

Industrial-keyboard-system

IKL-118 LT[1|4] *m*x*n* [LED] ethernet

IKL-118 LT1 4x3 ethernet

IKL-118 LT1 4x3 LED Ethernet

IKL-118 LT1 4x3 RGB ethernet

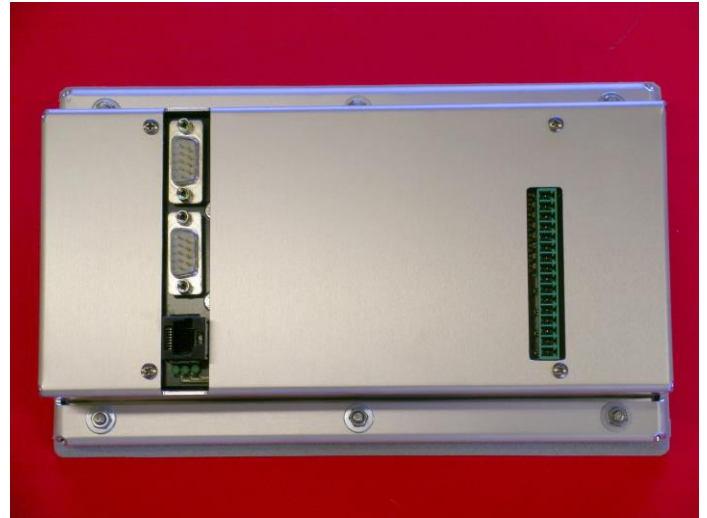
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Common



IKL 118 LT1 4x3 front view



rear view



IKL 118 LT1 4x3 LED ethernet



IKL 118 LT1 4x3 ethernet (with lamps)

R&R IKL-118 illuminated panel keyboard

front panel
dimensions

aluminium anodized
front panel 246 x 150 mm
mounting hole 233 x 137 mm
depth 71 mm without plugs

key types / layout

LT1 max. 4x4 keys
LT4 max. 10x4 keys

actuation force
level

1N or 2N
1.2 mm

Lifetime of keys
protection class

> 3 x 10⁶ cycles
front IP65

sealed contacts and leading system

inscription of the keys

On request or by customer

host interface / protocols

inlay size 27 x 17 mm

Ethernet 10 BASE T plug RJ45

protocol IP(IPv4), ARP, TCP, UDP, ICMP, Telnet
others on request

additional interfaces

RS232C,

8 digital inputs and 6(8) digital outputs 0/24V

temperature range

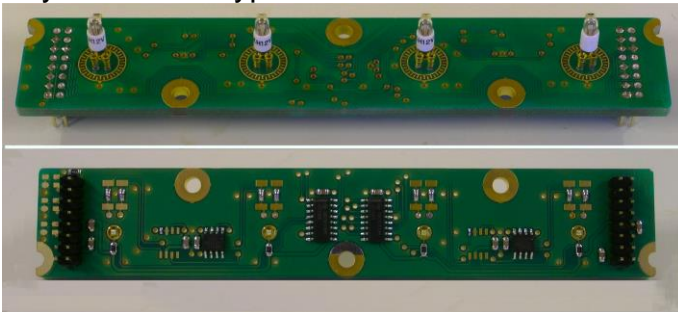
0°C...70°C

Key numbering

1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	16

...

Keyboard-PCB type RR-P-394



for LT1-keys (grid 35 x 25 mm)
with shift register interface
can be aligned in each direction
(4x1 keys per segment)

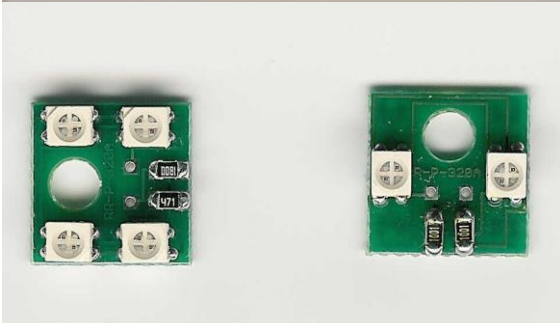
illumination options

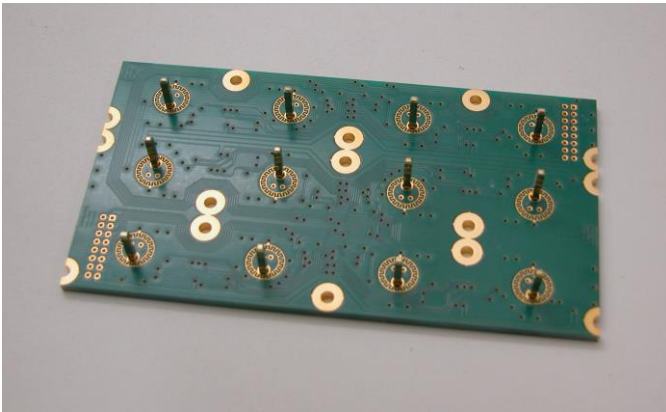
Micro lamp type T1

LED 3mm 1color or 2color

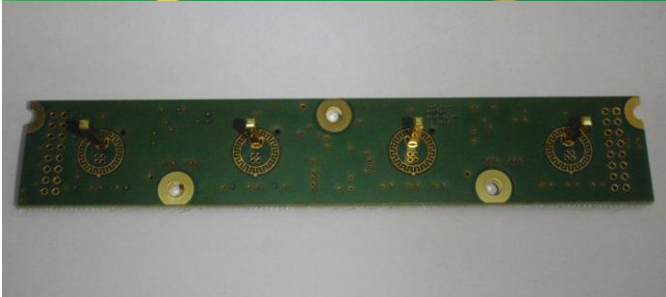
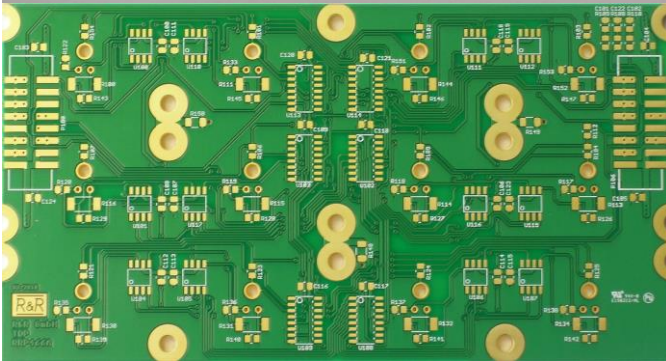
RR-P-320 2x 2color LED

RR-P-320 4x 2color LED

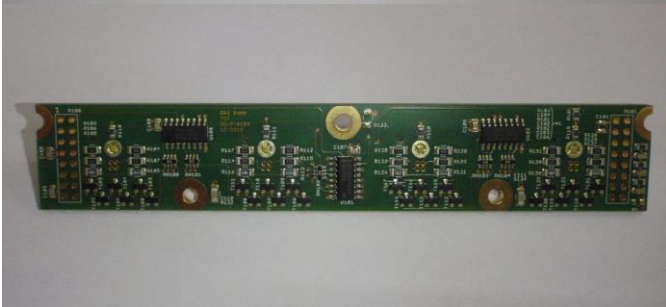


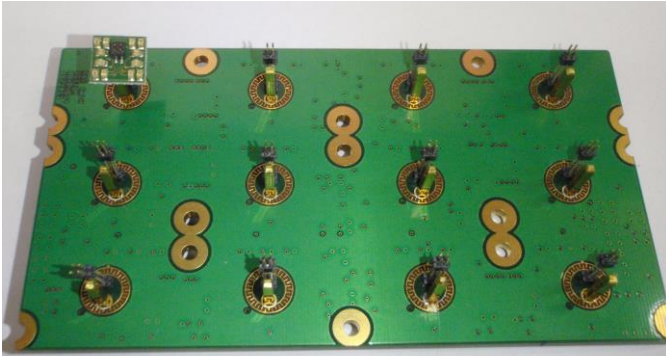


Keyboard pcb RR-P-466 = 3 x RR-P-394

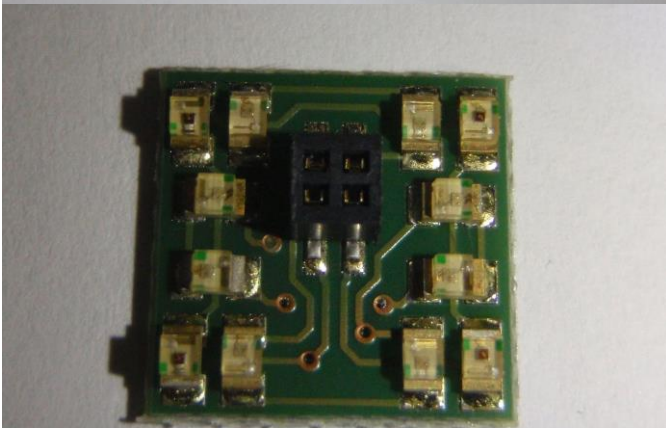
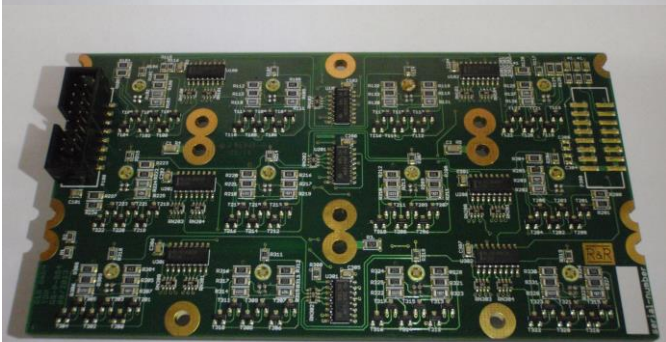


Keyboard pcb RR-P-515
R&R push button LT1
grid 35 x 25 mm
Shift register interface
can be aligned in each direction
(4x1 push buttons per module)
Illumination
RR-P-547 4x RGB LED





Keyboard pcb RR-P-554
= 3 x RR-P515
can be aligned in each direction
(4x3 push buttons per module)
Illumination
RR-P-547 4x RGB LED

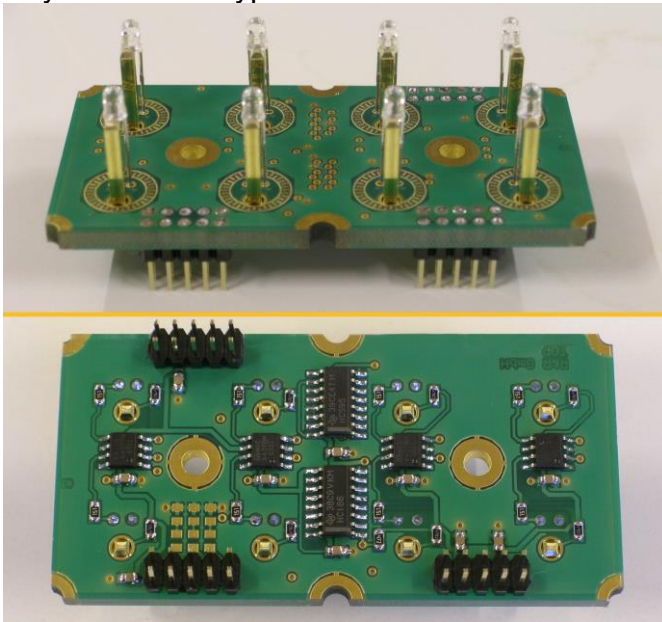


Illumination pcb RR-P-547 RGB LED
Usable for R&R push button type LT1 and LT2
2 x RGB LED
or
4 x RGB LED



IKL-118 LT1 4x3 RGB

Keyboard-PCB type RR-P-378



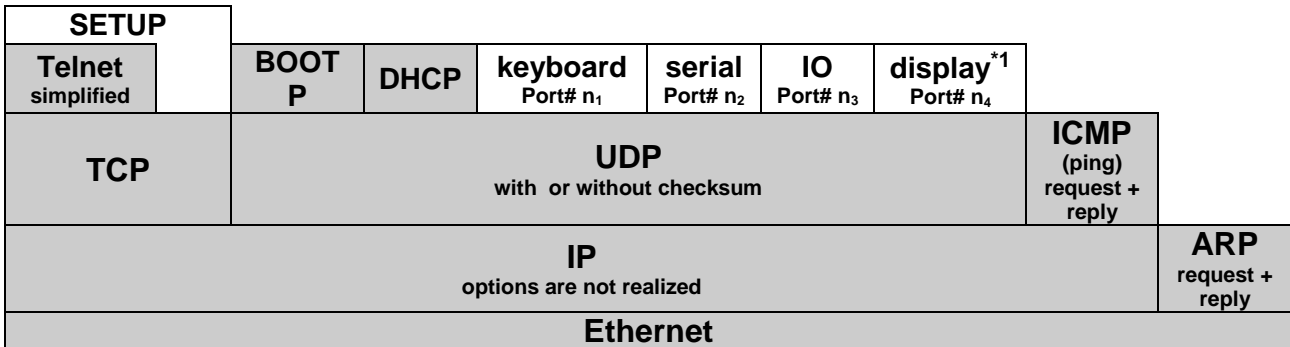
for LT4-keys (grid 19,05mm)
with shift register interface
can be aligned in each direction
(4x2 keys per segment)

illumination options
Micro lamp type T1
LED 3mm 1color or 2color

Datagram Formats

the TCP-IP-protocol-stack for illuminated keyboards Type “IKL 118 LT x m x n [LED] Ethernet”

Following diagram shows the realized protocols, in this device.



*1 the display is optional

The keyboard sends only after receiving a datagram.
The answer will always be send back to the last address.

Each received correct datagram to the IKL118 will be answered with a datagram.
The answer depends on the selected sub-units.

The sub-units **keyboard**, **serial** and **IO** send a datagram immediately when its state is changed. Changes are:

1. keyboard: press or release a key
2. serial interface: receive one or more characters
3. digital inputs: change from low to high or high to low on one or more inputs

Be aware that this behaviour can only be recognized after receiving the first datagram for the sub unit. Without a known IP-address the sub-unit will stay quiet!

Port-Numbers and IP-addresses can be changed/set by SETUP.

Datagram to the keyboard

The keyboard datagram begins with a mode control character

'K' Keyboard-Mode

'S' Status-String

Followed by the lamp//LED control string. The length of the control string is twice the number of the keys. For example: 12 keys = 24 characters.

The lamp state is divided in two parts (state #1, state #2). The first half of the control string defines the lamp/LED state #1 . The second half of the control string defines the lamp/LED state #2 . The states of the lamps/LEDs are changing in an interval of 1 second between state #1 and state #2 .The keys are enumerated from left to the right and from top to bottom. The first character is assigned to the first key, the second character is assigned to the second key and so on. If the key should not blink, the character in the control string must be the same in state #1 and state #2 .



There are different sets of control characters for lamps and LEDs.



1. lamps '0' (Null) for Off
 'i' for half intensity
 'I' for full intensity

2. LEDs '0' (Null) for Off,
 'Y' or 'y' for yellow
 'G' or 'g' for green
 'R' or 'r' for red

3. RGB LED '0', 'o', 'O' = OFF
 'r' = red half intensity 'R' = red full intensity
 'g' = green half intensity 'G' = green full intensity
 'y' = yellow half intensity 'Y' = yellow full intensity
 'b' = blue half intensity 'B' = blue full intensity
 'm' = magenta half intensity 'M' = magenta full intensity
 'c' = cyan half intensity 'C' = cyan full intensity
 'w' = white half intensity 'W' = white full intensity

other characters are not allowed

example 1: control string for LEDs string = "YYYYRRRRGGGGYRG0YRG0YRG0"	
The LEDs blink between state #1 and state #2:	
The 1 st half of the string describes state 1	The 2 nd half of the string describes state 2
"YYYYRRRRGGGG"	"YRG0YRG0YRG0"
	
Y	yellow
R	red
G	green
0	Off

example 2 for micro bulb lamps control string = "IIIIiiiiI0I0II0iii0I0I0I"	
the lamps blink between state #1 and state #2:	
The 1 st half of the string describes state 1	The 2 nd half of the string describes state 2
"IIIIiiiiI0I0"	"II0iii0I0I0I"
	
I	full intensity
i	half intensity
0	(Null) Off

Datagram sent by the keyboard

The keyboard has 2 modes.

1. Status string

In this mode the keyboard always sends a status string of the length, which corresponds to the numbers of keys. The strings contain only '0' (Null) and '1'.

The string example '000100000000' means the keyboard has 12 keys and the 4th key is pressed. If the key is released, the unit will send '000000000000'. The status string is embedded in a datagram of the following structure:

'S' + Status-String + <CR>

Every change of any key release an immediate datagram.

2. Keyboard mode

In this mode the unit behaves like an ordinary keyboard. That means, if a key is pressed, a character will be sent. In the same way, a character can be sent if a key is released.

For example:

If the SETUP item A is set to "make start at 0x41, break start at 0x61"

The keyboard with 12 keys will send make-codes from 'A' to 'L'.

The keyboard will send break-codes from 'a' to 'l'.

This datagram has the following structure:

"K" + make/break-code

Datagram to the serial interface

The serial interface can be used for small units like barcode scanners or similar units.

Restrictions for the serial port are:

1. No datagram longer than 64 bytes (receive buffer of the serial interface)
2. The buffer must be empty before the next datagram is sent
waiting time = number of bytes * 11 / baud rate

The restrictions are necessary due to the fact, that the Ethernet interface is fundamentally faster than an asynchronous serial interface.

Datagram from the serial interface

The answer datagram contains the received characters. If the receive buffer of the serial interface is empty, a datagram is sent with a data length of 0 (Null). There are no restrictions for the receiving direction, because the Ethernet interface is much faster than the serial interface. To minimize the traffic, the received characters are sent as a block datagram. The blocks are build according to following rules:

1. the input buffer is full
2. there are no new characters received since 100 ms.
3. the last received string is an CR LF (0x0D, 13₁₀)

The parameters for the serial port can be defined in the SETUP-mode

Datagram to the digital outputs

The outputs are controlled with a string of an 8 characters. The outputs are top down enumerated. The first character is assigned to the first output. There are only two characters defined:

1. '0' = OFF
2. '1' = ON

other characters are not allowed

Datagram from the digital inputs

The status datagram of the digital inputs is defined as a string of 8 characters. The status datagram is send as an answer to the datagram to the digital outputs. The string is build of character '0' (Null) and character '1'.

'0' = low level at the input-pin

'1' = high level at the input-pin

Every change of any input does force the immediate sending of a status datagram.

Datagram to the display (option)

Any datagram send to the sub unit display is shown on the screen. The old display screen will be deleted. The display scrolls up, if the string is longer than the size of the display.

Datagram from the display (option)

The answer of the sub unit display is always the string "OK".

The sub unit display does never send an immediate datagram by itself.

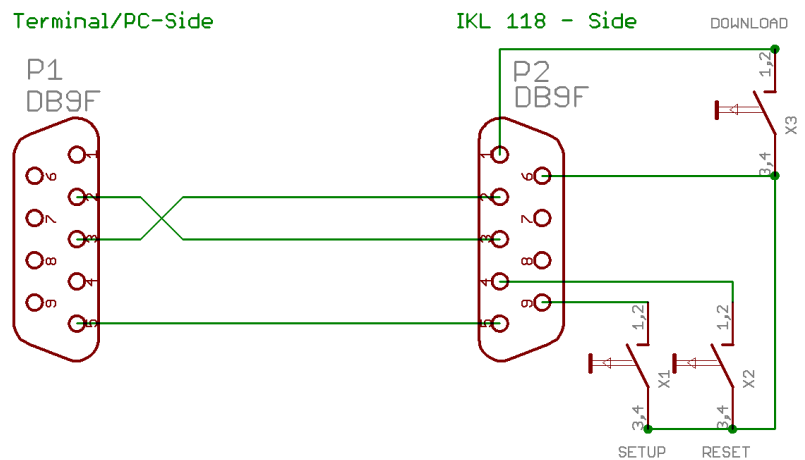
SETUP - Mode

The SETUP screen can be reached by the serial port or a TCP/TELNET-connection.
Please use a terminal or a terminal emulation running on a PC.
For the serial port use a special data cable as described below.
The parameters for serial interface are: 19200 Baud, 8 Bits no parity (19200/8/N).
For TCP-Telnet please use standard RJ45 cable.

Start of SETUP – Mode

1. press the SETUP-button for SETUP by the serial interface
or
2. establish a TCP-connection with the IKL118-device
(Port-Number on SETUP)
or
3. establish a Telnet-connection with the IKL118-device

SETUP - cable for serial interface



The input mask of the SETUP will appear

```
Tera Term - 192.168.116.101 VT
File Edit Setup Control Window Help
R&R IKL 118 LT1 ethernet setup
-----
1. MAC-address 52:26:52:0:0:2
2. IP-address 192.168.116.101
3. mask 255.255.255.0
4. gateway 192.168.116.2
----sub device----port---IP-address-----
5. keyboard 48000 0.0.0.0
6. serial 48001 0.0.0.0
7. IO 48002 0.0.0.0
8. display 48003 0.0.0.0
-----
9. baud/bits/parity 19200/8/N
A. keyboard mode make start at 0x41 break start at 0x61
-----
B. DHCP enabled
C. telnet setup enabled
D. tcp setup 10000
-----
0 save & exit, ESC quit without save
```

Use of SETUP:

The SETUP-Mode can be reached in different ways.

1. Connect the unit with a serial data cable to an terminal or an PC with a terminal emulation.
Start the set-up by pressing the set-up key. This option can not be locked.
2. Connect the unit to an Ethernet interface.
You must now the IP-Address of the unit. The port-Address is defined through the use of a telnet connection.
Start a Telnet connection with a terminal program.
The Setup-Mode will be mounted by this connection.
This option can be locked.
3. Connect the unit to an Ethernet interface.
Start a TCP connection with a terminal program.
The Setup-Mode will be mounted by this connection.
You must now the IP-Address and port number of the unit to establish a connection.
This option can be locked by setup.

The Terminal-Program must be a VT100-Terminal. Otherwise it will not work correctly.

During the SETUP-mode the unit keeps on working. Of course the serial port is occupied if you are using the serial port for SETUP. Leaving the SETUP mode by saving all changes will reboot the unit. The new parameters are valid at this moment.

Every input or parameter change must be finished with Enter/Return.
All addresses are decimal, separated by a dot.

For SETUP Item 5 to 8:

The port number 65535 will switch off the sub unit.

The IP address 0.0.0.0 will force the sub unit to accept any UDP-datagram of any station.

Using a valid IP-address, will force the sub-unit to accept data only from this station.

Item A

The meaning of "make start at 0x41" is that the first key will send an make-code 0x41 = 65₁₀ = 'A', the second key will send 'B' and so on.

"break start at 0x61" forces the first key do send a break-code 0x61 = 95₁₀ = 'a', the second key will send 'b' and so on. If parameter "break start at" set to 0xFF, no break-code will be sent.

Item B

To select the IP-address-procedure please use the keys D,B,F.

[D] = DHCP

[B] = BOOTP interval n

n = period for the life sign of the BOOTP server

n = 0 (Null) disables the function

n = 1 to 65535 period in seconds

[F] = valid IP-address selected by item 2

Every input must be closed with Enter.

Item C

Disables or enables the SETUP connection over Telnet.

[E] = enable

[D] = disable

The input must be closed with 'Enter'.

Item D

Disables or enables the SETUP connection over TCP.

n = 0 (Null) → disable

n = 1 ... 65535 → enable , n = Port-number

The input must be closed with 'Enter'.

For leaving the SETUP-mode please use key 0 (Null) or key 'ESC'.

[0] = All data will be saved to the E²PROM and the terminal will reboot.

[ESC] = Leaves the set up mode without saving.
The terminal will not reboot.

After power up all LEDs will be switched on (red or green). All SETUP parameters are checked by a check sum. Green indicates all SETUP-data are ok, red indicates an error, the SETUP-parameter must be checked by the user.

All LEDs will be switched on as long as the unit is waiting for an IP-address applied by DHCP / BOOTP. If the unit has a valid IP-address, all LEDs will be switched off after 2 seconds.

Hardware

Digital in/outputs and power-supply:

Phoenix "MCV 1,5/16-G-3,81"
 matching female plug Phoenix "MC 1,5/16-ST-3,81" (18 03 71 4)

Pin	Signal
1	Input 1
2	Input 2
3	Input 3
4	Input 4
5	Input 5
6	Input 6
7	Input 7
8	Input 8
9	Output 1
10	Output 2
11	Output 3
12	Output 4
13	Output 5
14	Output 6
15	Supply voltage + DC 24V (15..30V)
16	Supply voltage- (0V) and ground for inputs

Inputs:

The inputs have an input level of 0V/24 V DC. Input voltage lower the 8 Volt are recognized as logic 0. Input-level greater than 16 Volt is recognized as logic 1. Input Voltage above +/- 60 Volt will destroy the input circuit.

Outputs:

The outputs are switched to the power supply voltage.
 The output circuit is protected against short cut and over current.
 The power supply current of the whole unit must not exceed 2.5 A!

Power Supply:

The power supply is made for 24 V DC. The unit will work properly between 15V up to 30 V DC. The unit will not work properly below 15V DC. The exceeding 30 V DC may damage the unit! The power supply protected with 3A fuse inside.

Supply current with 24V DC

all lamps/ LEDs off	approx. 60 mA
all LEDs on	approx. 190 mA (...LT1 4x3 LED...)
all lamps on	approx. 400 mA (...LT1 4x3...)

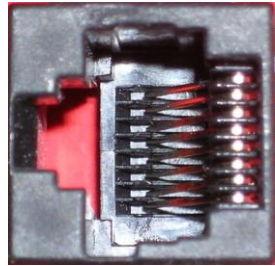
IKL118

Ob der Eck 4· D-78148 Gütenbach · Telefon (07723) 9186-0 · Telefax (07723)9186-30

[DNR13365_R04_E.doc](#) 07.04.2014

WWW.RURGMBH.DE WWW.RURSHOP.DE INFO@RURGMBH.DE

Network-connection



RJ45-female plug
fitting part: male plug RJ45

Pin	Signal
1	TX+
2	TX-
3	RX+
4	-
5	-
6	RX-
7	-
8	-

Specification:

10 BASE T (10MBit), Standard-interface
Protocol TCP/IP-family

serial interface (RS232C)




9pol. Sub-D- male plug
fitting part: 9pol. Sub-D female plug

Pin	Signal
1	download-switch (update)
2	RX
3	TX
4	RESET-button
5	Signal Ground
6	COMMON for all buttons/switches
7	RTS
8	CTS
9	SETUP-button

The serial interface is mainly used for the SETUP. The SETUP mode has fixed parameters of 19200 Baud, 8 Bit, none parity. In standard mode the serial interface can be used for any other purpose. The parameters of the serial interface can be selected by SETUP. Please do not connect the reserved pins of the serial port. The reserved pins (1, 5, 6, 9) are used to select special functions of the unit. Please be aware of the restrictions in the use of serial interface (see software / serial interface). The ground pin of the serial interface is connected to ground pin of the power supply. The serial interface does not support the handshake over RTS and CTS.

option:

9pol. Sub-D- male plug
fitting part: 9pol. Sub-D female plug

	Pin	Signal
	1	-
	2	-
	3	-
	4	-
	5	-
	6	-
	7	-
	8	-
	9	-

Reserved for future extensions, please do not use