

## INFO-StandAlone Master



The INFO Stand Alone Master board is the field bus master of an INFO-Link. The board operates entirely autonomously and does not need any higher-ranking computer for operation. For visualisation and software updates, a 10 MBit Ethernet port and two RS232 interfaces are available. The real-time-capable multitasking operating system of the master per-

forms the entire control of the machine or plant. Standard firmware enables the master to control up to 64 axes in addition to the entire machine/plant. The master is programmed from the integrated C++ development environment or the PLC-like ISM language, which also has real-time and multitasking capabilities. Up to 250 INFO-Modules can be connected to the INFO-SAM Master.

## INFO-SAM

Stand Alone  
INFO-Link  
Field Bus  
Master

### Technical Data

#### Operating system

- Real-time clock
- Multitasking operating system
- Real-time capabilities

#### 32-bit RISC processor

- PowerPC603E
- Up to 200MHz clock rate

#### Local bus

- 33MHz 32-bit bus
- Highspeed Burst Mode

#### Memory

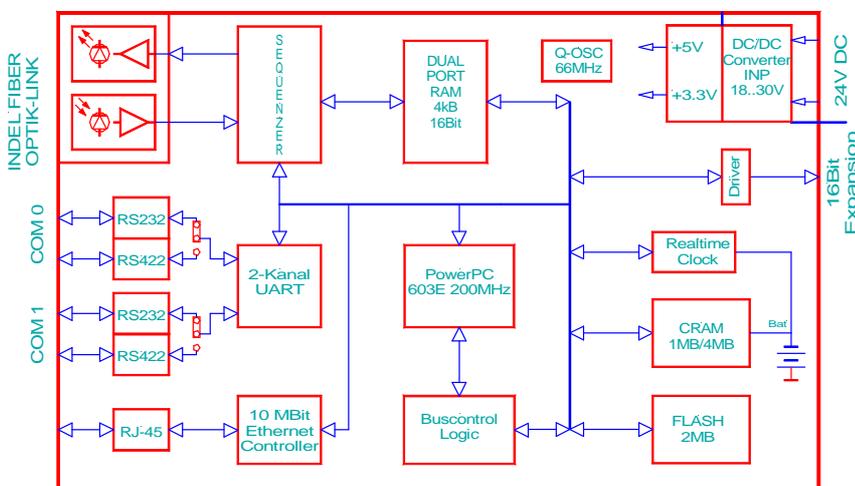
- 1/4 MByte CRAM battery-buffered
- 2MByte Flash PROM
- 4kByte 16-bit dualport RAM as interface with INFO-Link

#### INFO-Link

- Glass fiber medium
- Ring topology with deterministic access time
- 11MBit/s transmission rate
- Up to 250 field bus nodes
- Link cycle time: 1ms (250 nodes)

#### Interfaces

- 10MBit Ethernet
- 2 independent S-I/O interfaces, RS232 or RS422/RS485
- Bidirectional printer port
- Optional PC-Card interface



Order No.	INFO-SAM	97243-LAN/1MB
Order No.	INFO-SAM	97243-LAN/4MB
Order No.	INFO-SAM	97243-BOX/1MB
Order No.	INFO-SAM	97243-BOX/4MB

# INFO-SAM

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## INFO-Link

### INFO-Link

The INFO-Link connection is identical on all INFO boards. The TOS-Link module with the two jumpers is always the transmitter, the module with the two LEDs the receiver (modular design).

### Configuration

The PowerPC Master and the existing INFO boards (slaves) must be connected in series according to the connection example. The sequence of the slave number on the INFO-Link can be selected as required.

### Fiberoptic lines

As a field bus cable, it is possible to apply the APF fiber (all plastic fiber) in the standard version up to a max. line length of 30 to 50m. When a special PCF fiber (plastic cladding silica fiber) is used, the transmission distance may be up to 1000m. However, from 100m, the INFO-Modules must be equipped with special TOS-Link transmitter modules, which operate in the invisible infrared range.

When opening and closing the cable ducts, take care to ensure that the bending radii of the installed fiberoptic cables do not become tighter. Normal pneumatic hoses slipped over the fiberoptic cables have proved to provide the best protection.

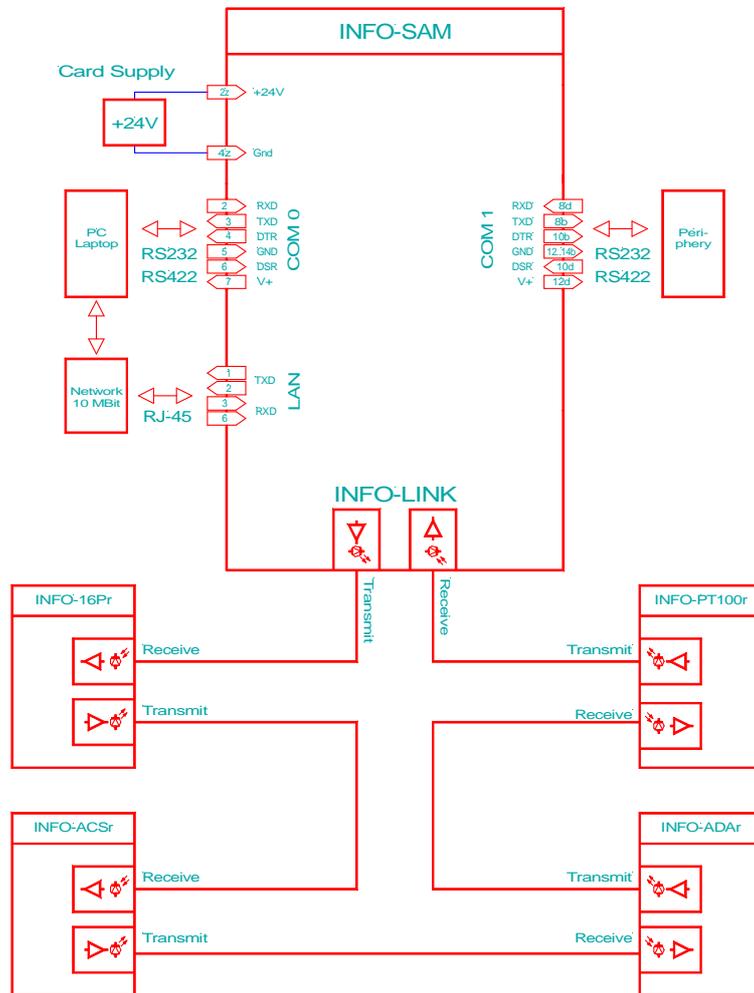
### Emergency system

In the emergency system, Flash PROM burning is supported. In order to start the controller in the emergency system, a short-circuit termination must be connected to the serial interface (front).

Connections:	
Signals	Pin
RxD, TxD	2, 3
DSR, DTR	6, 4

Once the controller has been started up, the short-circuit termination can be removed and the serial cable to the PC can be reconnected.

## Design of INFO-Link

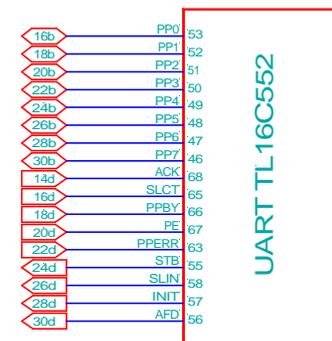


Basic diagram of INFO-Link

### Parallel-Port

PP0..7 I/O databus	
bidirektional	
ACK	I Line printer acknowledge (active low)
SLCT	I Printer select (active low)
PPBY	I Printer busy (active high)
PE	I Paper empty (active high)
PPERR	I Printer error (active low)
STB	O Strobe. Data latch (active low)
SLIN	O Printer select (active low)
INIT	O Printer init (active low)
AFD	O Autofeed (active low)

### Connection Diagram Parallel Port

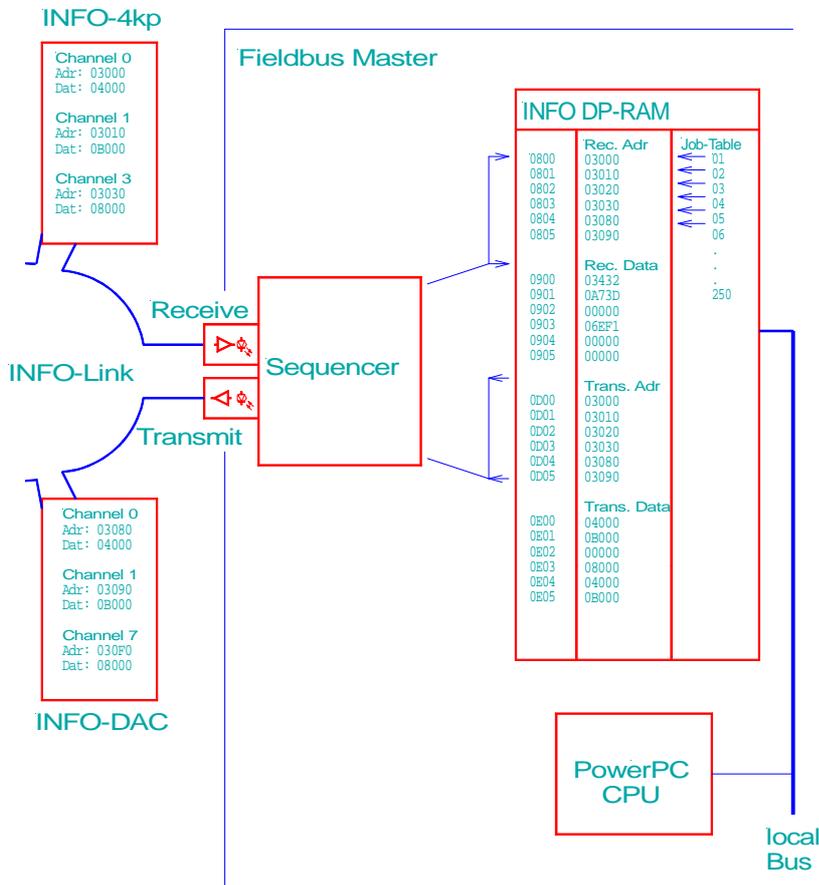


# INFO-StandAlone Master

# INFO-SAM

## Block Circuit Diagram INFO-SAM

## Mode of Operation



### Design of the master

The field bus master has an interface in the form of a dualport RAM in order to communicate with the field bus. The interface with the PC or laptop is ethernet or a serial interface on the front panel of the INFO-SAM board.

The INFO DP-RAM between the field bus and the master contains arriving and departing address and data words of the individual field bus nodes plus a job table. Each field bus node occupies one or more addresses and one or more jobs. For example, one INFO-4kp board occupies one address and one job each per channel. The hardware-implemented sequencer logic processes the maximum 250 jobs and transmits addressed telegrams to the existing bus nodes.

This process takes place independently of the processor and does not use any CPU power. The sequencer requires, for the addressing of a 16-bit node, merely 4µs, and for a 32-bit node 6µs. During the bus cycle time of 1 millisecond, all max. 250 nodes are addressed once!

### Data processing

The process data obtained such as temperatures, incremental encoder values, analog measurement values, etc. are processed directly by the operating system. The master performs the automatic offset and full-scale correction for all analog values and converts them to the appropriate unit. Temperature measurement values are linearized on a sensor-specific basis and converted to degrees centigrade. In the same way, increments of position boards are converted to degrees, meters or mm.

The entire process map including the configuration parameters can be viewed via ethernet or the serial interface of the PC. The configuration data is available through-out the system via names. The PC has access to the current process map at all times. The master can be addressed from any higher programming language via DLL, network wide.

Mode of operation of the sequencer

### Control functions

The PowerPC-Master is capable of performing high-precision and very fast control functions:

64 axes	4ms sampling rate
32 axes	2ms sampling rate
16 axes	1ms sampling rate
8 axes	0.5ms sampling rate

Any required ramps, e.g. sine ramps, can be run. Temperature controllers are also available.

### Operating system

The multitasking operating system can process any number of different tasks concurrently and in real time.

The master is programmed in C++ and/or the proven INDEL multitasking system ISM 6.0. Programming, configuration and debugging as well as software updating is performed over the network or through the serial interface on the front panel from a PC.

## Connector

### Board power supply

For the board power supply, a 3-phase rectifier without electrolytic capacitor will suffice. But in order to prevent interference, an electrolytic capacitor of 4,700 ... 10,000µF is recommended. The rack must be provided with a line filter just after the entry of the power supply.

### Bus connectors

The connector 2 is not assembled as standard. It incorporates the processor bus (16-bit data bus). No provision has been made to couple external peripheral devices directly to the processor bus. Options such as PC card adapters use the bus.

### Serial interface

The shield of the connector 3 (D-Sub connector on the front panel) passes through the connector housing.

### Power supply V+

The power supply is only allowed to be wired to the connectors of the SAM.

### network interface

The shield of the RJ-45 patch cable passes through the connector housing.

## Connector Allocation

		d		b		z
2	O	5V	O	GND	I	K 24V
4	O	5V	O	GND	I	K_Gnd
6	O	5V	O	GND		Shield
8	I	RXD(Sin-)	O	TXD(Sout-)		Shield
10	I	DSR(Sin+)	O	DTR(Sout+)		Shield
12	O	V+	O	GND		Shield
14	I	ACK	O	GND		Shield
16	I	SLCT	I/O	PP_0		Shield
18	I	PPBY	I/O	PP_1		Shield
20	I	PE	I/O	PP_2		Shield
22	I	PPERR	I/O	PP_3		Shield
24	O	STB	I/O	PP_4		Shield
26	O	SLIN	I/O	PP_5		Shield
28	O	INIT	I/O	PP_6		Shield
30	O	AFD	I/O	PP_7		Shield
32	O	GND	O	GND		Shield

### Connector 1 rack

90° angled  
DIN 41612, Type F-48  
2.8mm pins

### Connector 1 Box

24V power supply  
Drawing see p.6

1	+24V
2	0V

### Connector 3, 3a

90° angled  
D-SUB, 9-pin

1	NC
6	I DSR(Sin+)
2	I RXD(Sin-)
7	O V+
3	O TXD(Sout-)
8	NC
4	O DTR(Sout+)
9	NC
5	I GND

### Connector 4

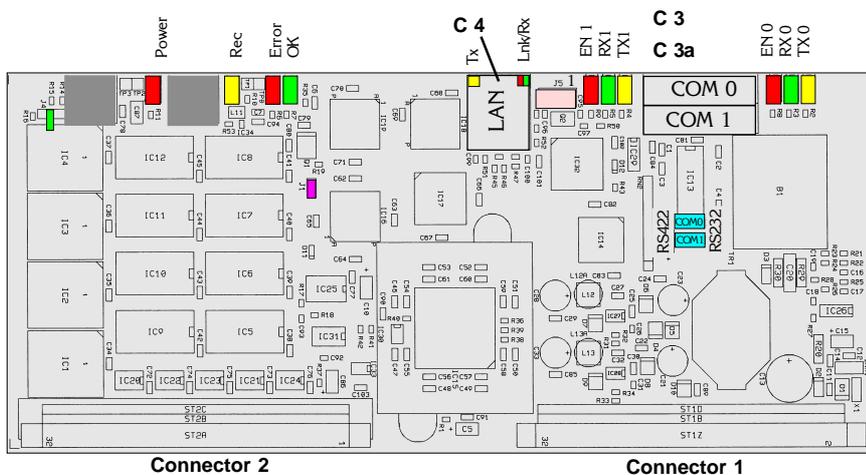
90° angled  
RJ-45, shielded

1	O	TX+
2	O	TX-
3	I	RX+
4		NC
5		NC
6	I	RX-
7		NC
8		NC

# INFO-StandAlone Master

# INFO-SAM

## Assembly



### Transmitter power(green)

The transmitter jumper influences the illumination intensity of the emitting LED and thereby the length of the light distance to the next board.

For the correct matching of the emitted light intensity to the cable attenuation, the jumper must be plugged as follows:

Segment length	Jumper position
0 ... 10m	no jumper
8 ... 30m	> 10
20 ... 50m	> 30

### Watchdog enable (magenta)

A possibility exists to bridge the watchdog by a hardware implementation. For this purpose, disconnect the jumper J1. If the jumper is set, the watchdog must be handled by a software function at least every 70ms, otherwise a reset will be initiated.

### LEDs on receiver module:

LED-Power(red)	=	+5V power supply
LED-Rec(yellow)	=	INFO-Link receiver signal OK; is lit if link is ok

### LEDs on LAN connector:

LED-Power(red)	=	+5V power supply
LED-Rec(yellow)	=	INFO-Link receiver signal OK; is lit if link is ok

### Ok, error LED:

The Ok and error LEDs are handled by the operating system.

Customized modifications are available as needed.

## Specifications

### Power supply

24V, 400mA max.

### Cooling

- The board generates approx. 8W dissipation power. It must be removed by sufficient air circulation, e.g. by means of a fan. For racks, ready-for-connection plug-in fans are available.

### Climatic conditions

- Ambient temperature:  
Storage: -20...+80°C  
Operation: 0 ... +45°C
- Board temperature:  
Operation: 0...+70 °C
- Relative air humidity  
no condensation: 95%

### Standard version

- Real-time clock with battery
- PowerPC 603E, 200MHz
- 1MByte CRAM with battery

### Options

- 4MByte CRAM
- Standalone Box

### Serial interfaces (cyan)

Both interfaces can be operated using jumpers either as RS232 or RS422. The INFO-SAMboard has an automatic baud rate detector. The maximum baud rate is 115200 baud.

### Battery

- 3Vlithium, CR2450N/CR2477N
- Useful life more than 5 years

## INFO-SAM

### Mounting

#### Rack mounting

- Connector DIN 41612, Type F-48
- Mounting in 19" chassis
- Dimensions:  
234 x 20 x 100 mm (LxWxD)
- 6U x 4SU

#### Box mounting

The standalone box will be mounted on a grounded wall with two M5 screws. You have to watch for enough air circulation for cooling.

#### Shielded lines

It is essential to operate the RS232 interfaces with shielded leads. The shielding must be connected inside the connector at both ends to the metallic connector housing. (Do not ground through the shield pin!)

The RS422 interface can be operated with twisted pair wires. For short distances, an unshielded cable will suffice. For connections of the RS422 over long distances (>400m), it is advisable to use a shielded twisted pair wire.

#### Grounding

The INFO-SAM board is grounded via its front panel. Make sure that the connection between the rack housing and the control cabinet is conductive (EMC grounding). This is best achieved using chromatinized mounting bars.

The box is grounded via the conductive backplane.

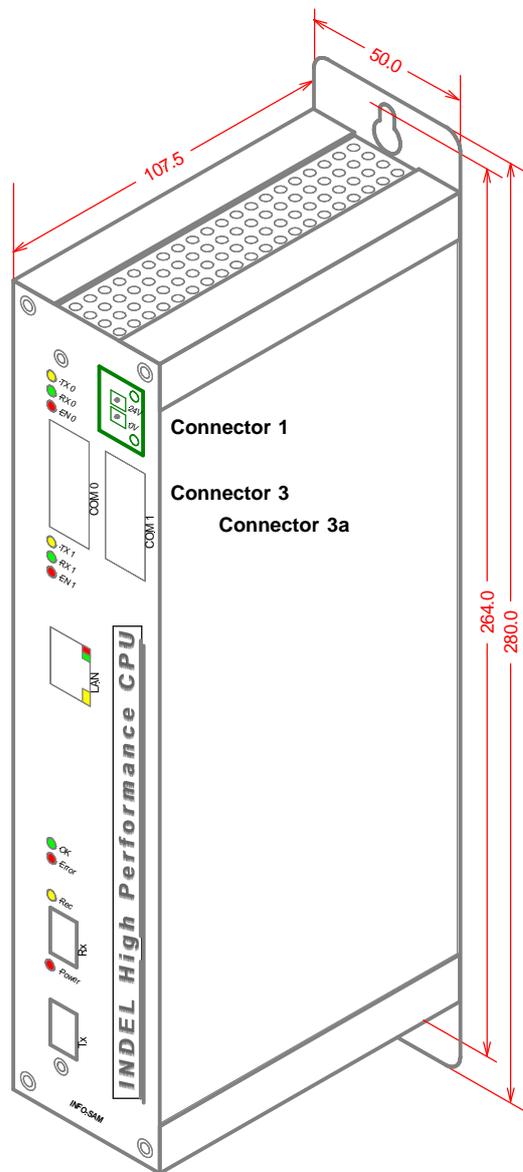
#### Shielding plate

If the Stand Alone Master is installed together with controllers of the INFO-ACSR series in the same rack, a shield plate must be inserted between the master and the controller. In addition, the manufacturer recommends a minimum distance of 5 ... 10cm between the master and power-voltage-carrying INFO boards. Possibly provide an empty space.

See also INDEL Wiring Guidelines and INDEL Design Guidelines.

## INFO-StandAlone Master

### Stand Alone box



#### Caution: laptop users

Observe the following sequence when connecting a laptop computer to the INFO-SAM:

1. Isolate the power supply of the laptop so that it is only supplied with power from the accumulator.
2. Connect the INFO-SAM and the laptop by appropriate serial cables.
3. Reconnect the power supply.

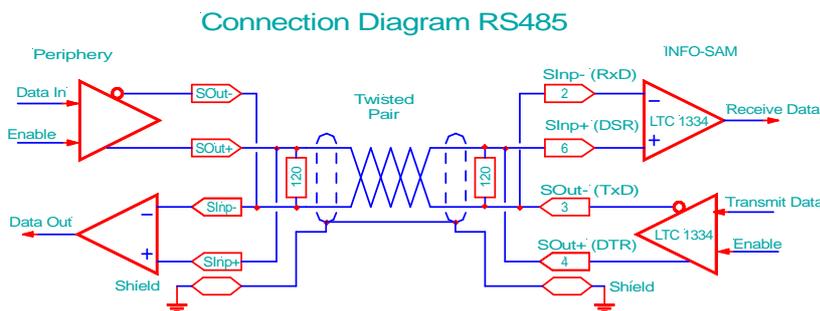
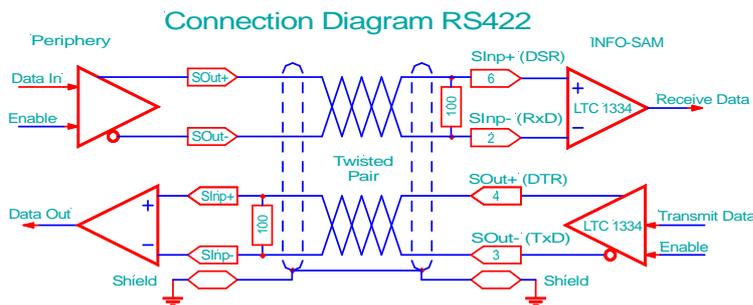
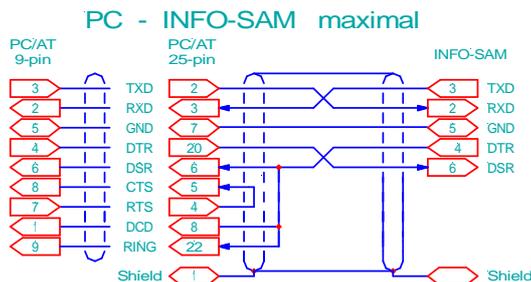
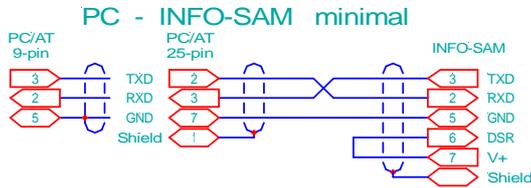
Reason: As a result of the electrical isolation of the transformer, the laptop power supply is raised to a potential of 110V (providing the laptop is supplied via the mains). Because there is no assurance with conventional SUB-D connectors that the shield will contact before the signal lines, there is a risk of potential equalization taking place via the signal ground line. This will destroy the relevant SIO channel.

# INFO-StandAlone Master

# INFO-SAM

## Serial Interface

## Description



The serial interfaces can be operated as RS232 or RS485/422 interfaces.

Switchover is done by jumper J6 → COM-0 and J7 → COM-1.

(See P. 5)

### RS232 interface

In order to ensure reliable operation between the INFO-SAM and the connected periphery, wiring recommendations are given opposite. The sketched cable connections correspond to the connector allocation of channel 0 of the INFO-SAM board. The connector allocations of the peripheral devices (modem, printer, etc.) are standardized.

### Minimum

This connection (PC - INFO-SAM) is mainly used for debugging, data transmission and operating data collection. It is often also called the minimum connection with software handshake.

### Maximum

This connection type must be supported by the PC software. This variant uses ONE handshake line: Data Terminal Ready → Data Set Ready.

### RS422 interface

RS422 and RS485 interfaces have been developed for serial data transmission across long distances. It is possible to implement data transmission lines across distances as long as 1200m.

The termination resistors must be additionally mounted.

### Pin allocation

RS232	RS485	COM0	COM1
TxD →	SOut-	3	8b
DTR →	SOut+	4	10b
RxD →	SInp-	2	8d
DSR →	SInp+	6	10d
Gnd →	Gnd	5	12,14b

### Pin description

TxD	Transmitted Data	DTR	Data Terminal Ready
RxD	Received Data	DSR	Data Set Ready
RST	Request to Send	DCD	Data Carrier Detect (CD)
CTS	Clear to Send	RI	Ring Indicator

# INFO-SAM

## Description

### Netzwerkanschluss

Über den RJ-45 Stecker (ST.4) wird die Masterkarte an ein 10MBit oder 10/100MBit Netzwerk angeschlossen. Dazu ist ein handelsübliches Kategorie 5 Patchkabel nötig. Für Industrie-Anwendungen nur abgeschirmte Kabel verwenden. Die maximale Länge zum nächsten Hub oder Switch beträgt 100m.

Wird der Master direkt mit einem PC verbunden, (nicht über einen Hub oder Switch), muss ein gekreuztes Netzwerk-kabel (Crossover) verwendet werden.

Wenn der Master in ein grösseres Firmenetzwerk eingebunden wird, muss besonders auf die Vergabe der Netzwerkadresse geachtet werden. Die Karte braucht eine statische, einmalige IP-Adresse. Setzen Sie sich dazu mit Ihrem zuständigen Netzwerkadministrator in Verbindung.

**Wichtig:** Die IP-Adresse muss richtig gesetzt sein, **bevor** der Master mit dem Netzwerk verbunden wird, da sonst Adresskonflikte auftreten können.

### IP-Nummer Vergabe

- Aufstarten des SAMs im Notsystem (mit Notstecker, Siehe Seite 2).
- Über die serielle Schnittstelle kann auf den SAM mit **SlaveNumber 1** zugegriffen werden.
- Setzen der IP-Adresse unter **Target.IPAddress**
- Jetzt kann über Netzwerk auf die IP-Adresse zugegriffen werden oder über ein Serielles Target, dessen **SlaveNumber dem untersten Byte der IP-Adresse entspricht!**

### Default IP-Adressen:

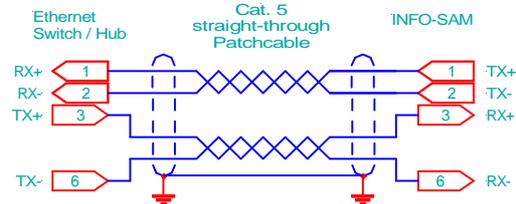
- IP-Adresse im Notsystem:  
255.255.255.1
- IP-Adresse in neuem IMD-Projekt:  
192.168.0.1

**Wichtig:** Das unterste Byte der IP-Adresse entspricht der Slave-Nummer des Serielles Targets! Slave-Nummer 255 geht immer.

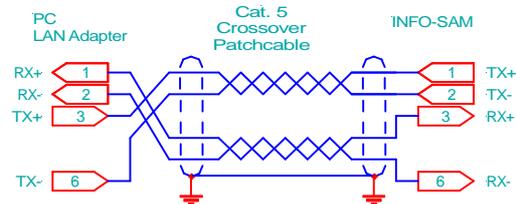
# INFO-StandAlone Master

## Network connection

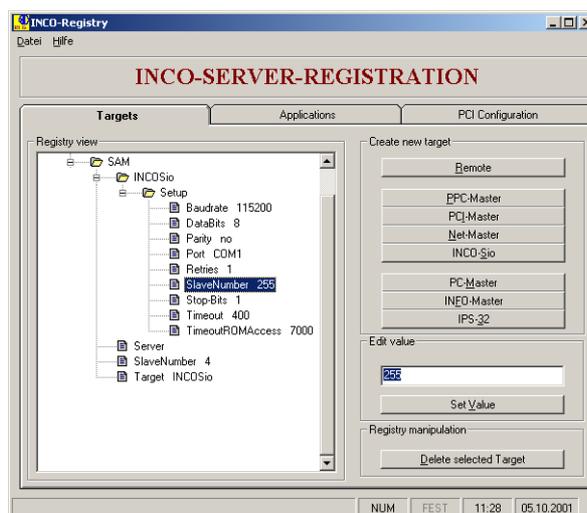
### Connection Diagram LAN <-> SAM



### Connection Diagram PC <-> SAM



## Serial Target



### Troubleshooting

### Fault

As all INFO modules are connected in series, the link is interrupted as soon as a module is without power supply. Therefore take care to ensure that all boards are supplied with power (the red LED at the receiver module must be lit).

Some INFO modules from older series (e.g. INFO-16P, INFO-4KP) have built-in fuses. When these have blown, an LED will be lit underneath the defective fuse. Therefore, if necessary remove the cover in order to determine whether a fuse has failed.

When the master is active (TRANS successfully completed), it will continuously transmit data via the INFO-Link. In order to determine whether the master is active and performing properly, make a direct connection using a fiberoptic line between the master transmitter and the master receiver. (Remove the transmit power jumper if the fiberoptic line is shorter than 10m.). Now, the yellow LED on the master must be lit.

Now include the first INFO board in the fiberoptic loop and set the transmit power jumper according to the fiberoptic cable length. If this module is properly addressed by the master, the yellow LED must be lit here, too.

Include all the other INFO modules in the same way in the fiberoptic loop until all modules are working and also the last yellow LED in the circuit and on the master is lit. Now the link is OK throughout.

The link is obviously closed and OK. Either your module is not included in this circuit at all, or it is not addressed by the master. Check that the board type and the address switch of your configuration corresponds to the Config-File. In case of customized boards, also the associated software must be loaded in the master.

Your link obviously contains a section that can be exposed to interference. The cause is usually an inadequate amount of light arriving at the receiver, in rare cases also too much light. In any event, check first that the transmit power jumpers are correctly set on all INFO modules and on the master and that sufficient light reserves are available (see page 3).

With the diagnostic tool of the Indel Master Desk IMD, you can find the cards which generates the errors.

From an electrical point of view, the receiver is the most sensitive component of every INFO module, since the light pulses are here converted to currents of merely a few pA. Although the casings of the INFO modules are made of special ferrous plastic with shielding properties, unfavorably arranged relays or contactors with unquenched contacts may easily interfere with the receiver. An adequate distance and grounded shield plates will help most in such a case. (See also INDEL Wiring Guidelines, Design Guidelines.)

**Red LED (Power) is not lit:**

**Yellow LED (Rec) is not lit**

**Yellow LED on the master is lit, but not on the external module**

**Error or LinkDown counter is counting**