ThinkIO™ - Duo

Intel® Core™ Duo DIN Rail PC

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Supplementary
Hardware Guide
-
CANopen
Fieldbus

kontron

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Chapter 1

Introduction

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1. Introduction

1.1 About This Guide

This guide supplements the ThinkIO-Duo Hardware Guide with information specific to the ThinkIO-Duo feature: CANopen Fieldbus. It is intended to be used in conjunction with the ThinkIO-Duo Hardware Guide.

1.2 ThinkIO-Duo with the CANopen Fieldbus

The ThinkIO-Duo DIN Rail PC is a part of an innovative concept to integrate high performance PC functionality and DIN Rail input/output modules to provide system integrators with a complete range of off-the-shelf solutions for industrial automation applications.

Packaged in a DIN rail mountable housing, 224 x 70 x 100 mm, the ThinkIO-Duo with the CANopen fieldbus option provides interfacing for Gigabit Ethernet, USB, serial communications, TFT/CRT display, and user definable digital I/Os.

In addition, this version of the ThinkIO-Duo can be fitted with an optionally available WAGO interface module (K-Bus) which provides direct access to the complete family of the WAGO-I/O-SYSTEM 750/753 input / output modules.

The following figures illustrate the physical layout of the ThinkIO-Duo with the CANopen fieldbus option and its interfacing capabilities.

Figure 1-1: ThinkIO-Duo with CANopen Fieldbus Option

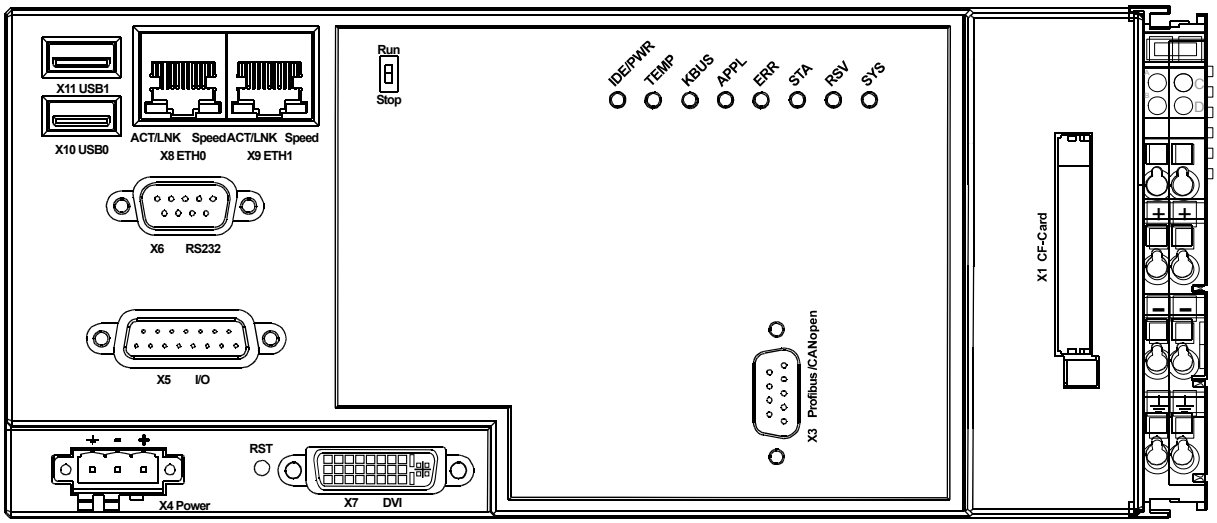
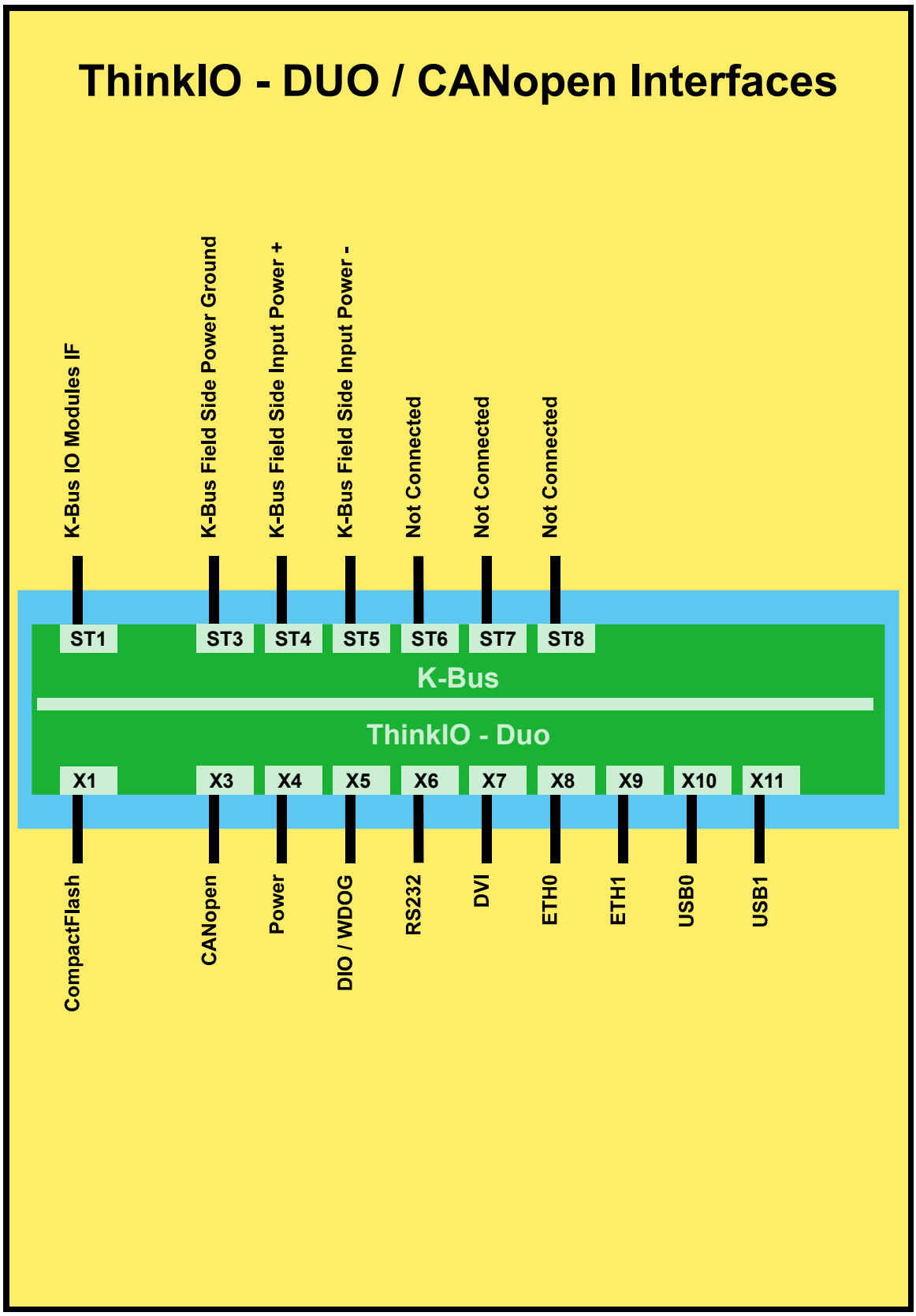


Figure 1-2: ThinkIO-Duo with CANopen Fieldbus Option Interfaces



1.3 Technical Specifications

Table 1-1: ThinkIO-Duo/CANopen Main Specifications

	DESIGNATOR	SPECIFICATIONS
CPU	CPUs	The following CPU configuration is available: • Intel® Core™ Duo processor U2500 (ULV), 1.2 GHz, 533 MHz FSB, 2 MB L2 cache
Memory	Main Memory	Up to 2 GB of soldered single/dual die DDR2 SDRAM, 533 MHz, no ECC
	Flash (BIOS)	8 Mbit Firmware Hub (FWH)
	Non-volatile RAM	256k x 16-bit MRAM
	Mass Storage	Up to 2048 MB soldered IDE Flash
ThinkIO-Duo Interfaces	Application Process and Monitor and Control	Types: - CANopen fieldbus - Gigabit Ethernet (two, 10/100/1000BASE-T, ETH0, ETH1) - PanelLink (one, DVI (TFT/CRT)) - Serial (one, RS232) - USB (two, USB 2.0, USB0, USB1) - Digital input (seven channels) - Digital output (two channels) - Watchdog (one PLC output channel with relay contacts) - CompactFlash, type I/II - Run / Stop switch - Reset switch - Operational status indicators (eight LEDs)
K-Bus (Optional)	WAGO Interface Module (K-Bus)	WAGO-I/O-SYSTEM 750/753 WAGO interface module (K-Bus) - compatible to all of WAGO's "750/753"-Series input / output modules - Form factor: W x H x L: 12 mm x 70 mm x 100 mm
	IO Modules and Field Side Power	Types: - I / O bus for WAGO-I/O-SYSTEM 750/753 input / output modules - + 5 V power bus for input / output modules - Field side power supply via power jumper contacts - Operational status indicator (one LED)

Table 1-1: ThinkIO-Duo/CANopen Main Specifications (Continued)

	DESIGNATOR	SPECIFICATIONS
General	Electrical	Main input power voltage: + 24 V DC (nominal) Main input power range: - 25% to + 30%
	Power Consumption	ThinkIO-Duo operational configuration with devices connected to both USB ports, both Ethernet ports, and the K-bus with five WAGO I/O modules installed: - 30 watts maximum @ 24 volts A maximum of 5 watts @ 5 volts is available for I/O modules via the ThinkIO-Duo. If more power is needed, (an) additional WAGO-IO-SYSTEM 750 internal power supply module(s) (750-613) must be added to satisfy power requirements. It may even be necessary to provide additional 24 VDC input power to the internal power supply module(s).
	Temperature Range	Operational: 0ºC to +55ºC Standard Storage: -25ºC to +85ºC
	Climatic Humidity	93% r.h. at 40° C, non-condensing (acc. to IEC 60068-2-78)
	Dimensions	Form factor: ThinkIO-Duo assembled with WAGO interface module (K-Bus) - W x H x L: 236 mm x 70 (65*) mm x 100 mm * from upper edge of 35 DIN rail Form factor: ThinkIO-Duo stand-alone - W x H x L: 224 mm x 70 (65*) mm x 100 mm * from upper edge of 35 DIN rail
	Weight(s)	ThinkIO-Duo/CANopen plus WAGO interface module (K-Bus): 1055 g ThinkIO-Duo/CANopen in stand-alone configuration: 1016 g

1.4 Applied Standards

The Kontron's ThinkIO-Duo DIN Rail PC complies with the requirements of the following standards:

Table 1-2: Applied Standards

COMPLIANCE	TYPE	STANDARD	REMARKS
CE	Emission	EN55022 EN61000-6-3	
	Immission	EN55024 EN61000-6-2	
	Electrical Safety	EN60950-1	The ThinkIO-Duo is specified I/O only for: SELV and EVL. It is **NOT SPECIFIED** for "Hazardous"
	PLC Product Standard	EN61131-2	EMC-Zone "A" and "B"
Mechanical	Mechanical Dimensions	EN 50022	
Environmental and Health Aspects	Vibration (Sinusoidal)	IEC60068-2-6	
	Shock	IEC60068-2-27	
	Temperature Tests A: Cold	IEC 60068-2-1	
	Temperature Tests B: Dry Heat	IEC 60068-2-2	
	Climatic Humidity	IEC60068-2-78	93% RH at 40 °C, non-condensing
	WEEE	Directive 2002/96/EC	Waste electrical and electronic equipment
	RoHS	Directive 2002/95/EC	Restriction of the use of certain hazardous substances in electrical and electronic equipment

Warning!

To satisfy CE requirements regarding ESD protection, special dust caps must be installed on connectors X3, X6, and X7 (CANopen, RS232, and DVI) when these connectors are not in use, i.e. no cable is connected. This is intended to prevent electrostatic discharging to the pins of these connectors.

Appropriate dust caps are supplied with the ThinkIO-Duo. In the event they are damaged or lost, replacement caps may be obtained by contacting Kontron.

1.5 Related Publications

Table 1-3: Related Publications

	ISSUED BY	DOCUMENT
WAGO-I/O-SYSTEM	WAGO Kontakttechnik GmbH	WAGO-I/O-SYSTEM 750 Input / Output Modules WAGO-I/O-SYSTEM 753 Input / Output Modules with Pluggable Field Wiring Internet Address: www.wago.com

Chapter 2

Interfaces

PRELIMINARY

PRELIMINARY

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2. Interfaces

The following chapters present interface information about the ThinkIO-Duo DIN Rail PC.

2.1 General Information

The ThinkIO-Duo with the CANopen fieldbus option provides the following interfaces:

- X1: a CompactFlash card, type I/II, socket
- X3: a CANopen connector
- X4: a power connector for 24 V DC main power input
- X5: a connector for digital inputs and outputs
- X6: a serial communications connector
- X7: a DVI-type, PanelLink, display connector for a TFT or CRT
- X8: a Gigabit Ethernet connector (ETH0) for a network
- X9: a Gigabit Ethernet connector (ETH1) for a network
- X10: a USB device connector (USB0)
- X11: a USB device connector (USB1)

In addition, the optional WAGO interface module (K-Bus) provides the following interfaces:

- ST1: a bus type interface for data exchange with WAGO-I/O-SYSTEM 750/753 I/O modules
- ST3: a field side power ground interface
- ST4: a field side power input interface
- ST5: a field side power input interface

Only the CANopen fieldbus interface is described in this guide. For information concerning the standard interfaces, refer to the ThinkIO-Duo Hardware Guide, ID: 36087.04.

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2.2 X3 CANopen

This fieldbus interface is optional and is exclusive of the other fieldbus interfaces available with the ThinkIO-Duo. If installed, it is the only fieldbus interface available. The connector for this interface is a 9-pin, male, D-Sub connector.

The following figure and table provide pinout information for this interface.

Figure 2-1: X3 CANopen Interface

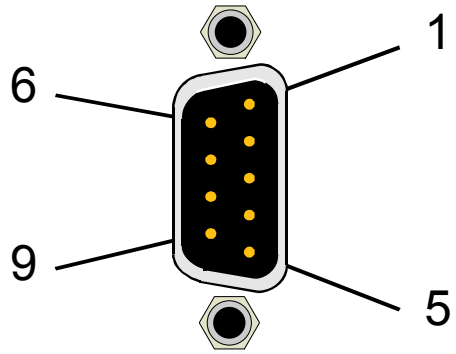

Table 2-1: X3 CANopen Interface

SIGNAL	PIN
CAN_+5V	9
NC	8
CAN+	7
NC	6
NC	5
NC	4
CAN_GND	3
CAN-	2
NC	1

WARNING!

To satisfy CE requirements regarding ESD protection, a special dust cap must be installed on this connector when it is not in use, i.e. no cable is connected. This is intended to prevent electrostatic discharging to the pins of this connector.

An appropriate dust cap is supplied with the ThinkIO-Duo. In the event it is damaged or lost, a replacement cap may be obtained by contacting Kontron Modular Computers.

PRELIMINARY

Chapter 3

Monitor and Control (M/C)

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3. Monitor and Control (M/C)

3.1 ThinkIO-Duo / CANopen LEDs

The ThinkIO-Duo has eight LEDs visible from the front of the ThinkIO-Duo for indicating various operational status information. Typical indicators are implemented along with POST code indications using the same LEDs during power-up and operation.

Only one type of LED is used for all LED ports. For maximum flexibility, a multi-color, red and green, LED is used. The architecture of this LED type permits the red and green color LEDs to be driven in parallel thus providing a kind of amber (or yellow) color.

3.2 Modes of Operation

The different modes of operation for the LED port can be grouped into:

- POST, and
- Operational

In the operation mode, the LEDs are mapped from left to right: IDE/PWR, TEMP, KBUS, APPL, ERR, STA, RSV, SYS.

In the POST mode, the first four LEDs from left to right form a 4-bit wide port to display POST codes in binary format (nibble multiplexed). The right most of these four LEDs is the least significant bit for POST code representation. POST mode is entered by default on power-up.

The POST code itself is divided into two nibbles: low = D[3...0], high = D[7...4]. Output of the low nibble is in red, the high nibble is green. Together they make up one byte of information.

For detailed information concerning the POST codes, refer to the ThinkIO-Duo BIOS Guide.

How to Read the 8-Bit POST Code

The following is an example of the status LEDs' operation if BIOS POST configuration is enabled.

Table 3-1: POST Code Example

	IDE/POWER	TEMP	KBUS	APPL	RESULT
HIGH NIBBLE	off (0)	on (1)	off (0)	off (0)	0x4
LOW NIBBLE	off (0)	off (0)	off (0)	on (1)	0x1
POST CODE					0x41

3.3 Status Indications

The following table provides an overview of the functions indicated by the various LEDs. For detailed information concerning LED operation for the K-Bus refer to the ThinkIO-Duo Hardware Guide, ID: 36087.04.

Table 3-2: ThinkIO-Duo CANopen LED Functions

INDICATOR	FUNCTION
IDE/Power	Status indication for IDE (CompactFlash) activity and main input power to the ThinkIO-Duo. Color: green; state: on steady; driven when main input power is applied and IDE is inactive. Color: red; state: on steady; driven when main input power is applied and IDE is active. The LED indication toggles between green and red when IDE activity occurs.
TEMP	Status indication of a Thermal Alarm for the CPU. Color: amber; state: on steady; driven when the CPU temperature exceeds 100°C. Color: red; state: on steady; driven when the CPU temperature exceeds 125°C.
KBUS	Operational status indication of the WAGO interface module (K-Bus) for WAGO-I/O-SYSTEM 750/753 modules. Refer to Hardware Guide for further information concerning the usage of this LED.
APPL	Free programmable User LED Color: green, red, amber; state: off, on steady, flashing
ERR	Status indication required by Fieldbus applications Color: red; state: off, on steady, flashing
STA	Status indication required by Fieldbus applications Color: amber; state: off, on steady, flashing
RSV	Reserved
SYS	Status indication required by Fieldbus applications Color: green, amber; state: off, on steady, flashing

The APPL and KBUS LEDs are also used during the pre-POST phase for displaying active RESET (APPL, red when reset active) and POWER GOOD (KBUS, red when power not good).

The following table provides detailed descriptions of the operational status LEDs for the CANopen fieldbus.

Table 3-3: CANopen - Master

LED	COLOR	STATE	DESCRIPTION
ERR	RED	OFF	No error
		ON	Device has detected a communication problem to at least one CANopen Node
STA	AMBER	OFF	Device is ready to receive or receiving telegrams
		ON	Device sends a telegram
SYS	-	OFF	Device does not have power supplied or no hardware has been detected
	AMBER	FLASHING (1 Hz/sec)	Device is in bootloader mode and is waiting for firmware download
	AMBER	FLASHING (5 Hz/sec)	Firmware download is in progress
	AMBER	FLASHING (irregularly)	Hardware or severe runtime error detected
	GREEN	ON	Communication is running, the device has established at least one configured fieldbus connection
	GREEN	FLASHING (5 Hz/sec)	No error in configuration found, communication is stopped (ERR LED red off) or ready for communication but no connection to any CANopen node (ERR LED red on)
	GREEN	FLASHING (irregularly)	Power Up: Configuration not available or faulty, device needs commissioning Runtime: Host Watchdog timeout

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