CU8860-0000

USB-Extender-Rx
(USB and DVI Extender)

Version: 0.3
Date: 2006-02-20

BECKHOFF

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1 Foreword

1.1 Notes on the documentation

This description is only intended for the use of trained specialists in control and automation engineering who are familiar with the applicable national standards. It is essential that the following notes and explanations are followed when installing and commissioning these components.

1.1.1 Liability Conditions

The responsible staff must ensure that the application or use of the products described satisfy all the requirements for safety, including all the relevant laws, regulations, guidelines and standards.

The documentation has been prepared with care. The products described are, however, constantly under development. For that reason the documentation is not in every case checked for consistency with performance data, standards or other characteristics. None of the statements of this manual represents a guarantee (Garantie) in the meaning of § 443 BGB of the German Civil Code or a statement about the contractually expected fitness for a particular purpose in the meaning of § 434 par. 1 sentence 1 BGB. In the event that it contains technical or editorial errors, we retain the right to make alterations at any time and without warning. No claims for the modification of products that have already been supplied may be made on the basis of the data, diagrams and descriptions in this documentation.

1.1.2 Conditions of delivery

Furthermore the general conditions of delivery of company Beckhoff Automation GmbH apply.

1.1.3 Copyright

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1.2 Safety Instructions

1.2.1 State at Delivery

All the components are supplied in particular hardware and software configurations appropriate for the application. Modifications to hardware or software configurations other than those described in the documentation are not permitted, and nullify the liability of Beckhoff Automation GmbH.

1.2.2 Description of safety symbols

The following safety symbols are used in this operating manual. They are intended to alert the reader to the associated safety instructions.

Danger	
⚠	This symbol is intended to highlight risks for the life or health of personnel.

Warning	
⚠	This symbol is intended to highlight risks for equipment, materials or the environment.

Note	
ⓘ	This symbol indicates information that contributes to better understanding.

2 Product Overview

2.1 Introduction

The Beckhoff USB-Extender-Rx allows to extend the limits of USB cable length. Standard USB cable are specified for cable length up to 5 meters. For some industrial applications there is need for longer distances. This box can extend the distance up to 50 meters. This box receive the externded USB signals from sending box CU8800 and convert them back to USB. It also conditions the DVI video signals. Other outstanding features are:

- User-friendly installation via mounting kit

- Optional installation via top hat rail adapter

- 24 V_{DC} supply voltage – the standard in industrial evironments

- 12 Mbit, and 1,5 Mbit support for compatibility to all USB1.1 standards

- Standard CAT5 network cable for extension

- compact industrial design

- clear quick diagnosis by separate LEDs for USB and DVI conditions

2.2 Technical Data

Product name	CU8860-0000
Number of USB type A ports (downstream)	1
Number of USB–Extender-Rx ports (RJ45)	1
Number of DVI Input ports	1
Number of DVI Output ports	1
Supported standard	DVI, USB 1.1
Supported baud rates USB	12 Mbit (Full Speed), 1,5 Mbit (Low Speed)
Supported Modes DVI	640 x 480 @ 60 Hz, 800 x 600 @ 60 Hz, 1024 x 768 @ 60 Hz, 1280 x 1024 @ 60 Hz
Status display	2 LEDs
USB wiring length (host to extender)	maximum 1 meter
USB extension wiring length	maximum 50 meters
USB wiring length (extender to hub/device)	maximum 5 meters
Power supply to USB	maximum 100 mA (without additional power supply) maximum 500 mA (with connected additional power supply)
Additional Power supply	24 V DC (-15% to +20%), protected against polarity reversal. To meet the UL requirements use 4 A fuse or class 2 power supply!
Power consumption	1,15 W
Dimensions (w x h x d)	app. 160 mm x 30 mm x 80 mm
Weight	app. 360 g
Permissible ambient temperature	0°C to +55°C (operation) -25°C to +70°C (transport/storage)
Permissible relative humidity	5% to 95%, no condensation
EMC resistance burst / ESD	EN 60000-6-2 / EN 60000-6-4
Vibration / Shock resistance	EN 60068-2-6 / EN 60068-2-27, EN 60068-2-29
Assembly	Adapter for mounting on 35 mm mounting rail conforms to EN 50022 Adapter plate for mounting on planar surfaces
Installation position	any
Protection class	IP20
Approvals	CE UL (see chapter UL requirements)

2.3 Dimensions

Model: CU8860-0000

FCC: Federal Communications Commission Radio Frequency Interference Statement

This equipment has been tested and found to comply with the limits for Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

FCC: Canadian Notice

This equipment does not exceed the Class A limits for radiated emissions as described in the Radio Interference Regulations of the Canadian Department of Communications.

Use 4 Amp. Fuse or
Class 2 Power supply
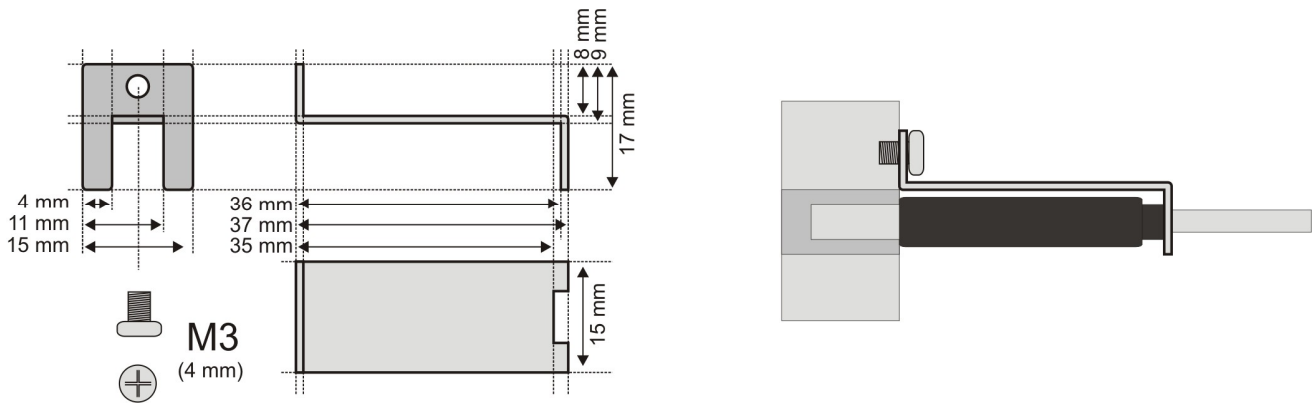
3   Installation

3.1   Installing USB cable strain relief

All plugs, connected to the unit, have an integrated stain relief, except the USB plug. To provide the USB plug from disconnecting, a bracket must be installed on the front of the unit. The bracket has the following measures:


The bracket is fixed with a screw (M3, 4 mm). The USB plug will be connected to the unit. The cable is place through the slot in the middle of the bracket. (see picture)

3.2   Mounting / Unmounting

The USB-Extender-RX CU8860-0000 can be installed in two ways. There are two versions of mounting kits to install the unit (a) onto a planar surface or (b) onto a 35 mm mounting rail that conforms to EN 50022.
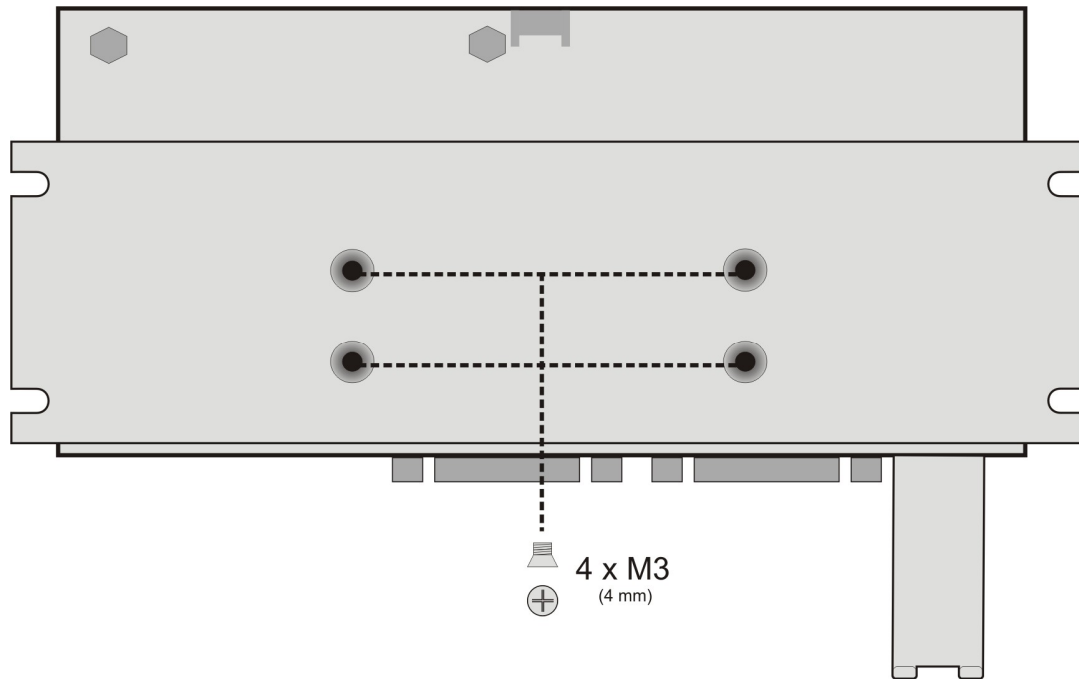
3.2.1   Mounting on a planar surface

First the installation on planar surfaces is described. The kit has the following measures:
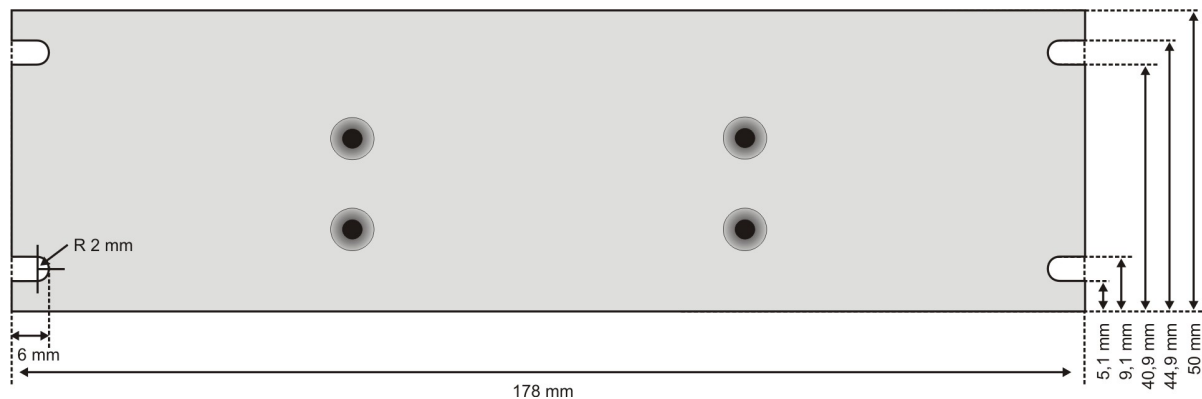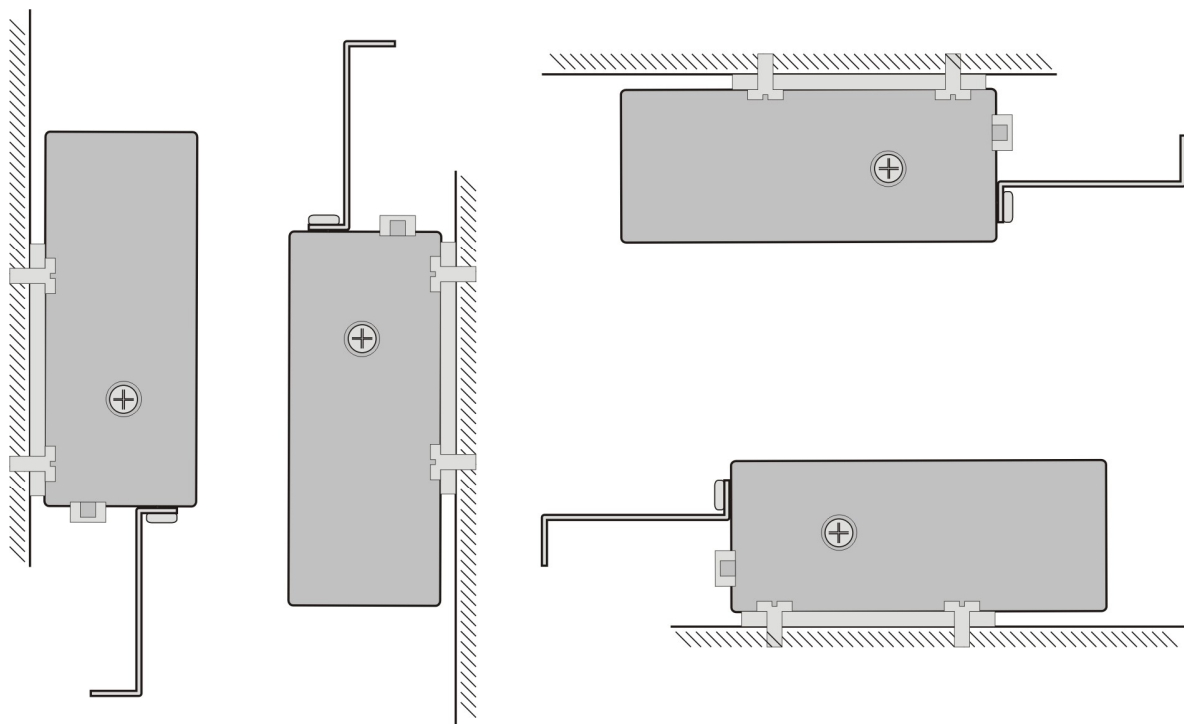
It will be fixed on the backside of the unit with four screws (4 x M3, 4 mm). The four notches can be used to fix the unit on the surface. The following picture shows how to fix the plate on the unit.


4 x M3
(4 mm)

The device has no restrictions for installation positions. The following picture shows some variations.

3.2.2   Mounting on a 35 mm mounting rail

Alternative the unit can be installed on a mounting rail. To use this installation option an adapter for the rail is needed. It can be ordered together with the unit. The adapter is fixed with four screws (M3, 4 mm). The picture shows the installation position:
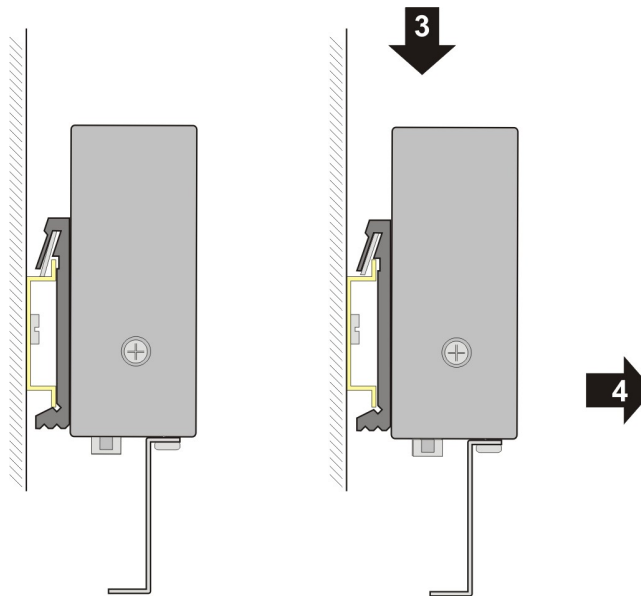
4 x M3
(4 mm)
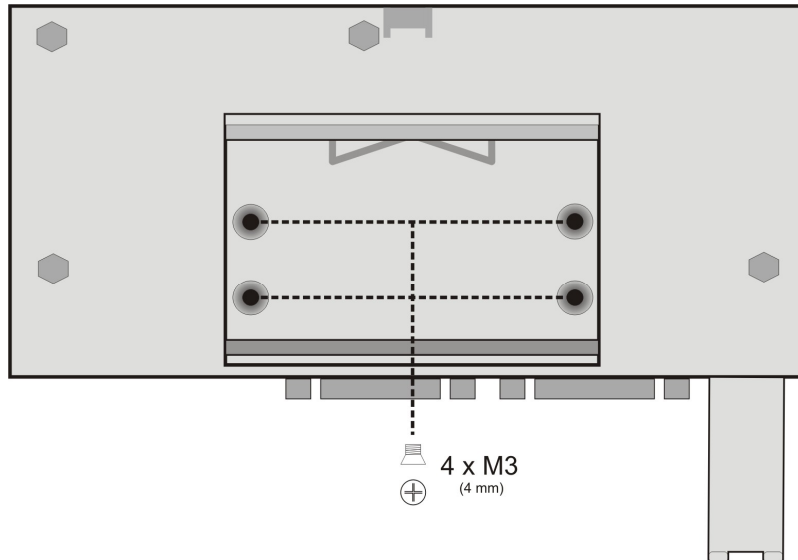
The unit is snapped onto the rail as follows:

1. Lower the backside of the installed adapter onto the rail and press it down.

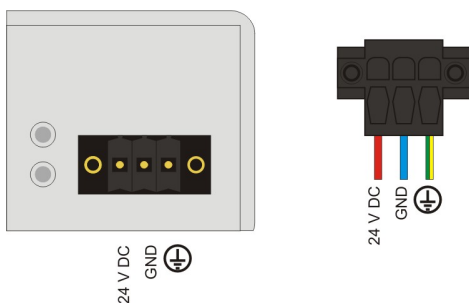2. Push the unit towards the rail until it snaps in.
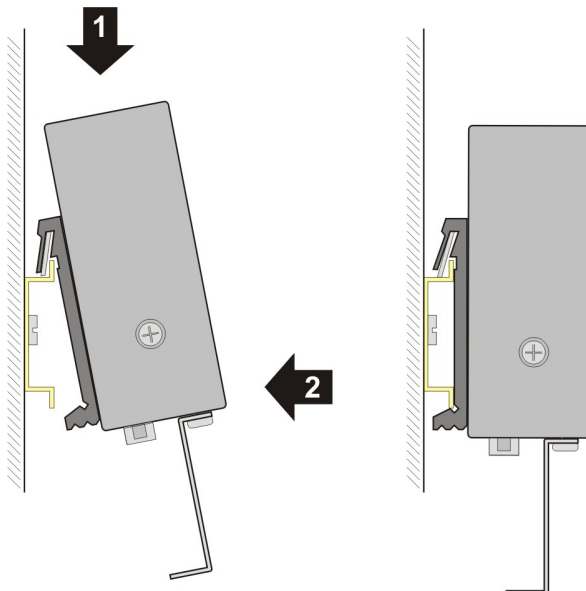
To release the CU8860-0000 from the mounting rail:

3. Press down the unit until it gets loose on the rail

4. Pull the unit from the mounting rail

3.3 Power Supply

The USB-Extender-Rx CU8860 can be powered by an additional power supply (X10). If a USB device needs more than 100 mA the additional power supply must be connected. The pins have to be connected as shown in the picture below.

3.3.1 UL requirements

Danger	
	For the compliance of the UL requirements the USB-Extender-Rx should only be supplied • by a 24 V_{DC} supply voltage, supplied by an isolating source and protected by means of a fuse (in accordance with UL248), rated maximum 4 Amp. • by a 24 V_{DC} power source, that has to satisfy NEC class 2. A class 2 power supply shall not be connected in series or parallel with another (class 2) power source!
	To meet the UL requirements, the USB hub CU8800-0000 must not be connected to unlimited power sources!

3.4   Data - Connectors

The connector are 1 USB port Type A, a RJ45-connector and 2 DVI-Sockets. The pins are described below:

USB type A Port (X50) (standard cable)

shield

1 2 3 4
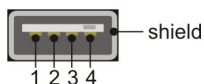
Pin	Assignment
1	VCC
2	Data -
3	Data +
4	GND
Shell	Shield

RJ 45 Port (X20) (standard CAT5 cable)

USB/E
PORT

8   1
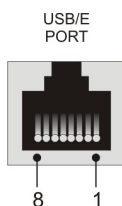
Pin	Signal	Assignment
1	15 V	15 V +
2	GND	Ground
3	TX	USB TX
4	RX	USB RX
5	RX	USB RX
6	TX	USB TX
7	15 V	15 V +
8	GND	Ground

DVI–D Port (X30 / X40)
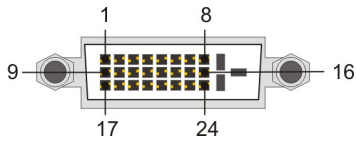
Pin	Assignment	Pin	Assignment	Pin	Assignment
1	TMDS data 2-	9	TMDS data 1-	17	TMDS data 0-
2	TMDS data 2+	10	TMDS data 1+	18	TMDS data 0+
3	TMDS data 2/4 Shield	11	TMDS data 1/3 shield	19	TMDS data 0/5 shield
4	not connected	12	not connected	20	not connected
5	not connected	13	not connected	21	not connected
6	DDC clock	14	+ 5 V Power	22	TMDS clock shield
7	DDC data	15	ground (+5 V, Analog H/V Sync)	23	TMDS clock +
8	analog vertical sync	16	hot plug detect	24	TMDS clock -

3.5 LED Diagnostics
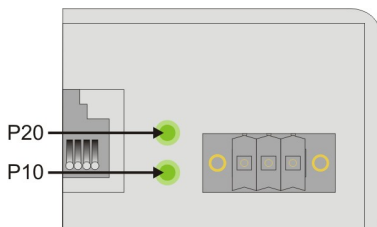
The following table shows the possible states for the LEDs:

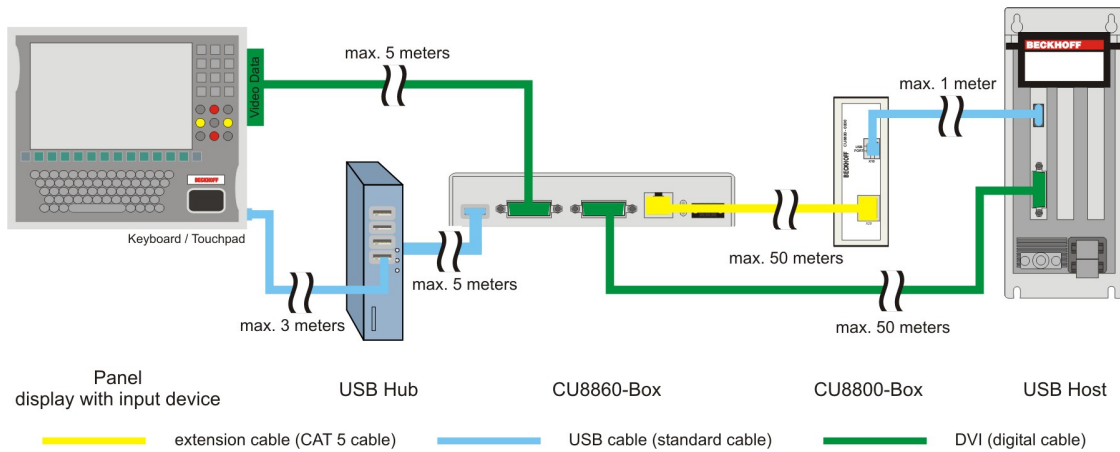| LED	Allocation	State	Meaning
P10	Power load on USB port	green	current < 500 mA
		red	current > 500 mA
P20	DVI-Link	green	DVI signal is connected (clock signal is sensed)
		red	DVI signal is not connected (No clock signal is sensed)

3.6 Architecture Description

Within the USB-Extender-TX (CU8800) and USB-Extender-RX (CU8860) the length of USB data transmission can be increased from 35 meters (1 host, 5 USB hubs and a device connected with 5 meters cable) up to 61 meters. Due to the USB signal runtime, it is not possible to connect more than one USB hub in the chain. The DVI signals are extended up to 55 meters. The following pictures show the maximal length of connection for possible configurations:

Panel display with input device		CU8860-Box	CU8800-Box	USB Host

extension cable (CAT 5 cable)   USB cable (standard cable)   DVI (digital cable)
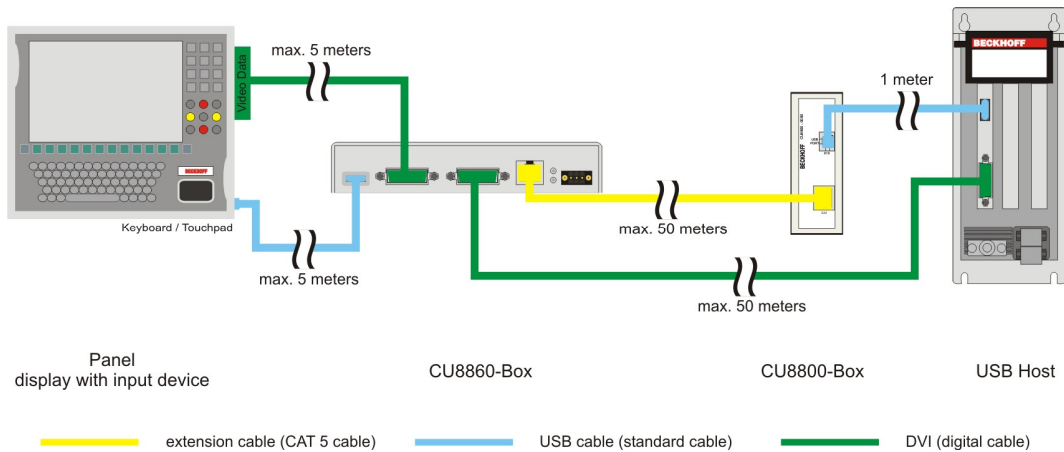
This configuration (1) contains no additional USB hub. The maximal distance of extension is 56 meters: 1 meter of cable to the extension box CU8800; up to 50 meters extension cable and 5 meters from extension box to USB device. The DVI cable can have a maximal length of 50 meters to the extension box. From there the DVI signal can be transmitted up to 5 meters.

Panel display with input device		CU8860-Box	CU8800-Box	USB Hub	USB Host

extension cable (CAT 5 cable)   USB cable (standard cable)   DVI (digital cable)
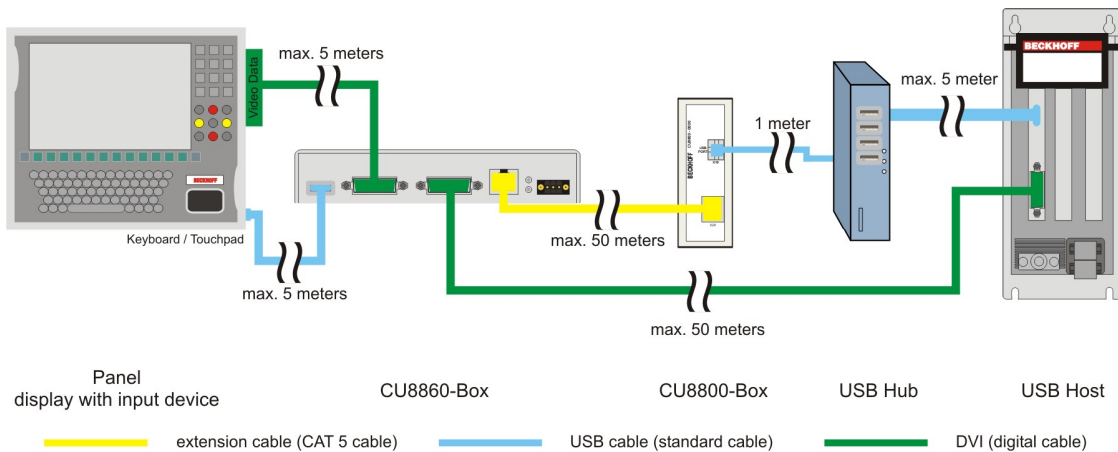
This configuration (2) contains an additional USB hub. The USB hub is connected directly to the host computer. The maximal distance of extension is 61 meters: 5 meters of cable from USB host to the USB hub; 1 meter cable to the extension box CU8800; up to 50 meters extension cable and 5 meters from extension box to USB device. The DVI Signal is also extended to maximum 55 meters. (see configuration1)

Panel display with input device	USB Hub	CU8860-Box	CU8800-Box	USB Host

extension cable (CAT 5 cable)   USB cable (standard cable)   DVI (digital cable)

The third configuration (3) has nearly the same structure than configuration 2. The USB hub is connected after the extension. Due to signal quality the maximal distance is 59 meters: 1 meter of cable from USB host to the USB extension box CU8800; up to 50 meters extension cable; 5 meters from extension box to USB hub and 3 meters of cable to the USB device. The DVI Signal is also extended to maximum 55 meters. (see configuration1)

4 Approvals for USA and Canada

4.1 FCC Approval for USA

FCC: Federal Communications Commission Radio Frequency Interference Statement
This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

4.2 FCC Approval for Canada

FCC: Canadian Notice
This equipment does not exceed the Class A limits for radiated emissions as described in the Radio Interference Regulations of the Canadian Department of Communications.

5 Appendix

5.1 Beckhoff support and service

Beckhoff and their partners around the world offer comprehensive support and service, making available fast and competent assistance with all questions related to Beckhoff products and system solutions.

5.1.1 Beckhoff support

Support offers you comprehensive technical assistance, helping you no only with the application of individual Beckhoff products, but also with other, wide-ranging services:
- world-wide support
- design, programming and commissioning of complex automation systems
- and extensive training program for Beckhoff system components

Hotline: + 49 (0) 5246/963-157
Fax: + 49 (0) 5246/963-9157
e-mail: support@beckhoff.com

5.1.2 Beckhoff service

The Beckhoff Service Center supports you in all matters of after-sales service:
- on-site service
- repair service
- spare parts service
- hotline service

Hotline: + 49 (0) 5246/963-460
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