegrams can vary between 7 bytes and 64 bytes. The typical length is 7 to 24 bytes. Local bus communication provides a maximum of 24 bytes per local bus telegram, of which 18 bytes can be used for KNX telegrams.

4.2.1 Device Mode

In the “Device” operating mode, KNX data is accessed via special function blocks of the IEC application. Configuration using the ETS engineering tool software is not required for KNX.

4.2.2 Router Mode

A maximum of 18 bytes can be used for KNX telegrams per local bus telegram. If KNX telegrams are larger than 18 bytes, the KNX bus messages must be split. The KNX IP controller handles splitting internally. The local bus telegrams that belong together are sent in sequence. This applies to the direction from the fieldbus controller to the KNX module and vice versa.

Access to the process image is not possible in “Router” operating mode. Telegrams can only be tunneled.

Planning

Note

Read system manual!

You can find cross-product information on the topic of Planning in the System Manual I/O System 750/753.

5.1 Compatibility

Not all fieldbus controllers are currently supported with the KNX/EIB/TP1 interface (753-646).
The KNX/EIB/TP1 interface is **NOT** functional on the following fieldbus controllers:

- INTERBUS Controller (750-804)
- DeviceNet Controller (750-806)
- MODBUS Controller (750-812, -814, -815, -816)

The KNX/EIB/TP1 interface cannot be used on fieldbus couplers.

5.2 Requirements for Wiring and Accessories

The I/O module has no power jumper contacts. If necessary, use a supply module (e.g., item no.: 750-612) for the field supply to subsequent I/O modules.

The KNX module does not have its own KNX power supply. Hence, the connection of a separate KNX supply module is required.

According to the KNX Association, a standard MSR line (e.g., PYCYM 2×2×0.8) or a telecommunications line (e.g., J-Y(St)Y 2×2×0.8) is recommended for the KNX bus line. The red and black strands are used for this. The bus line is installed in free topology. Ring topologies may not be created.
Because the cable length of a bus line is limited and the maximum cable lengths between bus devices must not be exceeded, general KNX guidelines must be observed.

In connection with the KNX IP controller (Item No: 750-889), the I/O module because a complete KNXnet/IP router that allows direct access from the IP network to a KNX/TP1 network and vice versa.

5.3 Aids

WAGO-I/O-*PRO*

To install the KNX module on a programmable fieldbus controller, you need the WAGO-I/O-*PRO* software to program the function blocks. You can find the function blocks to be used for WAGO-I/O-*PRO* to implement IEC-KNX communication at www.wago.com.

ETS

For configuration and commissioning, you need the ETS Engineering Tool Software with the WAGO product database and the WAGO ETS plug-in it contains.
ETS 6 is supported in compatibility mode with Firmware 05 or higher.
The **WAGO ETS Plug-in**, general application notes and the product manual can be found on the product detail page at **www.wago.com**.
You can download **ETS** at the KNX Association website: **www.konnex.org**

WBM

When used with the KNX IP controller (Item No.: 750-889), the router function is enabled by default. However, you have the option of disabling the router function in the web-based management system of the KNX IP controller on the “KNX” page. In this case, all plugged-in KNX modules, including the first one, are operated in the “Device” operating mode.

WAGO-I/O-*CHECK*

You can configure the I/O module using the WAGO-I/O-*CHECK* programming software. Please note, however, that telegram losses can occur when **configuring during operation**.

Commissioning

6.1 Switch On

6.1.1 Device Mode

To operate the KNX module in Device mode, a node is set up from a WAGO fieldbus controller and at least one KNX module and the power supply is switched on.

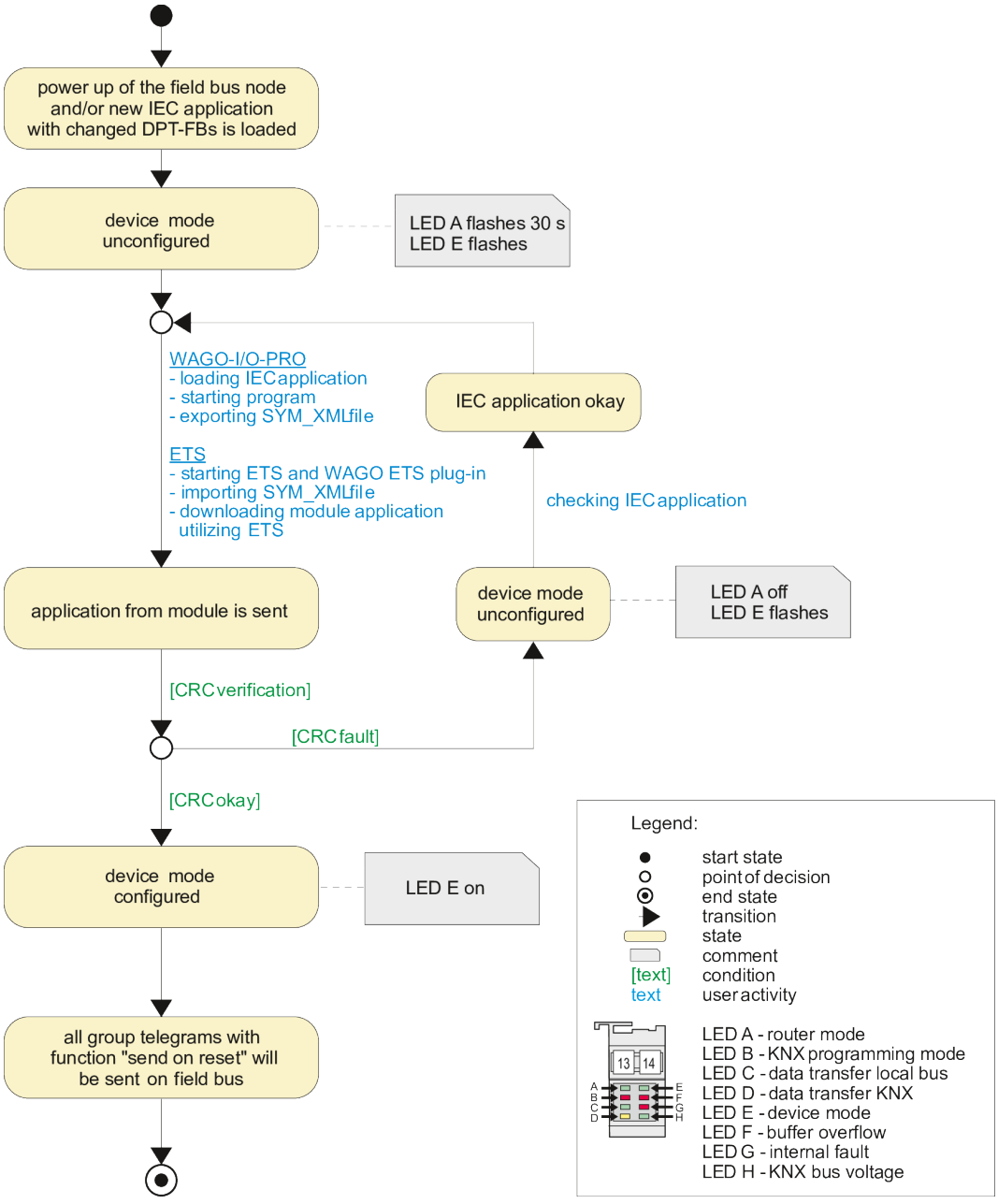

Figure 10: Startup Behavior of the KNX/EIB/TP1 Interface in Device Mode

LED A (Router mode) flashes for 30 seconds, LED E (Device mode) also flashes. The flashing signals the initialization phase of the KNX module. At this time, functions are not yet available.

An IEC program is loaded into the fieldbus controller so that the KNX module can communicate with other subscribers in the network. In this program, function blocks are created that are required for I/O module communication. All relevant variables will be exported as network variables as a SYM_XML file from the finished program.

The SYM_XML file with the IEC network variables is imported with the ETS configuration software and WAGO's own ETS plug-in.
The imported network variables must be linked to KNX group addresses and loaded into the I/O module as a mapping table. Telegrams are sent in the KNX net via the KNX group addresses.
A checksum (CRC) is created within the controller. A fault-free download and successful CRC check are indicated by a permanently green LED E. If LED E continues to flash, the IEC application must be checked.

If the KNX module has been configured and switched to Device mode, the group telegrams are sent via the bus to which the “Send at reset” function was previously assigned in the ETS. In this process, a delay is maintained between two sequential telegrams. This delay can be set via the ETS.

The KNX module is now ready for operation so that communication can take place between the IEC application and the KNX module and via the I/O module to connected TP1 networks.

This startup behavior is also evident when the bus node is already running but the IEC application has been modified.

6.1.2 Router Mode

To operate the KNX module in Router mode, a node is set up from a WAGO KNX IP controller and at least 1 KNX module and the power supply is switched on.

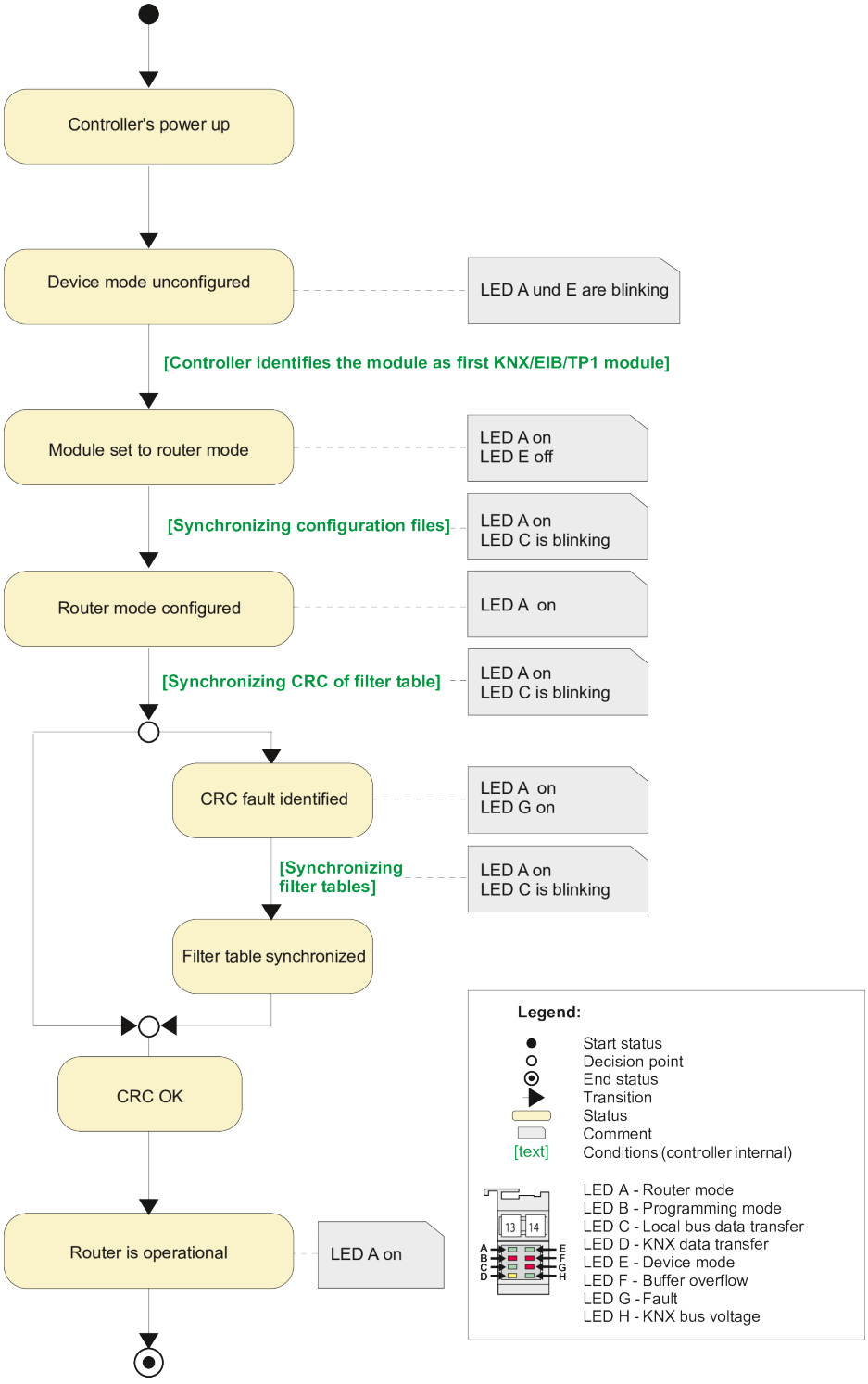

Figure 11: Startup Behavior of the KNX/EIB/TP1 Interface in Router Mode

LED A (Router mode) and LED E (Device mode) flash. The flashing signals the initialization phase of the KNX module. At this time, functions are not yet available.

During the initialization phase, the fieldbus controller recognizes the first plugged-in KNX module and enables the Router function in the I/O module.
LED A (Router mode) lights up continuously and LED E (Device mode) goes out.
No IEC program is required in the fieldbus controller for the router functionality. You only have to load the router configuration into the router via the ETS plug-in.

A checksum (CRC) is generated internally in the controller and compared with the filter table of the KNX module. During the configuration and the CRC comparison, LED C flashes (local bus data transfer). If LED G (internal error) flashes, an error has occurred. The fieldbus controller reloads the filter table into the I/O module.

If LED G (internal error) is off and LED A (Router mode) lights up continuously, the KNX module is ready to function as a router.

Diagnostics

7.1 Diagnostics via Indicators

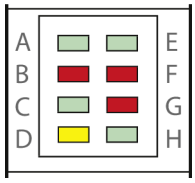

Table 1: LED A (Router mode)

Status	Possible Explanation
Off	“Router” operating mode is disabled.
Green	“Router” operating mode is enabled.
Flashing (green)	Synchronization

Table 2: LED B (KNX Programming mode)

Status	Possible Explanation
Off	KNX Programming mode is disabled.
Red	KNX Programming mode is enabled.
Flashing (red)	Checksum error

Table 3: LED C (data transfer local bus)

Status	Possible Explanation
Off	Local bus data transfer is disable.
Flashing (green)	Local bus data transfer is enabled.

Table 4: LED D (Data transfer KNX)

Status	Possible Explanation
Off	KNX data transfer is disabled.
Flashing (yellow)	KNX data transfer to own module is enabled.

Table 5: LED E (Device mode)

Status	Possible Explanation
Off	“Device” operation mode is disabled.
Green	“Device” operating mode is enabled.
Flashing (green)	Synchronization

Table 6: LED F (Buffer Overflow)

Status	Possible Explanation
Off	No buffer overflow
Red	Buffer overflow

Table 7: LED G (internal error)

Status	Possible Explanation
Off	No error
Red	Checksum error / device not configured

Table 8: LED H (KNX bus voltage)

Status	Possible Explanation
Off	No KNX bus voltage available
Green	KNX bus voltage available

Appendix

8.1 Technical Data, Approvals, Guidelines and Standards

Note

Subject to changes!

Please also observe the further product documentation! You can generate the current datasheet at any time at: www.wago.com /<item number>.

See also

Data sheet 753-646 [▶ 26]

The 753-646 KNX/EIB/TP1 Module connects to a KNX/EIB/TP1 network. This module supports two different functions:
1. Device mode: With this module, all programmable fieldbus controllers relevant for building automation can be connected to a KNX/TP1 network. In a KNX network, the module appears as a standard KNX device and is linked via ETS 3 Professional Commissioning Tool. The module supports a maximum of 253 communication objects with any DPTs, 254 group addresses and 254 associations. The application is programmed via WAGO-I/O-PRO Software. An ETS plug-in, which is included in the WAGO product database, is required so that the data from the application program can be allocated to the group addresses.
2. Router mode: When the 750-849 or 750-889 KNX IP Controller is connected to the first 753-646 KNX/EIB/TP1 Module, the device can be used as a KNXnet/IP router. The module is switched to the router mode automatically. An application program is not required for operation in router mode. Additional modules that are connected to a KNX IP Controller are addressed in device mode by the application.
WAGO's 753 Series Pluggable Connector with internally bridged contacts (3/7 and 4/8) is part of the delivery.
Both an external KNX power supply and ETS Professional Software are required to operate the KNX/EIB/TP1 Module.

Technical data

Device specification	KNX/TP1 Bus Specification: 1.0
Device-specific	Number of group addresses: 254; Number of communication objects: 253; Number of associations: 254
Current consumption (typ.)	5 mA (KNX)
Baud rate	9.6 kBd (KNX)
Data width	24 bytes
Power supply	KNX: via KNX power supply unit
Commissioning	WAGO-I/O-*PRO* V2.3
Advanced diagnostics	via FbKNX_Master_646 function block (device mode)
Supply voltage (system)	5 VDC; via data contacts
Current consumption (5 V system supply)	25 mA
Isolation	2.5 kV (rms)

Connection data

Connection technology: inputs/outputs	8 x CAGE CLAMP®
Connection type 1	Inputs/outputs
Solid conductor	0.08 … 2.5 mm² / 28 … 14 AWG
Fine-stranded conductor	0.08 … 2.5 mm² / 28 … 14 AWG
Strip length	9 … 10 mm / 0.35 … 0.39 inches
Connection point (other) designation	Programming button; bridge 2/6

Physical data

Width	12 mm / 0.472 inches
Height	100 mm / 3.937 inches
Depth	69 mm / 2.717 inches
Depth from upper-edge of DIN-rail	61.8 mm / 2.433 inches

Continued on next page

Mechanical Data

Mounting type	DIN-35 rail
Pluggable connector	pluggable

Material Data

Color	light gray
Housing material	Polycarbonate; polyamide 6.6
Fire load	1.031 MJ
Weight	55.9 g
Conformity marking	CE

Environmental requirements

Ambient temperature (operation)	0 … +55 °C
Surrounding air temperature (storage)	-25 … +85 °C
Protection type	IP20
Pollution degree (5)	2 per IEC 61131-2
Operating altitude	0 … 2000 m / 0 … 6562 ft
Mounting position	horizontal (standing/lying); vertical
Relative humidity (without condensation)	95 %
Vibration resistance	4g per IEC 60068-2-6
Shock resistance	15g per IEC 60068-2-27
EMC immunity to interference	per EN 61000-6-2, marine applications
EMC emission of interference	per EN 61000-6-3, marine applications
Exposure to pollutants	per IEC 60068-2-42 and IEC 60068-2-43
Permissible H_2S contaminant concentration at a relative humidity 75 %	10 ppm
Permissible SO_2 contaminant concentration at a relative humidity 75 %	25 ppm

Approvals and certificates

General approvals

Approval	Standard	Certificate name
EAC Brjansker Zertifizierungs-stelle	TP TC 020/2011	EAC RU C-DE.AM02.B.00087/19
KC National Radio Research Agency	Article 58-2, Clause 3	MSIP-REM-W43-MSM750
UL Underwriters Laboratories Inc. (ORDINARY LOCATIONS)	UL 508	E175199 Sec.1

Approvals for marine applications

Approval	Standard	Certificate name
ABS American Bureau of Shipping	-	22-2219060
BSH Bundesamt fuer Seeschifffahrt und Hydrographie	-	1104
BV Bureau Veritas S.A.	-	30389/B1 BV
DNV DNV Germany GmbH	DNV-CG-0339,Aug.2021	TAA0000194
LR Lloyds Register EMEA	-	LR22180952TA
PRS Polski Rejestr Statków	-	TE/2236/880590/19
RINA RINA Germany GmbH	-	ELE343521XG001

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