Switch16/Com3
Switch16/Com3-F

Gigabit Ethernet Switch with integrated COM Server

Hardware Manual

to Product   A.1109.01,
                     K.0508.74

N O T E

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⚠	This manual contains important information and instructions on safe and efficient handling of the Switch16/Com3. Carefully read this manual before commencing any work and follow the instructions. The manual is a product component, please retain it for future use.

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Document History

The changes in the document listed below affect changes in the hardware as well as changes in the description of the facts, only.

Rev.	Chapter	Changes versus previous version	Date
1.0	-	First English hardware manual of Switch16/Com3 and Switch16/Com3-F	2019-03-14
1.1	5.4, 6.2, 6.3	Specification of cable for serial interface corrected: shielded asymmetrical cable, maximum 30 m	2019-03-20
1.2	6.5	Figure 13 exchanged (pin position corrected), signal description added	2023-03-09

Technical details are subject to change without further notice.

Classification of Warning Messages and Safety Instructions

This manual contains noticeable descriptions, warning messages and safety instructions, which you must follow to avoid personal injuries or death and property damage.

This is the safety alert symbol.
It is used to alert you to potential personal injury hazards. Obey all safety messages and instructions that follow this symbol to avoid possible injury or death.

DANGER, WARNING, CAUTION

Depending on the hazard level the signal words DANGER, WARNING or CAUTION are used to highlight safety instructions and warning messages. These messages may also include a warning relating to property damage.

DANGER
Danger statements indicate a hazardous situation which, if not avoided, will result in death or serious injury.

WARNING
Warning statements indicate a hazardous situation that, if not avoided, could result in death or serious injury.

CAUTION
Caution statements indicate a hazardous situation that, if not avoided, could result in minor or moderate injury.

NOTICE

Notice statements are used to notify people on hazards that could result in things other than personal injury, like property damage.

NOTICE
This NOTICE statement indicates that the device contains components sensitive to electrostatic discharge.

NOTICE
This NOTICE statement contains the general mandatory sign and gives information that must be heeded and complied with for a safe use.

INFORMATION

INFORMATION
Notes to point out something important or useful.

⚠ Safety Instructions

- When working with the Switch16/Com3 follow the instructions below and read the manual carefully to protect yourself from injury and the Switch16/Com3 from damage.
- Do not use damaged or defective cables to connect the Switch16/Com3.
- In case of damages to the device, which might affect safety, appropriate and immediate measures must be taken, that exclude an endangerment of persons and domestic animals and property.
- Current circuits which are connected to the device have to be sufficiently protected against hazardous voltage (SELV according to EN 60950-1).
- The Switch16/Com3 may only be driven by power supply current circuits, that are contact protected. A power supply, that provides a safety extra-low voltage (SELV) according to EN 60950-1, complies with this conditions.

- Do not open the housing of the Switch16/Com3.
- The Switch16/Com3 has to be securely installed before commissioning.
- The permitted operating position is specified as mounted on the top hat rail or optionally as desktop unit. Other operating positions are not allowed.
- Never let liquids get inside the Switch16/Com3. Otherwise, electric shocks or short circuits may result.
- Protect the Switch16/Com3 from dust, moisture and steam.
- Protect the Switch16/Com3 from shocks and vibrations.
- The Switch16/Com3 may become warm during normal use. Always allow adequate ventilation around the Switch16/Com3 and use care when handling.
- Do not operate the Switch16/Com3 adjacent to heat sources and do not expose it to unnecessary thermal radiation. Ensure an ambient temperature as specified in the technical data.

⚠ **DANGER**
Hazardous Voltage - **Risk of electric shock** due to unintentional contact with uninsulated live parts with high voltages inside of the system into which the Switch16/Com3 is to be integrated.

→ All current circuits which are connected to the device have to be sufficiently protected against hazardous voltage (SELV according to EN 60950-1) before you start with the installation.
→ Ensure the absence of voltage before starting any electrical work!

NOTICE
Electrostatic discharges may cause damage to electronic components.
To avoid this discharge the static electricity from your body *before* you open the Switch16/Com3.

Qualified Personnel
This documentation is directed exclusively towards personnel qualified in control and automation engineering. The installation and commissioning of the product may only be carried out by qualified personnel, which is authorized to put devices, systems and electric circuits into operation according to the applicable national standards of safety engineering.

Conformity
The Switch16/Com3 is an industrial product and meets the demands of the EU regulations and EMC standards printed in the conformity declaration at the end of this manual.

Warning: In a residential, commercial or light industrial environment the Switch16/Com3 may cause radio interferences in which case the user may be required to take adequate measures.

Data Safety

This device is equipped with an Ethernet or other interface which is suitable to establish a connection to data networks. Depending on the software used on the device, these interfaces may allow attackers to compromise normal function, get illegal access or cause damage.

esd does not take responsibility for any damage caused by the device if operated at any networks. It is the responsibility of the device's user to take care that necessary safety precautions for the device's network interface are in place.

Intended Use

The intended use of the Switch16/Com3 is the operation as managed Gigabit Ethernet switch with integrated COM server. The guarantee given by esd does not cover damages which result from improper use, usage not in accordance with regulations or disregard of safety instructions and warnings.

- The Switch16/Com3 is intended for indoor use only.
- The operation of the Switch16/Com3 in hazardous areas, or areas exposed to potentially explosive materials is not permitted.
- The operation of the Switch16/Com3 for medical purposes is prohibited.

Service Note

The Switch16/Com3 does not contain any parts that require maintenance by the user. The Switch16/Com3 does not require any manual configuration of the hardware except the configuration of the jumper J1900. Unauthorized intervention in the device voids warranty claims.

Disposal

Devices which have become defective in the long run have to be disposed in an appropriate way or have to be returned to the manufacturer for proper disposal. Please, make a contribution to environmental protection.

Typographical Conventions

Throughout this manual the following typographical conventions are used to distinguish technical terms.

Convention	Example
File and path names	`/dev/null` or `<stdio.h>`
Function names	*open()*
Programming constants	`NULL`
Programming data types	`uint32_t`
Variable names	*Count*

Number Representation

All numbers in this document are base 10 unless designated otherwise. Hexadecimal numbers have a prefix of 0x, and binary numbers have a prefix of 0b. For example, 42 is represented as 0x2A in hexadecimal and 0b101010 in binary.

Abbreviations

API   Application Programming Interface
CAN   Controller Area Network
CPU   Central Processing Unit
CiA   CAN in Automation
HW   Hardware
I/O   Input/Output
LSB   Least Significant Bit
MSB   Most Significant Bit
n.a.   not applicable
OS   Operating System
SDK   Software Development Kit

Table of contents

1. Overview

This manual describes the standard version Switch16/Com3 and the customized version Switch16/Com3-F together as Switch16/Com3, differences will be noted. The Switch16/Com3 and the Switch16/Com3-F use the same hardware. They only differ in the configuration of the serial interface COM-A at the delivery.
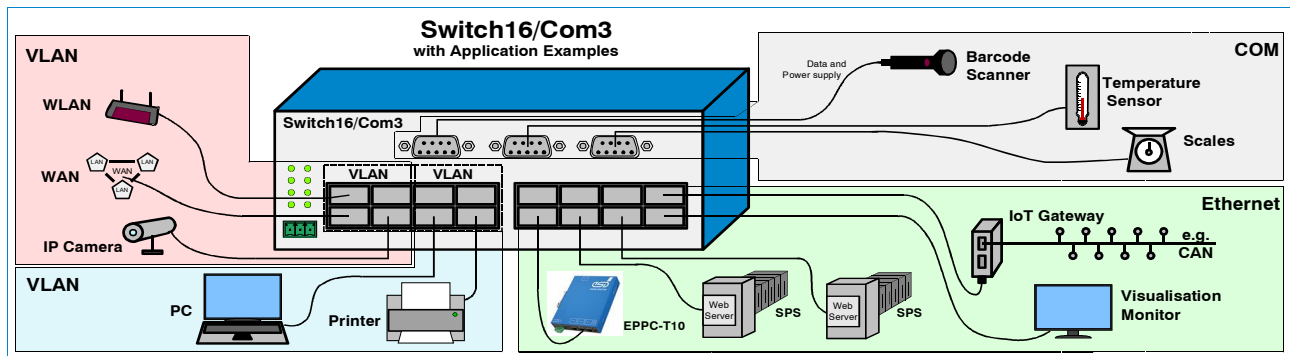
1.1 Description

Figure 1: Connection diagram

The Switch16/Com3 operates as a managed Ethernet switch with an integrated COM server.
It comes with 16 Ethernet ports via RJ45 sockets and 3 serial interfaces via DSUB9 connectors.
All interfaces are easily accessible via connectors in the front panel.

A Texas Instruments Sitata™ microprocessor, which is based on the ARM® Cortex®-A8 processor, is equipped on the Switch16/Com3. It is used as COM server for the serial interfaces. Furthermore, the CPU is responsible for the switch management. It is connected via an additional internal Ethernet port.

The Switch16/Com3 provides 3 serial interfaces in the network, that can be accessed for example from a PC. The serial interfaces of the COM ports can be switched per software between the standards RS-232, RS-422 and RS-485.
A switchable 24V/1A power supply for external devices is incorporated in the serial interface COM-A. It can be enabled via an internal jumper and switched on and off by software.

The Switch16/Com3 supports web-based network management for statistics, monitoring, VLAN (Virtual Local Area Network) etc. The usage of the VLAN improves the security and flexibility of the network because the sub-networks are logically separated from each other.

The COM server supports driver software for Windows® 7 and Windows 10 (32 and 64 bit).
To configure the serial interfaces on the host PC the Switch16/Com3 comes with an easy-to-use Windows based tool. For the configuration of the Switch16/Com3 features via the integrated web interface a standard web browser can be used.
A microSD™ card connector is easily accessible from outside. It can be used for firmware updates.

Customized options are available for customized series production in reasonable quantities. Please contact our sales team for detailed information.
For example for CAN-Ethernet-Gateway applications an optional CAN interface can be equipped.
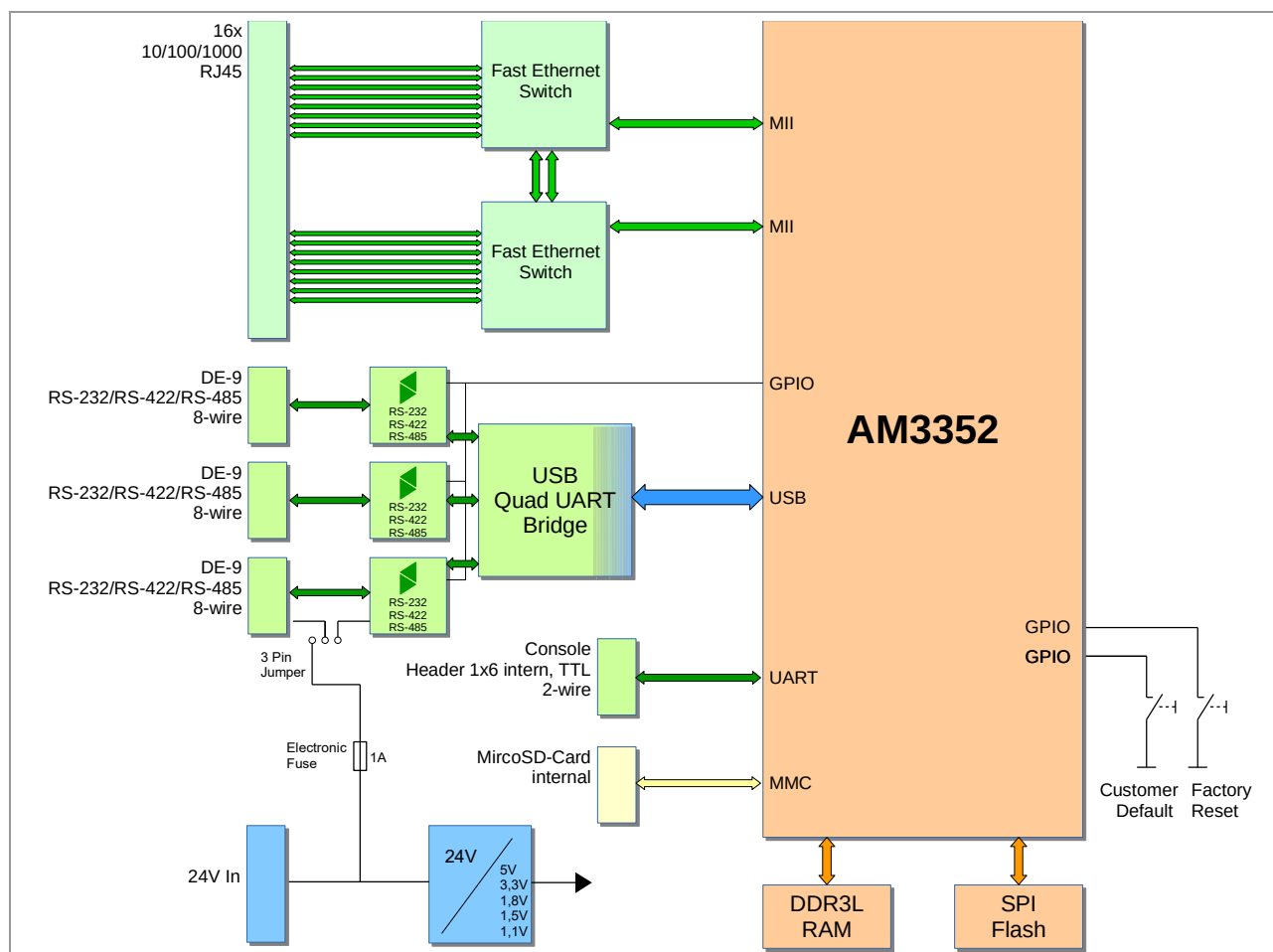
1.2 Block Circuit Diagram

Figure 2: Block circuit diagram

1.3 Hardware Components

- CPU core with Texas Instruments Sitara™ ARM Cortex-A8 CPU
- 64MByte serial NOR Flash for storing the bootloader and the operating system
- 128MByte DDR3L RAM
- 3 switchable RS-232/RS-422/RS-485 interfaces connected via a 4 x USB UART
- 16 port Ethernet switch designed of two Marvell 88E6390 11 port switches
- 24V power supply voltage
- microSD card slot for commissioning purposes and as potential alternative boot media of the operating system
- Optional 24V/1A power supply voltage via the COM-A interface for powering external devices. The 24V output is protected by a fuse (I_{OUT}=1 A) and can be configured via a jumper, see page 17)
- Two reset buttons (Customer Default, Factory Reset) for configuration

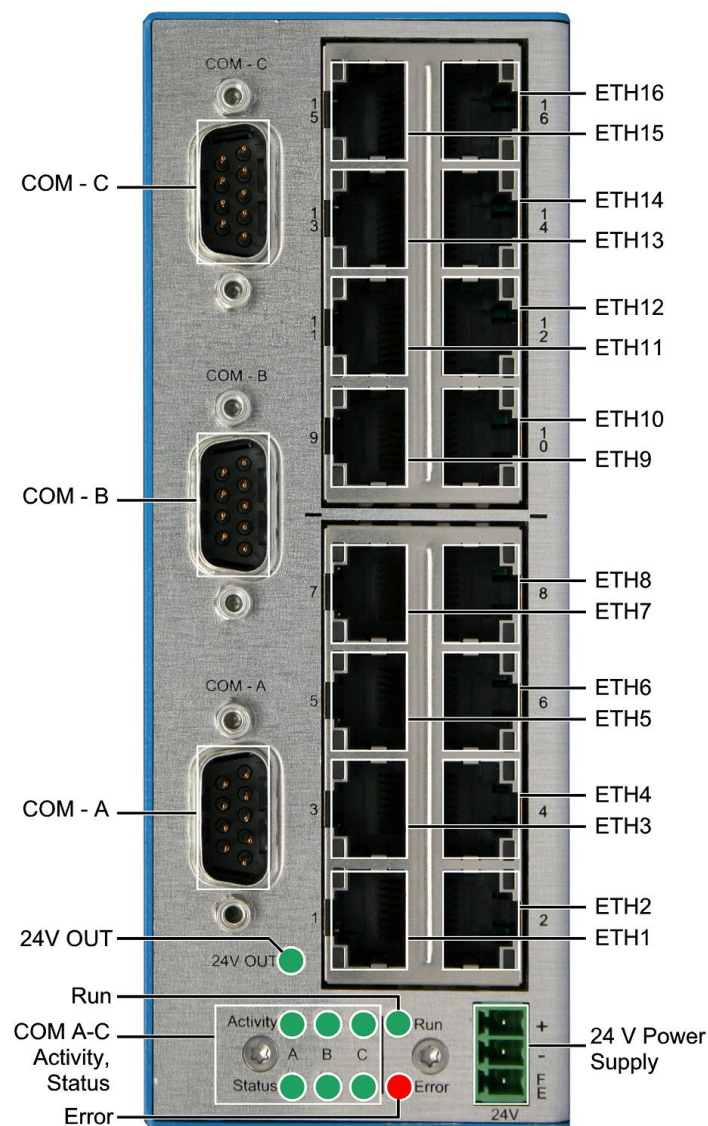# 2. Switch16/Com3 Views with Connectors

2.1 Front Panel

Figure 3: Front panel view of Switch16/Com3 (vertical orientation)

> **NOTICE**
> Read chapter "Hardware Installation" on page 15, before you start with the installation of the hardware!

2.2 Operating Positions

The Switch16/Com3 can be used **vertically orientated** as shown in Figure 3 on page 10.
- Ventilation slots are on the top and bottom side
- Mounting rail arranged horizontally

The Switch16/Com3 can also be used **horizontally orientated** as shown in Figure 4.
- Ventilation slots are on the left and right side
- Mounting rail arranged vertically

Figure 4: Switch16/Com3 horizontally orientated

2.3 Rear Side

The Switch16/Com3 comes with a clamp for top hat rail mounting on the rear panel.

Figure 5: Rear panel (horizontally orientated) with clamp

2.4 Side View

C-DFLT F-RST microSD
Card Slot
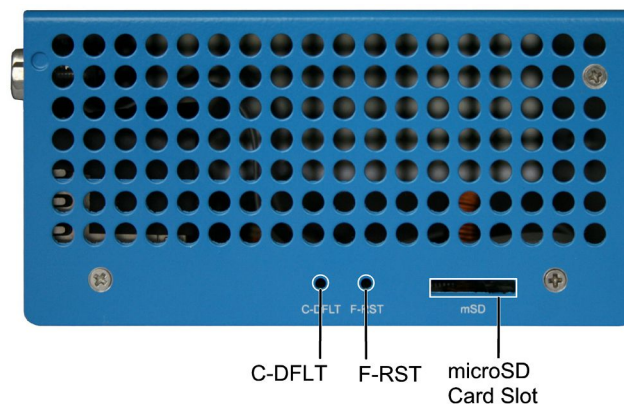
Figure 6: View of Switch16/Com3 side (horizontally orientated) with microSD card slot

The microSD card slot and the reset buttons C-DFLT and F-RST are accessible via the side panel. See chapter "microSD Card" on page 16 and chapter "Reset Buttons" on page 17 for further information.
If the Switch16/Com3 is mounted vertically orientated, the microSD card slot and the reset buttons are in the upper side.

2.5 Label

The product label is placed as shown in Figure 7.

The label contains the data matrix code, the esd label and:

- Product name
  (A.1109.01: Switch16/Com3 or
  K.0508.74: Switch16/Com3-F)

- Customer part no:
  (Switch16/Com3-F only)

- esd part no:
  (Switch16/Com3: A.1109.01,
   Switch16/Com3-F: K.0508.74)

- Revision:
  (revision of the product)

- SN:
  (Serial number from AA 000001)

- MAC-ID:
  (MAC address of the individual device,
   e.g.:00:02:27:A1:XX:XX)

Figure 7: Switch16/Com3-F with label

3. LEDs

All LEDs of the Switch16/Com3 are integrated in the front panel.
The Link and Activity LEDs of the Ethernet ports ETH1 - ETH16 are integrated in the Ethernet RJ45 connectors.
The COM port LEDs (Activity, Status), the RUN, Error and 24V OUT LED are located in the lower left part of the front panel.

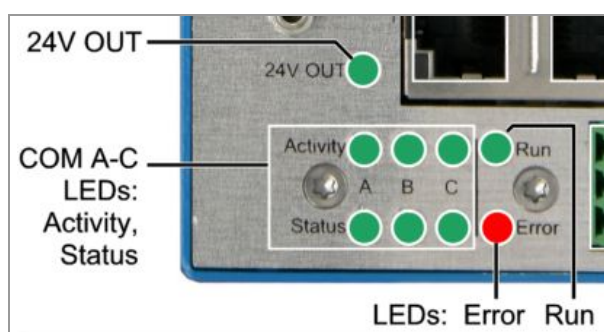## 3.1 LEDS (COM A - C, 24 V OUT, Run, Error)

Figure 8: LEDs (Detail)

LEDs: 24V Output, RUN, Error		
LED	**Colour**	**Meaning (LED on)**
24V Output	Green	24 V output voltage for external device is applied via COM-A (A.1109.01: On delivery the 24V output is disabled, K.0508.74: On delivery the 24V output can be switched on/off by software)
RUN	Green	CPU-RUN, Switch16/Com3 is ready for operation
Error	Red	An error occurred

Table 1: Display function when LED on

COM LEDs (Activity and Status) The serial interfaces use 6 green LEDs			
Interface	**LED**	**Display function**	**Meaning**
COM-A	Activity	flashing	Activity on COM-A, data are transmitted
	Status	on	COM port A is connected with Terminal (e.g. Windows PC)
COM-B	Activity	flashing	Activity on COM-B, data are transmitted
	Status	on	COM port B is connected with Terminal (e.g. Windows PC)
COM-C	Activity	flashing	Activity on COM-C, data are transmitted
	Status	on	COM port C is connected with Terminal (e.g. Windows PC)

Table 2: LEDs of serial interfaces

Special States during power-on COM LEDs (Status)			
Interface	**LED**	**Display function**	**Meaning**
COM-A and COM-B	Status	flashing	Factory Reset
COM-A and COM-C	Status	flashing	Load Customer Default Configuration

Table 3: COM Status LEDs during power-on

3.2 Ethernet LEDs ETH1 - ETH16

The Ethernet LEDs are integrated in the RJ45 sockets of the Ethernet interfaces ETH1 to ETH16.

	LED	**Colour**	**Display function**	**Meaning**
Activity Link	**Activity**	green	on	Ethernet connection on ETHx established
			flashing	Ethernet activity on ETHx, data are transmitted
	Link	yellow	on	Ethernet bit rate of ETHx: 1000 Mbit/s

x... Number of the corresponding Ethernet interface ETHx (x= 1 - 16)

Table 4: Description of RJ45 LEDs

4. Hardware Installation

> **NOTICE**
> **Read the safety instructions at the beginning of this document carefully, before you start with the hardware installation!**

> **DANGER**
> Hazardous Voltage - **Risk of electric shock** due to unintentional contact with uninsulated live parts with high voltages inside of the system into which the Switch16/Com3 is to be integrated.
> → Disconnect all hazardous voltages (mains voltage) before you open the system.
> → Ensure the absence of voltage before starting any electrical work.
> → Cover or block off adjacent live parts.

> **NOTICE**
> **Electrostatic discharges may cause damage to electronic components.**
>
> → To avoid this, discharge the static electricity from your body *before* you touch the Switch16/Com3.
> → Furthermore, you should prevent your clothes from touching the Switch16/Com3, because your clothes might be electrostatically charged as well.

4.1 Installation

Procedure:

1. Discharge your body.

2. If necessary configure the hardware (jumper) before you start with the installation. See chapter "Configuration COM-A / 24V (Jumper JP1900)" page 17.

3. Make sure that no risk arises from the system into which the Switch16/Com3 shall be inserted.

> **DANGER**
> Hazardous Voltage
> **Risk of electric shock** due to unintentional contact with uninsulated live parts with high voltages inside of the system into which the Switch16/Com3 is to be integrated.
>
> → Disconnect all hazardous voltages (mains voltage) before opening the system.
> → If the system does not have a flexible mains cable, but is directly connected to mains, disconnect the power supply via the safety fuse and make sure that the fuse cannot switch on again unintentionally (i.e. with caution label).
> → Ensure the absence of voltage before starting any electrical work
> → Cover or block off adjacent live parts.

4. Mount the Switch16/Com3 on the carrier rail.

5. Connect the interfaces (Ethernet ETH1 - ETH16, COM A - C or if applicable 24V OUT) and the 24 V power supply.

6. Connect the system to mains again (mains connector or safety fuse).

7. Switch on the system and the peripheral devices.

8. End of hardware installation.

9. Set the interface properties via the Switch16/Com3 esd-Netintegrator. Refer to the software manual of Switch16/Com3 [1] or Switch16/Com3-F [2].

4.2 Demounting

Procedure

A1. Switch off the 24 V supply voltage of the Switch16/Com3 and if necessary other network participants.

A2. Disconnect all connectors (24V, ETH, COM).

> ⚠️ **DANGER**
> Hazardous Voltage
> **Risk of electric shock** due to unintentional contact with uninsulated live parts with high voltages.
>
> → Disconnect all hazardous voltages (mains voltage) before opening the system.
> → If the system does not have a flexible mains cable, but is directly connected to mains, disconnect the power supply via the safety fuse and make sure that the fuse cannot switch on again unintentionally (i.e. with caution label).
> → Ensure the absence of voltage before starting any electrical work.
> → Cover or block off adjacent live parts.

A3. Remove the system from the carrier rail

4.3 microSD Card

The microSD card connector is located on the PCB bottom layer. It is accessible via the microSD card slot, a cut-out in the side panel of the Switch16/Com3, see Figure 6, page 12.
The card connector comes with a push-push-locking mechanism, therefore use a suitable blunt tool to eject the microSD card.

4.4 Reset Buttons

The Switch16/Com3 comes with two buttons for the reset of the factory defaults and the customer default. The buttons are equipped on the PCB. They are accessible via two little holes in the side panel, see Figure 6, page 12. Use a non-conductive pointed object (e.g. a screw-driver) with up to 1.5 mm cross section.

Reset	Button	Label	Description
Factory Reset	A	F-RST	A factory reset can be made when the Switch16/Com3 is switched on (power-on). Therefore carefully push and hold the button A (F-RST, see Figure 6 page 12) by means of the pointed object during power-on until the Status LEDs of the COM interfaces COM-A and COM-B are flashing. After the factory reset the Switch16/Com3 restarts automatically with the factory defaults.
Customer Default	B	C-DFLT	It is possible to create a file with a customer default configuration of the Switch16/Com3 with the esd-Netintegrator (see software manual). The file can also be downloaded via the esd-Netintegrator. The Switch16/Com3 can be reset to the customer default values during power-on. Therefore carefully push and hold the button B (C-DFLT, see Figure 6 page 12) by means of the pointed object during power-on until the Status LEDs of the COM interfaces COM-A and COM-C are flashing. All settings are reset to the values contained in the customer default configuration file. If the button is pushed and there is no file selected, the settings will not be changed. The Error LED starts flashing to indicate the failure of this action. After the customer default values are set, the Switch16/Com3 restarts automatically with the customer default values.

4.5 Configuration COM-A / 24V (Jumper JP1900)

The Switch16/Com3 comes with jumper JP1900, which is equipped on the PCB top layer inside of the housing.

Standard (Switch16/Com3 - A.1109.01):
On delivery jumper (JP1900) is set in this standard version in a way that the Ring Indicator / CTS signal is available on interface COM-A. The COM-A interface can be configured as RS-232, RS-422 or RS-485 interface per software.
See Switch16/Com3 software manual [1] for further information.

Customized (Switch16/Com3-F - K.0508.74):
On delivery jumper (JP1900) is set in this customized version in a way that the fused 24V output is available on interface COM-A. The 24V/1A output can be switched per software.
See Switch16/Com3-F software manual [2] for further information.

Procedure:

1.	Demount the module as described in chapter: "4.2 Demounting".

⚠	**NOTICE** **Electrostatic discharges may cause damage to electronic components.**
	→ To avoid this, please discharge the static electricity from your body *before* you touch the Switch16/Com3. → Furthermore, you should prevent your clothes from touching the Switch16/Com3, because your clothes might be electrostatically charged as well.

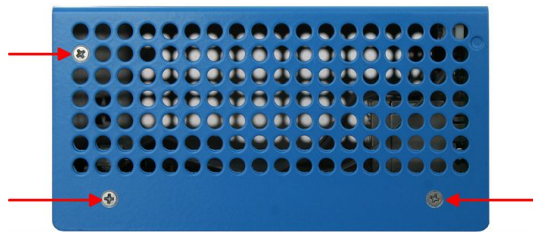2.	The jumper is inside the case of the Switch16/Com3.
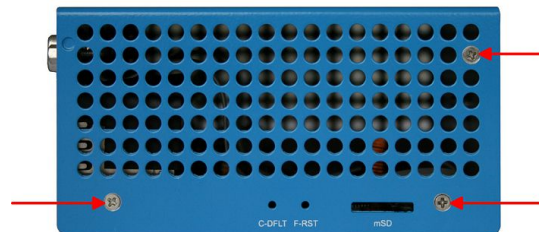

Figure 9: Side/Bottom view (screws)

Figure 10: Side/Top view (screws)

Loosen the six screws in the Switch16/Com3 case: Three in the bottom panel (Figure 3) and three in the upper panel (Figure 4); use Torx T6 screw driver.
From Rev. 1.1: Loosen two additional screws in the front panel.

3.	Open the case of the Switch16/Com3.
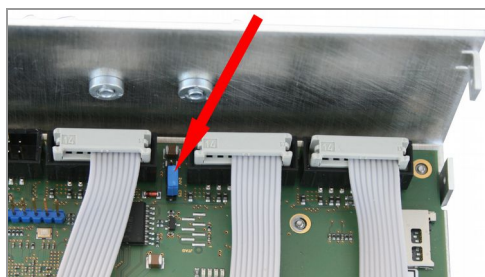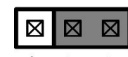
Figure 11: Switch16/Com3 PCB (Case open)

4.	The jumper is equipped on the PCB top layer (see Figure 11).

5.	Configure the jumper JP1900 according to your needs.

Jumper	Meaning	
☒ ☒ ☒ 3 2 1 (on Pins 1, 2)	COM-A interface with full enabled handshake Default setting on delivery of the standard version Switch16/Com3 (A.1109.01)	 **Figure 12:** Jumper internal (Detail)
☒ ☒ ☒ 3 2 1 (on Pins 2, 3)	24 V power supply for external devices via COM-A enabled. Default setting on delivery of customized option Switch16/Com3-F (K.0508.74)	

6.	Close the case of the Switch16/Com3 and fasten the six (or eight) case screws again.

7.	Install the module as described in chapter: "4.1 Installation".

5. Technical Data

5.1 General Technical Data

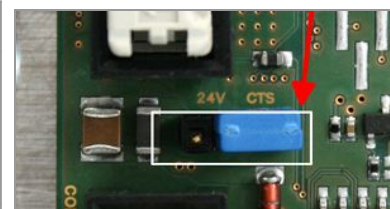|	
Power supply voltage	24 V= -15 %/+20 % (21.25 V= up to 28.8 V)
Power consumption	All ports 100MBit/s typical 5.5 W; maximum 6 W All ports 1GBit/s typical 9.5 W; maximum 10 W **NOTICE** Please note the increased power consumption in case of usage of the 24V output, see chapter "24V Output" on page 21. The output current is limited by a fuse to: I_{OUT} = 1A ±5%
Protective circuits	Reverse voltage protection, Overvoltage protection

Temperature range	Operation: 0 °C ... 50 °C
	   (all ports 1GBit/s, horizontally orientated, ventilation slots are on the left and right side, mounting rail arranged vertically)
	
	Operation: 0 °C ... 55 °C
	  (all Ports 1GBit/s, vertically orientated, ventilation slots are on the top and bottom side, mounting rail arranged horizontally)
	
	Operation: 0 °C ... 60 °C
	  (two ports 1GBit/s, all other port 100MBit/s, horizontally or vertically orientated)
	
	Storage: -40 °C ... 85 °C
	
	Transport: -40 °C ... 85 °C

Humidity	Operation: max. 90%, non-condensing
Protection class	IP20
Housing	Metal housing for carrier rail mounting NS35/7,5 DIN EN 60715
Form factor / Dimensions	55 mm x 143 mm x 113,5 mm (length x width x height)
Weight	450 g

Table 5: General data of the module

5.2 CPU Kernel

CPU	Texas Instruments™ AM3352 Sitara™ microprocessor based on the ARM® Cortex®-A8 processor
Clock rate	800 MHz
Memory	128 MiB DDR3L, 303 MHz clock rate, 16 Bit data bus
Flash memory (NOR)	64 MiB SPI NOR flash, 50 MHz data rate, 1 bit data bus

Table 6: CPU Kernel

5.3 Ethernet Interface

Number of Ethernet interfaces	16 external Ethernet interfaces ETH1 - ETH16
Standard	IEEE 802.3, 10BASE-T, 100BASE-TX, 1000BASE-T
Bit rate	10/100/1000 Mbit/s
Controller	2x Marvell 88E6390
Connection	Shielded twisted pair cable (compatible with IEEE 802.3), CAT 5e or better
Electrical isolation	Via converter, electrical strength 2 kVDC, integrated in the connector
Additional functionalities	Auto-negotiation and auto-crossing
Connector	RJ45 socket in the front panel with integrated LEDs (Link- and Activity), ≥ 750 mating cycles

Table 7: Data of the Ethernet interface

5.4 Serial Interface

Number	3 asynchronous serial interfaces - COM A – COM C
Standard	ANSI EIA/TIA-232-F, ANSI EIA/TIA-422-B
Controller	Silicon Labs CP2108 or similar, connected with local CPU via USB
Connection	Shielded asymmetrical cable, maximum length: 30 m
Electrical isolation	None
Bit rate	Value range: 9600 Baud ... 115200 Baud Default setting: EIA-232, 9600 Baud, 8 Bit, No Parity 1 Stop-Bit
Physical Interface	EIA-232, EIA-422 or EIA-485 interface, configurable via software (esd-Netintegrator) see Switch16/Com3 software manual, Termination resistors for RS-422 and RS-485 have to be set externally.
Software	Standard operating system driver
Connector	9-pin DSUB ≥ 200 contact durability

Table 8: Data of the serial interface

NOTICE
A shielded asymmetrical cable with a maximum wire length of 30 m has to be used for the serial interfaces.
esd grants the EC conformity of the product if the wiring is carried out with a shielded asymmetrical cable with a maximum wire length of 30 m.

5.5 MicroSD Card Interface

Number	1
Controller, Control	Integrated in CPU
Note	This interface is for test and commissioning purposes during development stage only.

5.6 24V Output

Number	1 (via COM-A)
Controller, Control	GPIO pins of the CPU
Usage, Status display	The 24V Output via COM-A can be configured via software (esd-Netintegrator). The 24V Output and the COM-A fuse can be switched per software. The status of the 24V Output (*24V Supply*: ON / OFF) and the status of the COM-A fuse (*COM-A Fuse status*: OK / BLOWN) are displayed in the esd-Netintegrator program window. The LED *24V OUT* in the front panel indicates if the 24V supply voltage is applied.
Electrical isolation	None
Topology	The power supply voltage, which is fed via the 24V power supply connector in the front panel can be internally switched to PIN 9 of the COM-A interface via an electronic fuse. It depends on the jumper configuration of jumper JP1900 if the Ring Indicator i.e. CTS input or the 24V output is enabled, see chapter "Configuration COM-A / 24V (Jumper JP1900)", page 17. A.1109.01: On delivery the 24V output is disabled K.0508.74: On delivery the 24V output is enabled
Electrical Parameter	24 V= -15 %/+20 % (21,25 V= bis 28,8 V) max. 1A
Protective circuit	Electronic fuse of type „Texas Instruments e-Fuse" TPS26601 Output current set to: I_{OUT_MAX} = 1A ±5% Behaviour in case of fault is set to „Latch Off". After the fuse is triggered (BLOWN) it has to be released. See Switch16/Com3 software manual for further information.

5.7 Default Buttons

Number	2
Controller, Control	GPIO Pins of the CPU
Usage, Status display Button A	Factory Reset - F-RST
Usage, Status display Button B	Customer Default - C-DFLT

5.7.1 Factory Configuration for Custom Version (K.0508.74 only)

Configuration	The default configuration may be different from A.1109.01 on delivery or after a factory reset with button F-RST.

5.7.2 CAN Interface (Customized Option)

Number	1
Standard	High-Speed CAN-Interface according to ISO11898-2
Controller, Control	Integrated in the CPU
Electrical isolation	Realized on the base board designed as a connector with CAN signals with TTL level and power supply. Electrical isolation is made via magnetic couplers and DC/DC-converters on an adapter. The dielectric strength is 250VDC.
Note	The CAN interface is only available on request.

5.8 Connectors accessible from Outside

Name	Function	Type
XVCC	Power supply voltage	3-pin Phoenix Contact connector MC 1,5/3-G-3,81
XCOMA	Serial COM-A (RS-232, RS-422, RS-485) or 24V output	DSUB9 connector, pin contacts, quality class 2
XCOMB	Serial COM-B (RS-232, RS-422, RS-485)	DSUB9 connector, pin contacts, quality class 2
XCOMC	Serial COM-C (RS-232, RS-422, RS-485)	DSUB9 connector, pin contacts, quality class 2
XETH1 - XETH8	Ethernet port 1 to port 8	RJ45 sockets, Pulse Electronics JDX9-4015NL
XETH9 - XETH16	Ethernet port 9 to port 16	RJ45 sockets, Pulse Electronics JDX9-4015NL

Table 9: Connectors, accessible from outside

5.9 Software Support

The Switch16/Com3 is equipped with an ARM Cortex-A8 CPU-Kernel. Linux® is used as operating system. The kernel offers essentially two applications:
- All necessary software parts of a device server are provided for the COM interfaces.
- The configuration of the Ethernet switches.

5.9.1 License

The complete local firmware is stored in the internal flash and can be updated as required. The Switch16/Com3 module can be configured by means of the Windows® based configuration tool, the esd-Netintegrator by esd.

Bootloader	"Das U-Boot"
License information	This product uses the open source-bootloader "Das U-Boot". The U-Boot-source code is released under the terms of the GNU Public License (GPL). The complete text of the license is contained in the esd-document "3rd Party Licensor Notice" as part of the product documentation. esd provides the complete bootloader-source code on request. esd strives to restore all changes on the bootloader into the official sources. The homepage of the U-Boot project is: http://www.denx.de/wiki/U-Boot.

The Switch16/Com3 supports Linux operating systems.

Operating system	Linux, Kernel 2.6.x
Adaptation	Driver and API functions are optimized for this system
License information	This product uses the operating system "Linux". The Linux-source code is released under the terms of the GNU Public License (GPL). The complete text of the license is contained in the esd-document "3rd Party Licensor Notice" as part of the product documentation. esd provides the complete operating system source code on request.

For more detailed information esd can make the complete list of licenses available.
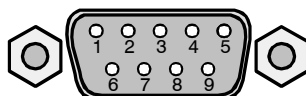
6. Connector Assignments

6.1 Serial Interfaces

6.2 COM-A

Device connector: 9-pin DSUB connector, pin contacts

Pin Position:

Pin Assignment:

RS-232				RS-422 (RS485)		
Pin	Direction	Signal		Pin	Direction	Signal
1	IN	DCD		1	OUT	Tx+ For RS-485 connect to pin 2
2	IN	RxD		2	IN	Rx+ For RS-485 connect to pin 1
3	OUT	TxD		3	OUT	RTS+
4	OUT	DTR		4	IN	CTS+
5	-	Signal Ground		5	-	Signal Ground
6	IN	DSR		6	OUT	Tx- For RS-485 connect to pin 7
7	OUT	RTS		7	IN	Rx- For RS-485 connect to pin 6
8	IN	CTS		8	OUT	RTS-
9	IN	RI or 24V output (see signal description below)		9	IN	CTS or 24V output (see signal description below)

Signal description
The signal assignment of pin 9 depends on the configuration of jumper JP1900.

A.1109.01: On delivery of Switch16/Com3 the RI (Ring Indicator / CTS) signal is available on Pin 9

K.0508.74: On delivery of Switch16/Com3-F the 24V output signal is available on Pin 9

For further information see chapter "Configuration COM-A / 24V (Jumper JP1900)", page 17.
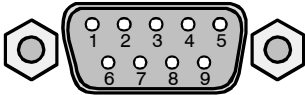
> **NOTICE**
> A shielded asymmetrical cable with a maximum wire length of 30 m has to be used for the serial interface COM-A.
> esd grants the EC conformity of the product if the wiring is carried out with a shielded asymmetrical cable with a maximum wire length of 30 m.

6.3 COM-B, COM-C

Device connector: 9-pin DSUB connector, pin contacts

Pin Position:

Pin Assignment:

| RS-232				RS-422 (RS485)		
Pin	Direction	Signal		Pin	Direction	Signal
1	IN	DCD		1	OUT	Tx+ (For RS-485 connect to pin 2)
2	IN	RxD		2	IN	Rx+ (For RS-485 connect to pin 1)
3	OUT	TxD		3	OUT	RTS+
4	OUT	DTR		4	IN	CTS+
5	-	Signal Ground		5	-	Signal Ground
6	IN	DSR		6	OUT	Tx- (For RS-485 connect to pin 7)
7	OUT	RTS		7	IN	Rx- (For RS-485 connect to pin 6)
8	IN	CTS		8	OUT	RTS-
9	IN	RI		9	IN	CTS

> **NOTICE**
> A shielded asymmetrical cable with a maximum wire length of 30 m has to be used for the serial interfaces COM-B and COM-C.
> esd grants the EC conformity of the product if the wiring is carried out with a shielded asymmetrical cable with a maximum wire length of 30 m.

6.4 Ethernet

Device connector: RJ45 socket, 8-pin

Pin Position:
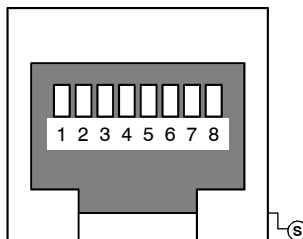
Pin Assignment:

Pin	10BASE-T, 100BASE-TX		1000BASE-T
	Signal	Meaning	Signal
1	Tx0+ (TxD+)	Transmit Data +	DA+
2	Tx0- (TxD-)	Transmit Data -	DA-
3	Rx0+ (RxD+)	Receive Data +	DB+
4	-	-	DC+
5	-	-	DC-
6	Rx0- (RxD-)	Receive Data -	DB-
7	-	-	DD+
8	-	-	DD-
S	Shield		Shield

Signal Description:

Tx0+/-, Rx0+/- ...	Ethernet data lines 10BASE-T, 100BASE-TX
- ...	reserved for future applications, do not connect!
DA+/-, DB+/-, DC+/-, DD+/- ...	Ethernet data lines 1000BASE-T
Shield...	case shield, connected with the front panel of the Switch16/Com3.

> **NOTICE**
> Permissible cable types: Cables of category 5e or higher have to be used to grant the function in networks.
> esd grants the EC conformity of the product if the wiring is carried out with shielded twisted pair cables of class S/UTP or higher.
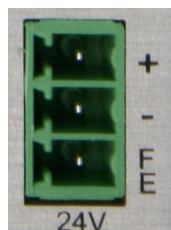
6.5 24 V-Power Supply Voltage

> **⚠ DANGER**
> The Switch16/Com3 may only be driven by power supply current circuits, that are contact protected. A power supply, that provides a safety extra-low voltage (SELV) according to EN 60950-1, complies with these conditions.

Device connector: Phoenix Contact PCB header MC 1,5/3-G-3,81

Pin Position:

Pin Assignment:

Position	Pin	Signal
+	3	+24V
-	2	0V
FE	1	FE

Figure 13: 24V Connector (Detail)

Signal description

+24V ...   Power supply voltage +24 V,
            permissible operating voltage range is: +16VDC ... +32 VDC.

0V ...   Reference potential of the +24V power supply voltage

FE ...   Functional earth contact (EMC)(connected to mounting rail potential)

> **ℹ INFORMATION**
> esd recommends to use the Phoenix Contact plug connector MC 1,5/ 3-ST-3.81[1] with screw-connection as mating connector.

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1 For technical data see Phoenix Contact website, PCB Connectors, Product list PCB connectors

7. References

[1] Switch16/Com3-ME-SW esd-Netintegrator Software Manual, A.1109.23, Revision 1.0,
    Switch16/Com3_esd-Netintegrator_Software-Manual_en_10.pdf, esd electronics gmbh.

[2] Switch16/Com3-F-ME esd-Netintegrator Software Manual, K.0508.75, Revision 1.0,
    Switch16/Com3-F_esd-Netintegrator_Software-Manual_en_10.pdf, esd electronics gmbh.

8. Declaration of Conformity

EU-KONFORMITÄTSERKLÄRUNG
EU DECLARATION OF CONFORMITY

Adresse *Address*	**esd electronics gmbh Vahrenwalder Str. 207 30165 Hannover Germany**

esd erklärt, dass das Produkt *esd declares, that the product*	Typ, Modell, Artikel-Nr. *Type, Model, Article No.*
Switch16/COM3 Switch16/COM3-F	**A.1109.01 K.0508.74**
die Anforderungen der Normen *fulfills the requirements of the standards*	**EN 61000-6-2:2005, EN 61000-6-4:2007/A1:2011**
gemäß folgendem Prüfbericht erfüllt. *according to test certificate.*	**H-K00-0718-19**
Das Produkt entspricht damit der EU-Richtlinie „EMV" *Therefore the product conforms to the EU Directive 'EMC'*	**2014/30/EU**
Das Produkt entspricht der EU-Richtlinie „RoHS" *The product conforms to the EU Directive 'RoHS'*	**2011/65/EU, 2015/863/EU**

Diese Erklärung verliert ihre Gültigkeit, wenn das Produkt nicht den Herstellerunterlagen entsprechend eingesetzt und betrieben wird, oder das Produkt abweichend modifiziert wird.
This declaration loses its validity if the product is not used or run according to the manufacturer's documentation or if non-compliant modifications are made.

Name / *Name* Funktion / *Title* Datum / *Date*	T. Bielert QM-Beauftragter / *QM Representative* Hannover, 2019-02-18

Rechtsgültige Unterschrift / *authorized signature*

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9. Order Information

Type	Properties	Order No.
Switch16/Com3	16-Port-Switch / 3-Port-COM-Server (Managable) - 16 ports RJ45 10/100/1000 Mbit - Web-based configuration, DHCP Client, DHCP Server, VLANs - COM-Server 3 x RS232/422/485 selectable per software - Driver for Windows 7/10 (32/64bit) - 24VDC power supply - DIN rail mounting, IP20	A.1109.01
Switch16/Com3-F	16-Port-Switch / 3-Port-COM-Server / 24 V output as A.1109.01 but configured for 24V output voltage via COM-A	K.0508.74

Table 10: Order information Switch16/Com3 hardware

PDF Manuals
For the availability of the manuals see tables below.
Please download the manuals as PDF documents from our esd website www.esd.eu for free.

Hardware Manual		Order No.
Switch16/Com3-ME-HW	Hardware manual to A.1109.01 and K.0508.74 in English	A.1109.21

Table 11: Hardware manual

Software Manual		Order No.
Switch16/Com3-ME-SW	Software manual to A.1109.01 in English	A.1109.23

Table 12: Software manual standard version

PDF Software Manual (Customized Version)
For the availability of the software manual for the customized version see table below. Please contact our sales team: sales@esd.eu.

Software Manual		Order No.
Switch16/Com3-F-ME	Software manual to K.0508.74 in English	K.0508.75

Table 13: Software manual custom version

Printed Manuals
If you need a printout of the manuals additionally, please contact our sales team: sales@esd.eu for a quotation. Printed manuals may be ordered for a fee.