1 General Information

This device is designed and built in conformity with the latest technical rules at the time of its development and production, so it is safe to operate.

Danger maybe presented by it, if it will be used for other than the intended purpose and by unskilled personnel. Please observe the standards and regulations of the VDE, the DIN as well as the following safety notes!

1.1 Safety Notes

The IP-Router shall only be used for its intended purpose and in undamaged and perfect condition!

1.2 Conformity with standards

Conforming to: Low voltage directive 72/23/EEC and EMC-directive 89/336/EEC.
Designed, manufactured and tested acc. to DIN EN ISO 9001.

1.3 Contens of operating instructions

Every person, ordered to work with the device, has to read the instructions carefully to understand them before work begins.

1.4 Changes and modifications

To avoid danger and to assure optimum performance, changes and modifications to the device are not allowed, except when the manufacturer has approved them.

1.5 Operational Safety

Observing the stated safety instructions and regulations can avoid damage to property and people when working with the converter.
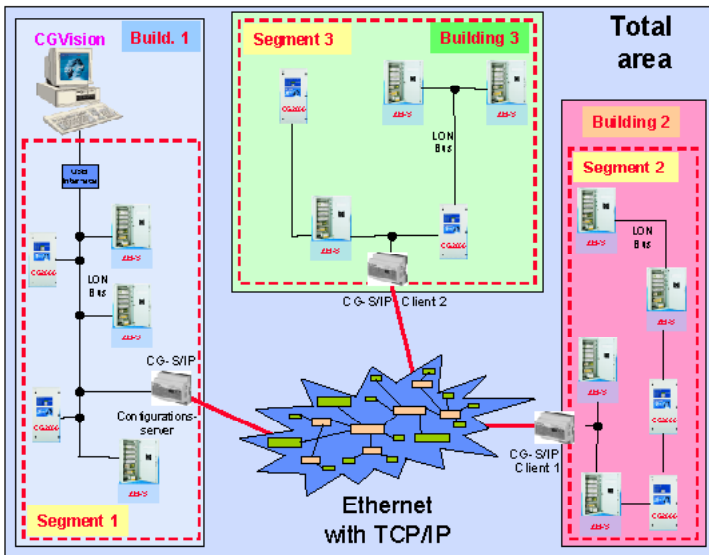
2 Technical Data

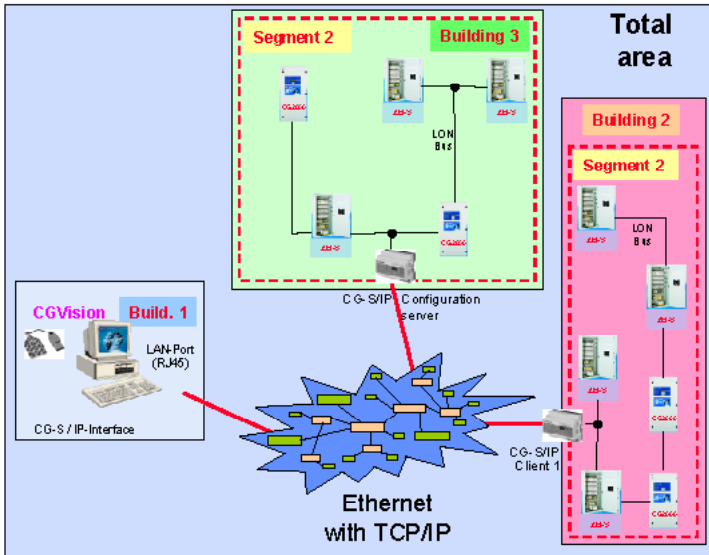|	
Operating voltage:	9-35 V DC or 12-24 V AC +/- 10%
Power consumption:	typ. 3W
In rush current:	up to 950mA @ 24V AC
Operating temperature (ambient):	0°C...+50°C
Storage temperature:	-10°C...+85°C
Humidity (non condensing) operating:	10 to 90% RH @ 50°C
Humidity (non condensing) storage:	90% RH @ 50°C
Enclosure:	Installation enclosure 6 TE, DIN 43880
Environmental protection:	IP 40 (enclosure), IP 20 (screw terminals)
Installation:	DIN rail mounting (EN 50 022) or wall mounting

3 Installation and function

3.1 Classical crosslinking

On side of the CGVision, a CG-S / IP router is placed, which is configured as configuration server. This device can manage up to 5 pcs. or up to 100 pcs. with multicast (see 4.7) CG-S / IP router (as client configured), which are placed on side of the emergency lighting sytems with STAR-technology (CG2000, ZB-S). The clients support DHCP in Intranet networks. Easy to understand diagnostic LEDs allow installers and system integrators to install and troubleshoot this device without expert knowledge and dedicated troubleshooting tools. Advanced built-in network statistics and network diagnostics capabilities allow fast network installation and guarantee reliable operation over the entire lifetime of the network.

3.2 Direct LAN-connection

The CG-S / IP ROUTER is a high performance, reliable, and secure network infrastructure component for accessing a CG-S BUS network with visualisation software CGVision and CEAG emergency lighting systems over the Intranet or Internet, as well. To create a CG-S bus network via Intranet, min. 2 pcs. CG-S / IP router are necessary. The first one is to configure as "configuration server", the second one is to configure as "client" a communication via ethernet via TCP / IP. If on side of CGVision a direct connection via LAN-interface is desired, an optional CG-S / IP-interface is available. In this case the CG-S / USB-interface or the CG-S / IP-router is not needed. The PC requires a static IP-address! Furthermore, a CG-S / IP-router must be configured as a configuration server, in which the IP-address of the PC must be entered.
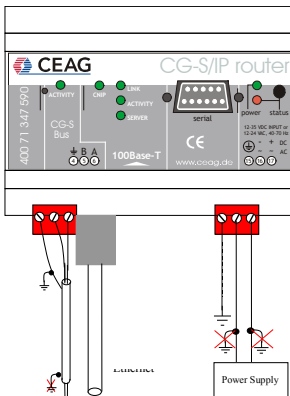
4 Mounting

4.1 Safety Notes

For the mounting and operation of electrical apparatus, the respective national safety regulations as well as the general rules of engineering will have to be observed.
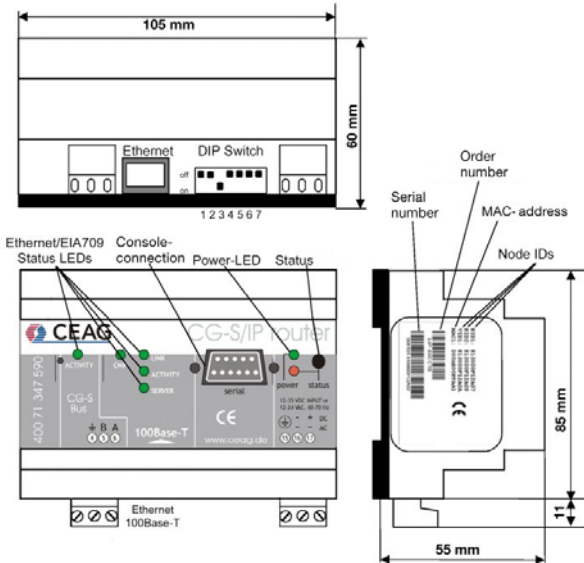
4.2 Hardware Installation

This chapter shows step-by-step instructions on how to configure the CG-S / IP-Router for a simple network architecture in a LAN environment.
Connect power 9-24V, the CG-S bus and the ethernet cable as shown in the figure below.

The CG-S / IP-Router enclosure is 6 TE (1 TE = 17.5mm) wide for DIN rail mounting following DIN 43 880:

4.3 Mounting

The device comes prepared for mounting on DIN rails following DIN EN 50 022. For wall mounting the CG-S / IP ROUTER uses a DIN rail. Then the CG-S / IP ROUTER is snapped on the rail.
The device can be mounted in any position. However, an installation place with proper airflow must be selected to ensure that the CG-S / IP ROUTER temperature does not exceed the specified range. For an easy installation, a complete connection box, including a CG-S / IP Router and a power supply is available (part no.: 400 71 347 592).

4.4 IP Configuration for Client Device via Console

Use a PC terminal program, e.g. Hyper Terminal, with the communication settings set to 38,400 bps / 8 data bits / no parity / 1 stop bit / no handshake. Connect a serial cable (null modem) to COM1 on the PC and to Console on the CG-S / IP ROUTER. Power up the CG-S / IP ROUTER or press Return if the CG-S / IP ROUTER is already running. The following menu should appear on the terminal:

```
Configuration Menu
======================

[1]   Show device information
[2]   Serial firmware upgrade
[3]   System configuration
[4]   EIA709 configuration
[5]   IP configuration
[6]   EIA852 device configuration
[7]   EIA852 server configuration
[8]   Reset configuration (factory defaults)
[9]   Device statistics
[0]   Reset device


Please choose:
```

Figure above) Main CG-S / IP ROUTER menu.
Select 5 from the Configuration Menu and enter the IP address, netmask and gateway address. Note that you must use different IP addresses if you are using multiple CG-S / IP Router in your setup.

```
IP Configuration Menu
=====================

[1]   DHCP/BOOTP              : disabled
[2]   IP Address              : 192.168.1.254
[3]   IP Netmask              : 255.255.255.0
[4]   IP Gateway              : 192.168.1.1
[5]   Hostname                : newlip
[6]   Domainname              :
[7]   DNS Servers             : none
[8]   NAT Address             : none

[9]   MAC Address             : 00 0A B0 01 00 1D (factory default)
[0]   Connection Keep Alive   : disabled

[q]   Quit without saving
[x]   Exit and save


Please choose:
```

Figure above) Enter basic IP settings.
Press x to save the IP settings and reset the CG-S / IP ROUTER with the main menu item 0 in order to let the new IP settings take effect.
You should now be able to add the CG-S / IP ROUTER to your CN/IP channel in the configuration server member list. If the CG-S / IP ROUTER should also act as the configuration server please proceed to Section 4.6.
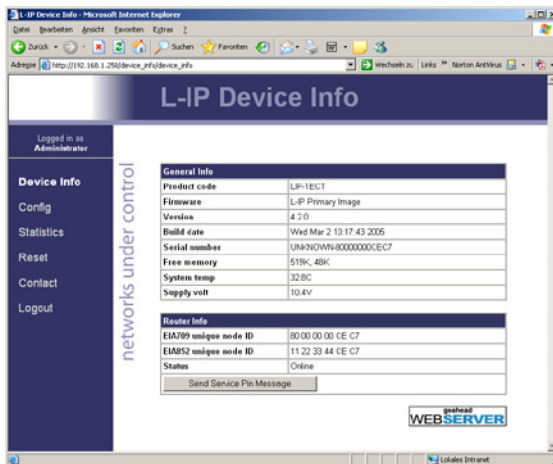
4.5 IP Configuration for Client Device via Web-Interface

Optionally to using the console interface one can also use the web interface to configure the client device. In your favorite web browser enter the default IP address 192.168.1.254 of the CG-S / IP ROUTER. Note that if your PC has an IP address in a subnet other than 192.168.1.xxx please open a command tool and enter the following "route" command to add a route to the CG-S / IP ROUTER.
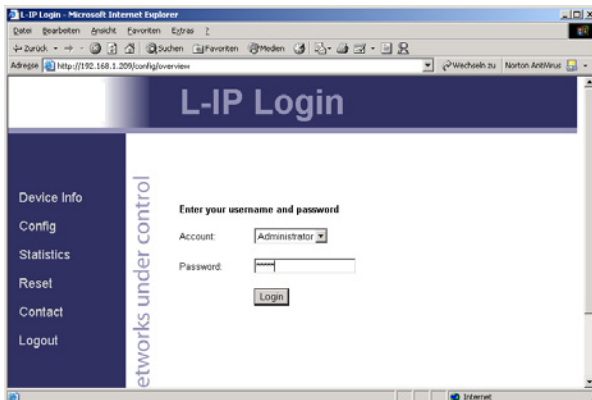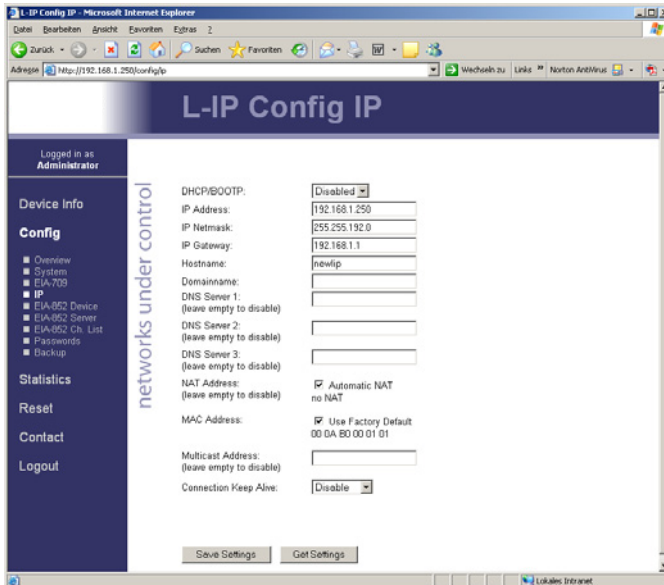
Windows START => Run

command.com

Route add 192.168.1.254 %COMPUTERNAME%

Click on „Config" in the left menu. You will be asked to enter the administrator password in order to change the IP settings. Enter „admin" and select Login.

The Config menu opens. Click on IP in the Config menu and enter the IP-address, the IP netmask and IP gateway for this CG-S / IP-router as shown above:

Press „Save Settings" and then reset the device by selecting „reset" in the highlighted text. This changes the IP settings of the CG-S / IP-router.

4.6   Configuration Server Settings

On side of the CGVision, a CG-S / IP Router must place, which is configured as configuration server for the CN/IP channel. Therefore go to the main menu item 7 and activate the EIA852 configuration server menu. Enable the configuration server [1] and y and add the client devices with the menu item a. Client devices include all other CG-S / IP ROUTERs, which should participate in the communication on the CN/IP channel.
Verify with the menu item l (lower case L) that the device(s) have been registered successfully.
Press x to save the new settings.
Optionally the configuration server settings can be set through the web interface by selecting the "EIA852 Server" and the "EIA852 Ch. List" menu item.
The cnip-LED on all CG-S / IP ROUTER devices should be green and the server-LED on the configuration server CG-S / IP ROUTER should be green as well.
Add the CG-S / IP ROUTER router to your network drawing and commission the CG-S / IP ROUTER in the network. You should now be able to communicate with CGVision via an Ethernet channel to all emergency lighting systems.

4.7 Multicast-Configuration

To reduce the bus-demand it is necessary to configure the CG-S / IP-Router with a multicast-address when operating with more than 6 pcs.
IP-multicast is a technic to send data efficiently to many recipients at the same time in one IP-network. All devices get the same multicast-address in one multicast-group.
Valid address-range from 224.0.0.0 to 239.255.255.255.
Enter the multicast-address in the menu „IP".

5 LED signals

5.1 Power LED (green power LED)

The CG-S / IP-Router power LED lights up green when power is supplied to terminals 16 and 17.

5.2 Status LED (red status LED)

The CG-S / IP-Router is equipped with a red status LED.
During boot-up the status LED is used to signal error conditions (red).
After boot-up the status is used to signal write accesses to flash memory (illuminates red for the duration of every write access).
If the fall-back image is executed the status LED flashes red once every second.

5.3 CG-S bus-activity LED

The CG-S bus-port at the CG-S / IP-Router has a three-coloured LED (green, red and orange). The following table shows different LED patterns of the port and their meaning.

Behaviour	Description	Comment
GREEN flashing fast	Traffic	
RED permanend	Port damaged	
RED flashing fast	Traffic with high amount of errors	
RED flashing at 1 Hz (all ports)	Firmware image corrupt! Please upload new firmware	Only by CEAG
ORANGE permanent	Port disabled	
ORANGE flashing fast	Traffic on port configured as management port	
ORANGE flashing with 1 Hz	Bit-rate-auto-detection	RS 485-ports only
ORANGE permanent (all ports)	Status button pressed for more than 5 seconds. CG-S/IP-Router will be reset to factory default once button is released	

5.4 Ethernet LInk LED (link LED)

The Ethernet Link LED lights up green whenever an ethernet cable is plugged-in and a physical connection with a switch, hub or PC can be established.

5.5 Ethernet Activity LED (activity LED)

The Ethernet Activity LED lights up green for 6 ms whenever a packet is transmitted or received or when a collision is detected on the network cable.

5.6   EIA-852 Status LED (cnip LED)

The CNIP LED is a three color LED that indicates different operating states of the CG-S / IP-ROUTER device.

Green: Device is fully functional and all CNIP configuration data (channel routing info, channel membership list, send list) are up-to-date.

Green flicker: If a valid CG-S bus packet is received or transmitted over the IP channel the CNIP LED turns off for 50ms. Only valid CG-S bus IP packets sent to the IP address of the CG-S / IP ROUTER can be seen. Stale packets or packets not addressed to the CG-S / IP ROUTER are not seen.

Yellow: Device is functional but some configuration data is not up-to-date (device cannot contact configuration server but has configuration data saved in Flash memory)

Red: Device is non-functional because it was rejected from the CN/IP channel or shut-down itself due to an internal error condition.

Off: Device is non-functional because the CNIP module has not started. This can be the case if the CG-S / IP ROUTER uses DHCP and it has not received a valid IP configuration (address) from the DHCP server.

Flashing Red: Device is non-functional because the CNIP module is started but has not been configured. Please add the device to a CN/IP channel (register in configuration server).

5.7   Configuration Server LED (server LED)

The Configuration Server LED illuminates green whenever the configuration server is activated on the CG-S / IP-Router device.

5.8   Wink Action

If the CG-S / IP ROUTER receives a wink command on any of its network ports, it shows a blink pattern on the CNIP and the CG-S BUS activity LEDs. The CG-S BUS activity and the CNIP LED turn green/orange/red (each 0.15 s). This pattern is repeated six times. After that the CNIP LED flashes orange six times if the wink command was received on the IP channel or the CG-bus activity LED flashes orange six times if the wink command was received on the CG-S BUS channel. After that the CG-S / IP ROUTER LEDs return to their normal behavior.

5.9   Network Diagnostics

The CG-S / IP-Router provides simple network diagnostics via its CG-S bus activity LED:

1)   If the LED does not light up at all this port is not connected to any network segment or the connected network segment currently shows no traffic.

2)   If the LED is flashing green the network segment connected to this port is ok.

3)   If the LED is flashing red a potential problem exists on the network segment connected to this port. This state is refered to as overload condition.
A port overload condition occurs if
- the average bandwidth utilization of this port was higher than 70% or
- the collision rate was higher than 5% or
- more than 15% CRC errors have occurred on a port with a power-line transceiver or more than 5% on a port with a transceiver other than power-line or
- the CG-S / IP ROUTER was not able to process all available messages.

For a deeper analysis of the reason of the overload condition it is recommended to use a protocol analyzer.

5.10 Status Button

The CG-S / IP ROUTER is equipped with a status button. When pressing the status button shortly during normal operation of the CG-S / IP ROUTER it sends a "Service Pin Message" on both network ports. Note, that every CG-S / IP ROUTER port has its own unique node ID ("Neuron ID"). As alternative to pressing the status button a service pin message can be sent via the web interface.

When pressing the status button during normal operation for more than 5 seconds, the CG-S / IP ROUTER loads the factory default settings.

5.10.1 Loading Factory Defaults

In order to load the factory default settings, the status button needs to be pressed for at least 5 seconds during normal operation of the CG-S / IP ROUTER. Loading factory defaults means:

- Resetting the CG-S BUS transceiver to the standard values.
- Clearing the group forwarding, the subnet/node forwarding and the router domain table when used in smart switch mode.
- Clearing the CG-S / IP ROUTER status and statistic data.
- But **does not** clear the IP address and EIA852 configuration settings.

All this is done when the button is released. Afterwards a reset is performed to let the changes take effect. Once the button is held down for more than 5 seconds the CG-S BUS activity and the CNIP LED are switched to orange and stay orange until the button is released and the CG-S / IP ROUTER is reset. This indicates that the CG-S / IP ROUTER was reset to factory settings.

Alternatively to holding down the status button the factory defaults can be loaded by selecting the menu item "Reset to factory defaults" in the console menu.

Important: If the CG-S / IP ROUTER is moved from one location to another or if major changes to the configuration of the network are made, it is recommended to reset the CG-S / IP ROUTER configuration to factory defaults.

Important: Wait at least 30 seconds after power-up of the CG-S / IP ROUTER before pressing the Status Button to ensure that the CG-S / IP ROUTER has booted properly!

5.11 DIP Switch-Settings

The L-IP has 7 switches to select the operating mode. Repeater mode is recommended. For details see the following table:

OFF = switch above, ON = switch down

DIP-switch #	Function	Factory default
1, 2	ON, ON: Smart Switch Mode **ON, OFF: Repeater Mode** OFF, ON: Smart Switch Mode / Subnet Learning OFF, OFF: Configured EIA-709 Router	**ON, OFF**
3	reserved	ON
4	reserved	OFF
5	Station ID Bit 0 (LSB)	OFF
6	Station ID Bit 1	OFF
7	Station ID Bit 2 (MSB)	OFF

5.12   Power Supply

The CG-S / IP-Router can either be DC or AC powered.

Terminal	Function	Note
15	Main Earth Ground	
16, 17	Power Inputs	9-35 V DC or 9-24 V AC +/- 10%

Important: Do not ground one of the power supply wires on terminal 25 and 26!

5.13   Terminal Layout

The CG-S / IP-Router provides screw terminals to connect the network as well as to the power supply. The screw terminal can be used for wires having a maximum thickness of 1.5mm / AWG 12.

5.13.1 CG-S / IP-Router

Terminal	Function
4	Screen
5, 6	LON A, B of CG-S bus
15	Main Earth Ground
16, 17	Power Supply

5.14   Wiring

Every network segment connected to the CG-S / IP ROUTER needs to be terminated according to the rules found in the specification of the transceiver.

Important: All used and unused ports must be properly terminated. For unused ports, it is recommended to use a 100 Ohm 0.25 W resistor between terminals A and B as termination.

Important: When using shielded network cables only one side of the cable should be connected to ground. Thus, the shield must be connected to earth ground either at the CG-S / IP ROUTER terminals or somewhere else in the network, but never at more than one place!

6   Console Interface

6.1   Console Connection

The CG-S / IP-Router is equipped with a serial interface to
● display the results of the self test
● allow configuration via a console menu

To use the serial interface the console connector of the CG-S / IP-Router can be connected to the RS-232 port of a PC. The PC can communicate with the CG-S / IP-Router using a standard terminal program with the communication settings set to 38,400 bps/ 8 data bits / no parity / 1 stop bit / X ON / X OFF.

Important: It is mandatory to at least set the proper IP configuration in order to operate the device!

6.2   Self Test

Whenever the CG-S / IP-Router comes out of reset it performs a self-test. If the self-Test passed successfully, the CG-S bus activity LED turns green for 0.5 sec. If a failure occurs during the self-test, the status LED is flashing red and the CG-S / IP-Router resets. The console output of a successful boot sequence on an CG-S / IP-Router reads as follows:

```
Testing Board ID (0E)                             Passed
Testing RAM                                       Passed
Testing boot loader                               Passed
Testing fallback image                            Passed
Testing primary image                             Passed
Testing Flash                                     Passed

Loading primary image                             Passed

Starting application                              Passed

Programming CPLD                                  Passed
Port 1 detected (XF/TP-1250)                      Passed

Starting TCP/IP networking                        Passed
Ethernet device eth0 detected                     Passed

System has passed self-test and is active ...
```

The duration of a successful boot sequence of an CG-S / IP ROUTER is typically 30 seconds.

7   CG-S / IP-Router / Feature Summary

- Routes packets between ANSI/CG-S BUS and IP networks (Ethernet)
- Tunneling of ANSI/CG-S BUS packets through IP (Ethernet) networks
- Fully compliant with EIA852 and ENV14908
- Configured Router Mode support
- Smart Switch Mode support
- Easy installation, Auto-NAT, roaming, DHCP
- Built-in EIA852 configuration server for 256 members
- Built in WEB server for CG-S / IP Router and IP-852 channel configuration
- MD5 authentication
- SNTP support for time synchronization
- Built-in communication test
- Supports firmware update through serial port, Ethernet, and CG-S BUS channel
- Network diagnostic LEDs
- CG-S BUS status and activity LED
- Ethernet link and activity LED
- EIA852 status and operating mode LED
- WEB server or serial port for configuration
- Remote monitoring of the supply voltage and device temperature
- Real-time clock with battery backup
- DIN-rail or wall mountable

8   Transport, Packaging and Storage

8.1   Safety Notes
The ldevice will be destroyed or damaged by improper transport!

8.2   Transport inspection
Check delivery on receipt for completeness and for transport damages, immediately. If external damage is detected do not accept the delivery, except under protest.

8.3   Packaging
If no return - agreement exists for packing material separate it according to type and size for further use.

8.4   Storage
Keep packages closed up to mounting and observe the external arrangement and storage notes.

9   Servicing
Observe the relevant national regulations which apply to the maintenance, servicing and check of electrical apparatus. On condition of an appropriate operation and of observing the mounting instructions and environmental conditions, no permanent servicing will be required.

10 Recycling

When a defective apparatus is disposed of, the respective national regulations on waste disposal and recycling will have to be observed. Plastic parts have been provided with respective symbols.