Instruction manual

New Value-/ First Value and Process Indicator System

NEMS 16

Contact Potential 15V/DC…30V/DC

TÜV type approval for feedback effects

Test no.: C1125-00/03

Sensors and Systems
for Combustion Engineering

LAMTEC

1 Table of Contents

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2 General information

2.1 Validity of this manual

This manual applies to NEMS in any configuration. The software-dependent details relate to software version N3K002 (shown on the label on the device). If you have a different version of the software, it may be that some of the functions described are not available or not all of the available functions are described. For using the functions of the LAMTEC SYSTEM BUS modules, you need at least the configuration software 1.4.9.2.

2.2 Standards and approvals

The devices comply with the following standards and regulations:

EN 60730

EMC directive

Low-voltage directive

The device is suitable for direct connection to a DC24V safety interlock chain (preferably ETAMATIC and FMS/VMS). Isolation is guaranteed and has been verified by tests carried out by TÜV-Süddeutschland.

2.3 For your safety

2.3.1 Heed the Equipment Safety Law

The Equipment Safety Law stipulates:

Heed instructions for use!

Only proceed in accordance with this operating manual (document no.: DLT5070).

Only use the device for the prescribed application.

Operation only by trained personnel. The device may only be operated and maintained by persons who are qualified to do so on account of their level of knowledge and their training.

Liability for the functioning of the equipment transferred to the owner or operator

Liability for the functioning of the equipment shall in all cases be transferred to the owner or operator if the equipment is improperly operated, serviced or repaired by persons who do not possess the necessary expertise, or if the equipment is handled in a manner other than that prescribed.

LAMTEC GmbH & Co. KG will not accept liability for damages arising from failure to comply with the above instructions. The above instructions do not extend the warranty and liability conditions of the Conditions of Sale and Supply of LAMTEC GmbH & Co. KG.

Where reference is made to laws, regulations or standards, these are based on the legal system of the Federal Republic of Germany.

Query on safety interlock chains

The approval for direct connection to safety interlock chains only applies to DC24V safety interlock chains and only to the configurations shown in the appendix. Other configurations only after consultation with and release by the manufacturer.

NEMS devices with a supply voltage of DC24V must be supplied with a protection potential if directly connected to a safety interlock chain.

2.4 Using this manual

2.4.1 Purpose of this manual

This manual only covers operation, commissioning and maintenance.

Special information that covers the options relating to this device is explained in separate documents if necessary.

2.4.2 Preliminary remarks

The procedure to be followed in order to make the best possible use of this manual is specified below:

Check to make sure that the settings of your NEMS correspond with the requirements of the installation. The factory settings are shown on the sticker on the device.

Which physical input variables (voltage, contact) and values are required by your NEMS.

Which physical NEMS output variables (voltage, relay signal) and values are expected by the installation?

Do the settings of the NEMS relating to operating performance correspond with the relevant requirements (indicator performance, safety interlock chains)?

If these points are unclear, please read the section entitled “Settings“ from page 30.

2.4.3 The intermediate headings

Are intended to guide you if you know how to operate the NEMS and just want to look up a specific piece of information.

3 Safety information

In these Operating Instructions, the following symbols are used as important safety instructions to the user. These symbols appear wherever there is a need for this information in a particular section. It is essential to note and comply with the safety instructions, particularly the warnings.

WARNING

Indicates possible danger to personnel, particularly with regard to electrical equipment.

WARNING

Indicates possible danger to personnel if the system components are not handled correctly.

IMPORTANT!

Indicates danger to system components or possible impairment of functionality.

NOTE:

Contains important additional information for the user concerning the system or system components and provides helpful tips.

Contained in texts, which provide information on how to perform tasks.

In performing all tasks, the operator is requested to observe all statutory safety regulations and to do everything possible, according to the circumstances, to prevent injury to persons or damage to equipment.

4 Intended application

The **NEMS** is a new value, first value and process indicator system consisting of individual **NEMS16** devices, each with 16 indicator inputs. By networking via a LAMTEC SYSTEM BUS, it is possible to create an indicator system with a maximum of 1024 signals (64 individual devices). Each indicator input (DC18-30V) can be converted to fault or process status signal as well as normal open or closed contacts and is displayed by means of a luminous, three-colour LED on the front panel.

When an indicator input is switched to the active state, the relevant LED changes over to a flashing light or a continuous light.

It is also possible to print out the signals in chronological order via a serial logging printer or a display and operating terminal connected at the LAMTEC SYSTEM BUS.

The device contains a real-time clock, which is synchronised with another NEMS16 in the system.

4.1 Applications

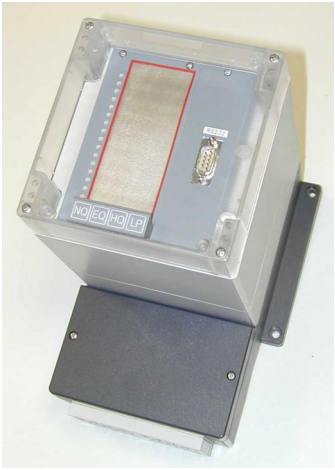
- Process monitoring
- Monitoring of safety interlock chains in combustion engineering
- Chronological recording and processing of fault values and operating data. Coupling to standard field bus systems (e.g. Profibus) is possible as an option.
- Logging and further processing in conjunction with higher-level computer systems.
- Decentralised recording of locally distributed signals.

5 System elements

5.1 Panel installation

Standard panel installation housing made of black sheet steel with bezel.
Dimensions (h x w x d): 144 mm x 72 mm x 200 mm.
A plastic film with integrated sealed keypad covers the front of the device.
This film also contains a pocket into which the labelling strips can be inserted.
Electrical connection is made to plug-in terminals at the back.
Removing the front and detaching the connectors can extract the electronic unit.
See section 13.
Protection class IP 40
Designs with and without RS232 interface.
Product no. 680 R 1000 without RS232, power supply 100…240V/AC, 50…60Hz
Product no. 680 R 1001 with RS232, power supply 100…240V/AC, 50…60Hz
Product no.. 680 R 1010 without RS232, power supply 24V/DC
Product no. 680 R 1011 with RS232, power supply 24V/DC
Product no. 680 R 1013 protection class IP 54 front side (option)

5.2 Design for wall mounting



Protection code IP65
Designs with and without RS232 interface.
Product no. 680 R 1025 without RS232, power supply 100…240V/AC, 50…60Hz
Product no. 680 R 1026 with RS232, power supply 100…240V/AC, 50…60Hz
Product no. 680 R 1027 without RS232, power supply 24V/DC
Product no. 680 R 1028 with RS232, power supply 24V/DC

5.3 Design as 19“-rack

19“ 3HE drawer unit for installation in a control cabinet or panel.
Designed for a max. of 7 NEMS16 devices and 112 signals.
Product no. 680 R 1040 19“ rack without equipment
Product no. 680 R 1015 NEMS16 electronics:

5.4 Display and operating terminal

For displaying incoming and outgoing fault and process status signals in chronological order. Timing accuracy of the time stamps: type. + 1 ms, max. + 5 ms.

For configuring, operating and displaying the NEMS devices.

To be connected via the NEMS LAMTEC SYSTEM BUS.

Product no. 680 R 6002 panel installation AC230V

Product no. 680 R 6003 panel installation DC5V

Product no. 680 R 6004 panel installation DC24V

Product no. 680 R 6005 panel installation DC110V:

Product no. 680 R 6006 installed in 19“, 3HE, rack DC5V

Product no. 680 R 6007 installed in 19“, 6HE, inclusive printer, DC24V

See section 16.8

5.5 Radio clock

The system time can also be sent to the system via a radio clock connected to the 2nd RS232 port instead of the integrated real-time clock (only in the periphery of 1000km of Frankfurt, otherwise use GPS)

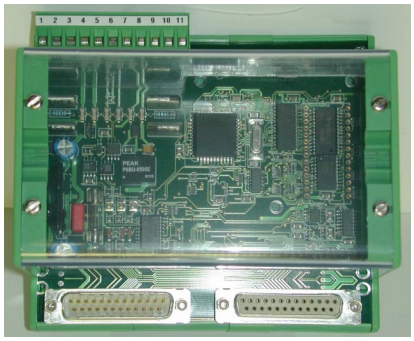
Product no. 680 R 6020 wall mounting case AC230V or DC24V

Product no. 680 R 6025 antenna for radio clock

Product no. GPS on request

See section 16.3

5.6 Field bus connection



The NEMS signals can be converted to a standard field bus protocol (Profibus, Interbus-S, CAN-Open, Modbus) via a communications processor connected to the LAMTEC SYSTEM BUS.

Product no. 633 R 0401 NE PROFIBUS

See section 16.4 and 17.2

5.7 Printer

For printing out incoming and outgoing fault and process status signals in chronological order. Timing accuracy of the time stamps: type. + 1 ms, max. + 5 ms.

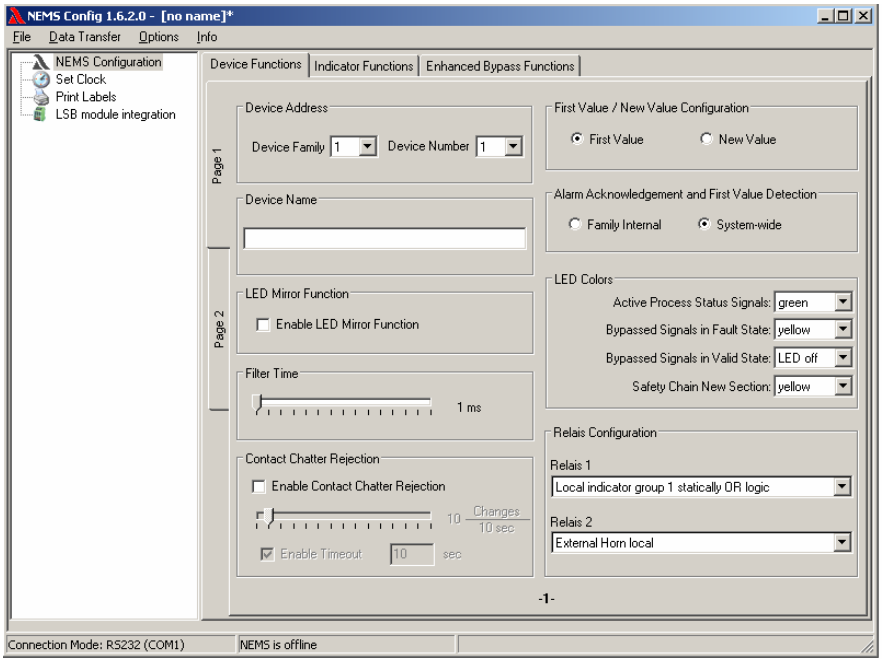
For connection to the RS232 interface of the NEMS or to the display and operating terminal.

Product no.	680 R 1070	for wall mounting 144x288, DC24V, with winder
Product no.	680 R 1090	for mounting in 19”-Rack, 6HE, DC24V, with winder
Product no.	680 R 1098	thermal paper, 25m role, 80mm wide

See section 16.1 and 16.2

5.8 Message text and configuration software

Software for input message texts and user-friendly configuration of the NEMS.

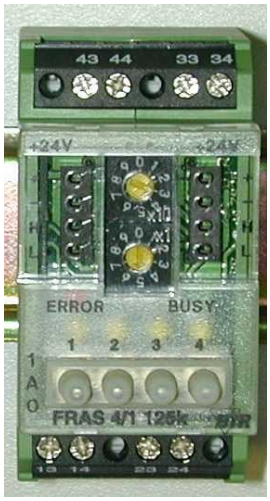


There are three versions of the configuration software amiable:

- For individual devices:
  Product no. 680 R 1053 for connection to an existing RS232 interface
- Light Version for maximum 2 devices connected to LSB:
  Product no. 680 R1056 for connection to the LAMTEC SYSTEM BUS via USB/CAN converter. There is no need for RS232 interface (with release code)
- Premium Version for max. 64 devices connected to LSB:
  Product no. 680 R1052 for connection to the LAMTEC SYSTEM BUS via USB/CAN converter. There is no need for RS232 interface (with release code)

See section 11

5.9 Digital output module



- To creation of max. 26 global indicator groups (A...Z)
- 4 relay outputs 250 V, 6 A
- control via LAMTEC SYSTEM BUS
- Fast wiring of several modules by strapping plugs
- Hand control elements
- Without programming applicable
- Product no.: 663 R 4027

See section 16.5 and 17.3

5.10 Digital Input Module

- To reset of each global indicator group (A...Z)
- 4 digital inputs DC24V (isolated).
  The inputs are designed as voltage-inputs, 24V DC, with metallic isolation
- Control via LAMTEC SYSTEM BUS
- Fast wiring of several modules by strapping plugs
- Hand control elements
- Without programming applicable
- Product no.: 663 R 4028

See section 16.6 and 17.4

5.11 External horn

Electronic triple sensor for instrument boards.
3 inputs for DC18-30V.

Product no.: LH4/OK-230	AC230V 50Hz power supply
Product no.: LH4/OK-24	DC24V power supply

See section 16.7

6 Functions

6.1 Indicator inputs

- 16 indicator inputs per device isolated by means of opt couplers.
- Variable filter time from 1…127 ms.
- Can be set to first value or new value function or process status signal.
- Contactor voltage DC15-30V (is provided by the device, or external voltage).
- Contactor voltage AC230V (extra NEMS).
  Product no. 680 R 1200 without RS232
  Product no. 680 R 120 with RS232
- Each input freely configurable to fault or process status signal.
- Each input freely configurable to normal open or closed contacts.
- Each input freely configurable to internal and/or external horn.
- Each input freely configurable to local indicator group 1 and/or 2 and relay output 1 and/or 2.
- Each input freely configurable to global indicator group A...Z, witch can be distributed by digital output modules. Configuration only via configuration software.
- Configuration is carried out using combinations of the front keys or using a PC with installed configuration software from WIN98 on.
- Direct connection of safety interlock chains in combustion engineering. Up to 4 safety interlock chains freely configurable.
- Max. 6 input bypasses with free allocation of the bypassed inputs. Inverted input bypasses can be configured (bypass is set when signal sent).
- Indication disconnected during self-testing with time restriction (5 ms) via input 16.
- Each input freely configurable contact chatter rejection (1...127 changes in level in 10 sec).
- Inputs 9...16 can be freely assigned to external keys with a choice of NQ, EQ, HQ or LP in each case, edge-triggered and with OR operation of several inputs.
- Acknowledgement also possible by digital input module. Configuration only via configuration software.
- Signals can be deactivated/activated via inputs or LSB-signal (virtual signal).
- Virtual indicator inputs, i.e. signals displayed via LAMTEC SYSTEM BUS.

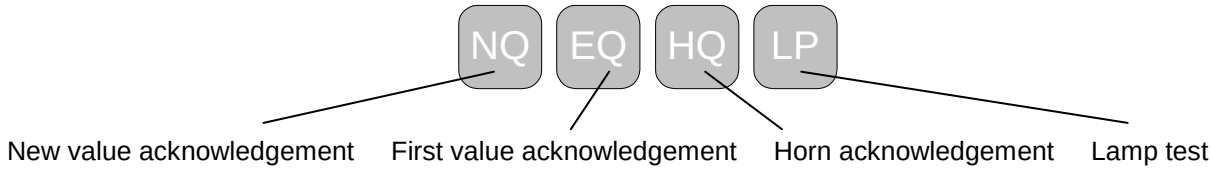
NOTE:

Virtual message inputs allocate a message input, but they don’t have to be wired.

It is sufficient, if the ETAMATIC/FMS is connected via LAMTEC SYSTEM BUS with the NEMS. The signals of the virtual message are pending on LAMTEC SYSTEM BUS.

6.2 Keyboard

Sealed keypad integrated in the handle for operating and programming the NEMS.



6.3 LEDs

- 16 three-colour LEDs for displaying the signals.
- Red with flashing frequency of 2 Hz = first value indication
- Red with flashing frequency of 1 Hz = new value indications,
  Green continuous light = process status signals.
- 1 LED (green) for displaying readiness for service.

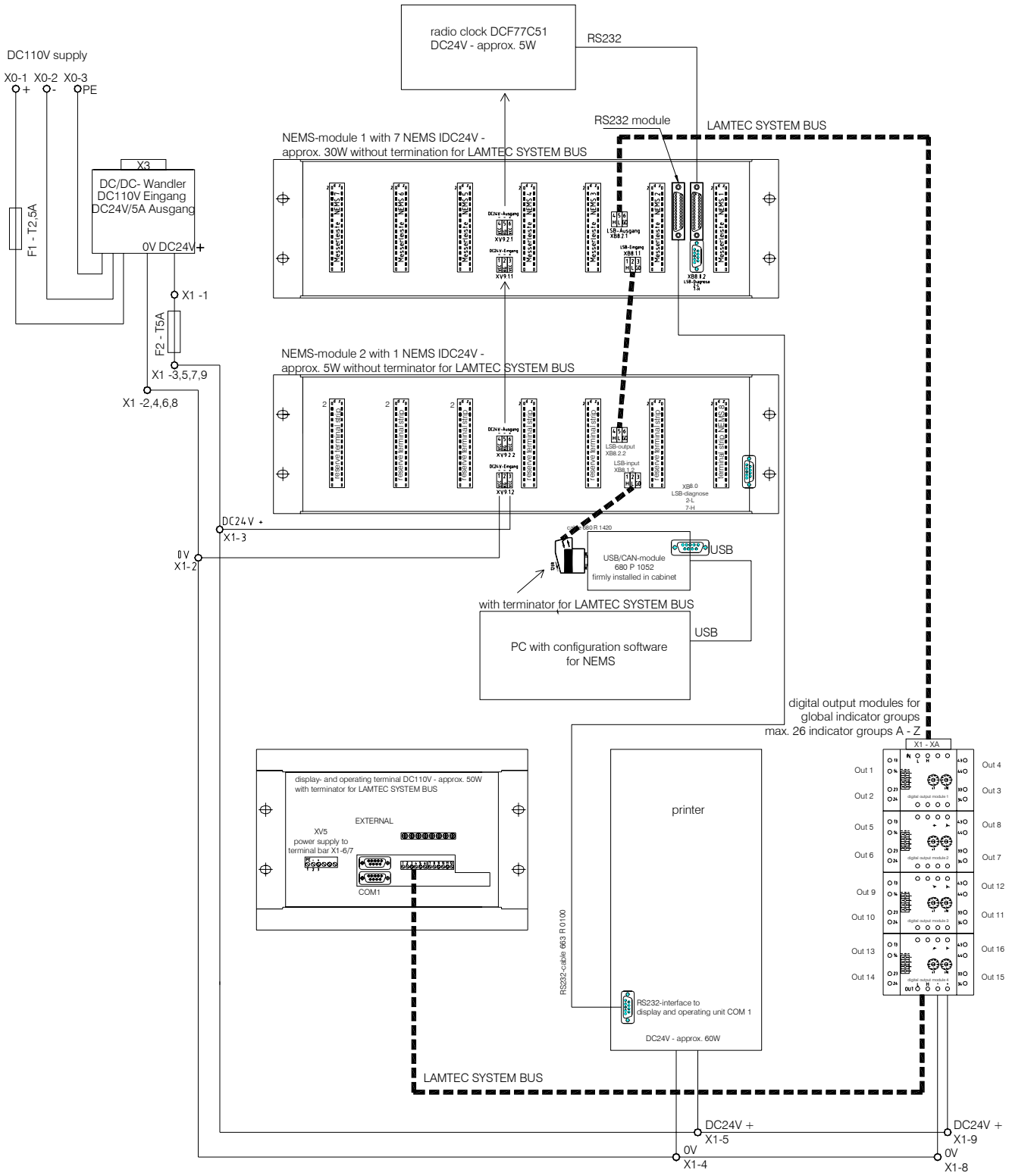
6.4 LAMTEC SYSTEM BUS (CAN-Bus)

- Can be expanded via LSB to up to 1024 indicator inputs. Therefore a total of up to 64 NEMS16 devices can be connected to an indicator system.
- Functions connected in parallel e.g. keys or first value interlocking
  a) limited to the family
  b) not limited to the family (whole system)

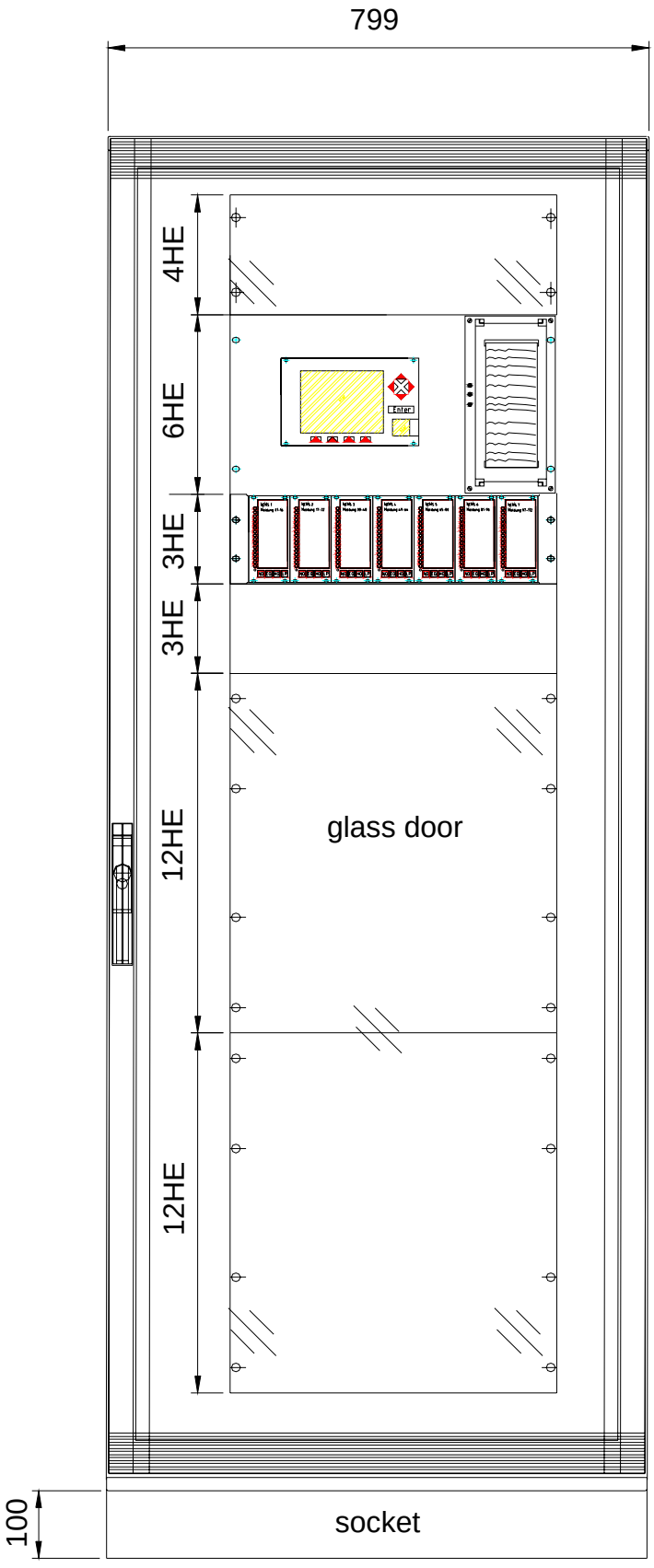
NOTE:
Synchronisation of flashing, date, time and printer output is always for the whole system (not limited).

- Possible via additional module RS232, RS422 or RS485 interface.
- Optional field bus connection possible (Profibus, Modbus, Interbus, CANopen).
- For connecting a display and operating terminal. Chronological signal output. Timing accuracy of the time stamps: type. + 1 ms.
- For reading the message texts and configuration using a PC with configuration software.
- For mirroring the Leeds on slave NEMS devices (NEMS without indicator inputs, just LED display and key operation).
- Connection to the FMS and ETAMATIC combustion management systems in order to display the faults as clear text.
- Output of clear text messages on a text display via LSB
- For creation up to 26 Indicator groups (A...Z) via additional digital output modules with each 4 isolated outputs.
- Resetting of the indicator inputs via additional digital input module.

6.4.1 Structure - Example of an Indicator System



6.4.2 Exampel Alarm Panel



6.5 Relays

2 relay contacts (relay 1 and 2) freely configurable to:

- Relay OFF
- Local indicator group 1 or 2 statically (OR-logic)
  Incoming signal – relay ON, outgoing signal – relay OFF.
  No reaction to new incoming signals.
- Local indicator group 1 or 2 impulse (OR- logic)
  Incoming signal – relay ON for 0,5sec.
  Relay ON for 1sec. in the event of new incoming signals.
- Local indicator group 1 or 2 acknowledgeable (OR- logic)
  Incoming signal – relay ON,
  Relay only released by acknowledging the signal.
- HORN external global
  HORN group contact for a whole system.

NOTE:

All signals, which are set to „Horn external or Horn internal & external“, are signalled by the “Horn external global“.

If signals are set to “Horn off“ or “Horn internal“, then they will not be signalled by the “Horn external global“.

The horn acknowledgement always operates all the NEMS devices in the system.

- HORN external local
  HORN group contact for a single device.
- WATCHDOG-function
  Indication of a fault in the device.
- Printer fault
- Local indicator group 1 or 2 statically (AND-logic)
  Relay ON by 16 incoming signals .
  Relay immediately OFF by outgoing signal
- Local indicator group 1 or 2 impulse (AND- logic)
  Relay ON for 0,5sec. by 16 incoming signals.
- Indicator group 1 or 2 acknowledgeable (AND- logic)
  Relay ON by 16 incoming signals.
  Relay only released by acknowledging the signal.
- LSB (PROFIBUS)
  Relays can be controlled via the PROFIBUS FMS/VMS/ETAMATIC.

7 Settings

NOTE:
The **factory settings** are marked with a **"#"**.

7.1 Device

Each NEMS16 device has adjustable functions, which relate to the whole device:

- **First value #**
- New value
- **Printer** ON/**OFF #**
- **Printer with** #/without **synchronisation**
- **Output process status signals ON** #/OFF
- **Keys and first value interlocking not limited to the family #**
- **LED mirror function** ON/**OFF #**
- **Communication processor PROFIBUS/Modbus** ON/**OFF #**
- **Process status signal LEDs green** #/red
- **Bypassed input LEDs yellow** #/OFF
- **Print number of characters from the message texts 32**# red/64 green (only with printer without synchronisation)
- **Signal acknowledgement by the display and operating terminal** ON/**OFF#**
- **Special function of input 16 for safety-oriented control systems** ON/**OFF #**
- **Filter time of the inputs # = 2 ms**
- **External key functions** ON/**OFF #**
- **Contact chatter rejection** ON/**OFF #**
- **LAMTEC SYSTEM BUS family** (1-4) **# = 1**
- **LAMTEC SYSTEM BUS address** (1-16) **# = 1**

7.2 Inputs

Each of the 16 indicator inputs can be programmed to the following adjustable functions:

- **Fault status signal #**
- Process status signal
- **Normal open contacts #**
- Normal closed contacts
- Input bypass
- Safety interlock chain input
- Assignment to **internal and** #/or **external horn (relay 2)**/OFF
- **Assignment to relay 1 #**
- Assignment to relay 2
- **Assignment to local indicator group 1 #**
- Assignment to local indicator group 2

7.3 Relays

Each of the indicator relays can be programmed to the following adjustable functions:

- Relay OFF
- **Local group 1 statically (OR-logic) # = relay 1**
- Local group 1 dynamic (OR-logic)
- Local group 1 impulse (OR-logic)
- Local group 1 acknowledgeable (OR-logic)
- Local group 2 statically (OR-logic)
- Local group 2 dynamic (OR-logic)
- Local group 2 impulse (OR-logic)
- Local group 2 acknowledgeable (OR-logic)
- Horn external global
- **Horn external local # = relay 2**
- Watchdog
- Printer fault
- Local group 1 statically (AND-logic)
- Local group 1 impulse (AND-logic)
- Local group 1 acknowledgeable (AND-logic)
- Local group 2 statically (AND-logic)
- Local group 2 impulse (AND-logic)
- Local group 2 acknowledgeable (AND-logic)

Setting is carried out using combinations of the front keys as specified in the programming list in this manual or using a PC with installed configuration software from WIN98.

If we are to install the customer-specific setting, then at the end of the manual you will find a “Configuration sheet“ for you to fill in and send to us.

7.4 Labels

NEMS16	New / first value and process indicator system with contactor voltage DC24V
Item-No.	Ser.-No.
Order-No.	Date
Line voltage	Software
LAMTEC	LAMTEC Mess- und Regeltechnik für Feuerungen GmbH & Co KG Impexstraße 5, D-69190 Walldorf 0049/(0)6227/6052-0

The factory setting is entered on a label on the side of the device.

7.5 Using the front keys

Operating various key combinations or individual keys can configure the NEMS16.

This works for all types of NEMS16.

See section 10”Configuration via keys”

7.6 Via RS232

NOTE:

The configuration software for RS232 is recommended for the user-friendly setting of individual NEMS16 devices. The devices can be set directly via the serial interface of the NEMS16 and using a PC.

This only works for NEMS16 devices with an RS232 interface.

See section 11

7.7 Via LAMTEC SYSTEM BUS

The configuration software for the LAMTEC SYSTEM BUS (light version or full version) is recommended for user-friendly setting of several NEMS16 devices. The devices in the system can be set directly using a LSB (CAN)-USB converter (included in delivery) and a PC. Only the addressing of the LAMTEC SYSTEM BUS has to be carried out manually beforehand. This setting can be entered at the Waldron plant.

This works for all types of NEMS16 device.

See section 11

8 Performance with bypasses

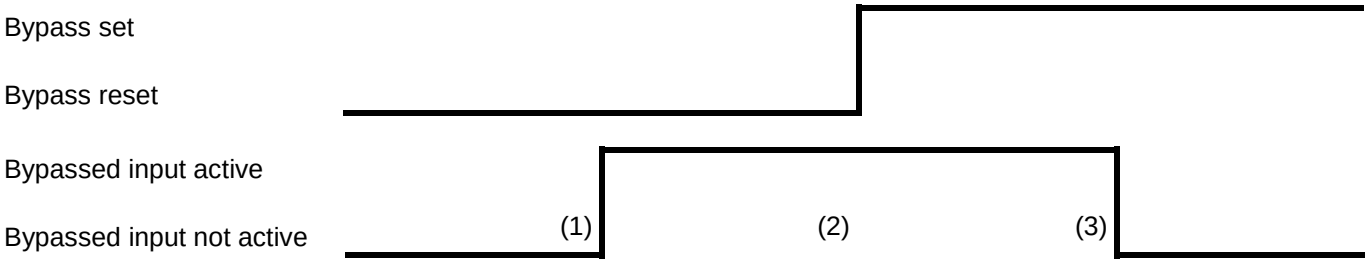
In certain situations selected messages can be by-passed with internal NEMS bypasses.

Example in combustion technology:
While using oil and gas for fuel the messages for safety interlock chain “Oil” is not interesting in gas operation.
With the virtual message “Gas operation” you can by-pass the safety interlock chain. It is not allowed to by-pass single messages within a safety interlock chain and that will not function.

A bypass can be used in common mode, i.e. e. the signal is pending → bypass active, as the case may be in inverse mode, i.e. e. signal quits → bypass active.

8.1 Bypasses normal / LED not inverted

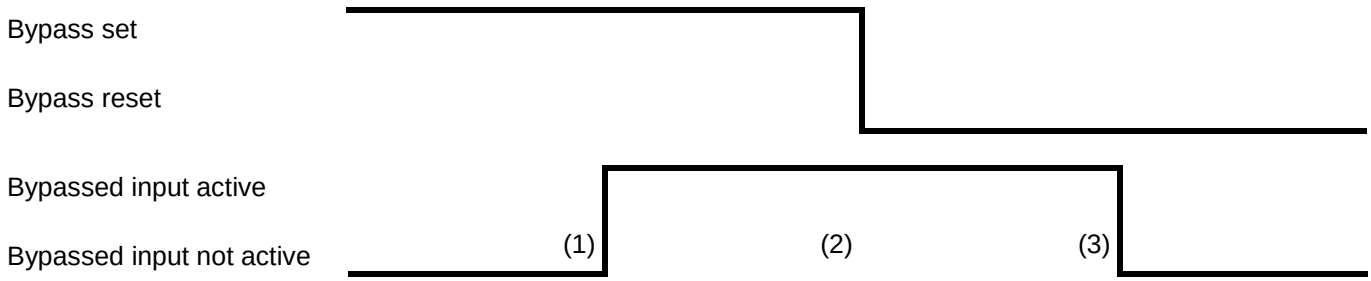
8.1.1 Bypass enabled and bypassed input active:



NEMS-reactions:

(1):	Bypassed input	• LED flashes red, • Printer MKO message (“Incoming signal“)
(2):	Bypass:	• LED flashes red, • Printer BSE message (“Bypass selected“)
	Bypassed input:	• LED flashes red if not acknowledged yet • LED with continuous yellow light if acknowledged • No printer MGE message (“Outgoing signal“)
(3):	Bypassed input:	• LED flashes red if not acknowledged yet • LED OFF if acknowledged • No printer MGE message (“Outgoing signal“)

8.1.2 Bypass disabled and bypassed input active:



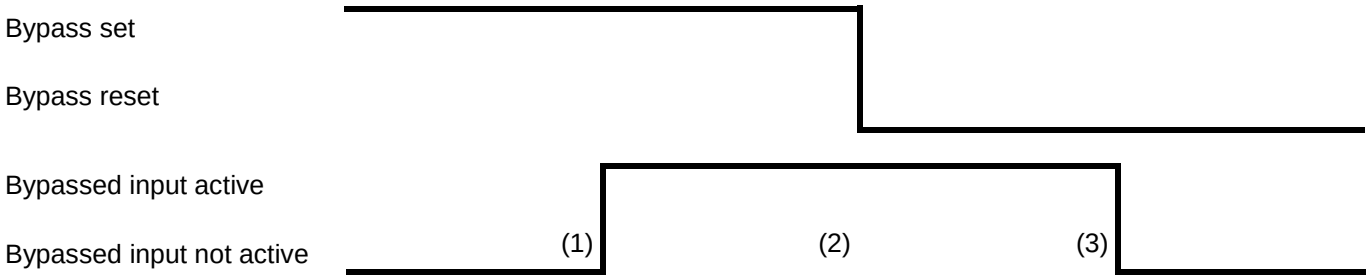
NEMS-reactions:

(1):	Bypassed input:	• LED with continuous yellow light if acknowledged • No printer MKO message (“Incoming signal“)
(2):	Bypass:	• LED flashes red if not acknowledged yet • LED off if acknowledged • Printer BRS message enabled (“Bypass reset“)
	Bypassed input:	• LED with continuous red light if acknowledged • No printer MKO message (“Incoming signal“)
(3):	Bypassed input:	• LED OFF if acknowledged • Printer MGE message (“Outgoing signal“)

8.2 Bypasses inverted (e.g. burner off)

NOTE:
In this case input bypass must be configured as process status signal!!!

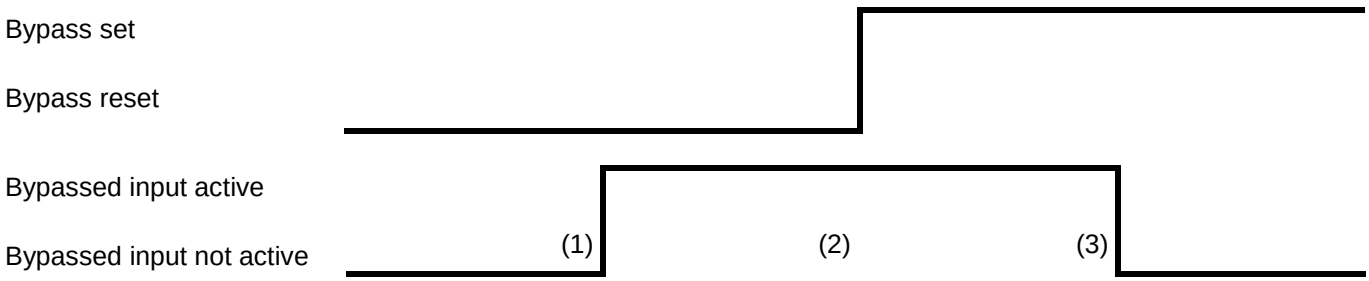
8.2.1 Bypass enabled and bypassed input active:



NEMS-reactions:

(1):	Bypass:	• LED with continuous green light (no change)
	Bypassed input:	• LED flashes red, • Printer MKO message (“Incoming signal“)
(2):	Bypass:	• LED OFF
	Bypassed input:	• LED flashes red if not acknowledged yet • LED with continuous yellow light if acknowledged • No printer MGE message (“Outgoing signal“)
(3):	Bypassed input:	• LED flashes red if not acknowledged yet • LED OFF if acknowledged • No printer MGE message (“Outgoing signal“)

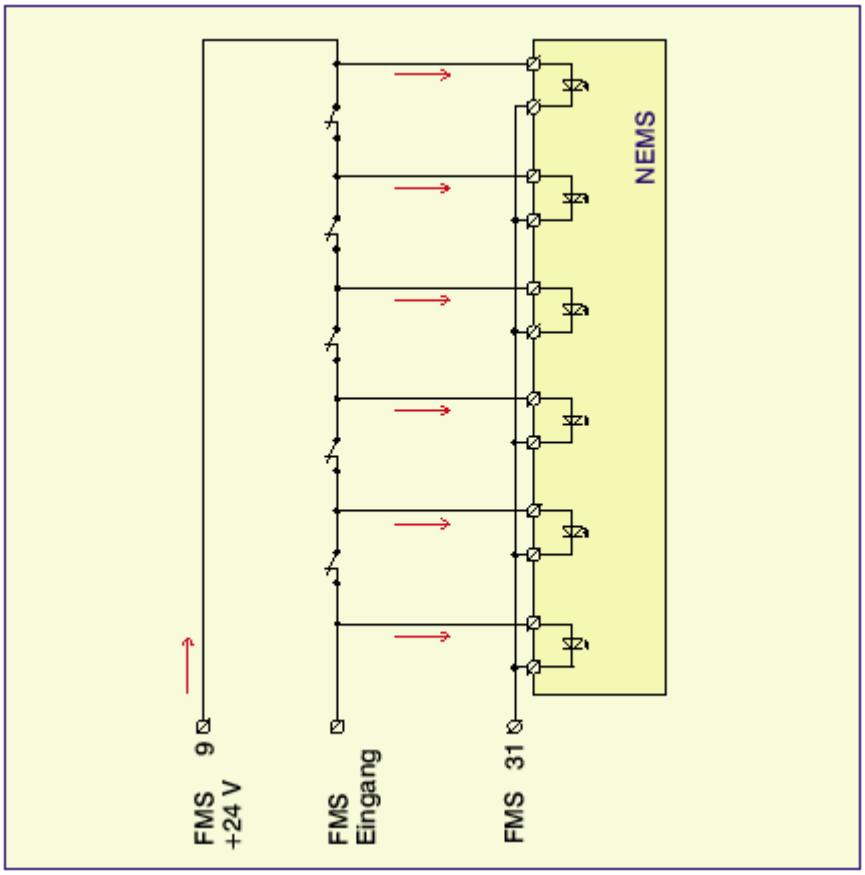
8.2.2 Bypass disabled and bypassed input active:



NEMS-reactions:

(1):	Bypass:	• LED OFF (no change)
	Bypassed input:	• LED with continuous yellow light • No printer MKO message (“Incoming signal“)
(2):	Bypass:	• LED with continuous green light (or if conf. as fault status signal. Then flashes red if not acknowledged yet or off if acknowledged) • Printer BRS message (“Bypass reset“)
	Bypassed input:	• LED with continuous red light • No printer MKO message (“Incoming signal“)
(3):	Bypassed input:	• LED OFF if acknowledged • Printer MGE message (“Outgoing signal“)

9 Performance with safety interlock chains



WARNING!

The NEMS has approval to directly tap voltage in the safety interlock chain. The isolation required has been confirmed by the TÜV. However this only applies to systems with a DC24V safety interlock chain.

In order to be able to use the safety interlock chain functions, the setting must be arranged in accordance with the circuits suggested in the appendix.

The messages of every single safety interlock chain have to be applied without gap, one after the other. An interruption of a single chain is not allowed.

IMPORTANT!

The FMS and ETAMATIC safety interlock chains have a self-testing function, i.e. the voltage is disconnected briefly. In order to prevent false alarms, the feed to the safety interlock chains must be located at terminal 16 of the NEMS device.

Terminal 16 at level N.N must be activated for safety interlock chain functions. During the self-testing of the indicator loop, inputs 1-15 are ignored for 5 ms. Terminal 16 is no longer available as an indicator input.

In addition, input 16 must be set to process status signal and normal closed contacts.

NOTE:

For the resolvingof the safety interlock chains of FMS and ETAMATIC maximally 8 NEMS can be attached to the LAMTEC SYSTEM BUS. The messages of these 8 NEMS can be requested via PROFIBUS FMS/VMS/ETAMATIC.

From these 8 NEMS you can use then for each safety interlock chain 1 NEMS.

See section 16.4 (Profibus - Modul)

Performance with safety interlock chains

9.1 Rules

A maximum of 4 safety interlock chains can be defined for each device.

A safety interlock chain always begins with the lowest indicator number in a defined chain and then continues with indicator numbers in ascending order.

A safety interlock chain always consists of consecutive indicator inputs.

9.2 Consisting of fault status signals

The first isolating point identified (trigger) with the lowest indicator number is displayed by the flashing of the LED and indicated on the printer. The simultaneous isolating points with higher indicator numbers are not identified.

Until the trigger message has been acknowledged, new isolating points identified will be displayed by the LED as a continuous yellow light (according to the configuration in each case) but not indicated on the printer.

The safety interlock chain is not **released** again for renewed triggering until the last trigger message has been acknowledged **AND** there are no more isolating points in this safety interlock chain.

9.3 Consisting of process status signals

If the inputs from the safety interlock chain are set as **process status signals**, then the same performance applies as in the case of fault status signals (see above) except that process status signals are automatically regarded as acknowledged when triggering occurs.

9.4 With bypassed safety interlock chains (eg burner on/off)

If an input bypass bypasses a safety interlock chain, then the setting must be arranged so that the whole safety interlock chain is always configured as inputs bypassed by the input bypass.

Any current isolating point is displayed by the LED as a continuous yellow light (according to the configuration in each case) but not indicated on the printer.

As soon as the bypass has been reset, then the safety interlock chain is not released again for renewed triggering until the last trigger message has been acknowledged (if there was still a trigger which had not been acknowledged before the bypass was set) **and** there are no more isolating points in this safety interlock chain.

NOTE:

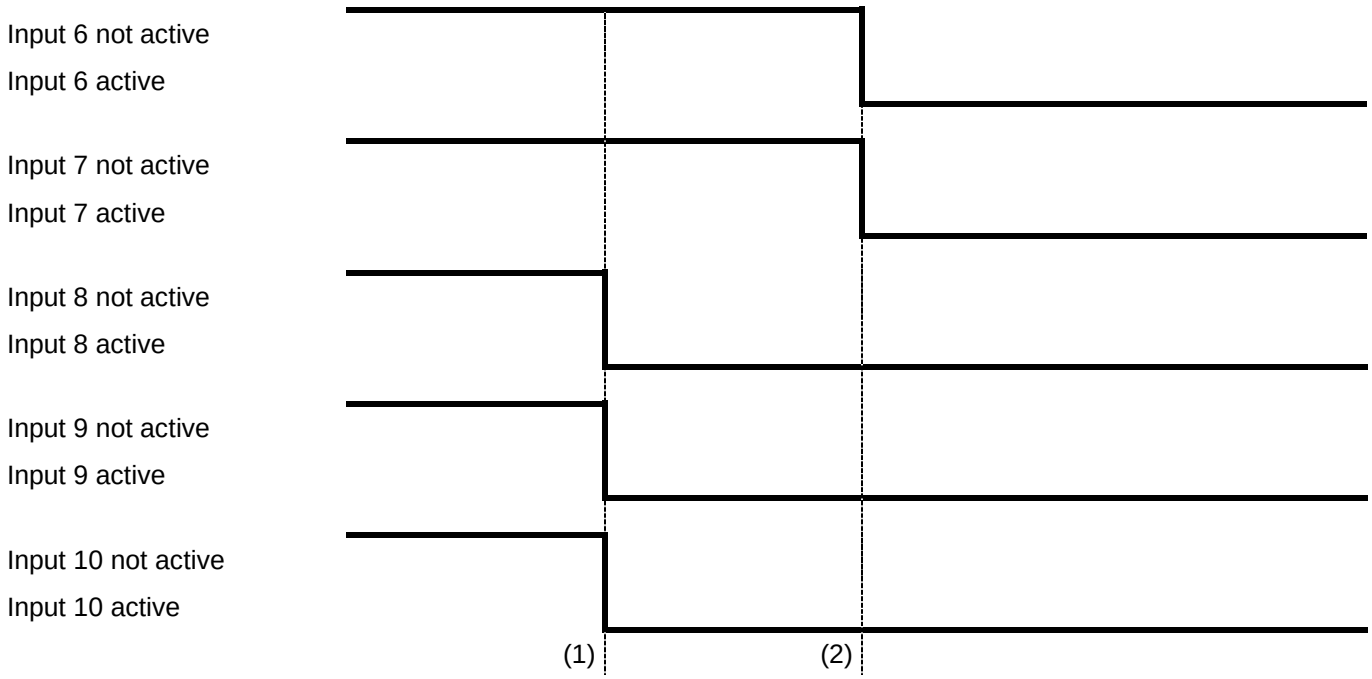
Virtual message inputs allocate a message input, but they don’t have to be wired.

It is sufficient, if the ETAMATIC/FMS is connected via LAMTEC SYSTEM BUS with the NEMS. The signals of the virtual message are pending on LAMTEC SYSTEM BUS.

9.5 Examples

For the following examples, input nos. 6, 7, 8, 9 and 10 are configured as safety interlock chain 1 and the inputs are configured to norm. closed contacts (act. at 0 V):

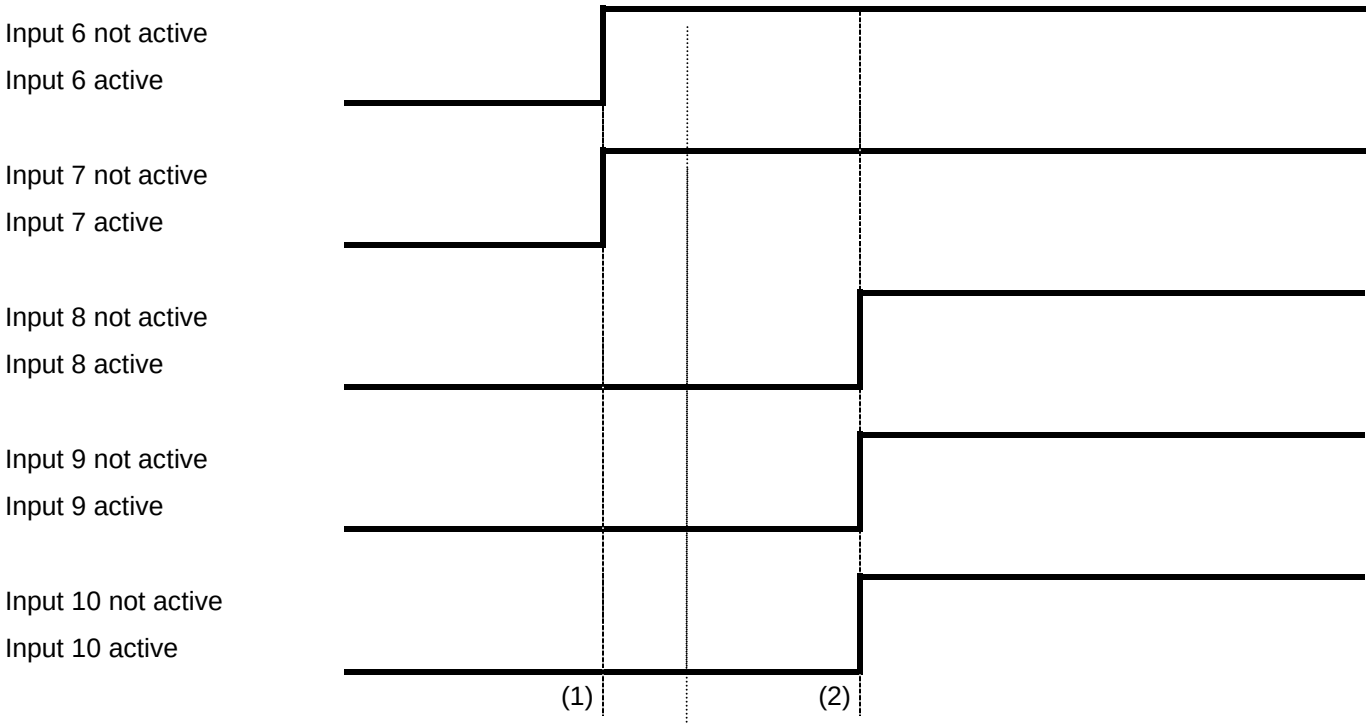
9.5.1 **Isolating point at input 8 enabled (therefore also 9 and 10 at the same time) Later on isolating point at input 6 enabled (=> 7,8,9,10)**



NEMS-reactions:

(1): Isolating point at input 8 enabled:	• Input 6: LED OFF • Input 7: LED OFF • Input 8: LED flashes red (fault status signal) => Printer MKO message or LED with continuous green light (process status signal) => Printer BKO message • Input 9: LED OFF • Input 10: LED OFF
(2): Isolating point at input 6 enabled:	• Input 6: LED yellow (new isolating point) => no printer message • Input 7: LED OFF (no change) • Input 8: LED flashes red if not acknowledged yet (fault status signal) or LED OFF if acknowledged (fault status signal) or LED off (process status signal) • Input 9: LED OFF (no change) • Input 10: LED OFF (no change)

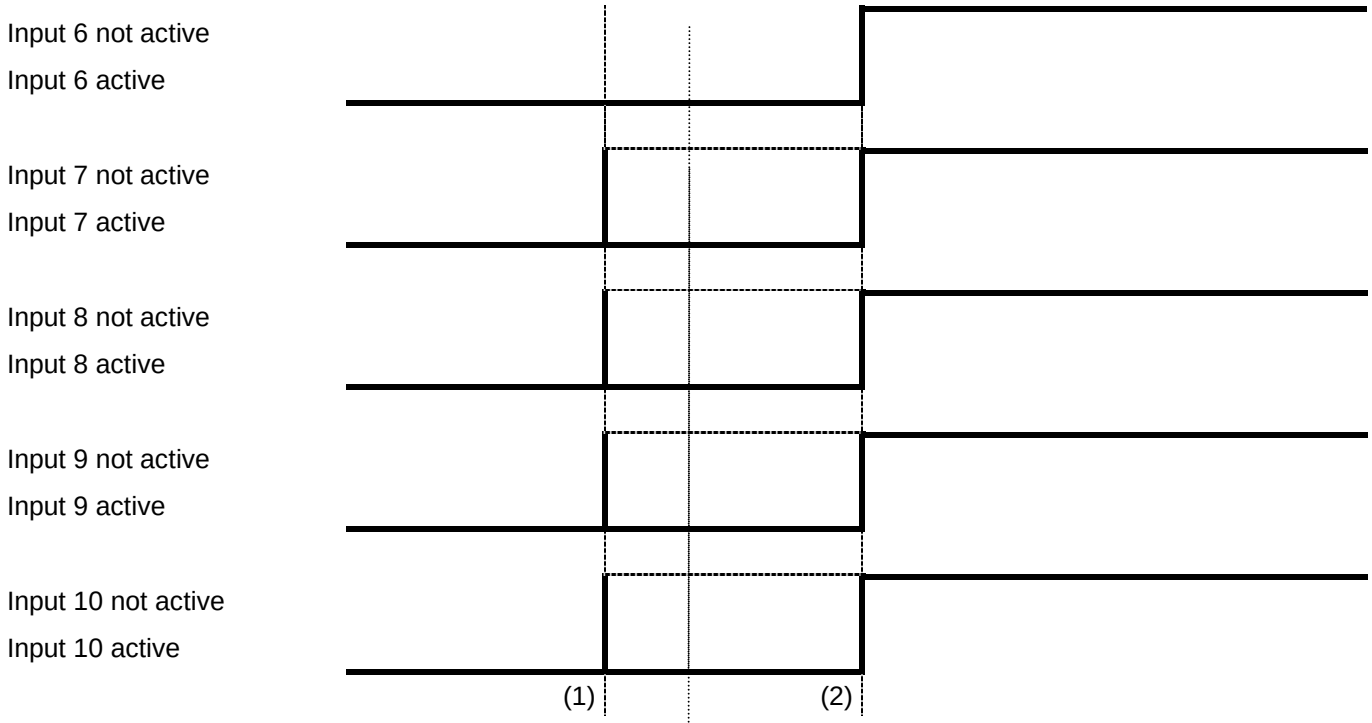
9.5.2 Isolating point at input 6 disabled (therefore also 7 at the same time) Later on isolating point at input 8 disabled (=> 9,10) (continuation of 9.5.1 where input 8 was indicated first of all)



NEMS-reactions:

1): Isolating point at input 6 disabled:	• Input 6: LED OFF => no printer message • Input 7: LED OFF (no change) • Input 8: LED flashes red if not acknowledged yet (fault status signal)(no change), or LED with continuous red light if acknowledged (fault status signal)(new isolating point) or LED with continuous green light (process status signal) (new isolating point) • Input 9: LED OFF (no change) • Input 10 LED OFF (no change)
(2): Isolating point at input 8 disabled:	• Input 6: LED OFF (no change) • Input 7: LED OFF (no change) • Input 8: LED flashes red if not acknowledged yet (fault status signal) or LED OFF if acknowledged (fault status signal) => Printer MGE message or LED OFF (process status signal) => Printer BGE message • Input 9: LED OFF (no change) • Input 10 LED OFF (no change)
After (2), the safety interlock chain is not released again for renewed triggering until the trigger message has been acknowledged at input 8.	

9.5.3 Isolating point at input 8 disabled (therefore also 9 and 10 at the same time) Later on isolating point at input 6 disabled (=> 7,8,9,10): (continuation of 8.5.1 where input 8 was indicated first of all)

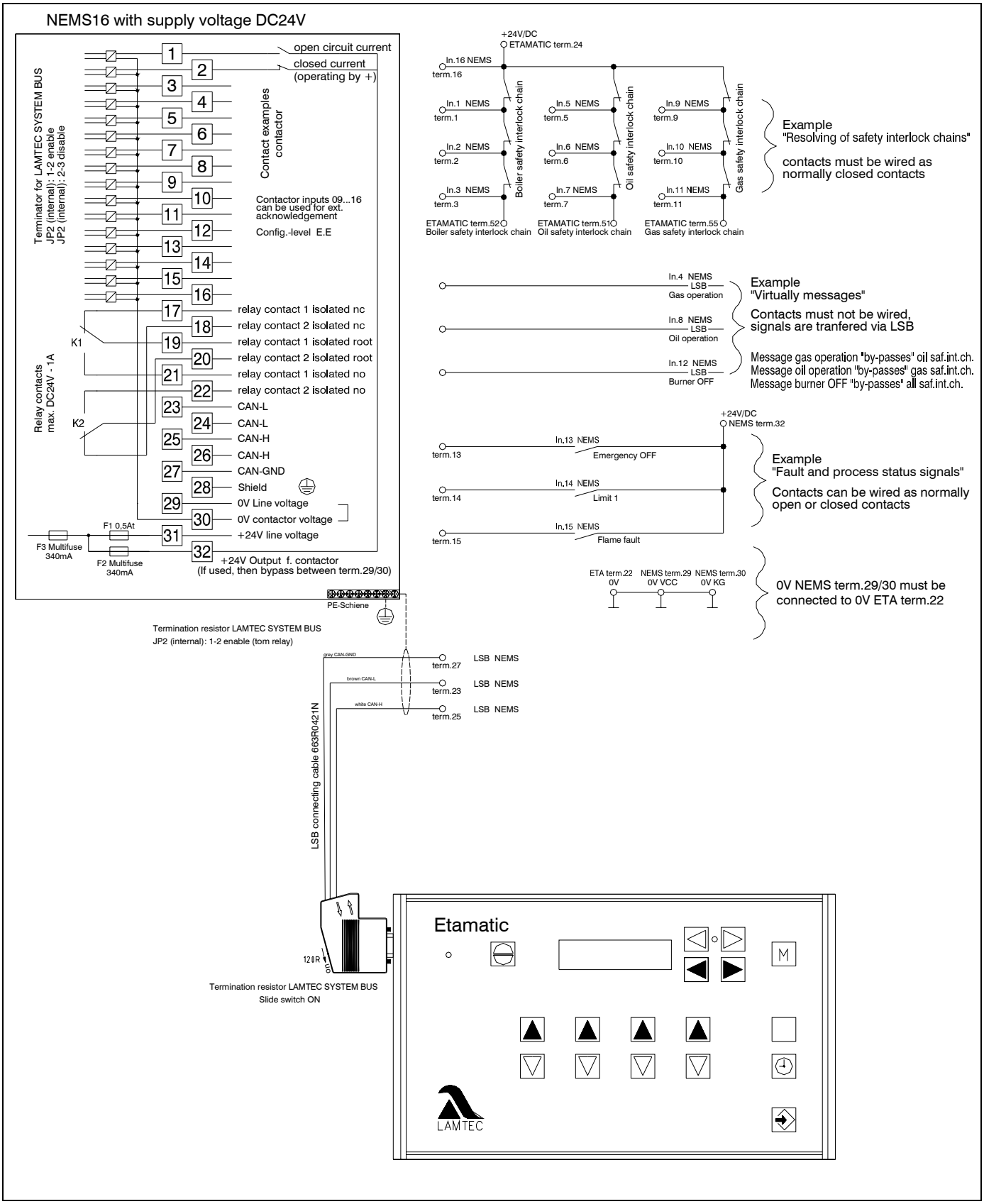


NEMS-reactions:

(1):	• Input 6: LED yellow (no change (new isolating point)) • Input 7: LED OFF (no change) • Input 8: LED flashes red if not acknowledged yet (fault status signal) or LED OFF if acknowledged (fault status signal) => no Printer MGE message or LED OFF (process status signal) => no Printer BGE message • Input 9: LED OFF (no change) • Input 10 LED OFF (no change)
(2):	• Input 6: LED OFF => no Printer MGE/BGE message • Input 7: LED OFF (no change) • Input 8: LED flashes red if not acknowledged yet (fault status signal) or LED OFF if acknowledged (fault status signal) => Printer MGE message or LED OFF (process status signal) => Printer BGE message • Input 9 LED OFF (no change) • Input 10 LED OFF (no change)
After (1) the hard-wired chain means that inputs 8, 9 and 10 are still active. For this reason, the Printer MGE message cannot be displayed until input 6 no longer has any isolating points although the isolating point at input 8 was already cancelled earlier. After (2) the safety interlock chain is not released again for renewed triggering until the trigger message has been acknowledged at input 8.	

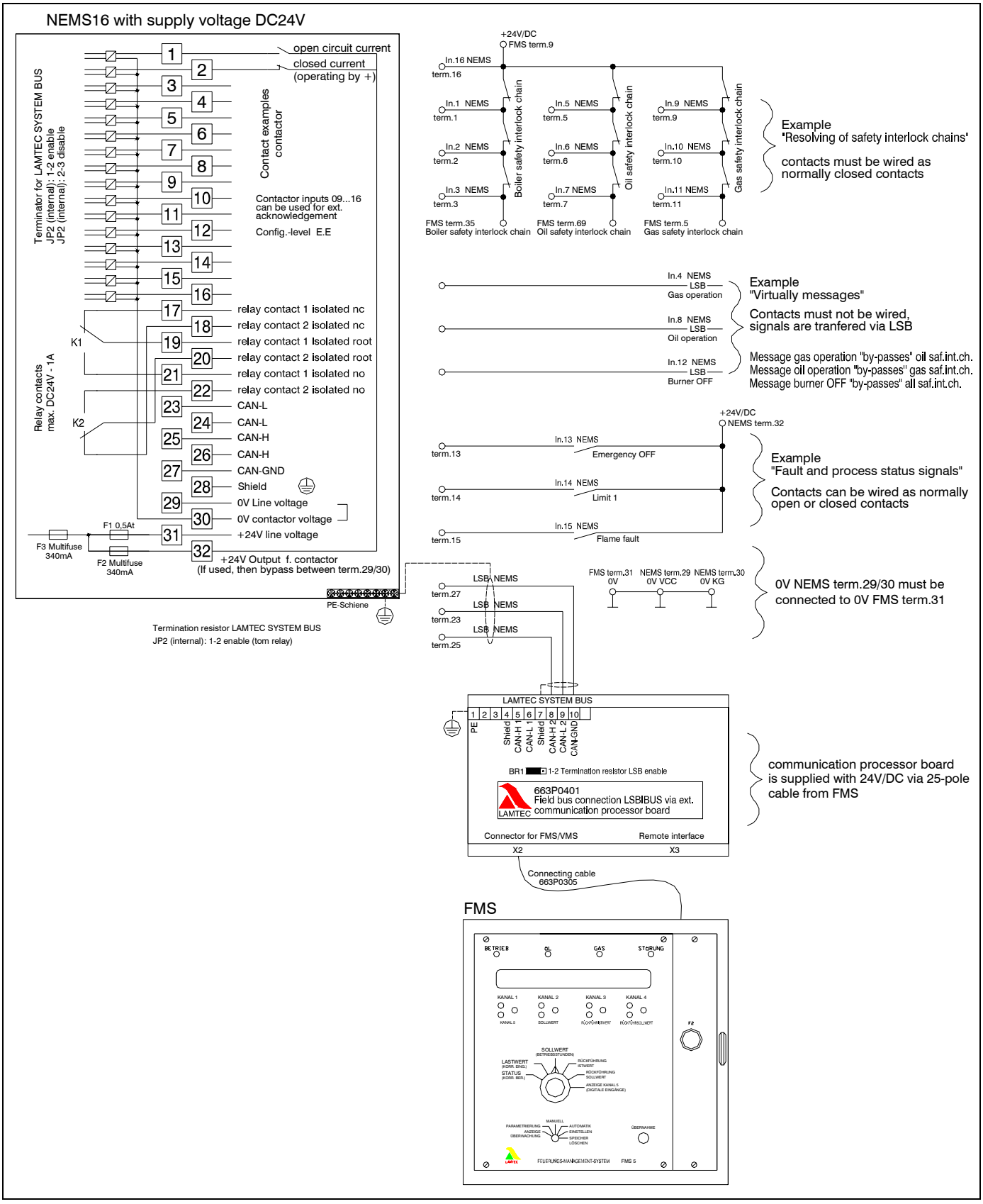
Performance with safety interlock chains

Example for Connecting Directly the Safety Interlock Chains with ETAMATIC



Performance with safety interlock chains

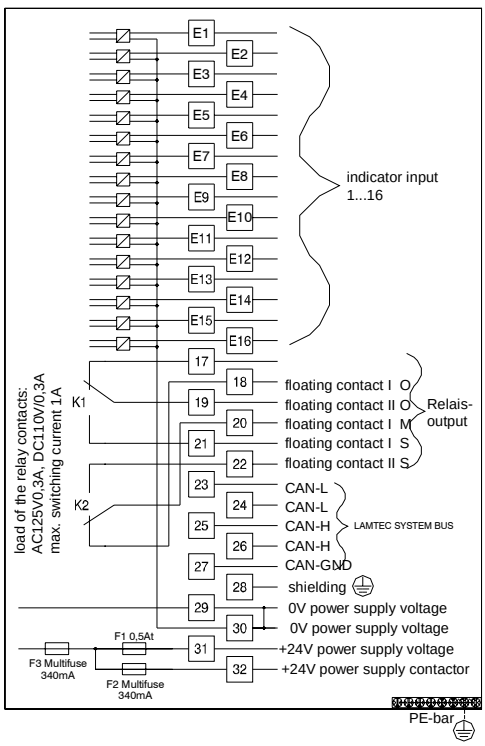
Example for Connecting Directly the Safety Interlock Chains with the FMS

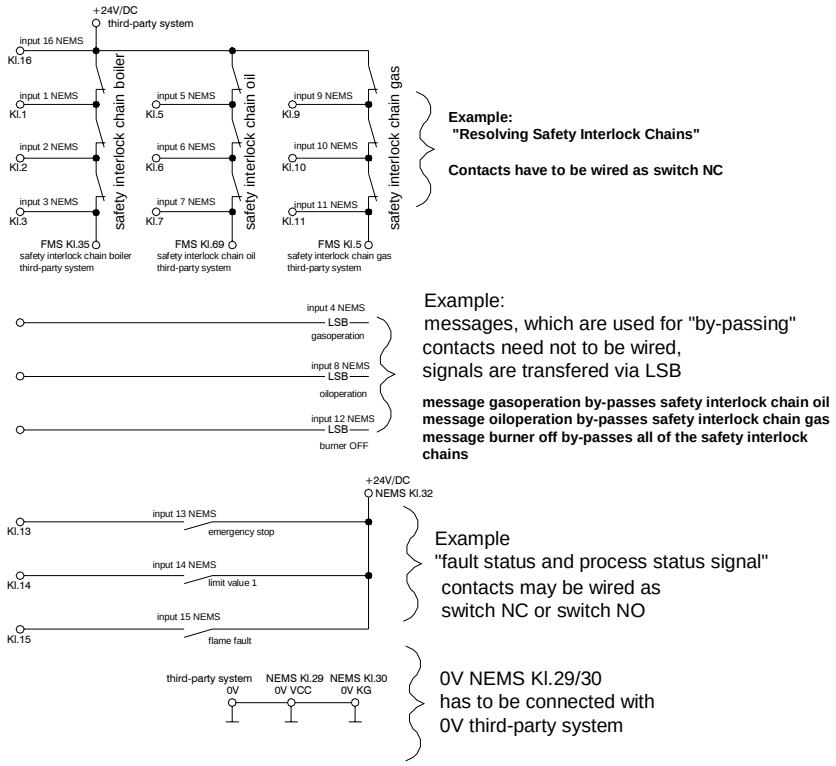


Performance with safety interlock chains

Example for Connecting Directly the Safety Interlock Chains with Third-Party System

NEMS16 with 24VDC power supply voltage





IMPORTANT!

With the NEMS with 24V/DC power supply voltage (product no. 680R 1010 and 680 R 1011) the power supply voltage has to be up to standard with VDE0100, part 410, section 4.1.

If this can't be guaranteed, the absence of reaction is not warranted.

Te power supply voltage and the safety interlock chains have to subject to the same potential.

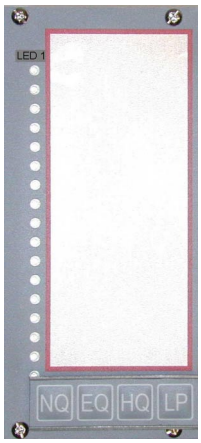
If there is no protective low voltage guaranteed, you have to choose NEMS with 230V/AC power supply voltage (product no. 680 R 1000 and 680 R 1001)

NOTE:

The above shown connecting diagrams of the safety interlock chains are only examples. The configuration has to be adapted for each application.

10 Setting via the front keys

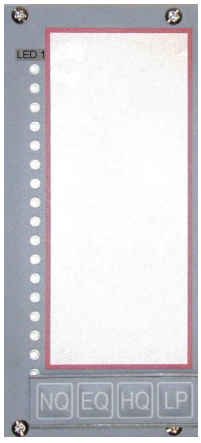
10.1 Entering configuration mode



Hold down keys NQ + EQ simultaneously for 3 sec.

- LEDs 1-16 switch to a running green light.

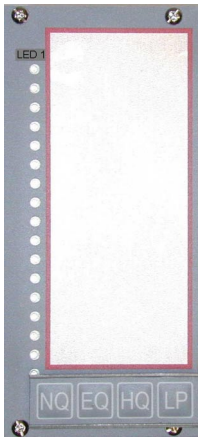
10.2 Exiting configuration mode



Press keys NQ + EQ briefly simultaneously.

- Exit configuration mode and return to the normal mode.
- This key combination works on any configuration level.

10.3 Restoring the factory setting



Hold down keys NQ + EQ + HQ simultaneously for 3 seconds.

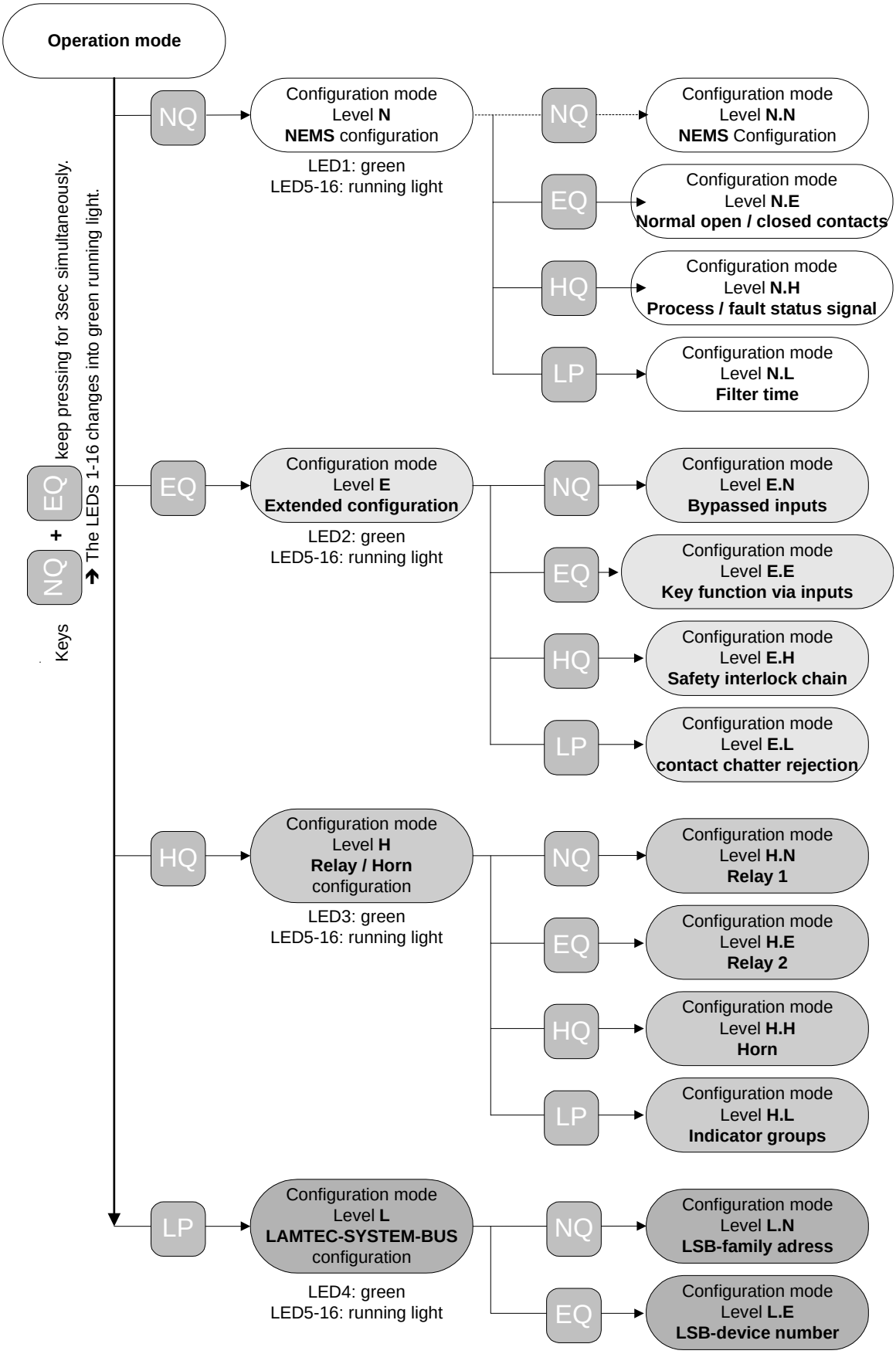
- LEDs 5-12 switch to continuous yellow light.

Press keys NQ + EQ briefly simultaneously.

- Factory setting is restored.
- Exit configuration mode and return to the normal mode.

The individual factory settings are identified by a # in each case on the following pages!

10.4 Structure - overview

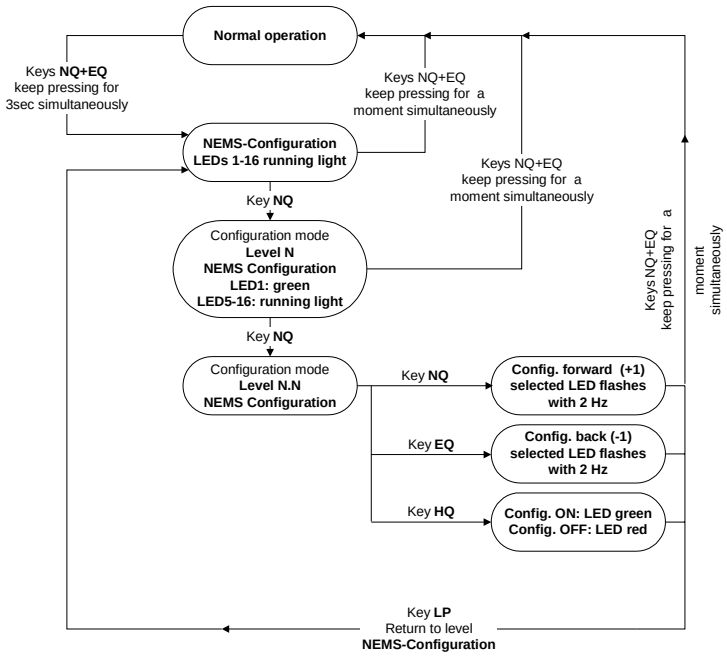


10.5 Level N.N – device functions

Hold down NQ + EQ simultaneously for 3 sec, then. NQ , ther NQ

At this level you can configure the following settings on the NEMS:

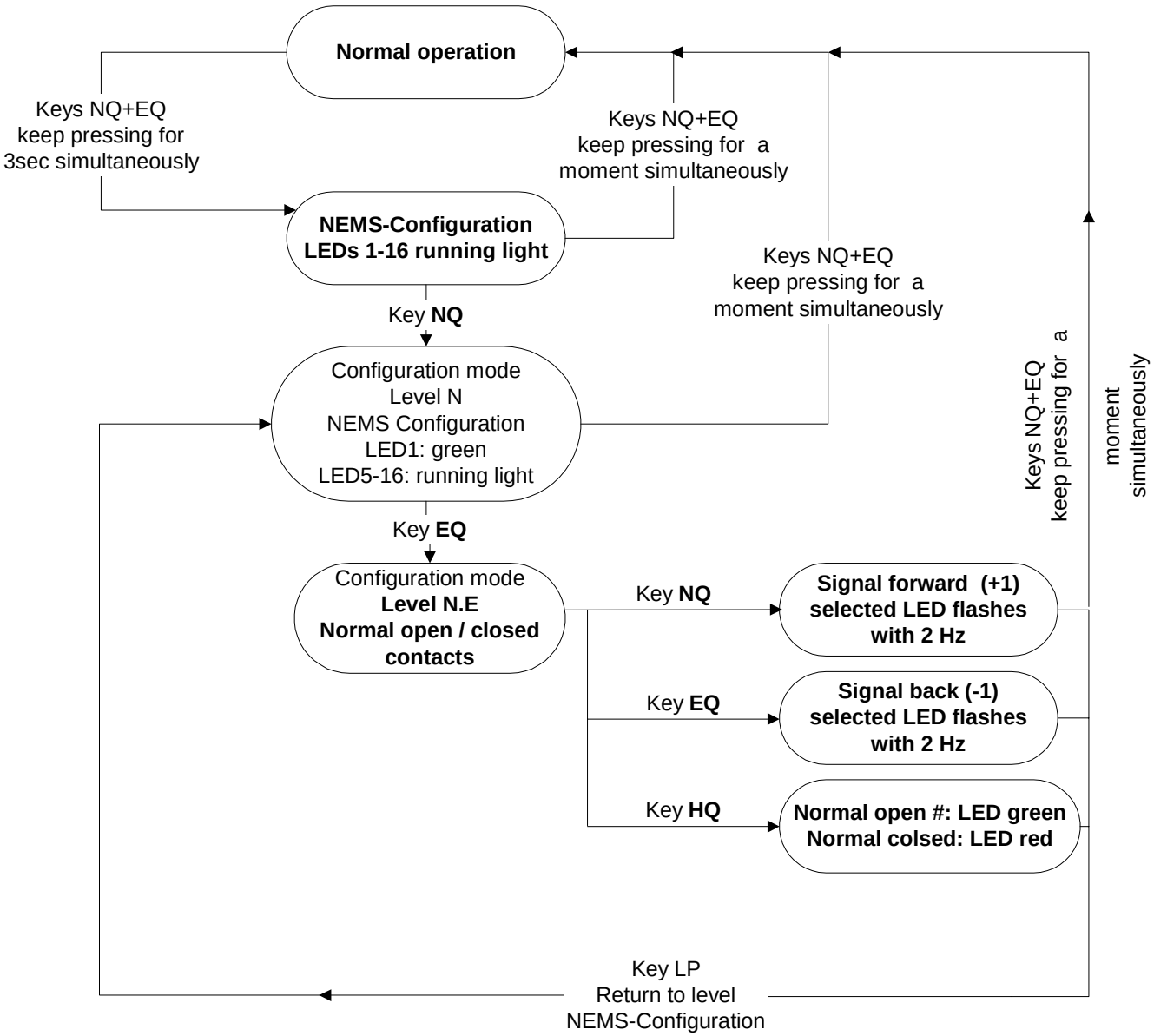
- LED1 green: First value #
- LED2 green: New value
- LED3 green/red #: Printer ON/OFF #
- LED4 green/red #: Printer with/without # synchronisation
- LED5 green # /red: Logging process status signals ON#/OFF
- LED6 green #/red: Keys and first value interlocking not limited to the family ON #/OFF
- LED7 green/red #: LED mirror function ON/OFF #
  If "ON": Set device to the same address (Level L.E) as the NEMS to be mirrored.
- LED 8 green/red #: Com. processor PROFIBUS/Modbus ON/OFF #
- LED 9 green #/red: Process status signal LEDs green #/red
- LED10 green #/red: Bypassed input LEDs yellow #/OFF
- LED11 green/red #: Print 32 # or 64 characters from message texts (only with printer without synchronisation)
- LED12 green #/red: SI chains new isolating point LEDs in yellow #/rd-gn
- LED13 green #/red: Signal acknowledgement by the display and operating terminal
- LED14 green / red #: report bypassed inputs ON / OFF#
- LED15 green / red #: LEDs of the bypassed inputs in good operating condition green / OFF #
- LED16 green/red #: With safety-oriented control systems, during the self-testing of the indicator loop inputs 1-15 are ignored for 5 ms ON/OFF #
  If "ON": set input 16 to normal closed contacts (Level N.E) and process status signal (Level N.H).



10.6 Level N.E – Normal open/closed contacts

Hold down NQ + EQ simultaneously for 3 sec, then NQ, then EQ

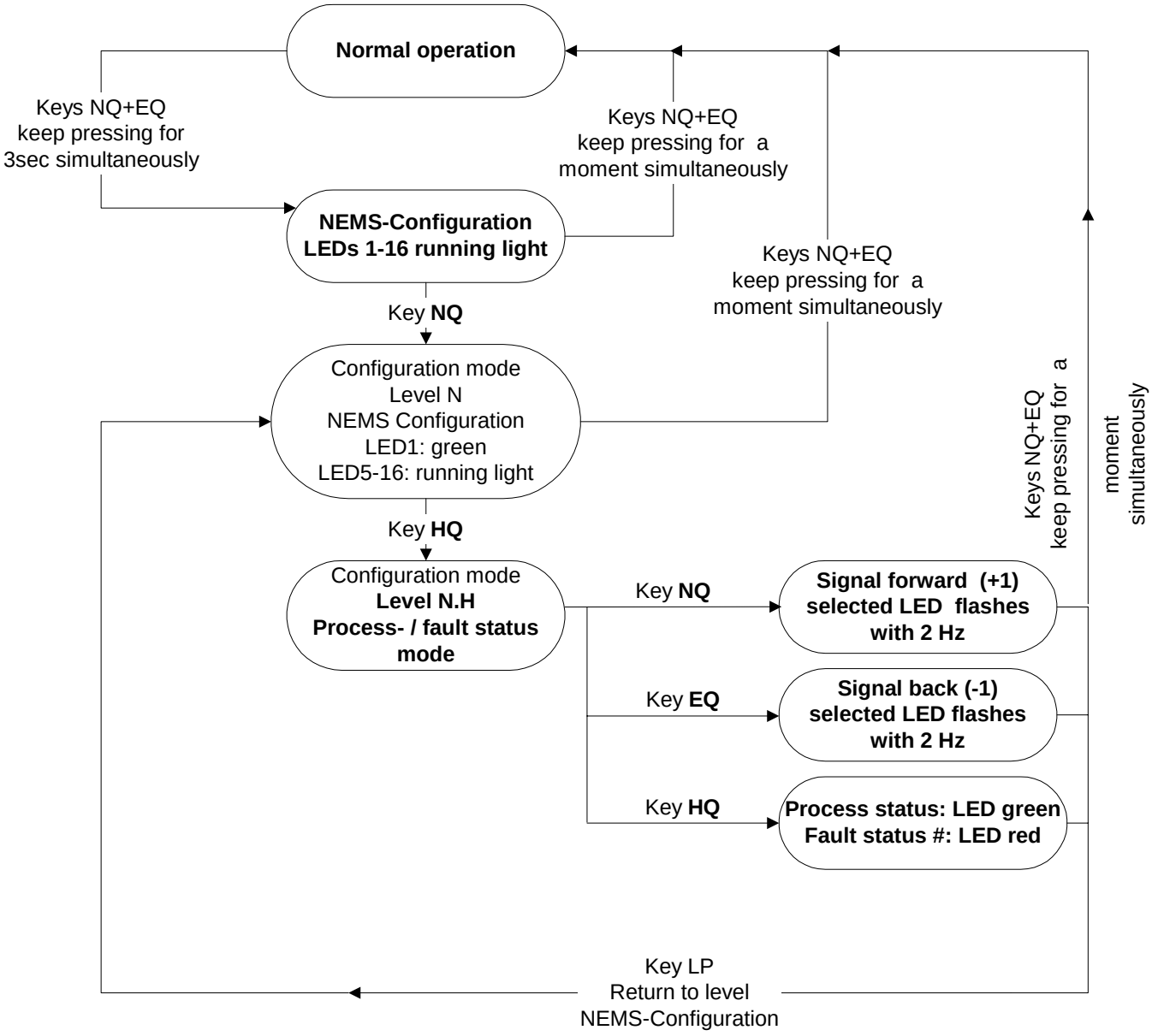
At this level you can configure each of the 16 indicator inputs to the normal open or closed contacts principle.



10.7 Level N.H – Operating/Fault mode

Hold down NQ + EQ simultaneously for 3 sec, then NQ, then HQ

At this level you can configure each of the 16 inputs to process or fault indicator input.

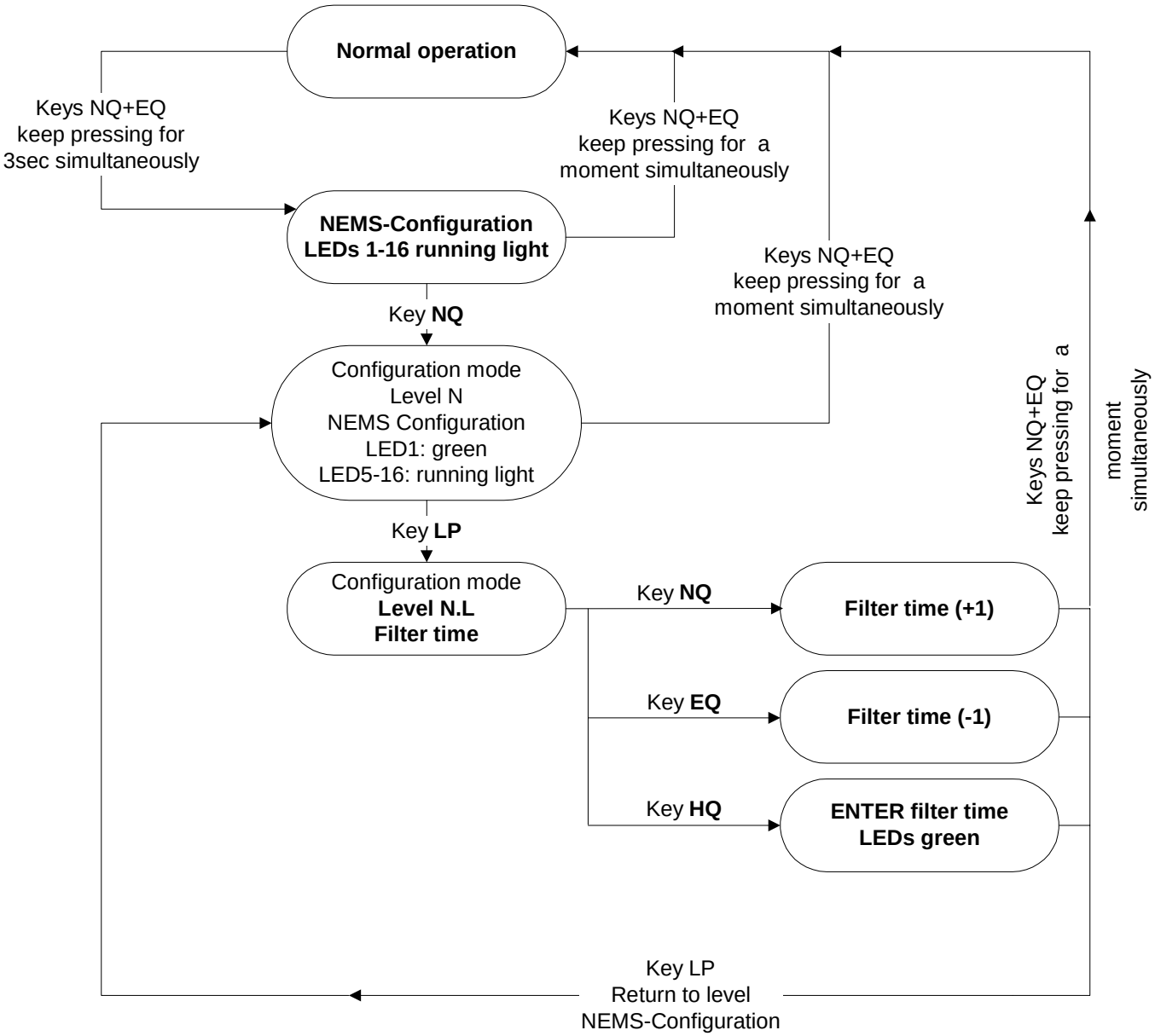


10.8 Level N.L – Filter time 1-127ms

Hold down NQ + EQ simultaneously for 3 sec, then NQ, then LP

At this level you can configure the filter time (reaction time) of the indicator inputs. This filter time relates to all the inputs and is displayed on the LEDs in binary code.

- Example: LED1: green = 1 ms #
  LED2: green = 2 ms
  LED1+2 green = 3 ms
  LED3: green = 4 ms



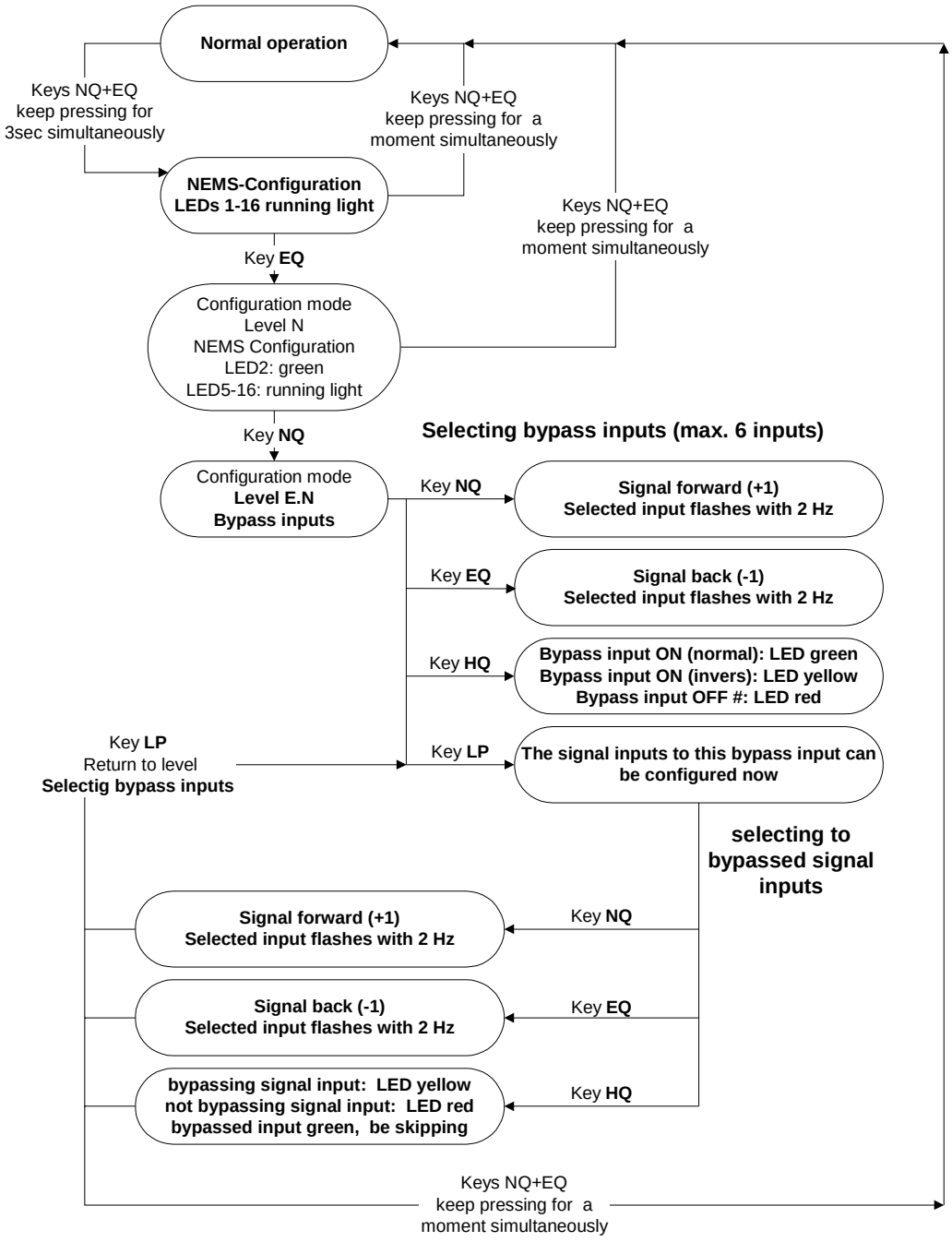
10.9 Level E.N – Bypassed inputs

Hold down NQ + EQ simultaneously for 3 sec, then EQ, then NQ

A bypass can be set in order to skip any indicator input by means of configuration. In combustion engineering, for example, during “Gas operation“ the signals from the “Oil operation“ safety interlock chain are irrelevant and can be bypassed.

NOTE:

When assigning the indicator inputs to the input bypass selected, the input bypass is always displayed by means of a green LED regardless of whether it is configured as “normal“ or “inverted“ in order to prevent it from being confused with the bypassed indicator inputs (LEDs yellow).

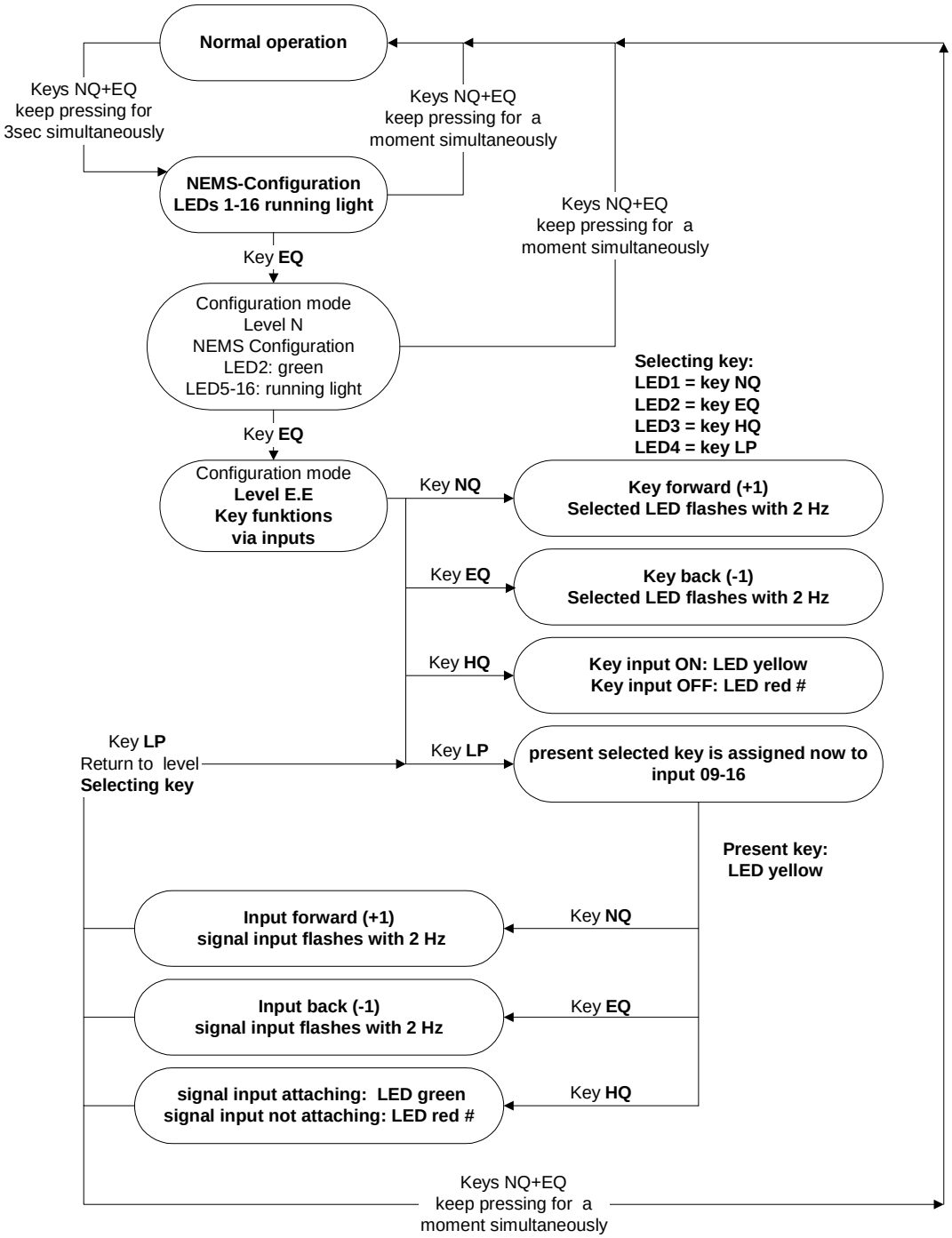


10.10 Level E.E – Key functions via inputs

Hold down NQ + EQ simultaneously for 3 sec, then EQ, then EQ

Indicator inputs 09-16 can be configured as key inputs, e.g. for external acknowledgement keys or lamp testing.

You also have the facility to connect all acknowledgement keys to one input. This will give you group acknowledgement:



10.11 Level E.H - Safety interlock chains

Hold down NQ + EQ simultaneously for 3 sec, then EQ , then HQ

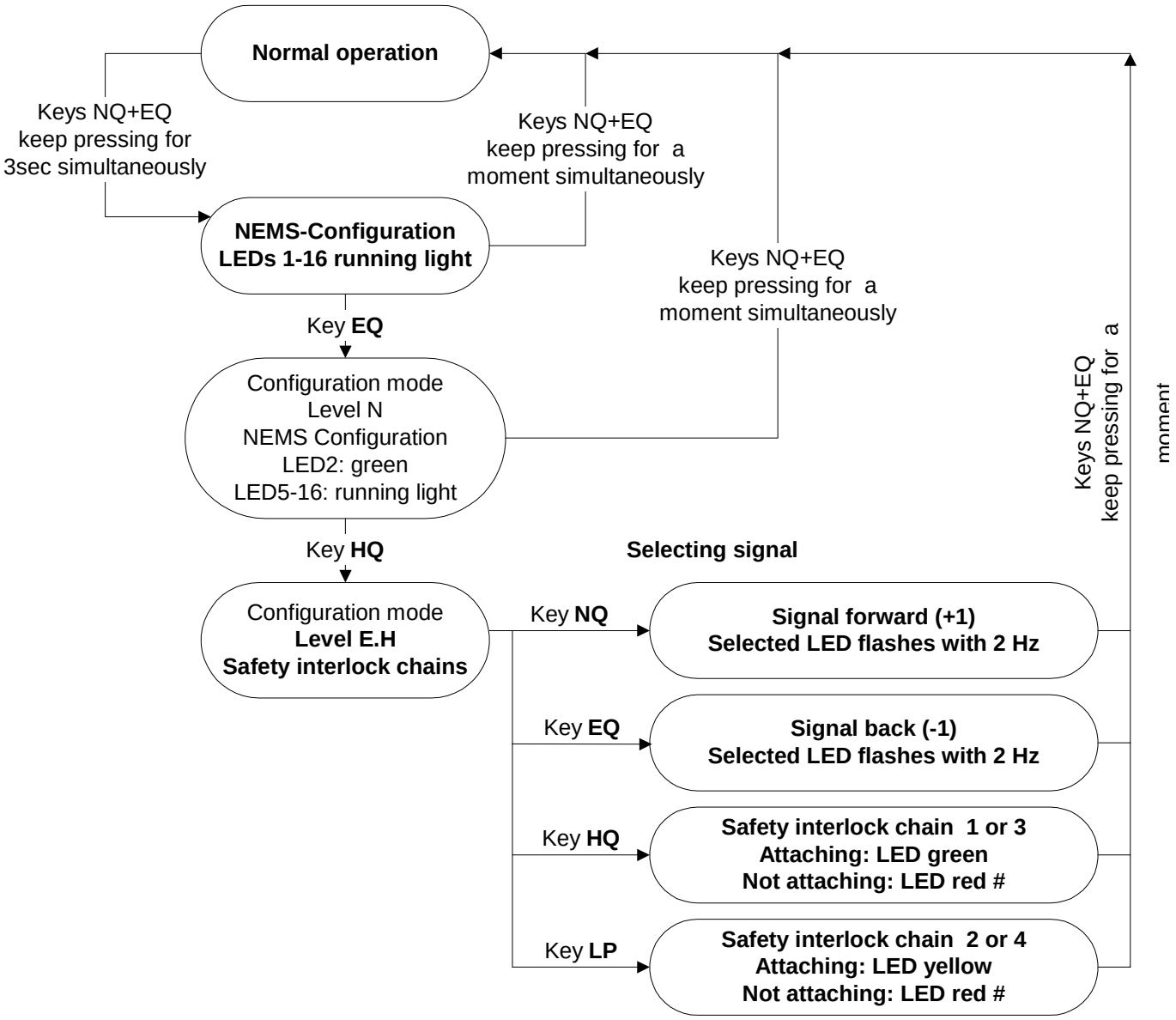
A maximum of 4 safety interlock chains can be defined for each device.

The setting of the safety interlock chains always begins with chain 1 in ascending order.

A safety interlock chain always begins with the lowest indicator number (highest priority) in the defined chain and then continues with the indicating numbers in ascending order.

The assignment of signals within a chain must not contain any gaps.

The device automatically decides whether **HQ** chain 1 or 3 is used for assignment or **LP** chain 2 or 4.



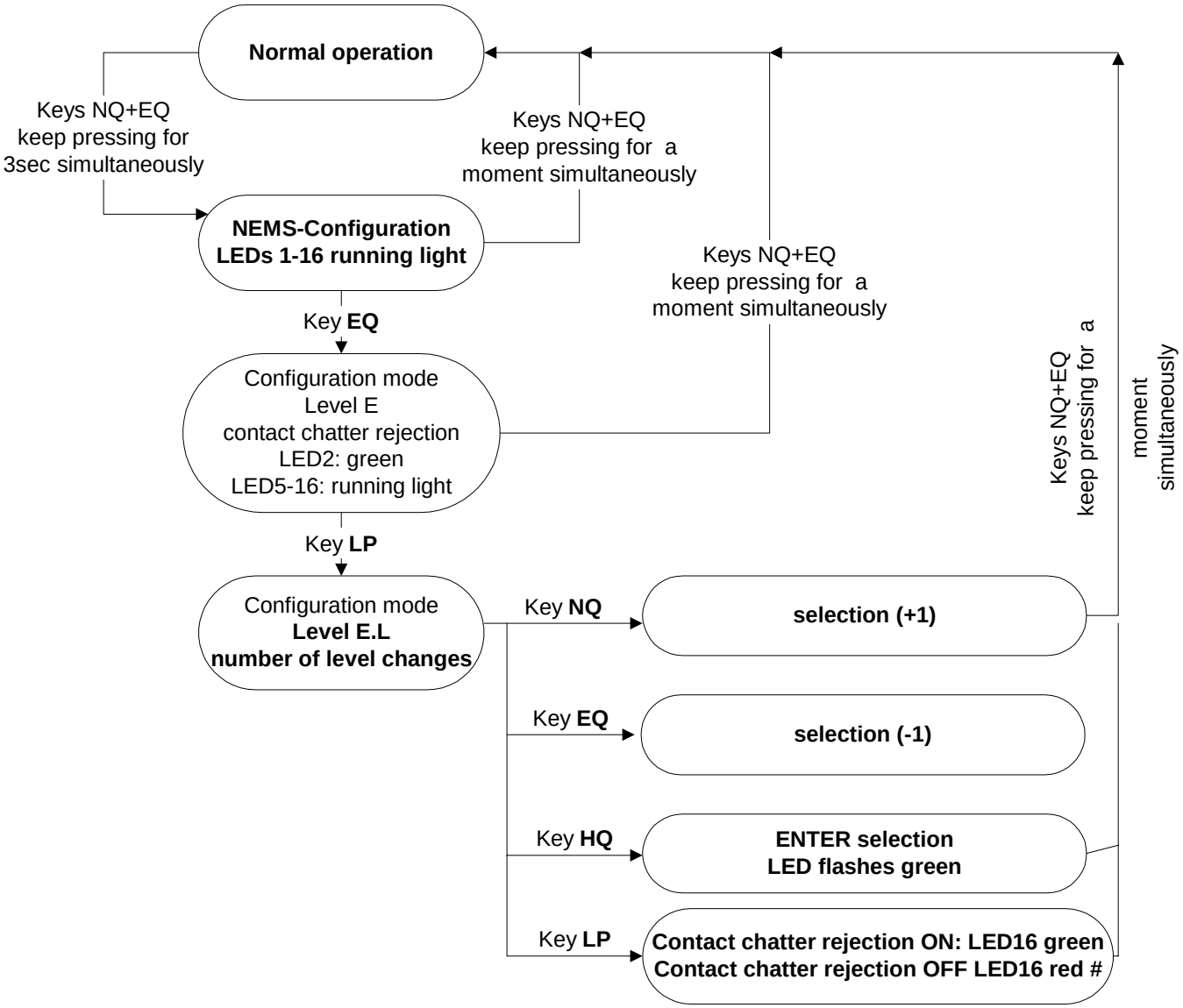
10.12 Level E.L – Contact chatter rejection

Hold down NQ + EQ simultaneously for 3 sec, then EQ , then LP

At this level you can configure contact chatter rejection (number of changes in level within 10 sec) of the indicator inputs. This contact chatter rejection relates to all inputs and is displayed in binary code on the LEDs.

- Example: LED1: green = 1
  LED2: green = 2
  LED1+2 green: = 3
  LED3: green = 4

If contact chatter rejection is active (e.g. after 10 changes in level in 10 sec), the corresponding indicator input is blocked. The corresponding indicator input is released again after a waiting period of 10sec. via the configuration software you can activate a TIMEOUT, with which the waiting period for the release can be configured (see 11.4.5).



10.13 Level H.N – Relay 1

Hold down NQ + EQ simultaneously for 3 sec, then HQ , then NQ

The actual setting is displayed in binary code on the LEDs.

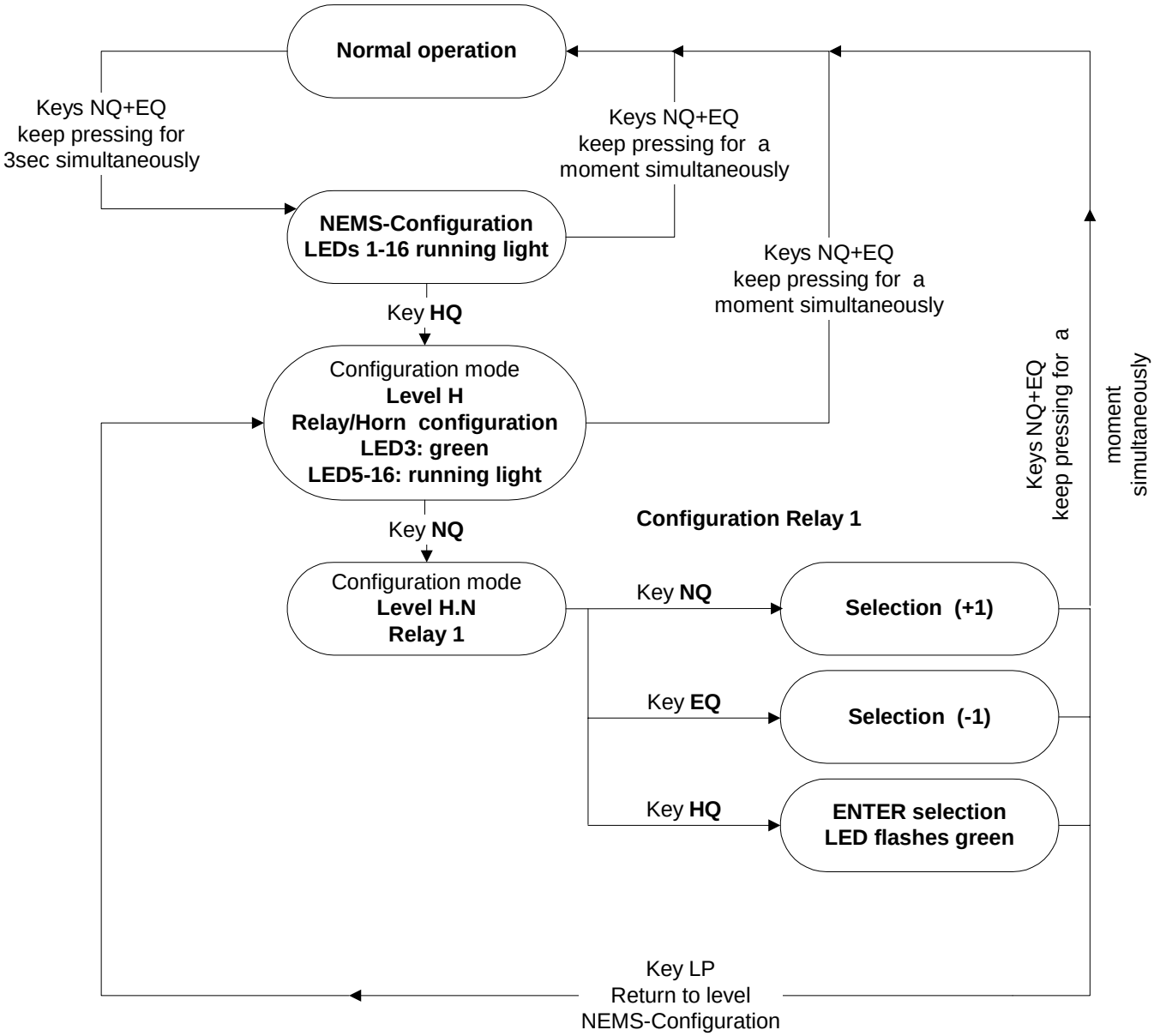
- „0“: Relay 1 OFF
- „1“: Local group 1 statically (OR-logic) #
  incoming signal from indicator group 1 – relay picks up,
  outgoing signal from indicator group 1 – relay drops off,
  no reaction to new incoming signals.
- „2“: Local group 1 impulse (OR-logic)
  Incoming signal – relay ON for 0,5sec.
  Relay ON for 1sec. in the event of new incoming signals.
- „3“: Local group 1 acknowledgeable (OR-logic)
  incoming signal from indicator group – relay picks up,
  relay only drops off if the signal is acknowledged
- „4“: Local group 2 statically (OR-logic)
- „5“: Local group 2 dynamically (OR-logic)
- „6“: Local group 2 acknowledgeable (OR-logic)
- „7“: Horn external global

NOTE:

All signals, which are set to „Horn external or Horn internal & external“, are signalled by the “Horn external global“.

- „8“: Horn external local
- „9“: Watchdog (equipment fault)
- „10“: Printer fault
- „11“: Local group 1 statically (AND-logic)
- „12“: Local group 1 impulse (AND-logic)
- „13“: Local group 1 acknowledgeable (AND-logic)
- „14“: Local group 2 statically (AND-logic)
- „15“: Local group 2 dynamically (AND-logic)
- „16“: Local group 2 acknowledgeable (AND-logic)
- „17“: Local group 1 dynamically (OR-FUNKTION)
  Incoming signal – relay ON, outgoing signal – relay OFF.
  Relay ON for 1sec. in the event of new incoming signals.
- „18“: Local group 2 dynamically (AND-logic)
- „19“: LSB (PROFIBUS FMS/VMS/ETAMATIC)

Setting via the front keys



Level H.N – Relay 1

10.14 Level H.E – Relay 2

Hold down NQ + EQ simultaneously for 3 sec, then HQ ,then EQ

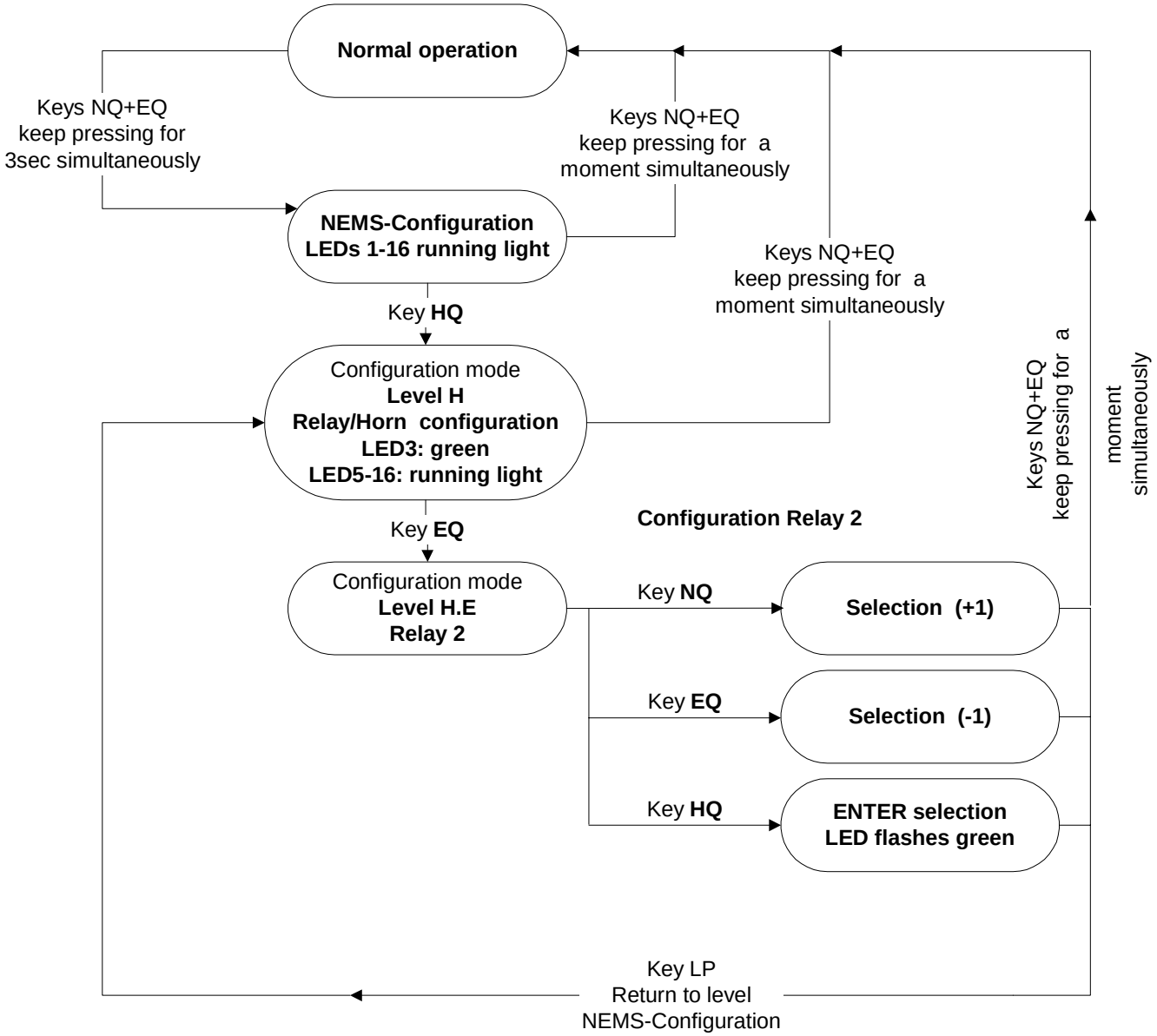
The actual setting is displayed in binary code on the LEDs.

- „0“: Relay 2 OFF
- „1“: Local group 1 statically (OR-logic) #
  incoming signal from indicator group 1 – relay picks up,
  outgoing signal from indicator group 1 – relay drops off,
  no reaction to new incoming signals.
- „2“: Local group 1 impulse (OR-logic)
  Incoming signal – relay ON for 0,5sec.
  Relay ON for 1sec. in the event of new incoming signals.
- „3“: Local group 1 acknowledgeable (OR-logic)
  incoming signal from indicator group – relay picks up,
  relay only drops off if the signal is acknowledged
- „4“: Local group 2 statically (OR-logic)
- „5“: Local group 2 dynamic (OR-logic)
- „6“: Local group 2 acknowledgeable (OR-logic)
- „7“: Horn external global

NOTE:

All signals, which are set to „Horn external or Horn internal & external“, are signalled by the “Horn external global“.

- „8“: Horn external local
- „9“: Watchdog (equipment fault)
- „10“: Printer fault
- „11“: Local group 1 statically (AND-logic)
- „12“: Local group 1 impulse (AND-logic)
- „13“: Local group 1 acknowledgeable (AND-logic)
- „14“: Local group 2 statically (AND-logic)
- „15“: Local group 2 dynamically (AND-logic)
- „16“: Local group 2 acknowledgeable (AND-logic)
- „17“: Local group 1 dynamically (OR-logic)
  Incoming signal – relay ON, outgoing signal – relay OFF.
  Relay ON for 1sec. in the event of new incoming signals.
- „18“: Local group 2 dynamically (AND-logic)
- „19“: LSB (PROFIBUS FMS/VMS/ETAMATIC)



Level H.E – Relay 2

10.15 Level H.H - Horn

Hold down NQ + EQ simultaneously for 3 sec, then HQ ,then HQ

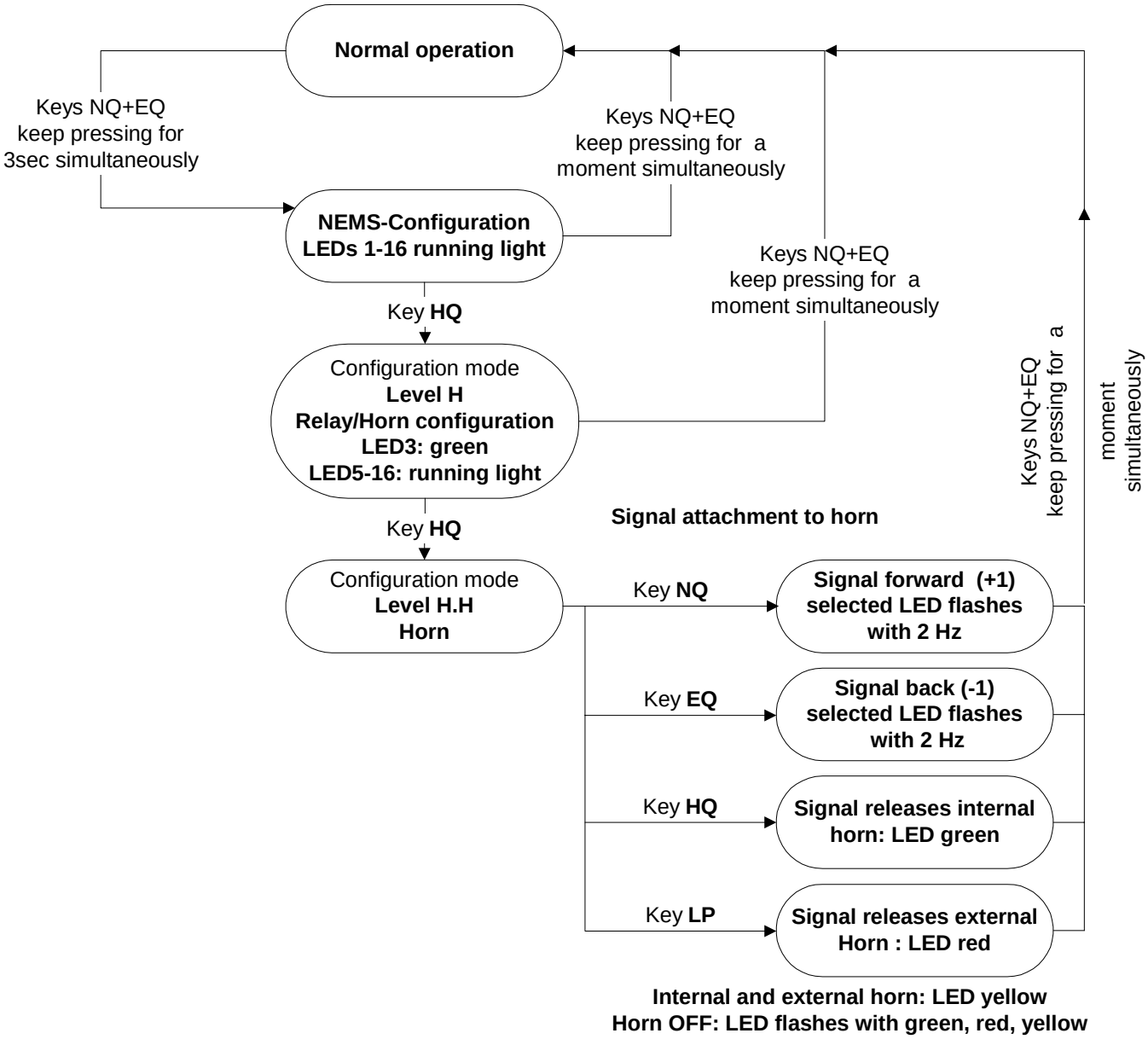
At this level you can set the horn function to each of the 16 indicator inputs.

Signal triggers internal horn (LED green)

Signal triggers internal and external horn # (LED yellow)

Signal triggers external horn (LED red)

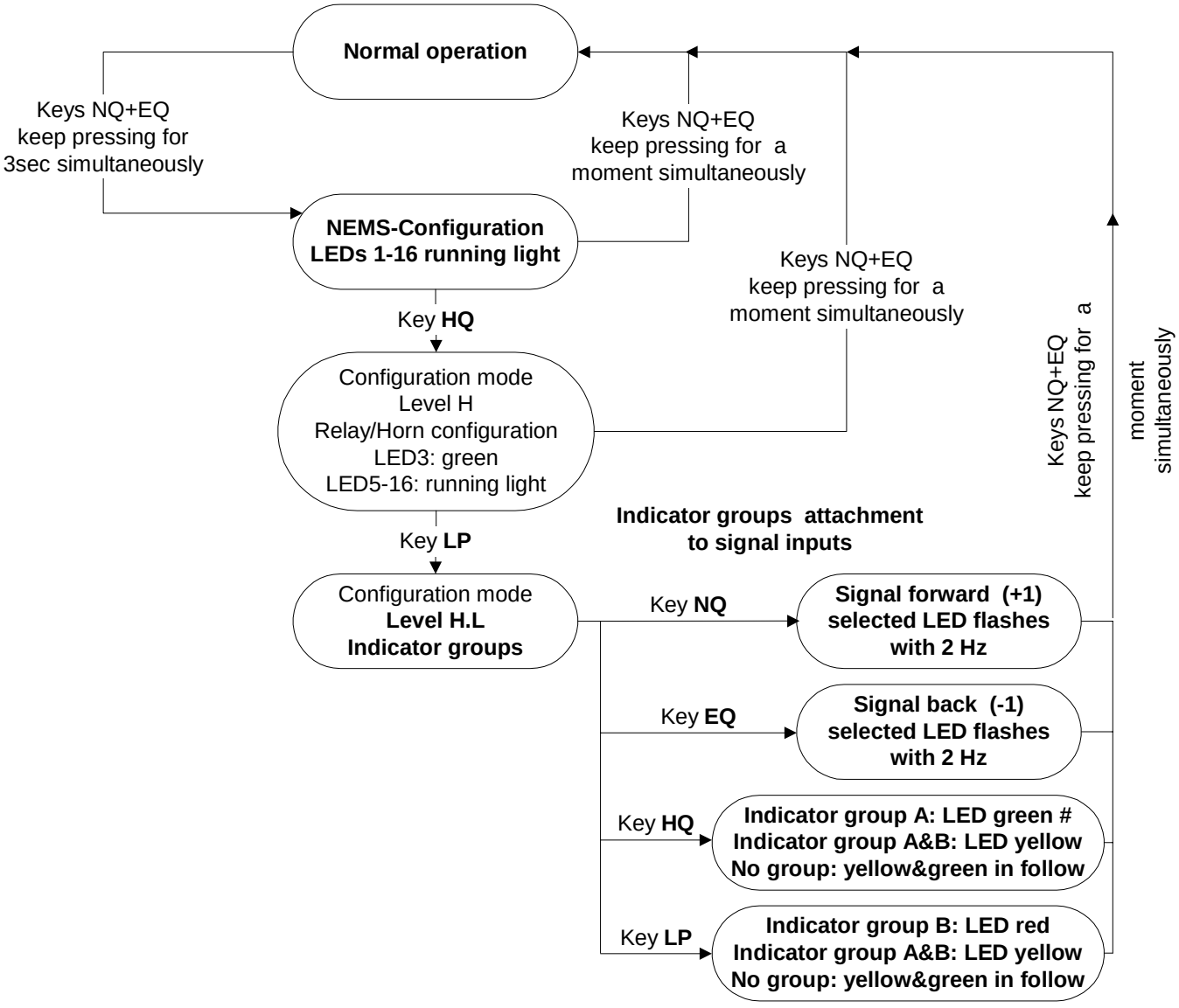
Signal does not trigger any horn (LED flashes in sequence green/red/yellow)



10.16 Level H.L – Local indicator groups

Hold down NQ + EQ simultaneously for 3 sec, then HQ ,then LP

At this level you can set local indicator group 1 and/or 1 to each of the 16 indicator inputs.

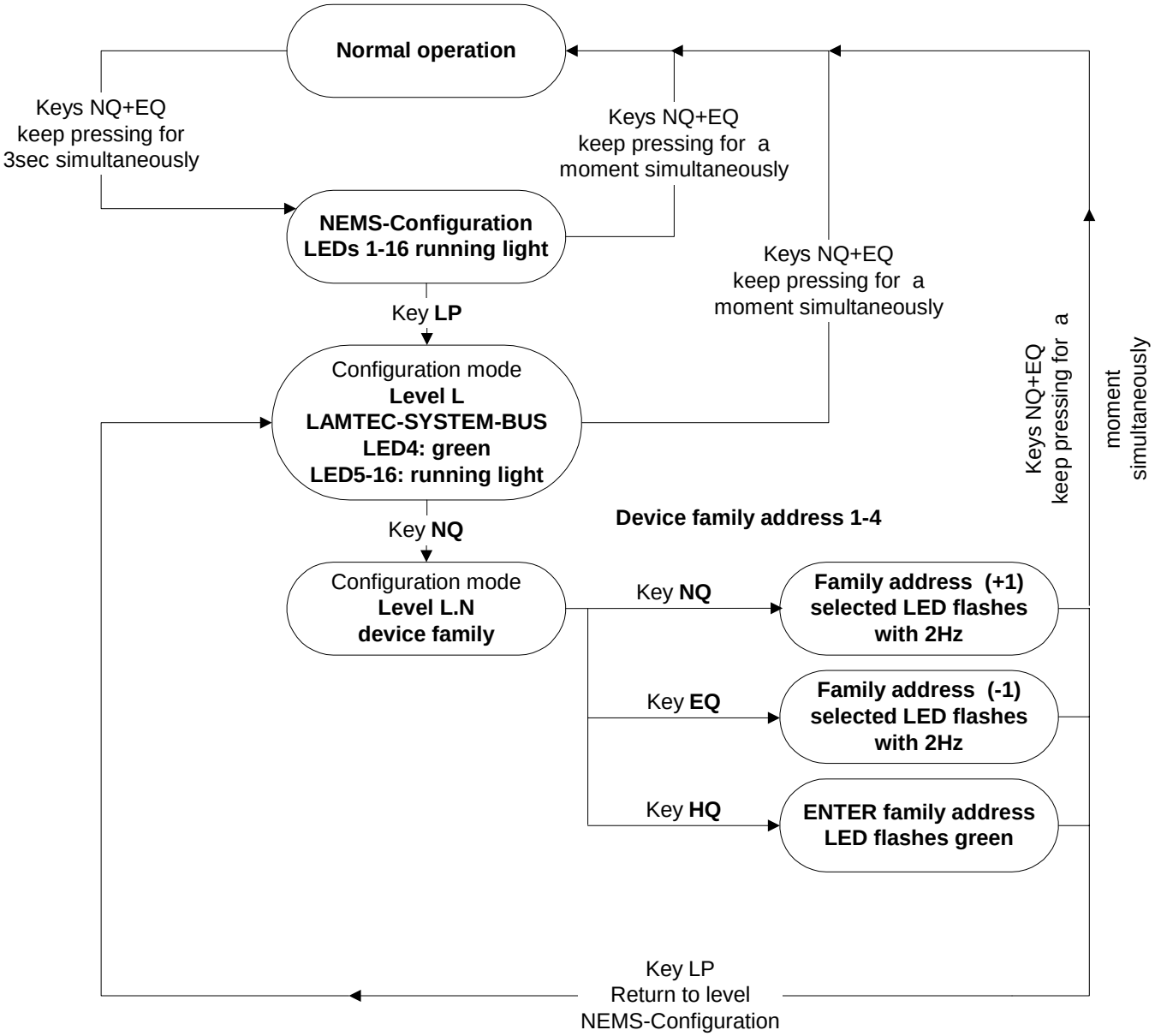


10.17 Level L.N – LAMTEC SYSTEM BUS – device family

Hold down NQ + EQ simultaneously for 3 sec, then LP ,then NQ

At this level you can set the device families (1-4).

NOTE:
There are 16 device addresses available for each device family.
(default = family 1).



10.18 Level L.E – LAMTEC SYSTEM BUS – device addresses

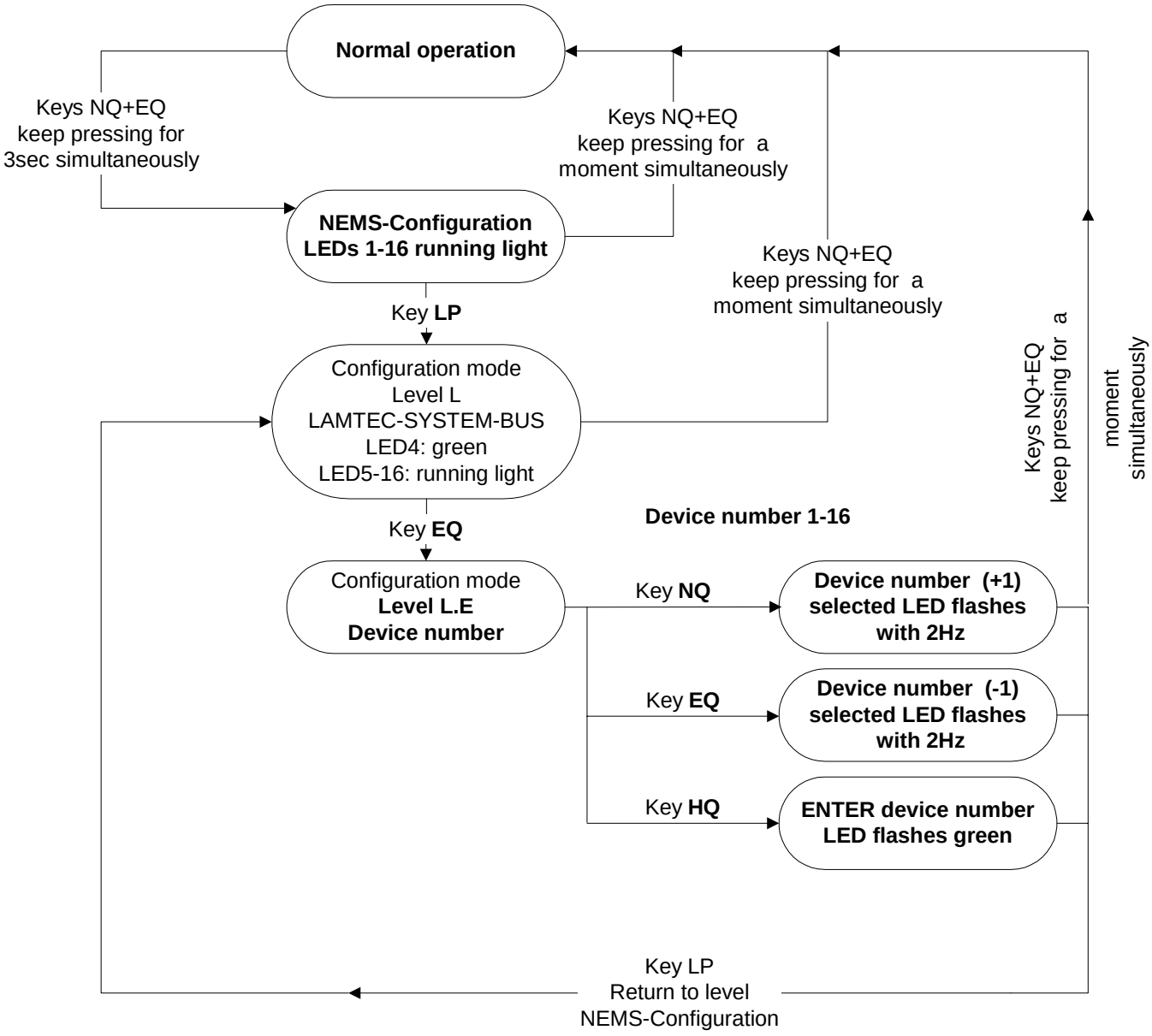
Hold down NQ + EQ simultaneously for 3 sec, then LP ,then EQ

At this level you can set the device address (1-16).

NOTE:

If an equipment address is allocated twice in an indicator system, the NEMS devices in question will switch to configuration mode (operating light LEDs 1-16). You can then change the duplicated equipment address using the key sequence LP → EQ.

(default = address 1)



11 Configuration software

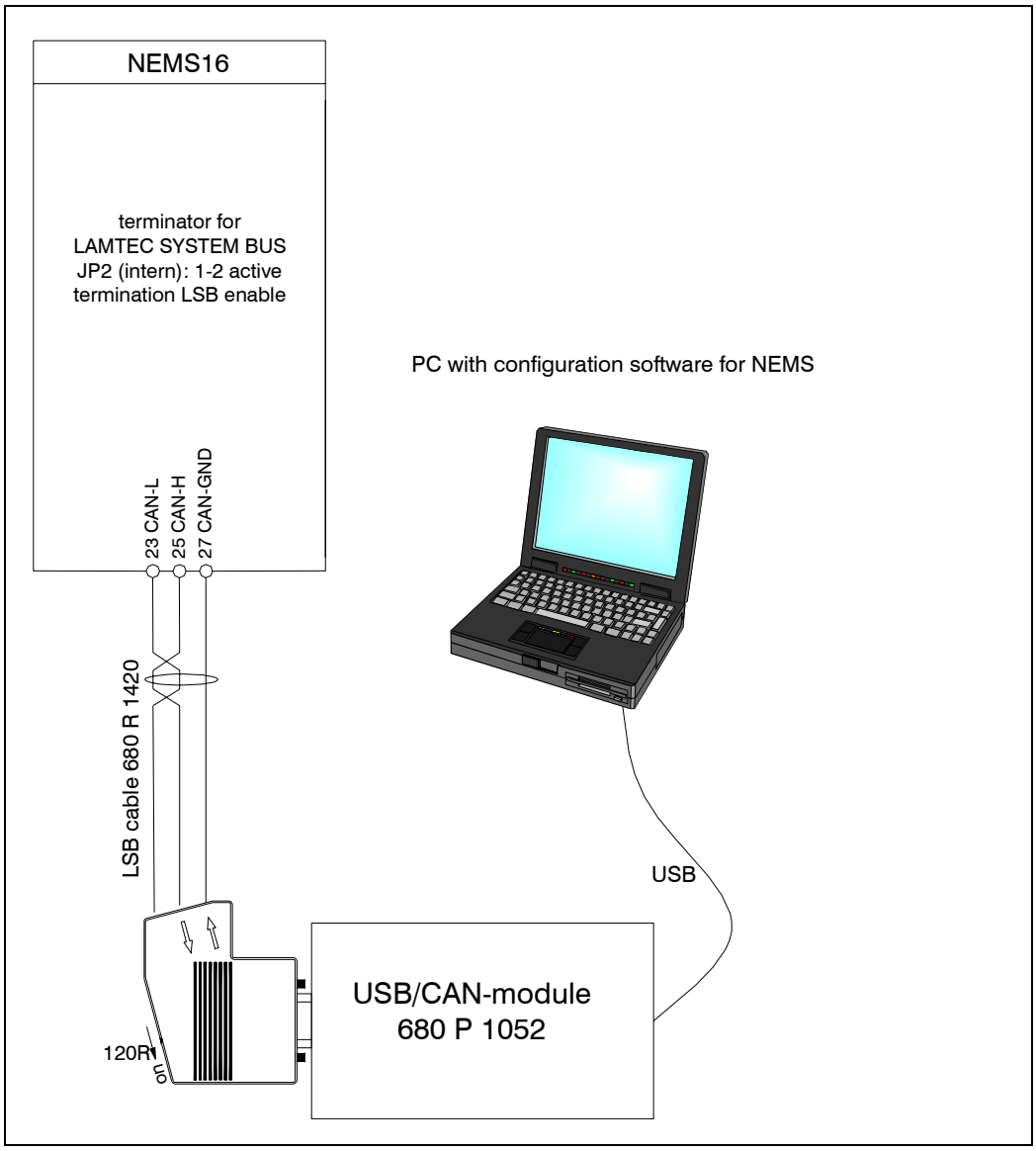
The software was made for entering indicator texts and user-friendly configuration of the NEMS.
Therefore you need a PC with RS232 interface, respectively with USB interface and minimum Win98.

There are three versions of the configuration software aviable

Single Version:
For individual devices, for connecting via a present RS232 interface
product no. 680 R 1053

Light Version:
For connecting up to 2 devices (with registration code) with the LAMTEC SYSTEM BUS via USB/CAN converter. There is no need for a RS232 interface in this version.
product no. 680 R 1056.

Premium Version:
For connecting up to 64 devices with LAMTEC SYSTEM BUS via USB/CAN converter. There is no need for a LS232 interface in this version.
product no. 680 R 1052 (with registration code).



Configuration software

11.1 Installation

NOTE to NEMS-Config < version 1.6.0!

If you acquired the CAN version of NEMS Config, it is first necessary to install the device driver of the provided USB/CAN module.

Please follow the provided installation guidance. If this driver is not installed, NEMS Config starts in the RS232-Mode.

NEMS Config is fully executable on the following Windows versions:

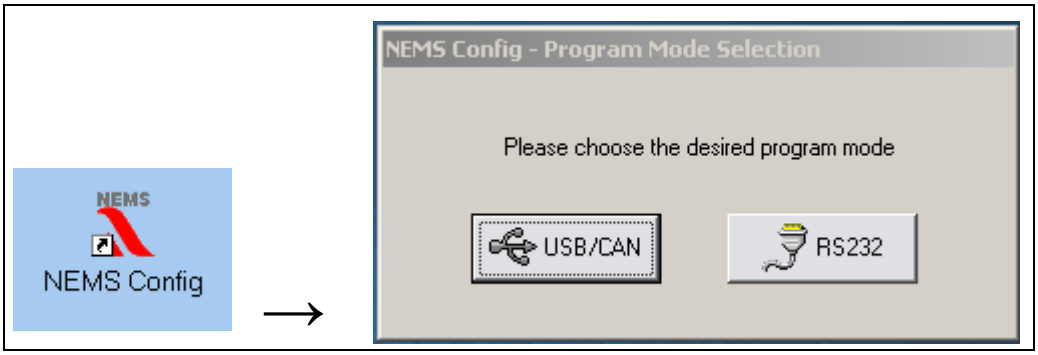
Windows 98, ME, 2000 also XP. By Windows 95 and NT4.0 (Service Pack 6 or higher) supports NEMS Config only RS232-Mode, because Windows 95 and. NT4.0 doesn't support USB, which would be necessary for the CAN-operation. Note that you need for the installation under Windows NT4.0, 2000 and XP of administrator rights.

From NEMS-Config version 1.6.0.0 on, during the installation process the actual driver for the USB/CAN module will be installed. It is not necessary to install the driver separately. Please disconnect the module from the USB and reconnect it after the installation process. In the situation of the first installation Windows should detect the device and requests the installation of the module automatically

Start the file „NEMS_Config_X.Y.Z.exe“ to install the software. Choose your language and follow the instructions on the screen. The required data-files will be stored automatically in this directory:

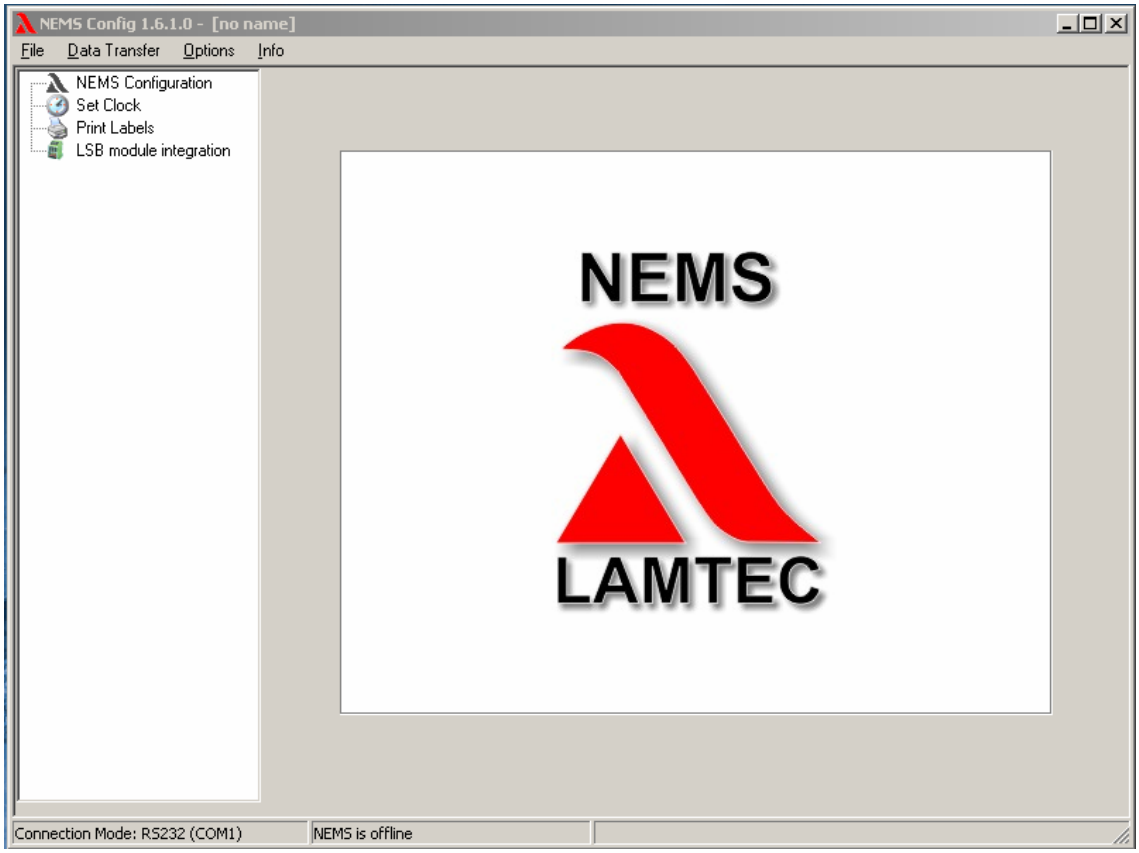
„C:\Programme\Lamtec\NEMS config X.Y.Z“.

The program can be started by mouse double click from the Desktop.

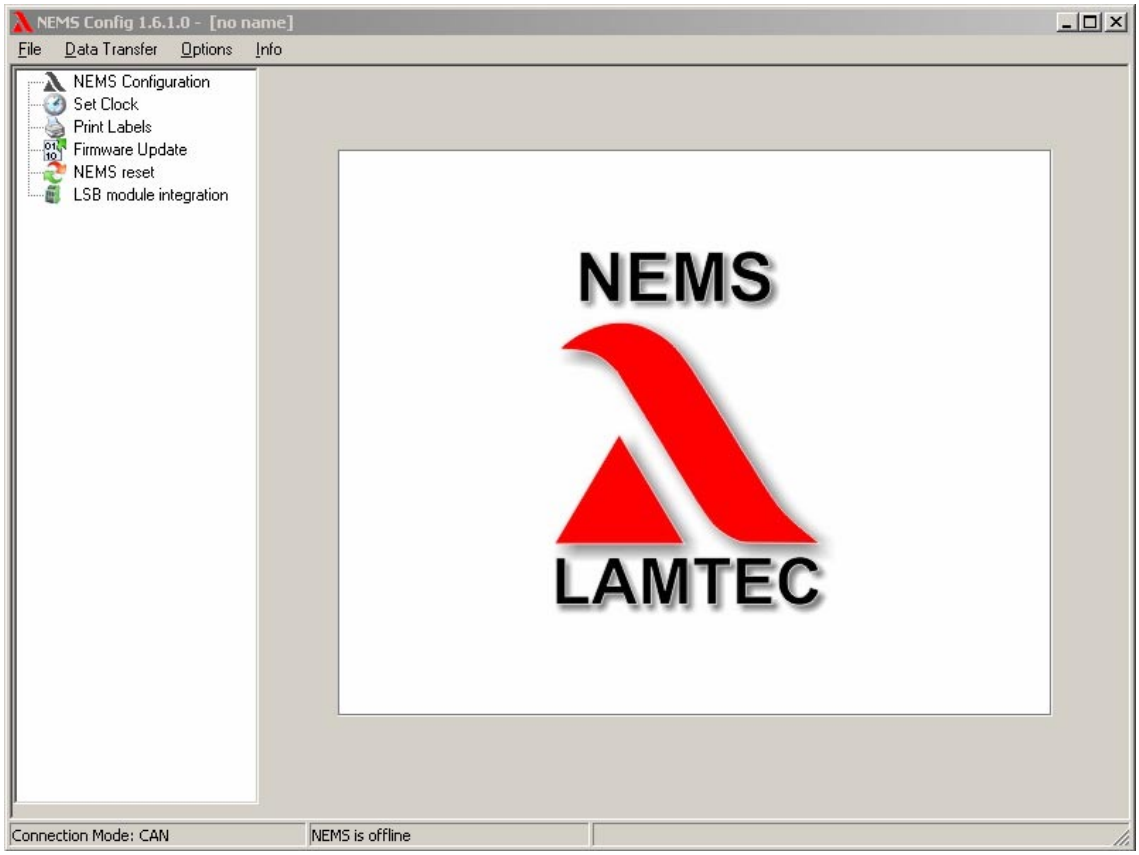


Select now the corresponding “Program-Mode”

11.1.1 Window Program Mode RS232 (as described)



11.1.2 Window Program Mode USB/CAN



11.1.3 Select Language

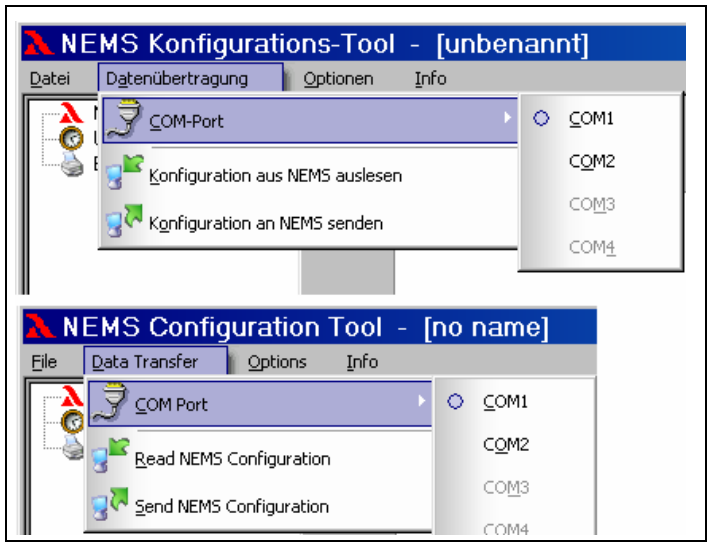
Select the desired language with:

Options ⟶ Language ⟶ Deutsch or English or Français

11.1.4 Configuration COM-Port

To communicate with NEMS prepare a free serial port.

For its configuration click on the menu „**Data Transfer ⟶ COM Port**“.



11.2 Connection to the NEMS via RS232 mode

Attention: Connect and disconnect the RS 232 cable only when NEMS is switched OFF from line power!

When the RS 232 cable is plugged on to NEMS serial port, then the configuration software is able

11.3 Connection to the NEMS via USB/CAN mode

In the situation of the first installation Windows should detect the device and requests the installation of the module automatically. Now please connect the USB/CAN adapter with the USB interface at your PC.

Attach now the CAN side to the clamps of the first NEMS (term.23 CAN-low, term.25 CAN-high). Make sure that the terminal resistance for the LAMTEC SYSTEM BUS at the last NEMS and at the plug of the USB CAN adapter is set.

Now open the configuration software and select “USB/CAN”

Change to:

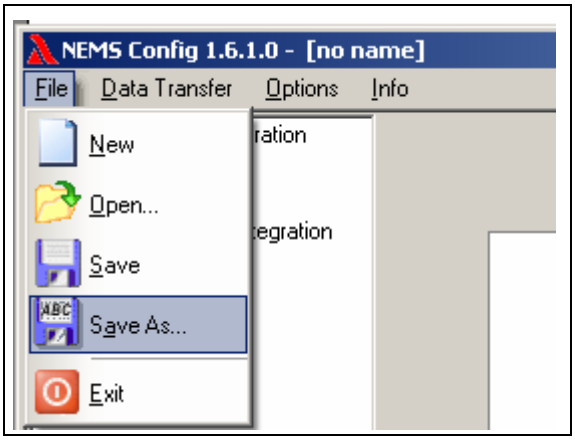
Option ⟶ Unlock program features

Now you have to enter the 16-digit release code shipped with the software. This code will activate the purchased functions.

After the next restart of the configuration software you have then access to all NEMS in the system.

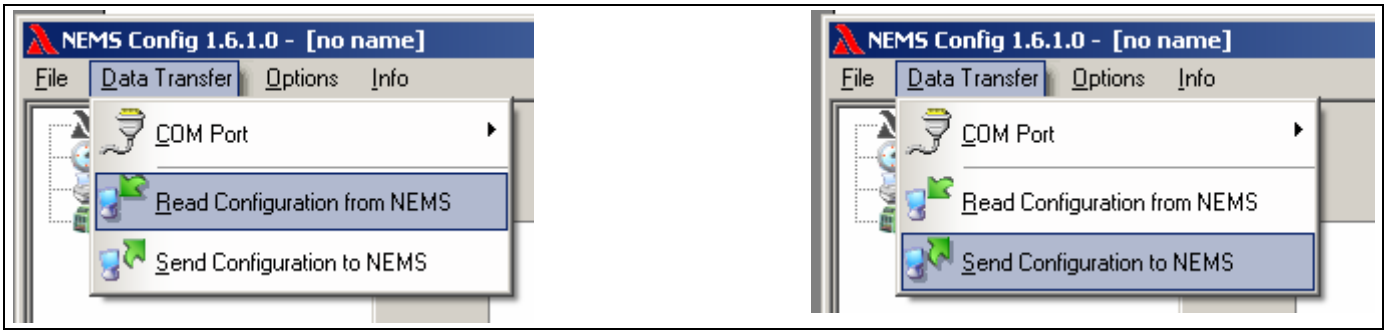
Switch ON the NEMS now.

11.4 Window „File“



Use this window to open, and save the configuration files for NEMS

11.5 Window “Data Transfer”



Use this window to send the actual configuration to NEMS or to read the actual configuration from NEMS

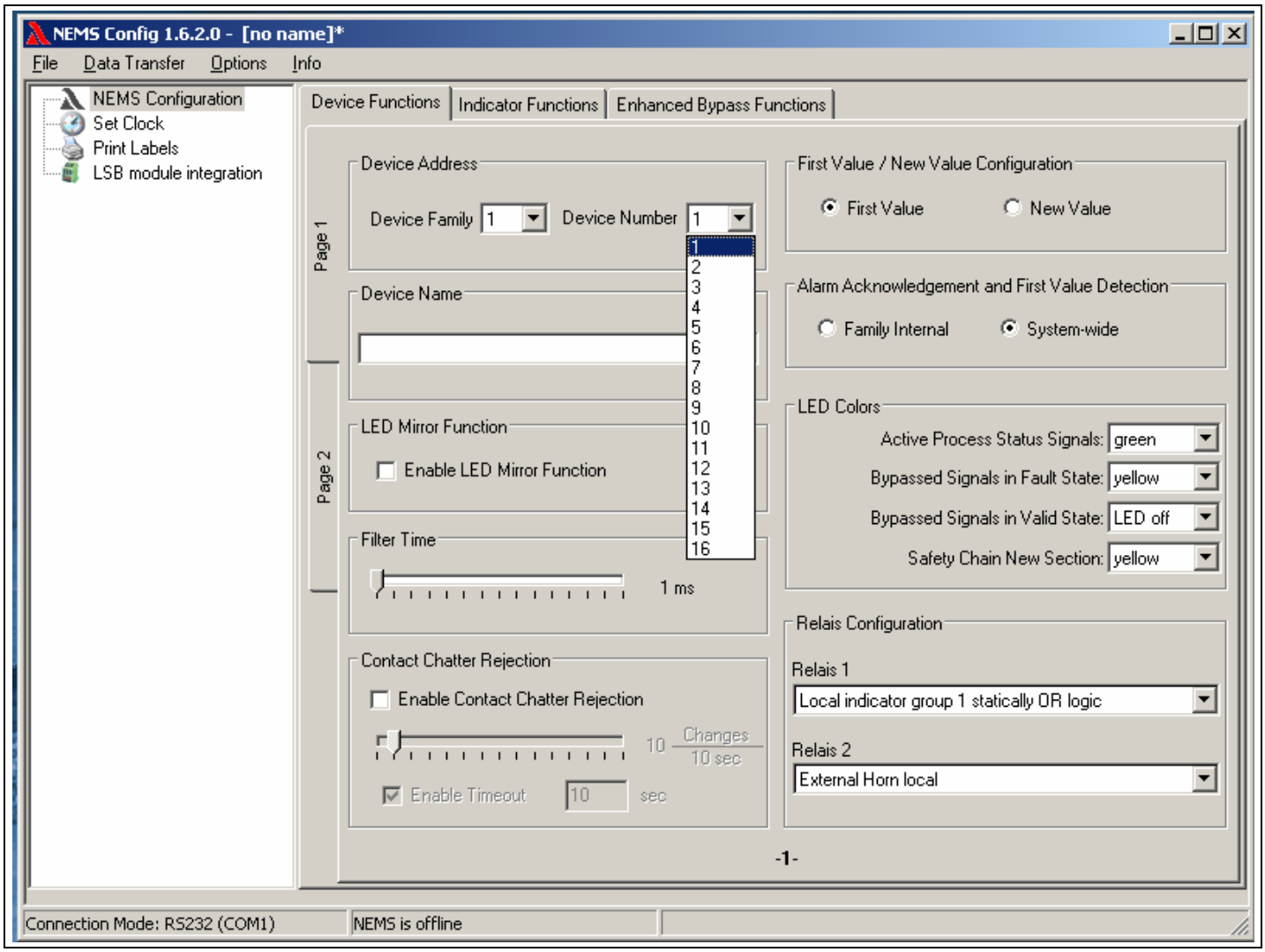
NOTE:

You may read the actual configuration from the NEMS, change settings and send the new configuration back to NEMS.

You may also create a configuration at the PC in advance and send this configuration to the NEMS.

You are not working online! You have to send the configuration to NEMS altogether.

11.6 Device Functions (Page 1)



11.6.1 Device Address

At this level you can set the device family (1-4) (default=1)

NOTE:
There are 4 device families available.

and the device number (1-16) (default=1).

NOTE:
If an equipment address is allocated twice in an indicator system, the NEMS devices in question will switch to configuration mode (operating light LEDs 1-16). You can then change the duplicated equipment address using the key sequence LP → EQ

With single devices is this function without meaning.

11.6.2 Device Name

The name you have registered here will be used in the header of the labelling cards.

11.6.3 LED Mirror Function

For mirroring the LEDs on slave NEMS devices (NEMS without indicator inputs, just LED display and key operation). The device addresses of both NEMS have to suit and the function has to be activated.
Only possible in RS232 mode!

11.6.4 Filter Time

Setting the filter time (delay time) of the indicator inputs. This filter time relates to all inputs.

- Filter time from 1...127ms

11.6.5 Contact Chatter Rejection

Setting of contact chatter rejection (number of changes in level within 10 sec) of the indicator inputs. This contact chatter rejection relates to all inputs.

If the contact chatter rejection is active (i.e. after 10 changes in level within 10 sec), the appropriate indicator input will be locked. After a delay of 10 sec. The indicator input will be unlocked again. You also have the option to activate a timeout (10…250 sec.) to configure the delay for the enabling the input.

11.6.6 First Value / New Value Configuration

Selection if the NEMS indicates the first message separately.

- First value → LED red with flash frequency 2Hz
- New value → LED red with flash frequency 1Hz

11.6.7 Acknowledgement via Front Keys and First Value Interlocking

The acknowledgement of fault signals via the keys, as well as the first value interlocking has either system-spreading validity, or are limited to the own device family.

11.6.8 Colours of the LEDs

Process status signal green / red:
Process status signals can be signalled alternatively with green steady light or red steady light

Safety interlock chains new section yellow/red/green: If a safety interlock chain was released, then a again recognized isolating point can be signalled alternatively with yellow steady light, or with red steady light (by configuration as fault signal) and/or green steady light (by configuration as process status signal).

Bypassed signals in ERROR state yellow/OFF:
If a bypass is enable, then the mode of this input can be signalled alternatively with yellow steady light, or without a light (LED OFF).

Bypassed signals in valid state (without faults) green/OFF:
If a bypass is disable, then the mode of this input can be signalled alternatively with green steady light, or without a light (LED OFF).

11.6.9 Relay Configuration

Settings for relay 1 and relay 2

- Relay OFF
- Local indicator group 1 static (OR-logic)
  incoming signal from indicator group A – relay ON,
  outgoing signal from indicator group A – relay OFF,
  no reaction to new incoming signals.
- Local indicator group 1 dynamic (OR-logic)
  incoming signal from indicator group A – relay ON,
  outgoing signal from indicator group A – relay OFF,
  0.5 sec good condition in the event of new incoming signals (group A)
- Local indicator group 1 acknowledgeable (OR-logic)
  incoming signal from indicator group – relay ON
  relay only OFF if the signal is acknowledged
- Local indicator group 2 static (OR-logic)
- Local indicator group 2 dynamic (OR-logic)
- Local indicator group 2 acknowledgeable (OR-logic)
- HORN external global

NOTE:

All signals, which are set to „Horn external or Horn internal & external“, are signalled by the “Horn external global“.

- HORN external lokal
- WATCHDOG-function
- Printer fault
- Local indicator group 1 static (AND-logic)
- Local indicator group 1 dynamic (AND-logic)
- Local indicator group 1 acknowledgeable (AND-logic)
- Local indicator group 2 static (AND-logic)
- Local indicator group 2 static (AND-logic)
- Local indicator group 2 acknowledgeable (AND-logic)
- LSB (PROFIUS FMS/VMS/ETAMATIC).

Device Functions (Page 2)

11.6.10 Devices for the interpretation of messages

Printer connected to NEMS
For printing out incoming and outgoing fault and process status signals in chronological order. Timing accuracy of the time stamps: type. + 1 ms .... + 5 ms. For connection to the RS232 interface of the NEMS. Activate this option, if the NEMS has a printer, which is directly attached at the NEMS master.

PROFIBUS/Modbus communication processor
The NEMS signals can be converted to a PROFIBUS protocol via a communications processor connected to the LAMTEC SYSTEM BUS. Activate this option, if the NEMS has a communications processor with PROFIBUS (also in connection with PROFIBUS FMS/VMS/ETAMATIC).

Operation terminal
For displaying incoming and outgoing fault and process status signals in chronological order. Timing accuracy of the time stamps: type. + 1 ms ... + 5 ms. For configuring, operating and displaying the NEMS devices. To be connected via the NEMS LAMTEC SYSTEM BUS. Activate this option, if the NEMS has to be connected to this terminal.

Enable logging of process status signals
Activate this option, if also by-passed inputs are to be reported (also with delivery to the PROFIBUS).

Report bypassed inputs
Activate this option if by-passed inputs with fault shall be announced.

“Resetting bypass” assumes indicator with alarm
Config. “without alarm”
If a by-passed input has a fault at the moment the bypass is moved back, the input is set to active and continuous light immediately, There is no flashlight, no horn and no message.

Config “with alarm”
If a by-passed input has a fault at the moment the bypass is set; an alarm with flashlight, horn and message is generated.

This also happens, if for the by-passed input a tripping time is configured.

11.6.11 Special function terminal 16

Switching of messages during self-test

NOTE:

The safety interlock chains of FMS and ETAMATIC are provided with a self-test i.e. the voltage shuts down for a moment. To avoid false alarms the supply of the safety interlock chains has to effect at clamp 16 of the NEMS.

With safety interlock chain functions the special function clamp 16 has to be activated. With the self-test of the indication-loop the inputs 1-15 will be ignored for 5 sec.
Clamp 16 is not longer available for indication input.

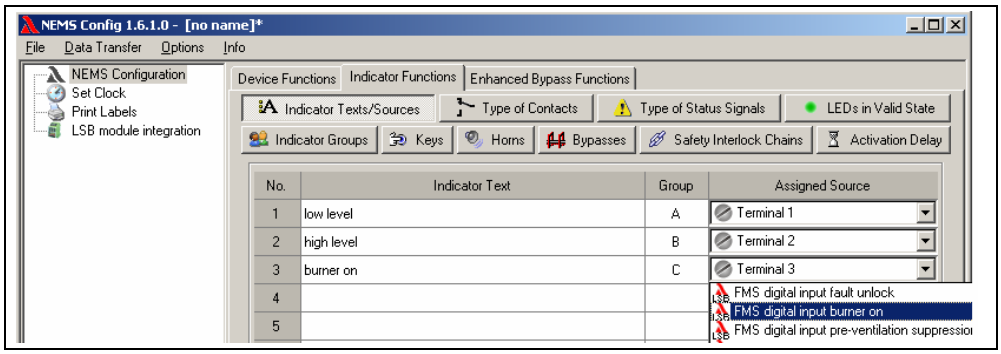
Furthermore the input 16 has to be set to quiescent current and process status signal.

11.6.12 Enable Central clock (radio controlled clock)

If you have a radio-controlled clock in the system, this option must be set to „enable“, to allocate the source of time with the devices. See also section 16.3.4

11.7 Indicator functions

11.7.1 Indicator texts / sources



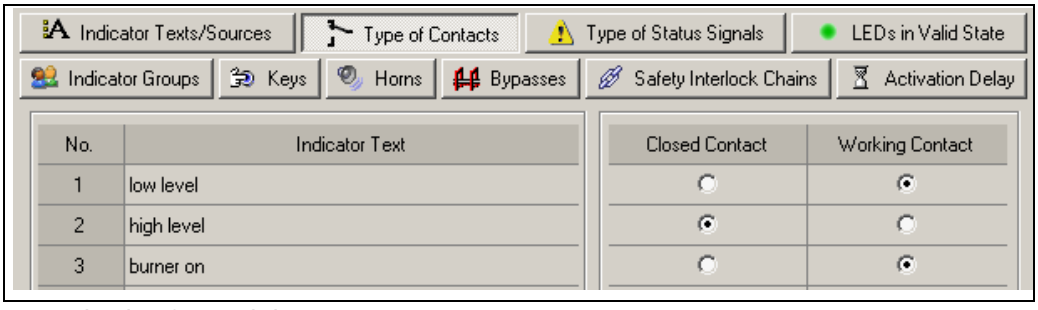
- For entering indicator texts.
- For entering global indicator groups (A...Z), output control via digital output module, see section 11.9 and 16.5
- For selection of the source of the indicator function.
  - Messages from the clamps have to be wired.
  - Virtual messages via LAMTEC SYSTEM BUS need not to be wired (apart form LSB).

Abstract of the virtual messages

NOTE:

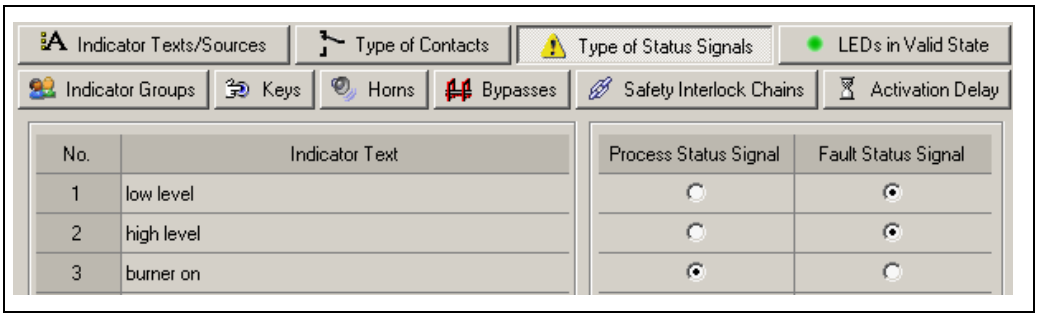
In fact virtual indicator inputs allocate an indicator input, but they don't have to be wired. It's quite enough to connect ETAMATIC/FMS via LAMTEC SYSTEM BUS with NEMS. The signals of the virtual messages apply to LAMTEC SYSTEM BUS:

11.7.2 Type of contacts



- Selection for each input
- Closed contacts (normal closed): contactor of the input in normal mode (without faults) closed.
- Working contacts (normal open): contactor of the input in normal mode (without faults) open.

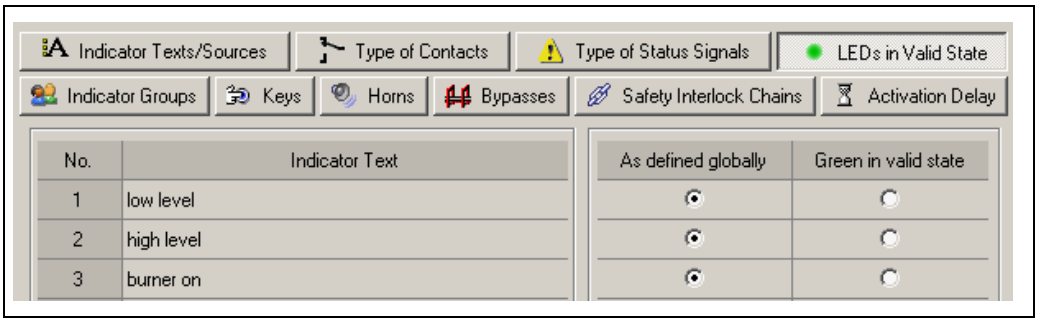
11.7.3 Type of status signal



Selection for each input

- Fault status signal: LED flashes as first value or new value
- Process status signal: LED only (ON/OFF)

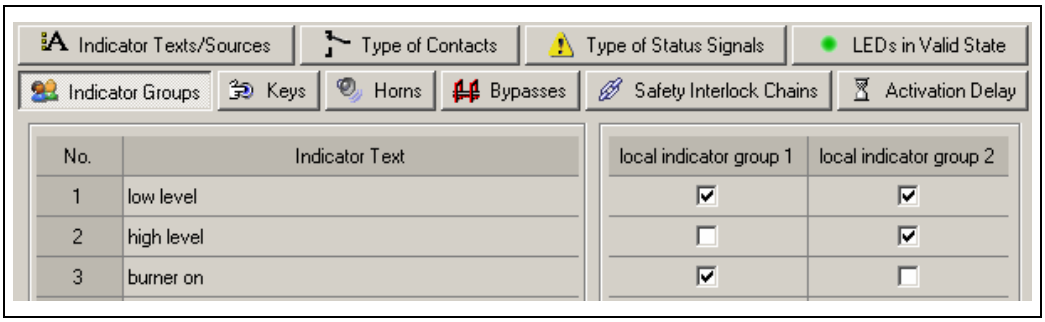
11.7.4 LEDs in Valid State



Global definition
LEDs are off in good condition

In good condition green
LEDs glow green in good condition

11.7.5 Indicator groups

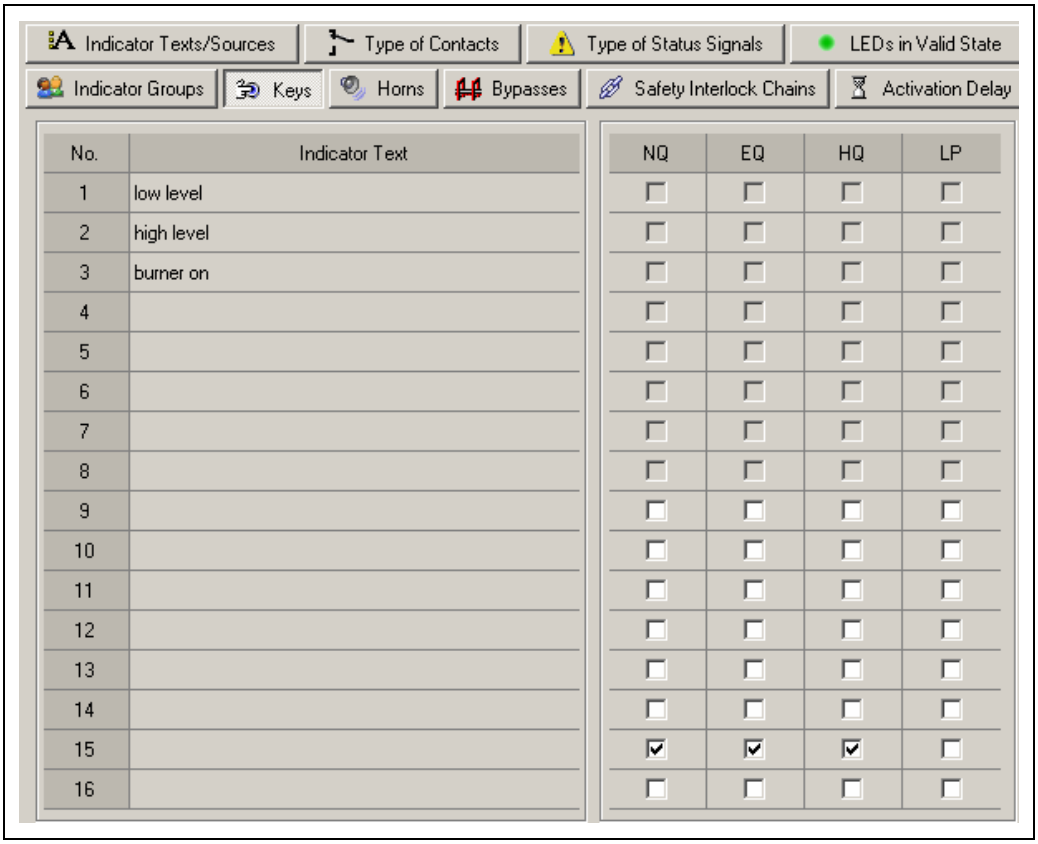


Selection if an input is to be assigned to local indicator group 1 and/or 2.

- Output of the local indicator groop via relay 1 and/or relay 2. The relays have to be set, see section 11.6.9

NOTE:
The indicator group 1 and 2 refer only in each case locally, separately for each NEMS
In opposite to the global indicator groups A...Z via the LSB modules.

11.7.6 Keys



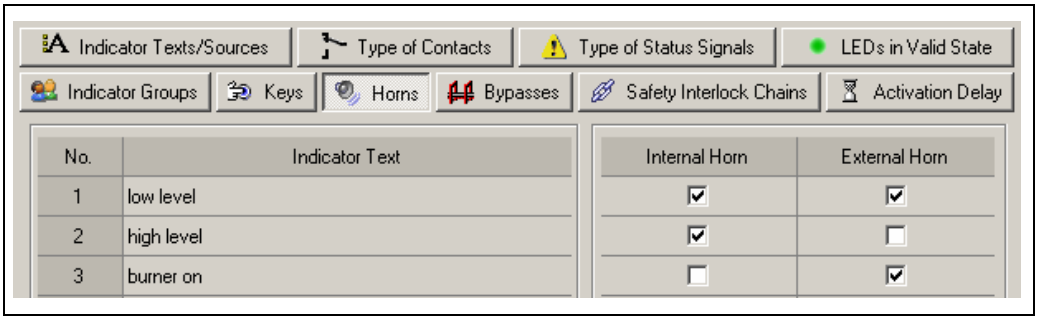
No.	Indicator Text	NQ	EQ	HQ	LP
1	low level	☐	☐	☐	☐
2	high level	☐	☐	☐	☐
3	burner on	☐	☐	☐	☐
4		☐	☐	☐	☐
5		☐	☐	☐	☐
6		☐	☐	☐	☐
7		☐	☐	☐	☐
8		☐	☐	☐	☐
9		☐	☐	☐	☐
10		☐	☐	☐	☐
11		☐	☐	☐	☐
12		☐	☐	☐	☐
13		☐	☐	☐	☐
14		☐	☐	☐	☐
15		☑	☑	☑	☐
16		☐	☐	☐	☐

Selection, which input is to be used for external acknowledgement keys.

- Starting from input 9...16.
- Also collecting acknowledgement possible

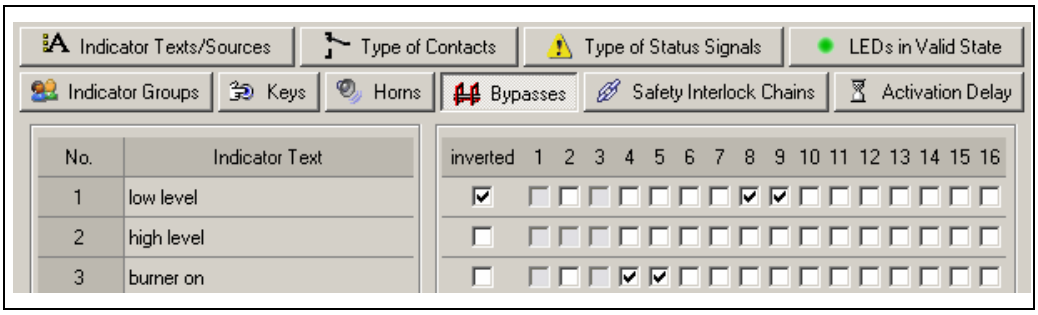
Further acknowledgement possibilities see also LSB module connection.

11.7.7 Horn



Selection if an input is to be assigned only to internal horn and/or to external (relay) horn or OFF.
Output via internal horn or via relay 1 and/or relay 2. The relays have to be set, see section 11.6.9

11.7.8 Bypasses

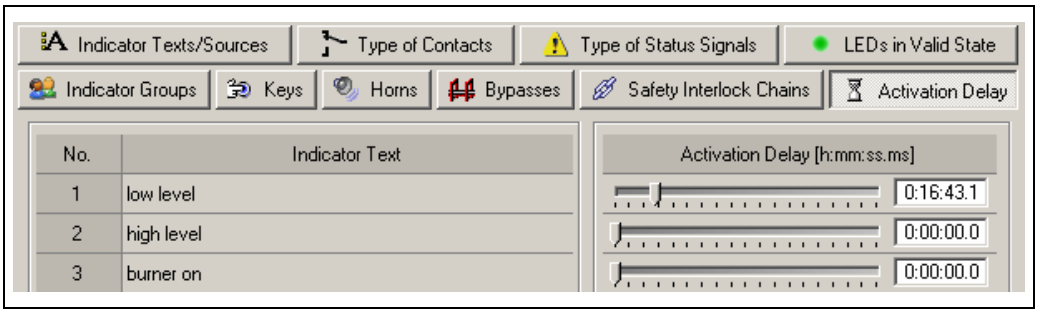


Within NEMS bypasses can be set, which are “by-passing” selected messages in certain conditions.
Bypasses can be run in common mode, i.e. signal appears → bypass active or in inverted mode signal disappears → bypass active.

Examples:

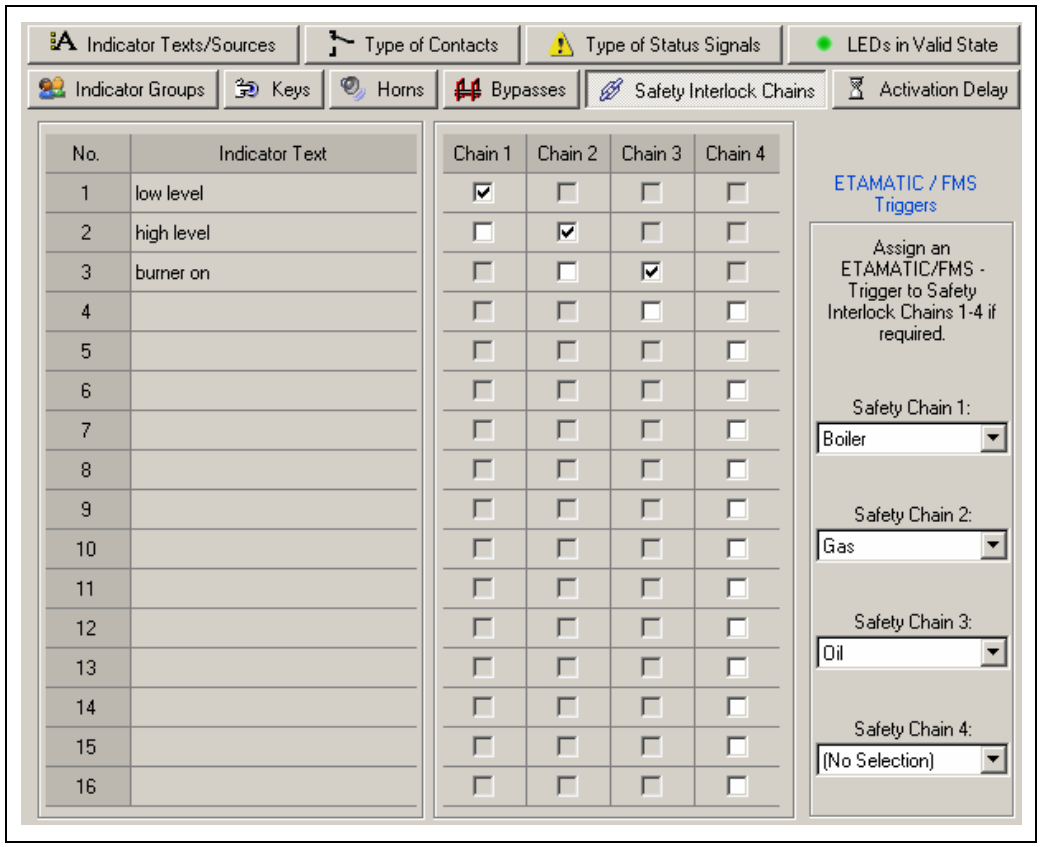
- Activation of indicator input 3 → input 4 and 5 by-passed
- Activation of indicator input 1 → input 8 and 9 by-passed
  i.e. indicator input 1 active → bypasses not set
  indicator input 1 not active → bypasses set
  See also section 8 “Performance with Bypasses”

11.7.9 Activation delay



- Delay of the activation for each input up to max.1h49min.
- In the example indicator input is set to a delay of 16min and 43 sec.
- LED-colour yellow for upcoming message, but not yet active. The same configuration is used as for by-passed inputs in fault condition.

11.7.10 Safety interlock chains



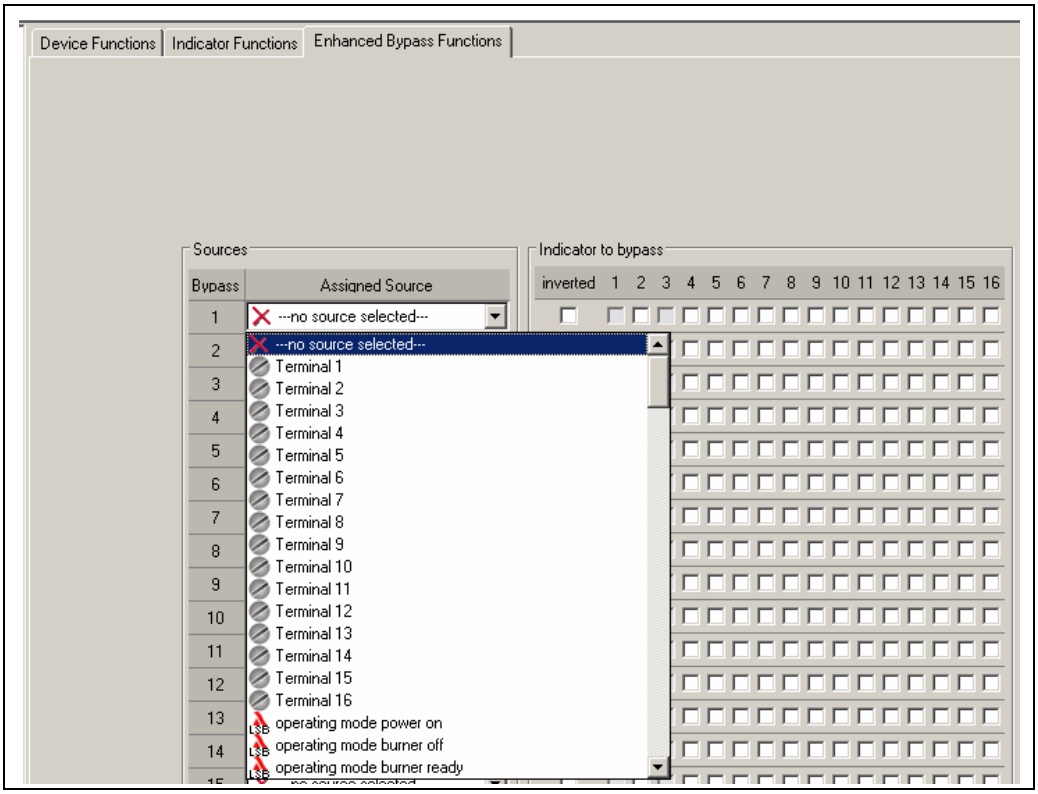
Settings:

1) If you want to use the 24V contactor voltage from ETAMATIC/FMS, activate **“Special Functions Terminal 16”** on **“Device Functions”** → **“Page 2”** and wire the 24V contactor voltage on indicator input 16 of the NEMS.
   Also set input 16 to process status signal and quiescent current.
2) Set all messages of the safety interlock chains to quiescent current.
3) Activate chain 1 / chain 2 / chain 3 / chain 4
   every chain has to be activated consecutively without a gap.
   Between the single safety interlock chains fault signals or process status signals may be inserted (i.e. between boiler- and gas safety interlock chain the process status signal “Fuel Gas” is inserted as a virtual message).
4) Set “Trigger”
   i.e. safety interlock chain 1 → safety interlock chain boiler,
   thus the message texts are sent to FMS/ETAMATIC and in fault condition indicated in the display.
5) Set “bypasses”
   i.e. if the message “Fuel Gas” shall by-pass the safety interlock chain oil, you have to set the bypasses in corresponding conditions.

You will find a dataset example on the CD with the configuration software.

See also section 9 “Performance with safety interlock chains”

11.8 Enhanced Bypass Functions

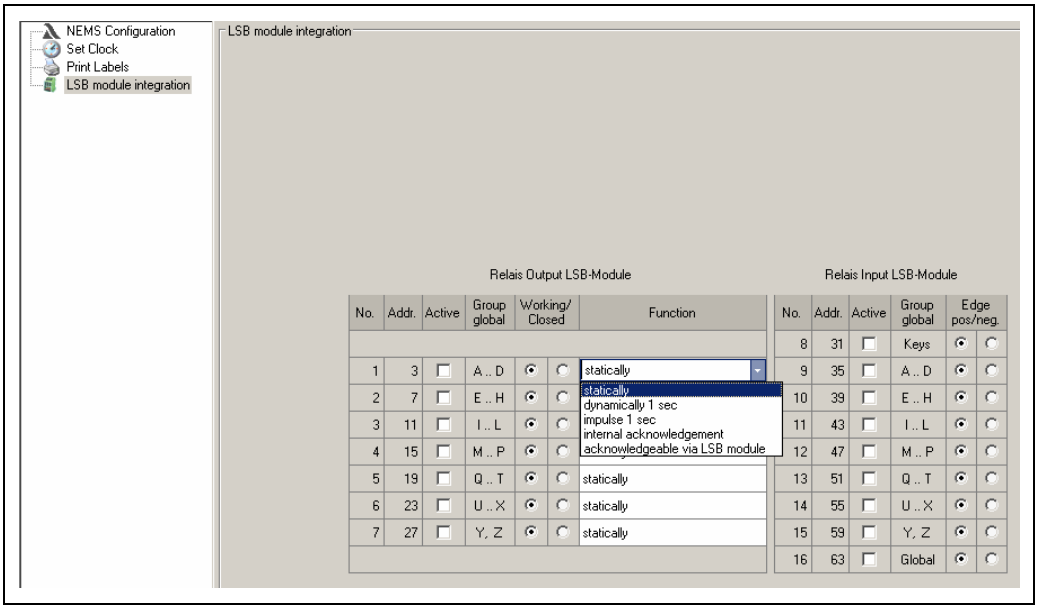


You have the opportunity to activate 16 bypasses with free allocation to the source. The indicator inputs 1…16 and all virtual messages (LSB-messages) respectively can be chosen as source.

The behaviour of the enhanced bypass functions is equivalent as the behaviour of common bypasses. See section 8

By activating of “indicator to bypass” 1…16 the enhanced bypass input is set.

11.9 LSB-Module connection



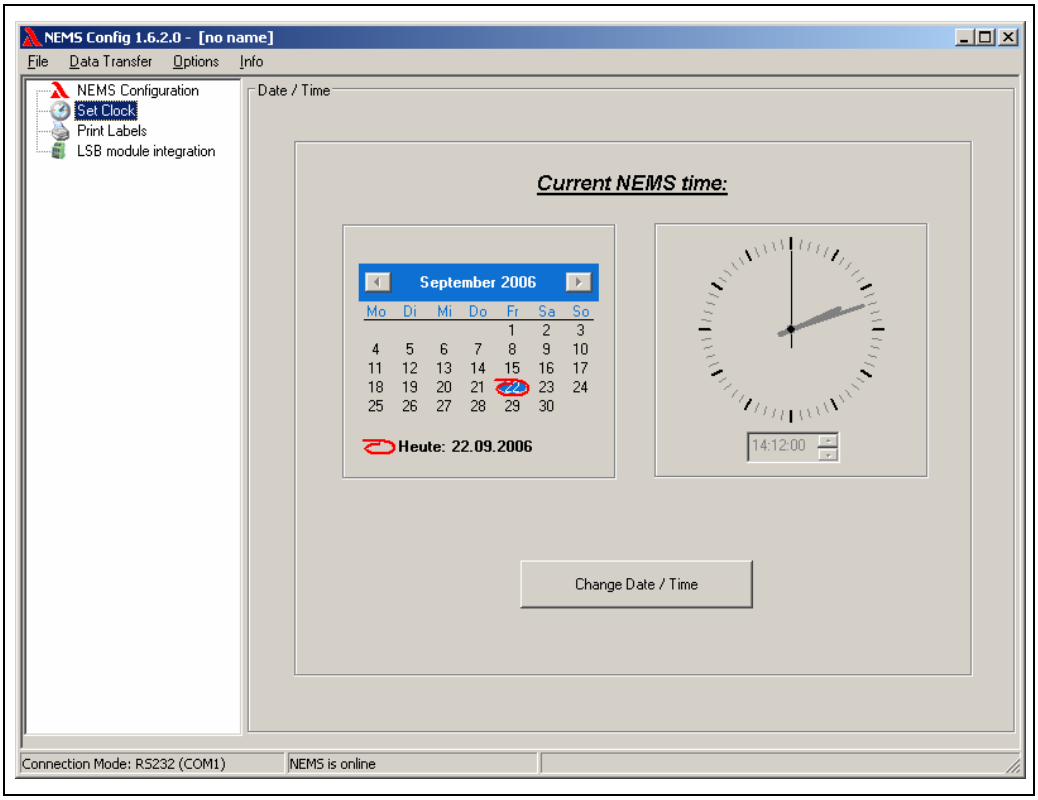
Assignment of the digital output modules to indicator groups A...Z and to the function.

- Working contacts (normally open):
  The output contacts of the modules are in normal mode (without faults) open.
- Closed contacts (normally closed):
  The output contacts of the modules are in normal mode (without faults) closed.
- Static:
  Incoming signal – output contact ON, outgoing signal – contact OFF.
  No reaction to new incoming signals.
- Dynamic 1sec:
  Incoming signal – output contact ON, outgoing signal – contact OFF.
  Contact OFF for 1sec. in the event of new incoming signals.
- Impulse 1sec:
  Incoming signal – Output contact for 1sec. ON,
  In the event of new incoming signals – contact always for 1 sec ON.
- Acknowledgeable internal:
  Incoming signal – output contact ON,
  Contact only released by acknowledging the signal.
- Acknowledgeable via BTR:
  Contact only released by acknowledging the signal via digital input module
- See also section 11.7.1 and 16.5

Assignment of the digital input modules to indicator groups A...Z and to the function.

- Only function of acknowledgement.
- Alternatively with positive or negative edge.
- See also section 16.6.

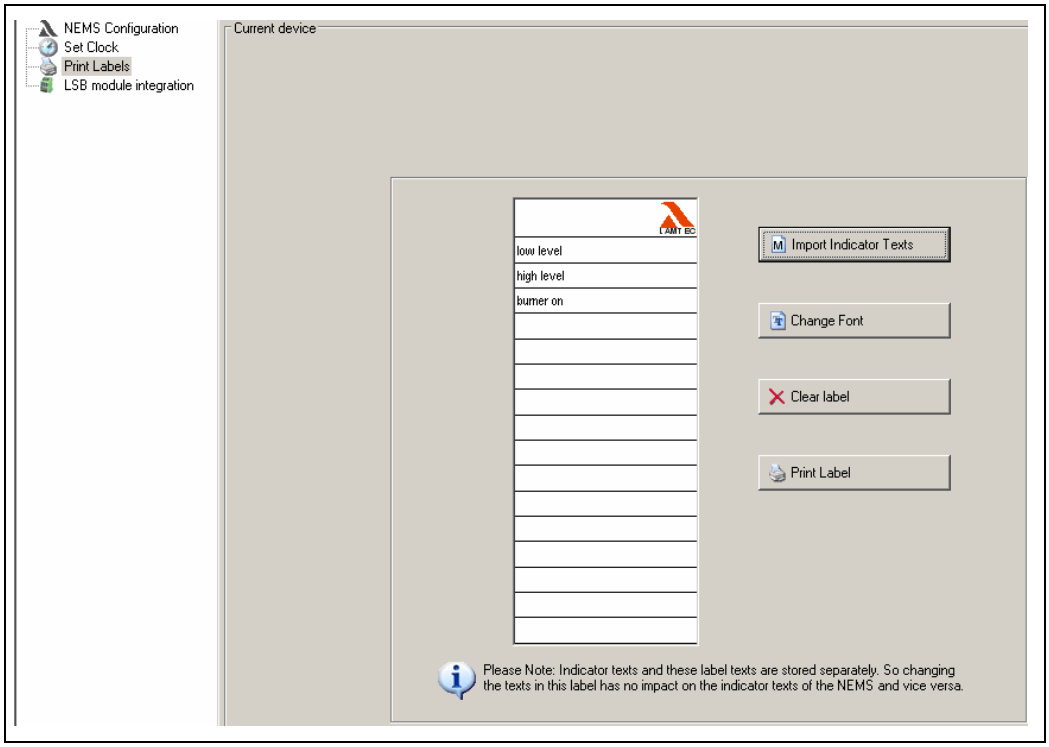
11.10 Set clock



- Setting the internal clock of the NEMS.
- Only with existent RS232- or LSB-Connection to NEMS
- Only necessarily by printing of messages, and/or in connection with display and operating terminal.

NOTE:
If “Central clock” is set to “enable”, setting of the time via configuration software or display and control terminal does not become certified.

11.11 Print labels



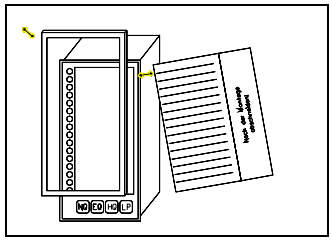
Printing of inscription cards with indicator texts, which are slid into the front plate.

- Use **NEMS Configuration** → **Indicator Functions** → **Indicator Texts/Sources**
  to insert the message texts.
- Use **Print Labels** → **Import Indicator Texts** to import the message texts to the label.
- If necessary use **Change Font.**
- Use **Print Label** to print out, then cut out and insert into the front panel of the NEMS.

NOTE:
Indicator texts and label texts will be saved separately. Everything you change in the texts in the label section does not effect the indicator texts of the NEMS and vice versa.

With NEMS sipped without configuration software a disc is shipped with a labelling file. You may also ask for that file via e-mail (seider@lamtec.de).
The labels-cards are can easy to change if the indicator texts have changed. For easy use, the label-cards are designed with a mounting border, which you can cut off after inserting the label card.

- Remove front frame
- Insert the label-card under the film
- Cut off the mounting border
- Mount the front frame



12 Commissioning

12.1 Supply voltage

- Make sure that the supply voltage connected to your installation corresponds with the supply voltage of the NEMS device to be installed. The voltage required is specified on the label attached to the device.

12.2 Contactor voltage

- Make sure that the contactor voltage is between DC15V and DC30V.
- A contactor voltage of DC24V is provided by the NEMS (terminal 32). However, terminals 29 (0 V equipment voltage) and 30 (0 V contactor voltage) must be bypassed.
- If you use an external voltage for the contactor, then this bypass is omitted. The 0V of the external voltage has to be wired ant terminal 30.
- An option for supplying a contactor voltage with AC230V is with this device not possible. Therefore use another NEMS device:

  without RS232 interface product no. 680 R 1200
  with RS232-interface product no. 680 R 1021

12.3 LAMTEC SYSTEM BUS

If you connect several devices via the LAMTEC SYTEM BUS, make sure that:

- The setting of the equipment family is correct (**Level L.N**)
  Devices 01-16 → family 1
  Devices 17-32 → family 2
  Devices 33-48 → family 3
  Devices 49-64 → family 4
- Each device within a family has a different equipment address (**Level L.E**)
- The terminating resistor has been activated for the first and last device in the bus (BR2 on the NEMS electronics in position 1-2 for the relays)

Up to 64 NEMS16 devices can be networked together to form an indicator system via the LSB. The interconnected units must always form a line; there must be no spur line off the bus.

The termination resistors must be activated on the first and last device in the LSB.

NOTE:

If an equipment address is allocated twice in an indicator system, the NEMS devices in question will switch to configuration mode (operating light LEDs 1-16). You can then change the duplicated equipment address using the key sequence LP → EQ.

NOTE:

The following recommendations are given for the line lengths and the line cross-section of the LSB:

0 – 40 m 4 x 0,22 mm^2, stranded in pairs with shield, impedance 120 Ohms.

40 – 300 m 4 x 0,34 mm^2, stranded in pairs with shield, impedance 120 Ohms.

300 – 500 m 4 x 0,5 mm^2, stranded in pairs with shield, impedance 120 Ohms.

12.4 Save the data record

Note:

Once the devices have been configured, the data records are to be saved using the text and configuration software.

Therefore if a device is replaced, the settings can be restored in the shortest possible time.

See section 11.4 and 11.5

12.5 Connection of the shields

All conductors from and to the NEMS are to be shielded (exception: 230 V supply conductor). The shields must be connected as close as possible to the PE bus bar.

12.6 PE bus bar

A PE bus bar is attached to the back of the device. All shields and the PE are to be connected there.

12.7 Laying in the control cabinet

The low-voltage lines from and to the NEMS are not to be laid parallel to the supply and outgoing conductors of the power electronics in one channel. Frequency converter conductors and switches, or contactors, which switch high inductive and capacitate loads, are especially critical. Parallel routing with the control lines of solenoid valves; ignition transformers or large motor actuators and suchlike are therefore to be avoided.

IMPORTANT!

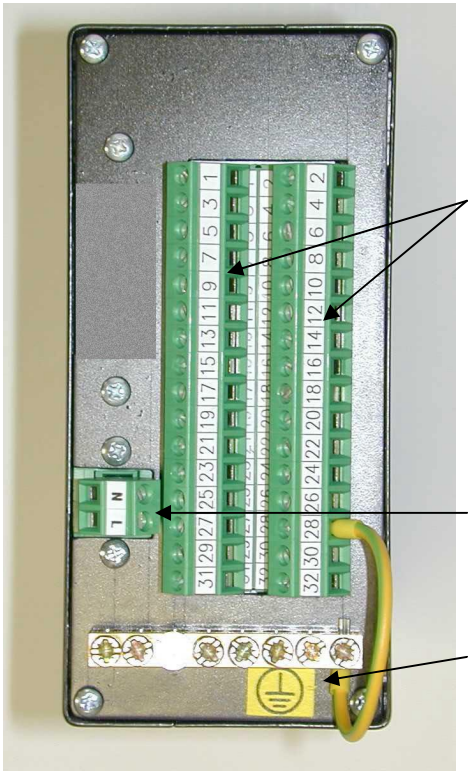
Although this device far exceeds all the relevant valid EMC standards in part, corresponding wiring is a prerequisite for ensuring that the whole installation will always work perfectly.

12.8 Shielding of supply conductors from the field

In the case of shielded supply conductors from the field, the most favourable option is to connect them directly (without intermediate terminals) to the NEMS.

If intermediate terminals should be required, then the shielding in the direct vicinity is to go over the terminal as well. Long routes in the channel without shielding are to be avoided.

12.9 Electrical connection to AC230V



NEMS16 with AC230V supply voltage without RS232 interface

Product no.: 680 R 1000

2 x Plug-in connector terminals 16-pole for:

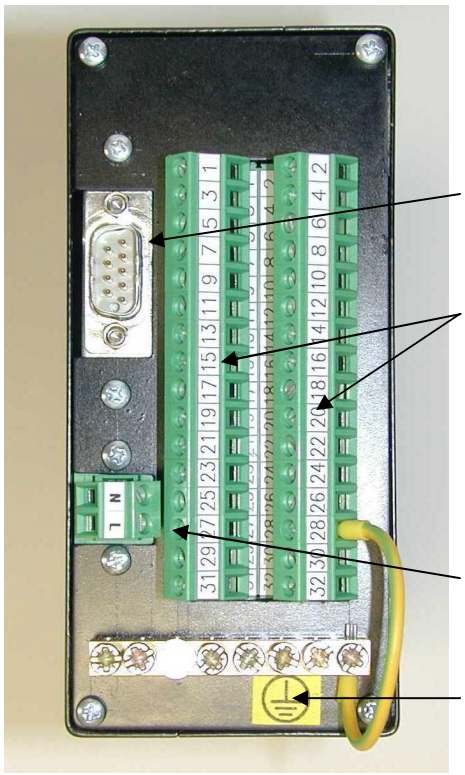
- indicator inputs 1…16
- 2 x relay output
- LAMTEC SYSTEM BUS
- contactor voltage

Plug-in connector 2-pole for:

- Power supply voltage 230V

PE-bar

Back view without RS232



NEMS16 with 230 VAC supply voltage with RS232 interface

Product no.: 680 R 1001

RS232 interface

2 x Plug-in connector terminals 16-pole for:

- indicator inputs 1…16
- 2 x relay output
- LAMTEC SYSTEM BUS

contactor voltage

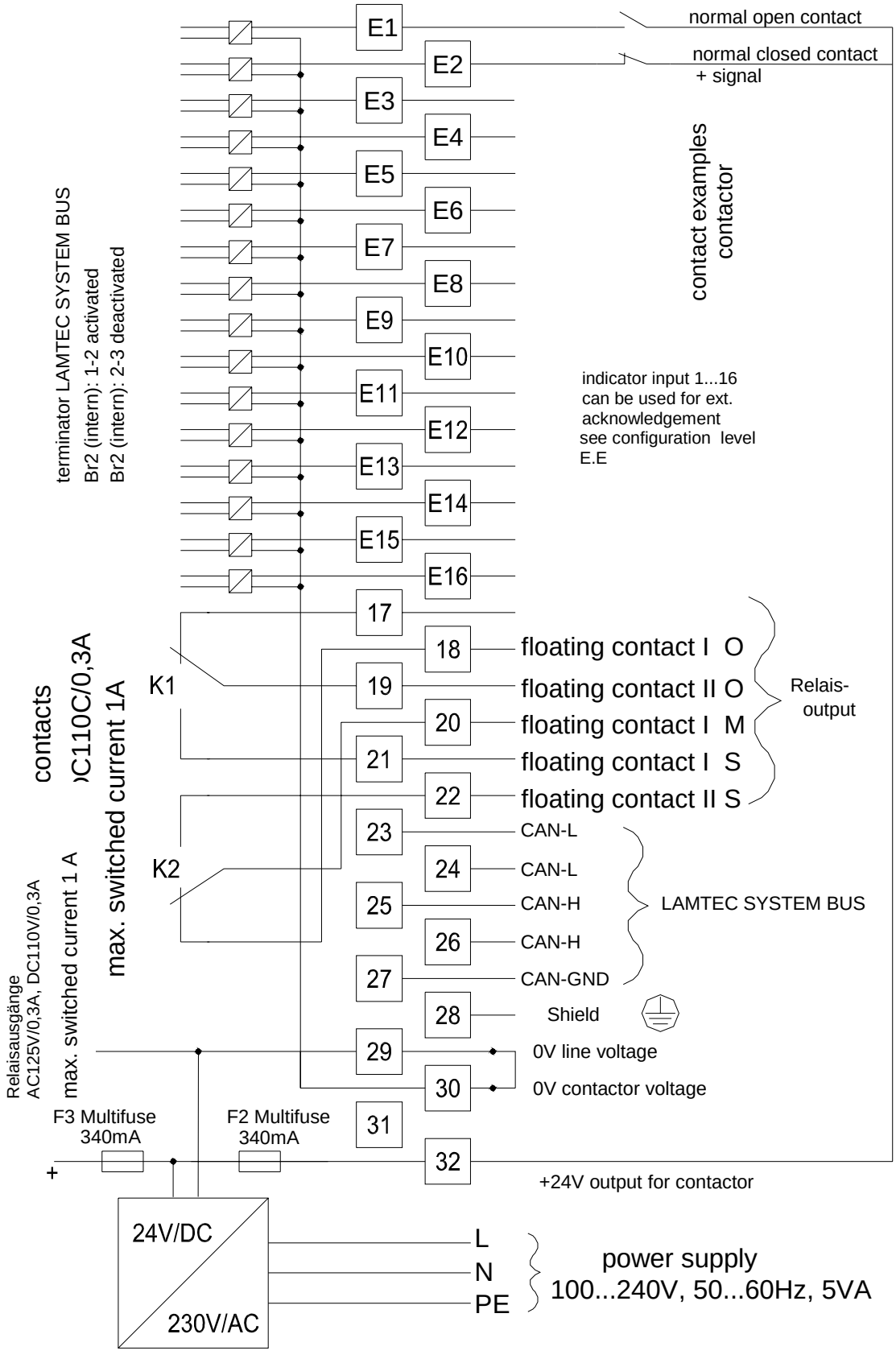
Plug-in connector 2-pole for:

Power supply voltage 230V

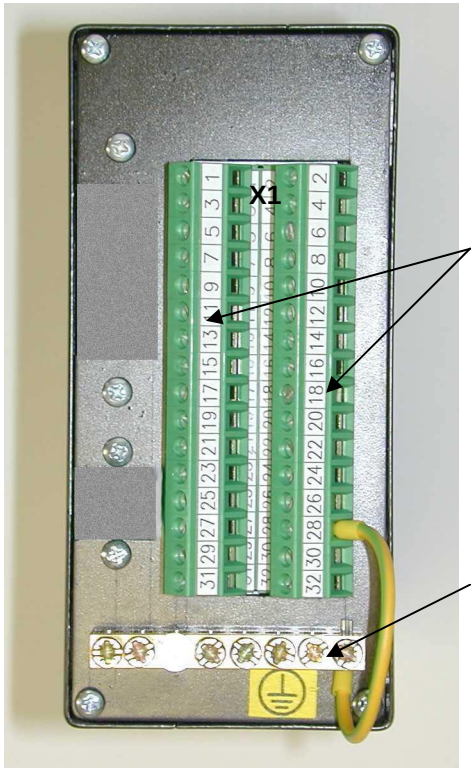
PE-bar

Back view with RS232

12.9.1 Connector assignment AC230V



12.10 Electrical connection to DC24V



NEMS16 with DC24V supply voltage without RS232 interface

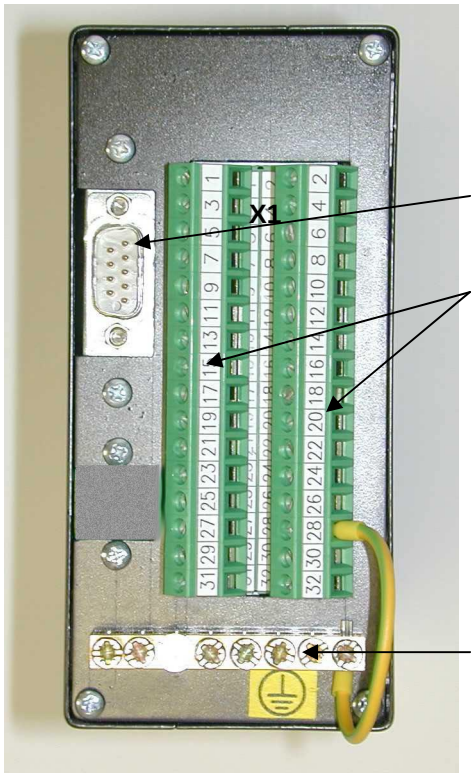
Product no.: 680 R 1010

2 x Plug-in connector terminals 16-pole for:

- indicator inputs 1…16
- 2 x relay output
- LAMTEC SYSTEM BUS
- contactor voltage
- power supply voltage 24V/DC

PE-bar

Back view without RS232



NEMS16 with DC24V supply voltage with RS232 interface

Product no.: 680 R 1011

RS232 interface

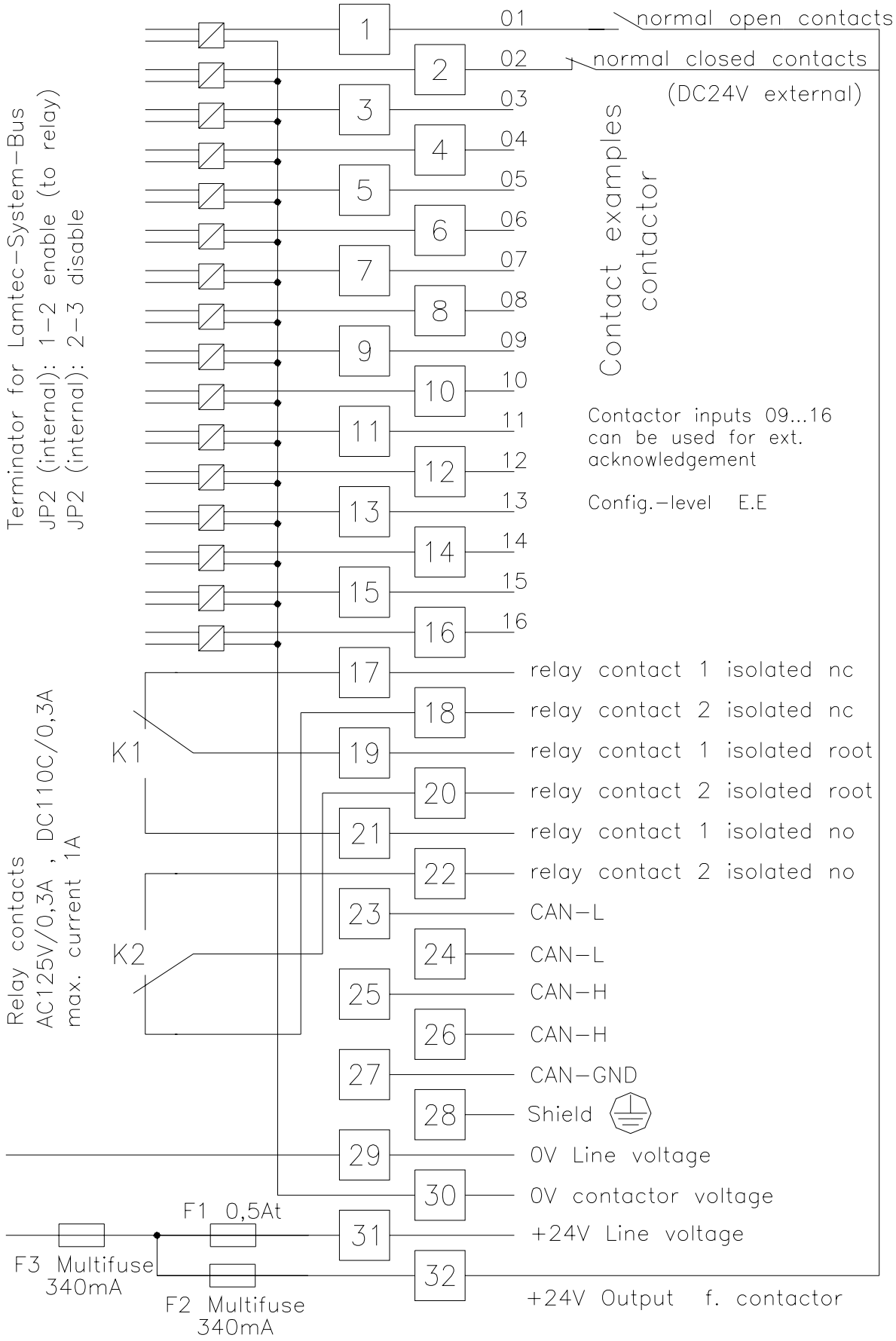
2 x Plug-in connector terminals 16-pole for:

- indicator inputs 1…16
- 2 x relay output
- LAMTEC SYSTEM BUS
- contactor voltage
- power supply voltage 24V/DC

PE-bar

Back view with RS232

12.10.1 Connector assignment DC24V



13 Electronic unit

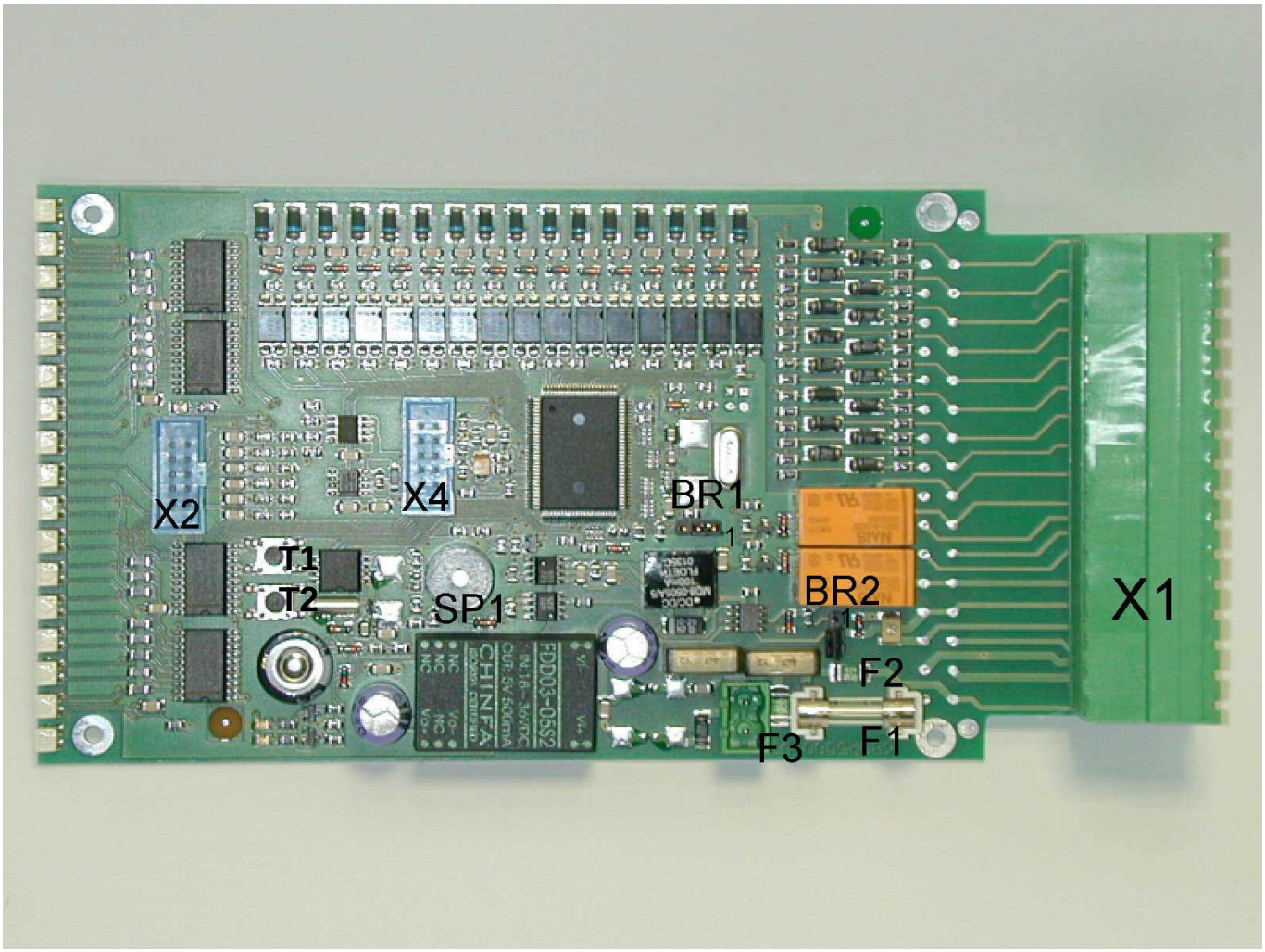
13.1 Disassembling the electronic unit

- Disconnect the NEMS from the power supply
- Pull out the connector at the back
- Remove front panel
- Remove the electronic unit in the handle from the housing

IMPORTANT!

Never insert or remove connectors if supply voltage lies close !

13.2 Connectors, fuses and jumper



X2	Keyboard connection
X3	DC24V-input for AC230V devices
X4	Connection for RS232, RS422 and RS485 interface modules
F1	T500mA, miniature fuse 5x20, (mains fuse) not for 230 V devices
F2	T340mA, multi-fuse, use protection contactor voltage
F3	T340mA, multi-fuse, Fuse protection electronics
BR2 position 1-2 direction relais	Termination LAMTEC SYSTEM BUS enable
BR2 position 2-3 direction F1	Termination LAMTEC SYSTEM BUS disable
SMD-key T1, T2	T1: LSB device address +1 T2: LSB device address -1

14 Troubleshooting – Assistance

14.1 Power ON- LED does not light up when supplied with DC24V

- Check whether voltage is connected to the device at term 29-/term 31+
- Check fuse F1 (T500mA) on the printed circuit board
- Check fuse F3 (multi-fuse) on the printed circuit board

14.2 Power ON- LED does not light up when supplied with AC230V

- Check whether voltage is connected to the device at terminal L/N
- Check fuse F3 (multi-fuse) on the printed circuit board
- Check operating voltage (DC24V) at connector X3 on the printed circuit board

14.3 Signals are not displayed on the LEDs

- Bypass set between terminals 29 and 30?
- Check whether contactor voltage (DC24V) is connected to terminal 30 -/terminal 32 +
- Check fuse F2 (multi-fuse) on the printed circuit board
- If using external voltage, there must be 0 V at terminal 30 and the bypass out
- Contactor voltage must be between DC18V and DC30V

14.4 Incorrect configuration

- Restore the factory configuration
- Hold down keys NQ + EQ + HQ simultaneously for 3 s.
- LEDs 5-12 switch to continuous yellow light.
- Press keys NQ + EQ briefly simultaneously.
- Factory configuration will be restored.
- Please take the factory configuration from the lable on the device

14.5 Replacing a device

- Save data record using the message text and configuration software
- Replace device
- Set equipment address manually
- Restore the data record by using the text and configuration software

14.6 FMS for connection to the NEMS in the safety interlock chain

Terminals 9 and 10 of the FMS both have + 24 V but are monitored at different times by means of internal tests. They may not be connected to each other or reversed.

IMPORTANT!

Terminal 9 only to supply the safety interlock chains (to terminal 16 of the NEMS device).

Terminal 10 either to supply the NEMS or to supply a flame monitor.

Never use the FMS to supply both devices.

Do not connect any other consumers unless expressly permitted to do so.

14.7 ETAMATIC for connection to the NEMS in the safety interlock chain

Terminals 23 and 24 of the ETAMATIC both have + 24 V but are monitored at different times by means of internal tests. They may not be connected to each other or reversed.

IMPORTANT!

Terminal 24 only to supply the safety interlock chain (to terminal 16 of the NEMS device).

Terminal 23 either to supply the NEMS or to supply a flame monitor.

Never use the ETAMATIC to supply both devices.

Do not connect any other consumers unless expressly permitted to do so.

14.8 Fault safety interlock chain although chain OK

The contactor voltage of the safety interlock chain must be routed via indicator input 16.

This must be configured accordingly (activated, normal closed contacts, process status signal). During the self-testing of the indicator loop, the KG voltage is interrupted briefly. Input 16 identifies this and ignores inputs 1-15 for 5 ms.

Activation:	use front keys Level N.N (section 10.5) or use configuration software (section 11.6.11)
Normal closed contacts:	use front keys Level N.E (section 10.6) or use configuration software (section 11.7.2)
Process indicator input:	use front keys Level N.H (section 10.7) or use configuration software (section 11.7.3)

14.9 Several NEMS in the system switch to running light after power on

Duplicate device addresses

If an equipment address is allocated twice in an indicator system, the NEMS devices in question will switch to configuration mode (operating light LEDs 1-16). You can then change the duplicated equipment address using the key sequence LP → EQ. section 10.18

15 Maintenance

Normally NEMS don't need any maintenance. Occasional a new device software has to be installed.

There are two ways to install the software:

- Use a FLASH programming software (only NEMS with RS232 interface) section 15.1 or
- Use the configuration software (only NEMS with LAMTEC SYSTEM BUS) section 15.2

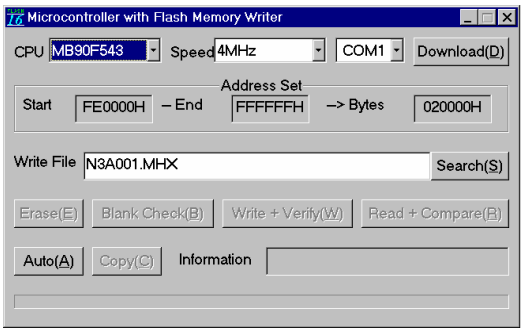
15.1 Software Update with FLASH Programming Software via RS232

The following are required

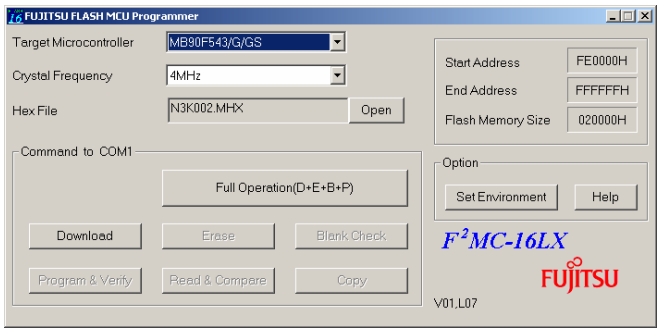
- RS232 interface adapter incl. connection cable for NEMS electronics Connector X4 (only for NEMS without RS232)
- RS232 interface cable as PC connection
- PC with FLASH programming software installed
- Current software file (*.MHX)

Procedure

- Switch off the NEMS device
- Remove the electronics and connect 24 VDC
- Move BR1 to position 2-3 (for the LEDs)
- Connect RS232 interface adapter incl. connection cable to connector X4
- Connect RS232 interface to the PC
- Switch on the NEMS device
- Start FLASH programming software on the PC
- Set CPU type to MB90F543
- Load current software file *.MHX
- Program NEMS using "Auto"



Version für Windows 98



Version für Windows 2000/XP

- If "All OK" the programming is terminated
- Disconnect NEMS again
- Replace BR1 in position 1-2
- Install the electronics and switch on
- After a brief self-test, the NEMS is ready for operation again

15.2 Software update at several devices at the same time via LSB

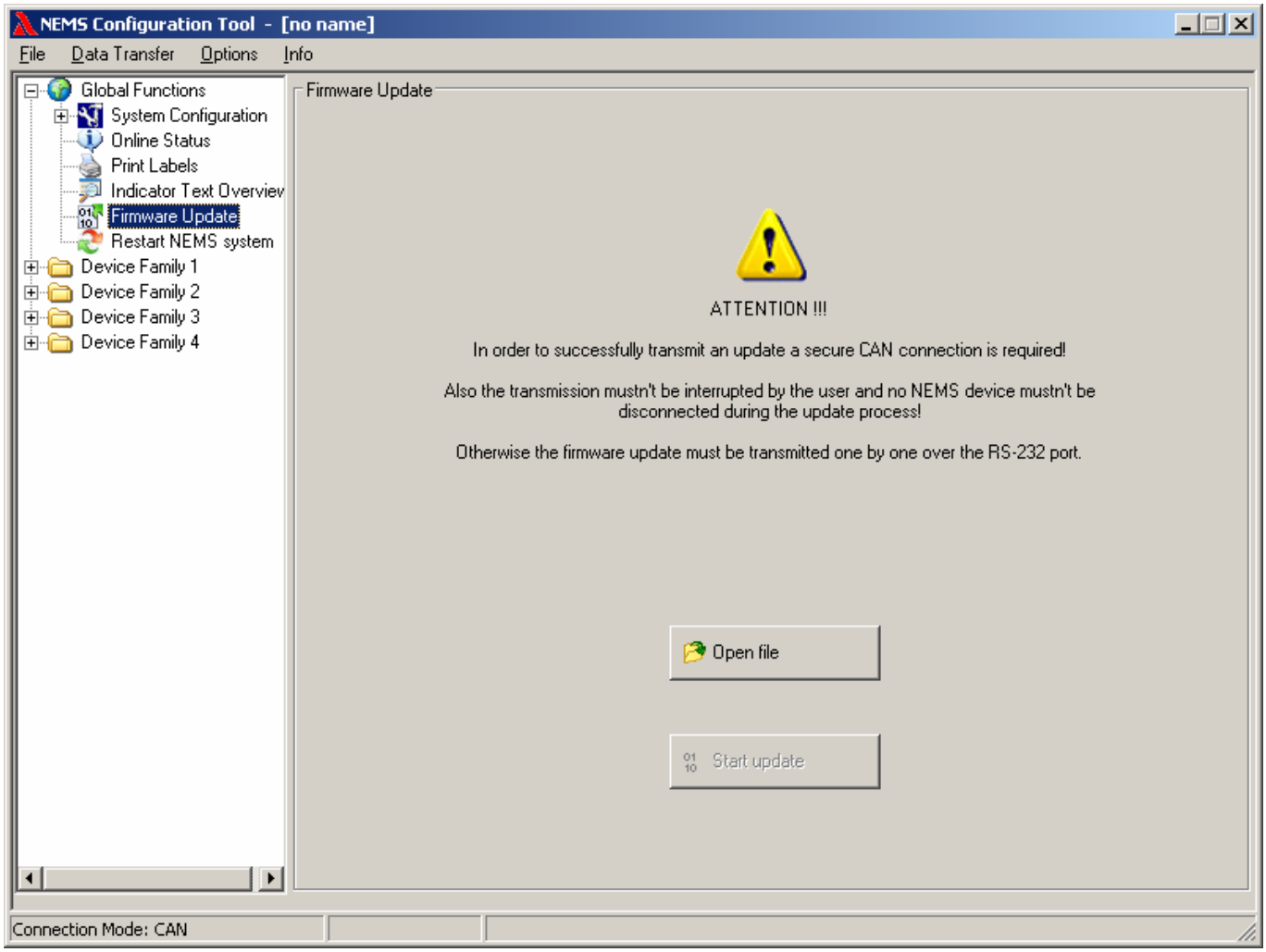
The following is needed

- Software for entering indicator texts and user-friendly configuration of the NEMS. for connecting LAMTEC SYSTEM BUS
- Newest software file

Proceeding

- Connect your PC via CAN/USB module to the NEMS system.
- Start the configuration software in CAN mode.
- Start **„Global Functions“ → „Firmware-Update“**
- **„Open file“** and software select file for update.

Note:
Jumper JP1 does not have to be changed !!



16 Accessories

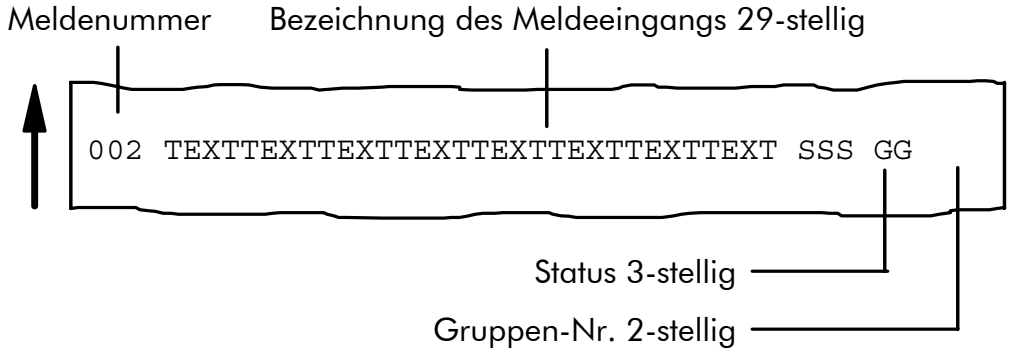
16.1 Printer

To print out incoming and outgoing fault and process status signals in chronological order. Timing accuracy of the time stamps: type. +1 ms, max. + 5ms.

Connection is made to the existing RS232 interface of the NEMS (according to the size of the indicator system in each case) or to the RS232 interface of the display and operating terminal.

16.2 Structure of the message print-out

A message text is made up of the following:



16.2.1 Indicator number

The indicator number is directly connected with the corresponding pin on the input connector. It is not possible to change this definition.

16.2.2 Designation of the indicator input

An alphanumeric text with a maximum character length of 29 characters can be entered on the NEMS as the designation for an indicator input.

16.2.3 Number of global indicator group (locator GG)

Local indicator groups A…Z

Setting via configuration software (section 11.7.1)

Output and/or acknowledgement via digital in-/ output module possible (section16.5, 16.6 and 17.3, 17.4)

16.2.4 Status (locator SSS)

All changes in status relating to the inputs are logged with date and time and always updated immediately.
When a signal changes from OK STATUS to FAULT STATUS, the mnemonic MKO is added to the message text; in the case of an outgoing signal, it is the mnemonic MGE ("Outgoing signal").

Abbreviations for indicator signals

Note for printing:

The configuration "Enable NEMS Printer" must be activated via keyboard level N.N – LED 3 (section 10.5), or via configuration software (section 11.6.10)

"MKO": Meldung Kommt - Incoming signal with valid event time (must be acknowledged)"MGE": Meldung Geht - Outgoing signal

"MKZ": Meldung Kommt, Zeitstempel ungültig - Incoming signal with invalid time (must be acknowledged) (time = time received

"MGZ": Meldung Geht, Zeitstempel ungültig – Outgoing signal, Time stamp invalid

"MKI": Meldung Kommt, instabil - Incoming signal - unstable (must be acknowledged).

"MGI": Meldung Geht, instabil - Outgoing signal, unstable

Note for printing process status signals:

Config. "Enable logging of process status signals" must be activated via keyboard level N.N – LED 3 (section 10.5), or via configuration software (section 11.6.10)

"BKO": Betriebsmeldung Kommt - Incoming process status signal (does not have to be acknowledged).

"BGE": Betriebsmeldung Geht - Outgoing Process Status Signal

"BKZ": Betriebsmeldung Kommt, Zeitstempel ungültig - Incoming process status signal with invalid time. Incoming Process Status Signal, time stamp invalid

"BGZ": Betriebsmeldung Geht, Zeitstempel ungültig - Outgoing Process Status Signal, time stamp invalid

"BKI": Betriebsmeldung Kommt, instabil (Flattermeldung) - Process status signal unstable.

"BGI": Betriebsmeldung Geht, instabil (Flattermeldung) - Outgoing Process Status Signal, unstable (contact chatter rejection)

NOTE:

In the case of "contact chatter signals" you should activate contact chatter rejection in Level E.L (section 10.12) or via configuration software (chapter 11.6.5).

„FKO" : Flattersperre kommt - Incoming contact chatter rejection with valid event time (must be acknowledged).

„FGE" : Flattersperre geht - "contact chatter rejection" going out

„FKZ" : Flattersperre kommt, Zeitstempel ungültig - Incoming contact chatter rejection with invalid time (must be acknowledged) (time = time received at the terminal)

„FGZ" : Flattersperre geht, Zeitstempel ungültig - "contact chatter rejection" going out, time stamp invalid

„FKI" : Flattersperre kommt, instabil - Incoming contact chatter rejection unstable (must be acknowledged).

„FGI" : Flattersperre geht, instabil - "contact chatter rejection" going out , instable

Note for printing bypassed signals:

Configuration “Enable NEMS Printer” and "Report bypassed inputs" must be activated via keyboard level N.N – LED14 (section 10.5), or via configuration software (section 10.6.10).

If "Report bypassed inputs" is set to disable:

- Bypasses will be printed as “BSE”, “BRS”
- Bypassed inputs will not be printed.

"BSE": Brücke Gesetzt – Bypass Set

"BRS": Brücke Rückgesetzt – Bypass Reset

"BSZ": Brücke Gesetzt, Zeitstempel ungültig - Bypass Set, time stamp invalid

"BRZ": Brücke Rückgesetzt, Zeitstempel ungültig - Bypass Reset, time stamp invalid

"BSI": Brücke Gesetzt, instabil (Flattermeldung) - Bypass Set, unstable (contact chatter signal)

"BRI": Brücke Rückgesetzt, instabil (Flattermeldung) - Bypass Reset, unstable (contact chatter signal)

If "Report bypassed inputs" is set to enable:

- Bypasses will be printed as “MKO”, “MGE”
- Bypassed inputs will be printed as “BSE”, “BRS”.

"BSE": Brücke für diesen Eingang Gesetzt - Bypassed input set

"BRS": Brücke für diesen Eingang Rückgesetzt - Bypassed input Reset

"BSZ": Brücke für diesen Eingang Gesetzt, Zeitstempel ungültig - Bypassed input Set, time stamp invalid

"BRZ": Brücke für diesen Eingang Rückgesetzt, Zeitstempel ungültig - Bypassed input Reset, time stamp invalid

"BSI": Brücke für diesen Eingang Gesetzt, instabil (Flattermeldung) - Bypassed input Set, unstable (contact chatter signal)

"BRI": Brücke für diesen Eingang Rückgesetzt, instabil (Flattermeldung) - Bypassed input Reset, unstable (contact chatter signal)

Abbreviation for system signals (“SYS”)

- "Central-Clock offline"
- "Central-Clock online”
- "Central-Clock Receive Error"
- "Central-Clock Receive Ok"
- "Central-Clock Annou. MEZ<->MESZ"
- "Central-Clock Change MEZ<->MESZ"
- "Central-Clock Annou. Add.-Second"
- "Central-Clock Add.-Sec.Inserted"
- "NEMS Restart due to PowerOn"
- "NEMS Restart due SW-Watchdog"
- "NEMS Restart due Voltage drop"
- "NEMS Restart Software-Reset"
- "NEMS is offline”
- "NEMS is online again"

16.3 Radio Clock

Note:

The radio clock only works within a radius of 1000km around Frankfurt/Main. With a greater distance use a GPS-system (on request).

16.3.1 Printer message DCF-77 receipt

The DCF-77 receipt is supervised via 24 hr.
If the radio clock have in the last 24 hr. no correct DCF-77 receipt, the message "Central-Clock Receive Error" at 01:59 o'clock each daily will be printed once.
If the radio clock have in the last 24 hr. only one correct DCF-77 receipt, the message "Central-Clock Receive OK" at 01:59 o'clock each daily will be printed once.

16.3.2 Conversion MEZ Central European Summer Time and switching second

The conversion MEZ Central European Summer Time and inserting one switching second becomes now max. 1 hr. before announced with the printer messages
"Central-Clock Annou. MEZ<->MESZ"
"Central-Clock Annou. Add.-Second"
The actual time of the conversion MEZ Central European Summer Time and inserting one switching second are now then supervised exactly and announced with the printer messages
"Central-Clock Change MEZ<->MESZ"
"Central-Clock Add.-Sec. Inserted"
accurately at the time of the NEMS conversion.

16.3.3 Format

Format of "Central-Clock"-SYS printer messages

Date: Time: No.: Message text: SSS GG

25.04.04 16:04:13,000 ---- Central-clock online ....SYS

Format of "NEMS"-SYS printer messages

Date : Time: No.: Message text SSS GG

25.04.04 16:04:13,000 33 NEMS Restart due to Power On. .SYS

25.04.04 16:04:13,000 17 NEMS Restart due to Power On.. SYS

25.04.04 16:04:13,000 01 NEMS Restart due to Power On. .SYS

The column "No." is the first indicator number of the respective NEMS device.

During restart of the NEMS-System always the complete list of all in the system NEMS devices will be printed.

16.3.4 Entering reporting texts and time

For entering the reporting texts and the time you need a computer with WINDOWS operating system and an installed text and configuration software as programming device. This computer is attached to the existing RS232-Schnittstelle of the NEMS
In NEMS without RS232-Schnittstelle the configuration is made by LSB converters. The advantage: Several NEMS can be configured together and at the same time in the system.
If the central clock (radio clock) is configured, placing the time via NEMS configuration software, or via the display and operating terminal is not certified.

16.3.5 Performance of the NEMS by operating with/without central clock:

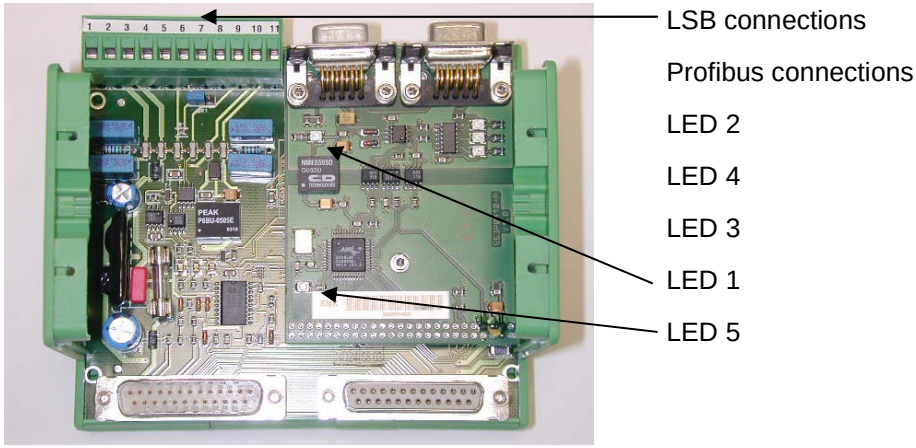
In the following operating situations automatic software RESET of the NEMS system will be started:
Setting the time NEMS configuration software

- Setting the time via display and operating terminal
- If the central clock (radio clock) is OFFLINE and the ONLINE again.
- During conversion MEZ Central European Summer Time

16.3.6 DIP-switches of the central clock (radio clock)

SW-1, SW-2, SW-4, SW-6, SW-7, SW-8, SW-9: **ON**
SW-3, SW-5. SW-10: **OFF**

16.4 Profibus Module on ext. communication processor



Discription of the LEDs

- LED1 green: continuous light in normal operation: display of the operating voltage of the electrically isolated Profibus interface
- LED2 green: Profibus TX-LED to Profibus master
- LED3 yellow: Profibus Rx-LED to Profibus master
- LED4 red: shows Profibus in- and output-switching of the RS-465 driver (Enable-enable)
- LED5 yellow: shows Profibus condition “Data exchange”
  - Switched off if “Data exchange “Data exchange” (Condition: GET_CONFIG, GET_PARAMETER, or all other fault conditions)
  - Continuous light if No “

Note:
Further information see PROFIBUS manual of the single devices.

See section 18.4 „Technical Data - Communication Processor“

16.4.1 NEMS with its own Profibus module

You can connect up to 64 NEMS 16 via LAMTEC SYSTEM BUS to an external communication processor with a Profibus module.

Product no. 663 R 0401 NE
(see separate manual)

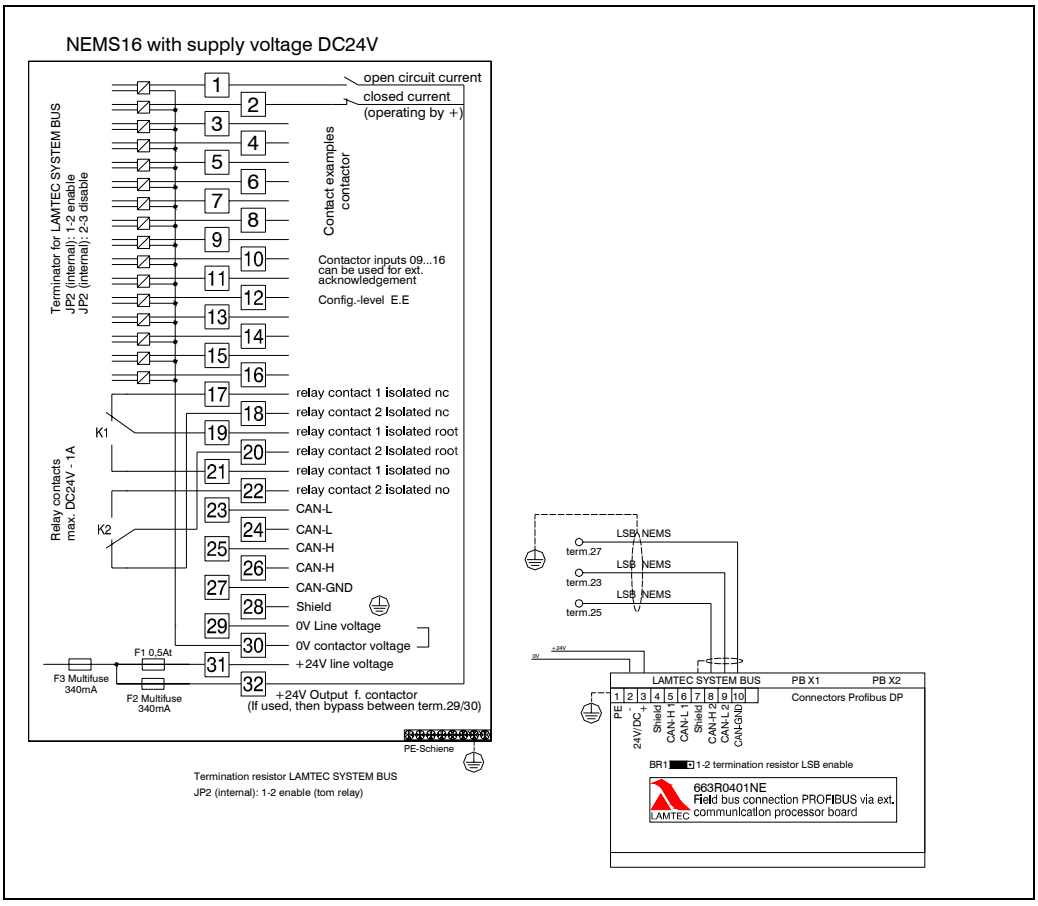
The following values are transmitted from Profibus to NEMS (input data):

- Selection of a NEMS device number whose input-status shall be displayed in the NEMS-input-status-window.

The following values are transmitted from NEMS to Profibus (output data):

- Device status of NEMS 1…64 ONLINE/OFFLINE
- Handshake-IN of NEMS 1…64
- Information for the incoming messages
- Indicator number 1…1024 valid/not valid
- Timestamp day / month / year / hour / minute / second / millisecond
- Indicator input status:
  - process status- / fault status signal
  - input bypass active / not active
  - input instable

The option **“PROFIBUS/MODBUS Communication Processor”** and **“Output Process Status Signal”** have to be activated via the configuration software (section 11.4.10) respectively via the front keys (section 10.5).
Otherwise there will be no communication.



Example

16.4.2 NEMS at the Profibus Module of FMS / ETAMATIC

Combustion technology provides the possibility to connect up to 8 NEMS via LAMTEC SYSTEM BUS to the communication processor Profibus of the NEMS and of the ETAMATIC respectively (see separate manual).

The following values are transmitted from Profibus to NEMS (input data):

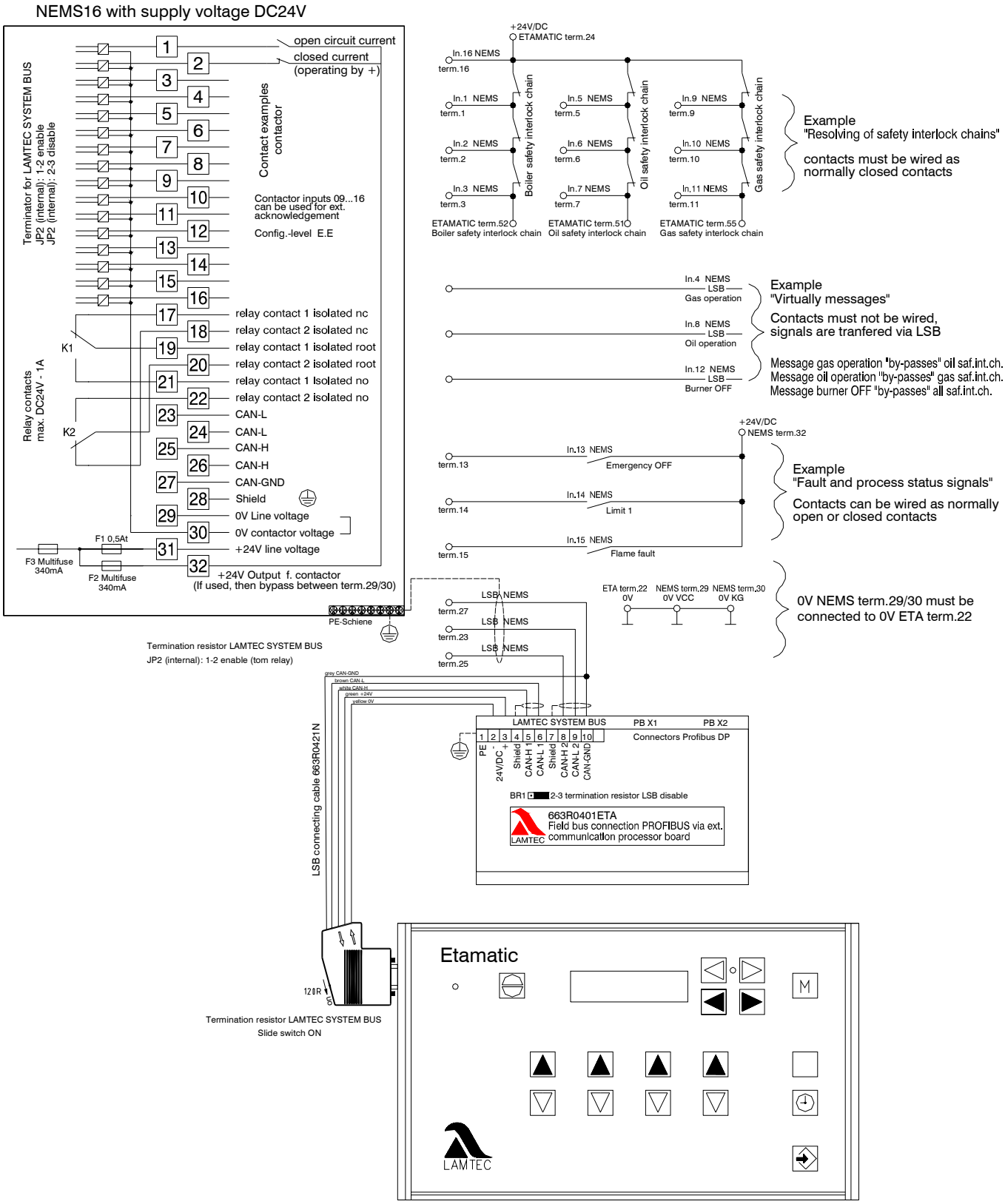
- Selection of a NEMS device number whose input-status shall be displayed in the NEMS-input-status-window.
- Control of the Output relays NEMS 1…8
  (the relays have to be configured to **"LSB-Profibus"**
- Set LSB-time

The following values are transmitted from NEMS to Profibus (output data):

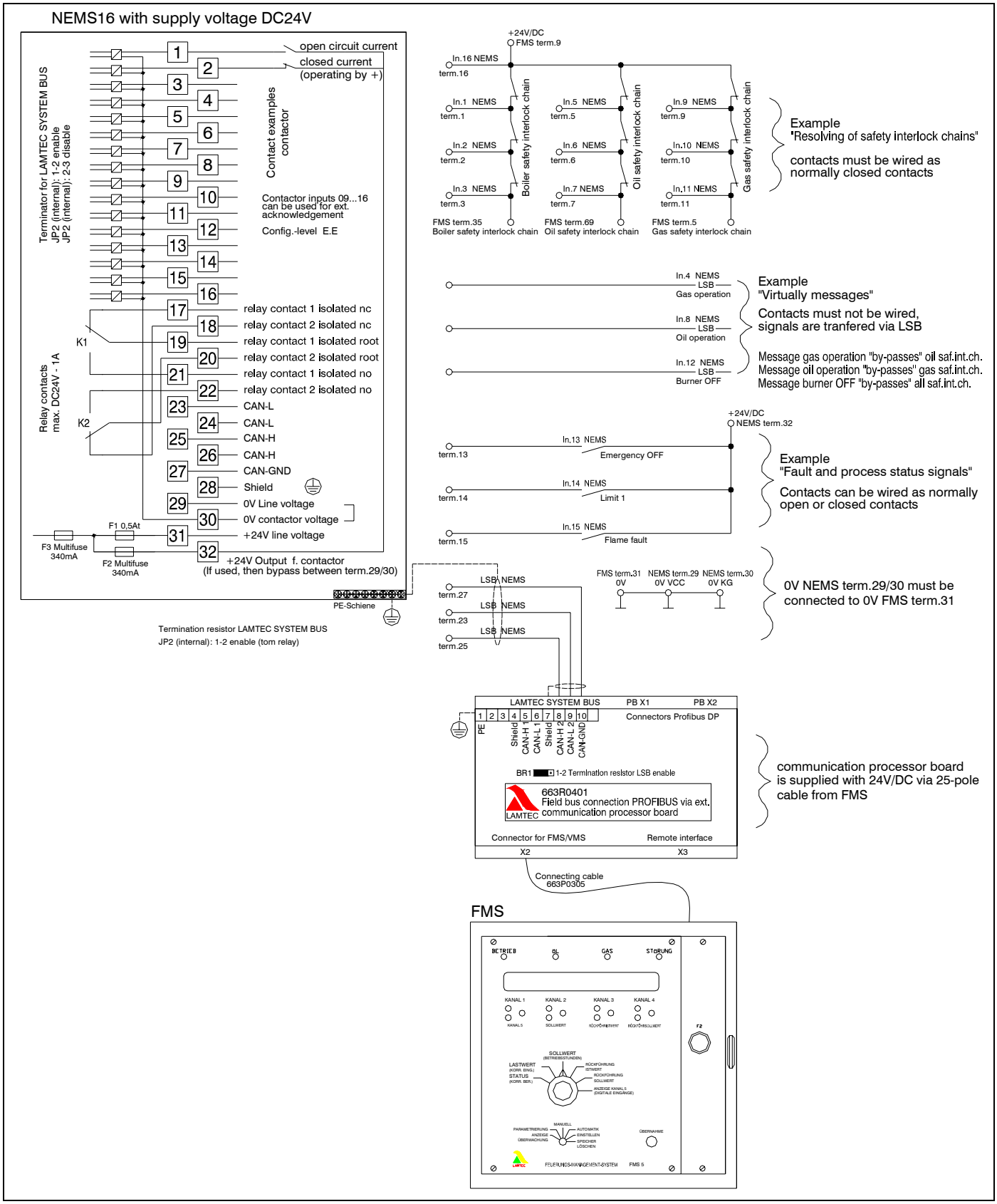
- Device status of NEMS 1…8 ONLINE/OFFLINE
- Handshake-IN of NEMS 1…8
- Information for the incoming messages
- Indicator number 1…128 valid/not valid
- Timestamp day / month / year / hour / minute / second / millisecond
- Indicator input status:
  - process status- / fault status signal
  - input bypass active / not active
  - input instable

The option **"PROFIBUS/MODBUS Communication Processor"** and **"Output Process Status Signal"** have to be activated via the configuration software (section 11.4.10) respectively via the front keys (section 10.5).
Otherwise there will be no communication.

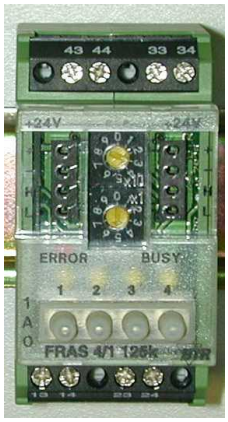
Connection Diagram Example for safety interlock chain at ETAMATIC incl. Profibus



Connection Diagram Example for safety interlock chain at FMS incl. Profibus



16.5 Digital output module



- To creation of max. 26 global indicator groups (A...Z)
- 4 relay outputs 250 V, 6 A
- Fast wiring of several modules by strapping plugs
- Hand control elements
- Without programming applicable
- Product no.: 663R4027

The field bus modules are universally applicable output modules, which are controlled via LAMTEC SYSTEM BUS (for DIN rail assembly).

The module is addressed via an adjustable address (1... 99) and conveyed in the data bytes to implement whether data requested or whether instructions.

In connection with a digital input module, the digital output module can be remote controlled.

NOTE:

Hand control elements:
Position „1“ → Output contact always closed
Position „A“ → Output contact switches via LAMTEC SYSTEM BUS
Position „0“ → Output contact always open

Address	Output 1	Output 2	Output 3	Output 4
03	Indicator group A	Indicator group B	Indicator group C	Indicator group D
07	Indicator group E	Indicator group F	Indicator group G	Indicator group H
11	Indicator group I	Indicator group J	Indicator group K	Indicator group L
15	Indicator group M	Indicator group N	Indicator group O	Indicator group P
19	Indicator group Q	Indicator group R	Indicator group S	Indicator group T
23	Indicator group U	Indicator group V	Indicator group W	Indicator group X
27	Indicator group Y	Indicator group Z		

- Attitude of the address on the module
- Activation and attitude of functionality via configuration software

Note:
The module is to be connected without distance. After connection of 15 modules the supply voltage must be started again externally.

Note:
E.g. the module address “7” has another function in FMS/ETAMATIC as in NEMS.
If you use LSB modules in conjunction with FMS/ETAMATIC and NEMS, the default control of the modules is taken over by FMS/ETAMATIC.
If you want to use the functions of the global indicator groups (control via NEMS), the parameter 846 has to be set to “7”.
Therefore the identification of the LSB modules is switched off.

16.6 Digitat input module

- To reset of each global indicator group (A...Z)
- 4 digital inputs DC24V (isolated).
- Fast wiring of several modules by strapping plugs
- Hand control elements
- Without programming applicable
- Product no.: 663R4028

The field bus modules are universally applicable output modules, which are controlled via LAMTEC SYSTEM BUS (for DIN rail assembly).

The module is addressed via an adjustable address (1... 99) and conveyed in the data bytes to implement whether data requested or whether instructions.

In connection with a digital input module, the digital output module can be remote controlled.

Hand control elements:

Position „1“ → Input always HIGH
Position „A“ → Input switches via external contact
Position „0“ → Input always low LOW

Address	Input 1	Input 2	Input 3	Input 4
31	NQ	EQ	HQ	LP
35	Reset IG-A	Reset IG-B	Reset IG-C	Reset IG-D
39	Reset IG-E	Reset IG-F	Reset IG-G	Reset IG-H
43	Reset IG-I	Reset IG-J	Reset IG-K	Reset IG-L
47	Reset IG-M	Reset IG-N	Reset IG-O	Reset IG-P
51	Reset IG-Q	Reset IG-R	Reset IG-S	Reset IG-T
55	Reset IG-U	Reset IG-V	Reset IG-W	Reset IG-X
59	Reset IG-Y	Reset IG-Z		
63	Global LSB	Global NEMS		

- Attitude of the address on the module
- Activation and attitude of functionality via configuration software
- Adjustable to positive/negative edge

Note:

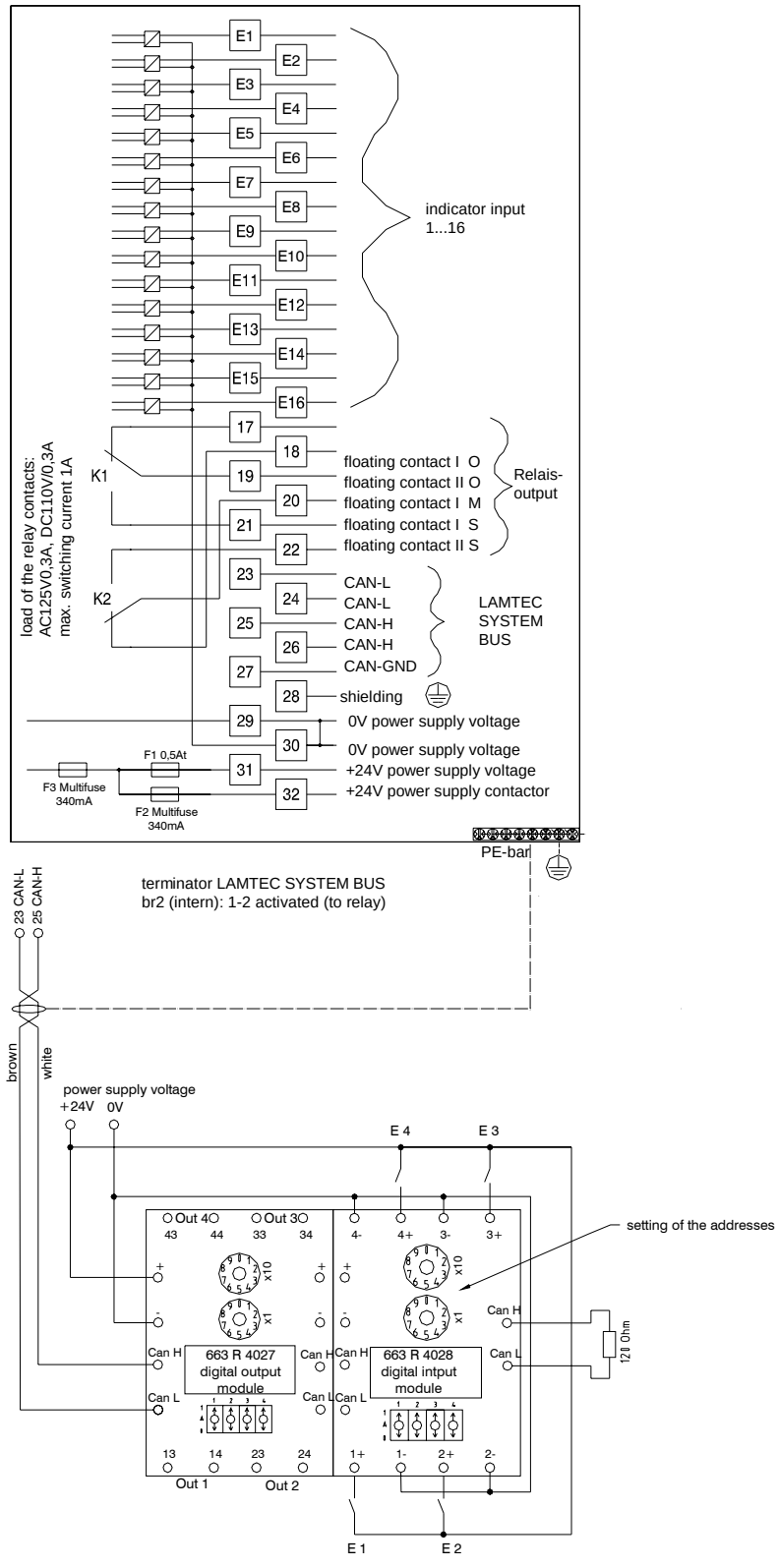
The module is to be connected without distance. After connection of 15 modules the supply voltage must be started again externally.

Note:

E.g. the module address “63” has another function in FMS/ETAMATIC as in NEMS.
If you use LSB modules in conjunction with FMS/ETAMATIC and NEMS, the default control of the modules is taken over by FMS/ETAMATIC.
If you want to use the functions of the global indicator groups (control via NEMS), the parameter 846 has to be set to “7”.
Therefore the identification of the LSB modules is switched off.

Connection Diagram Example LSB-Module

NEMS16 with 24VDC power supply voltage



16.7 External horn

Electronic triple transductor for control room.

- 3 inputs – separated through optocoupler18-30V/DC.
- one signal frequency per input
- with 2 or 3 alarms at the same time, periodic change of the signal frequency takes place
- 1 input with flashing signal for intermittent message
- 1 output 24V/DC for the supply of controling contacts
- pitch and volume adjustable with potentiometers (190...2100Hz)
- function test over inserted key
- volume with 1m distance: max. 90 dB
- protection class IP52
- power supply voltage 24V/DC or 230V/AC
- h x w x d 180 x 130 x 100mm

product no. LH4/OK-230	power supply 230V/AC, 50Hz
product no. LH4/OK-24	power supply 24V/DC

1	2	3		4	5	6	7	8	9	10	11	12	13
L	N	PE		+	-	+	-	+	-	+	-	+	-
24V~												flash	
+	-	PE	fuse 0,8 A mt	output 24V=		3 inputs 24V=						input 24V=	
24V=													

terminal assignment

16.8 Display- and operating terminal

For displaying in chronically order of incoming and outgoing fault status messages and process sates messages;
accuracy of the time stamps → +1ms, max. +5ms.

For handling and visualisation of the NEMS devices.

Connection via LAMTEC SYSTEM BUS of the NEMS .

- Monitoring and display of the system status
- Chronological display of all current messages (alarms).
- Selection and acknowledgement of alarms
- Setting/resetting of bypasses and display of all bypasses set
- Generation, display and printing of histories (events stored in chronological order)
- Comprehensive filter options for histories
- Selective status interrogation of a signal input
- All functions also available via Ethernet/Internet browser
- E-mail for new alarms

16.8.1 Configuration

- Data processor with linux OS
- Built in 19“ frame or mounting plate 100mm depth
- Key pad with 9 keys
- Dimensions: 40TE x 3HE
- Protection class: IP00
- Colour LCD-display with backlight (lifetime 50.000 h)
- Resolution: 320 x 240 pixel (1/4 VGA)
- Power consumption: ca. 15W
- BUS-connection: LAMTEC SYSTEM BUS
  with add-on module to PROFIBUS possible

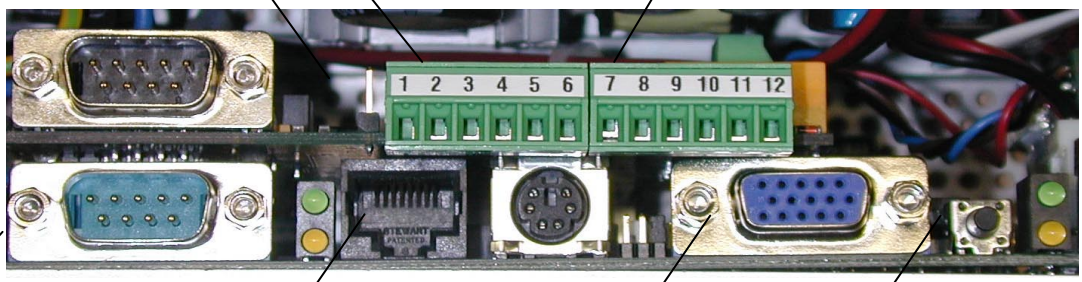
16.8.2 Product-Nr.

- 680 R 6000 DC5V without housing
- 680 R 6002 AC230V in panel installation case
- 680 R 6003 DC5V in panel installation case
- 680 R 6004 DC24V in panel installation case
- 680 R 6005 DC110V in panel installation case
- 680 R 6006 DC5V in 19“ rack 3HE
- 680 R 6007 DC24V in 19” rack 6HE (with thermal printer)

Accessories

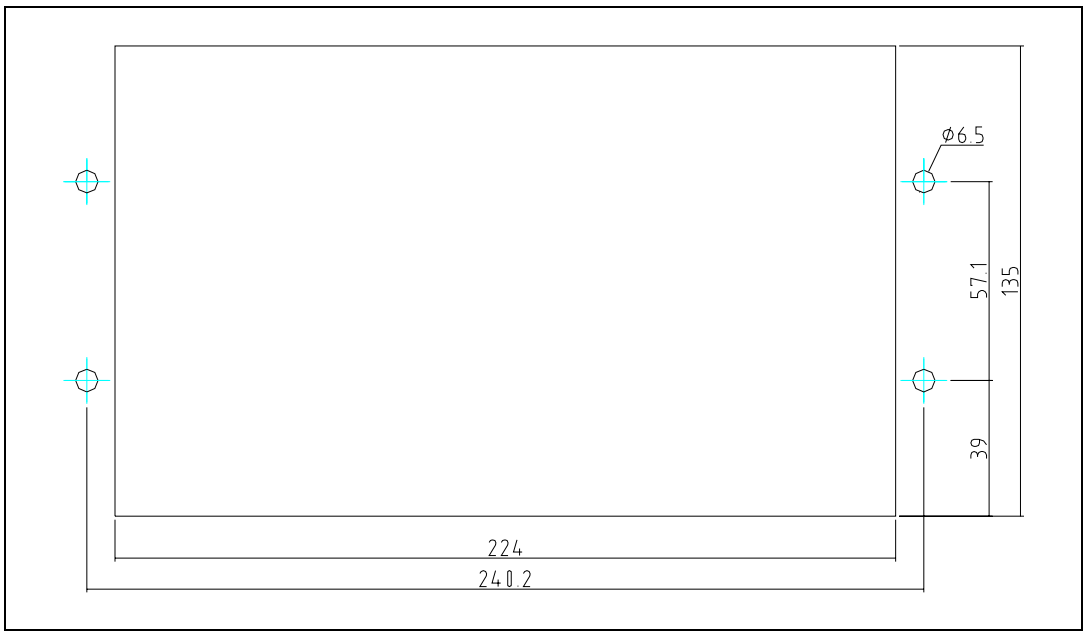
Electrical connectors

Termination resistor LAMTEC SYSTEM BUS	XB6 LAMTEC SYSTEM BUS & Inputs	XB7 Relay outputs
close → with termination	1 CAN-H	7 Relay output ”HORN“ - nc
open → without termination	2 CAN-L	8 Relay output ”HORN” - no
	3 CAN-GND	9 Relay output ”HORN” - root
	4 Input 1	10 Relay output ”WATCHDOG“ - nc
	5 Input 2	11 Relay output ”WATCHDOG“ - no
	6 GND optocoupler	12 Relay output ”WATCHDOG“ - root



COM 1: Serial interface for connecting a printer	Ethernet interface	VGA	RESET

16.8.3 Panel Cut-Out



17 Technical data

17.1 NEMS

17.1.1 NEMS16 for AC230V-supply voltage

Without RS232 interface Product no.: 680 R 1000

With RS232 interface Product no.: 680 R 1001

Supply voltage: AC100V...AC250V, 50...60Hz

Power consumption: 5VA

Weight: 1250gr

17.1.2 NEMS16 for DC24V-supply voltage

Without RS232 interface Product no.: 680 R 1010

With RS232 interface Product no.: 680 R 1011

Supply voltage: DC20V...DC28V

Power consumption: 5W

Weight: 1200gr

17.1.3 NEMS16 wall mounting case for DC24V-supply voltage

Encasing material: ABS, PC

Housing colour: Light grey similarly RAL7045/ Graphite-grey similarly RAL7024

Without RS232 interface Product no.: 680 R 1027

With RS232 interface Product no.: 680 R 1028

Supply voltage: DC20V...DC28V

Power consumption: 5W

Weight: 1600gr

Ambient temperature

Betrieb 0°C - +60°C

Lagerung –25°C - +60°C

Permissible ambient humidity

Class F DIN40040

Signal inputs

16 digital inputs isolated electrically via optocouplers

Trigger level DC15V... DC30V

Power input approx. 3mA per input

Technical data

Signal Outputs

2 relay outputs isolated

Gold-plated contact material designed for 125 VAC/0.3 A, 110 VDC/0.3 A

Max. switched current 1A

Protection code DIN 40050

Panel mounting case: IP40 (optionally IP54 at the front)

Wall mounting case: IP65 (except cable entry)

Voltage outputs terminal 32

1 output with contactor voltage DC24V,

in addition terminals 29 and 31 must be bypassed (0 V connection)

Times

Delay time (delay) of the indicator inputs can be configured from 1...127 ms.

Storage of the configuration

Flash storage device

Number of programmings

Unlimited

Interface

1 serial interface to 9-pol. sub-D pins

Only for devices with product no.: 680 R 1001
680 R 1011

RS232 (standard setting 19200 baud, parity none, 8 data bits, 1 stop bit)

IMPORTANT!

Connecting and removing the interface is only to be carried out with the device disconnected.

Only connect devices, which comply with DIN EN60950/ VDE0805.

Field bus coupling

External communications processor via LSB for the systems:

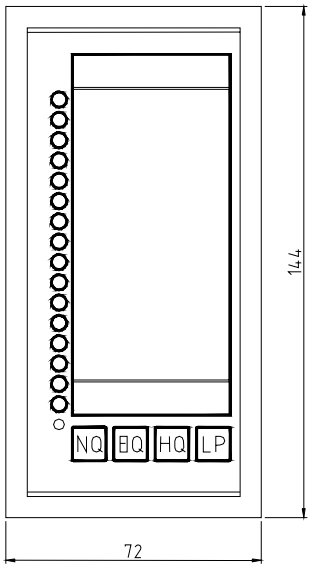
- Interbus-S
- Profibus-DP
- Modbus
- CANopen
- Ethernet

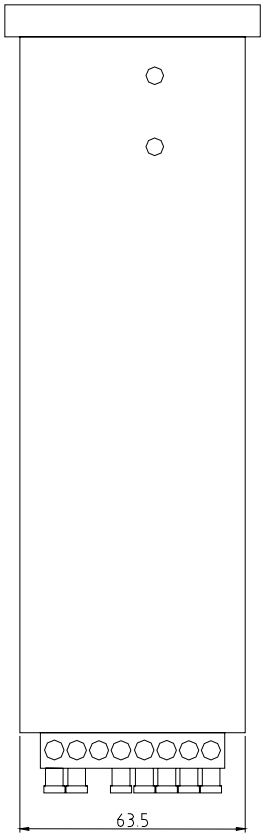
LAMTEC SYSTEM BUS

Via terminals 23, 25, 27

Termination BR2

17.1.4 Dimensions



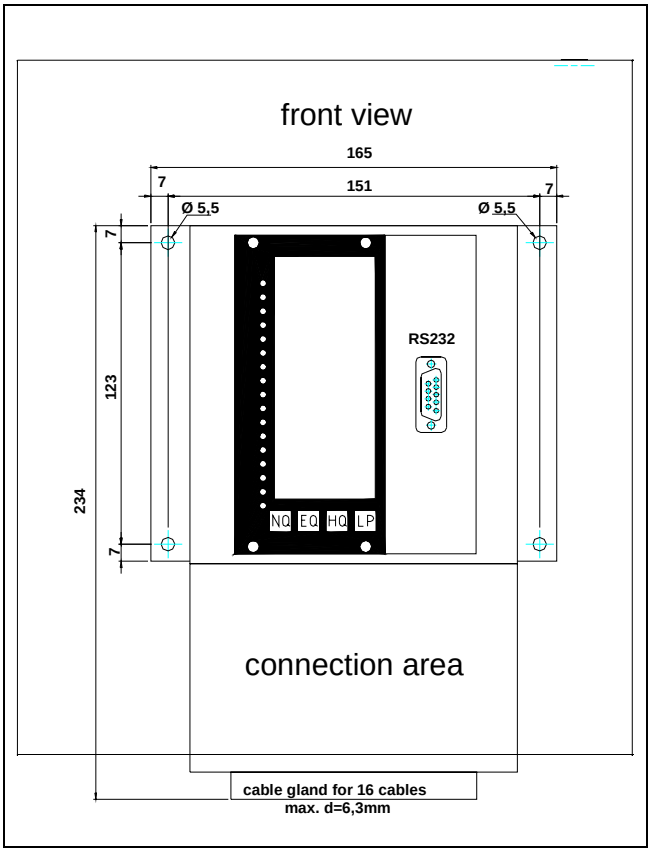


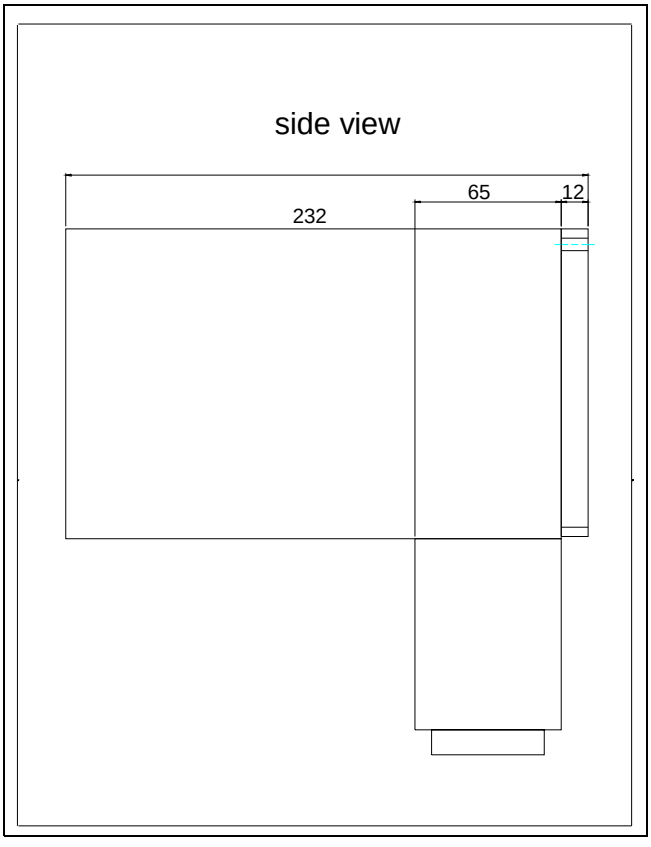
Dimensions panel cutout

- For 1 NEMS 67mm x 138mm
- For 2 NEMS 139mm x 138mm
- For 3 NEMS 211mm x 138mm

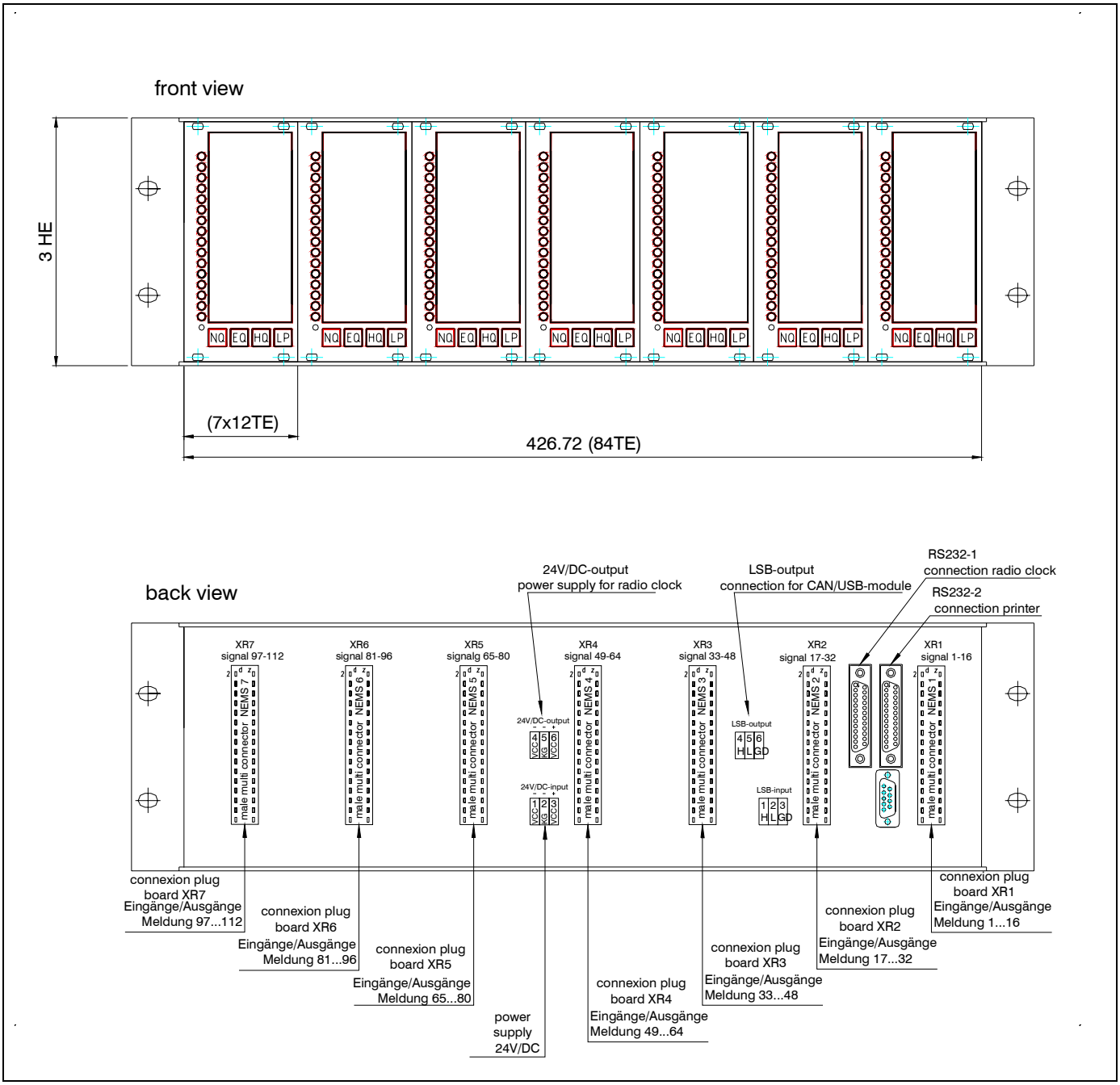
For each additional NEMS built in: + 72mm

17.1.5 Abmessungen Wandgehäuse



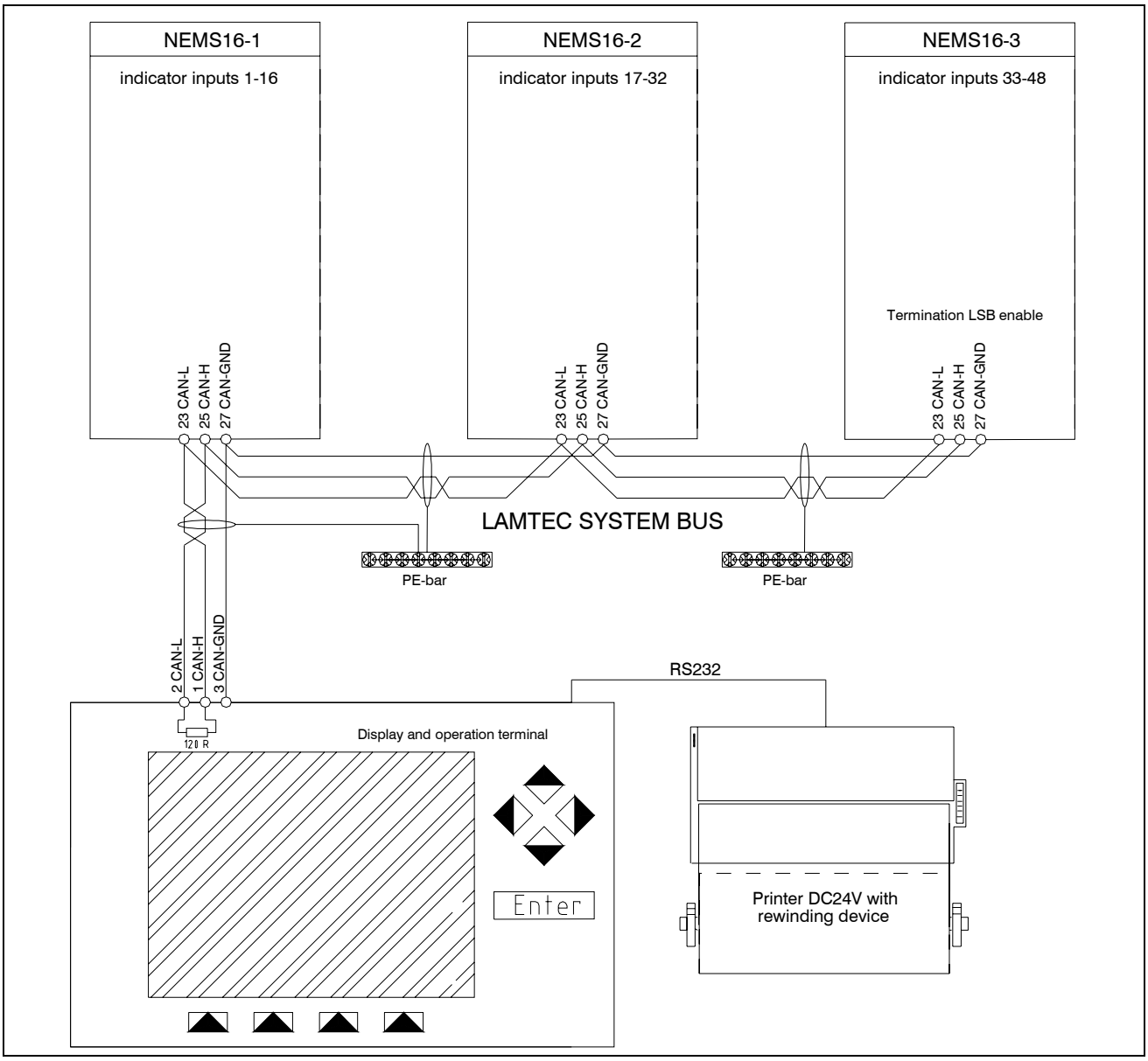


17.1.6 19“-Einschub

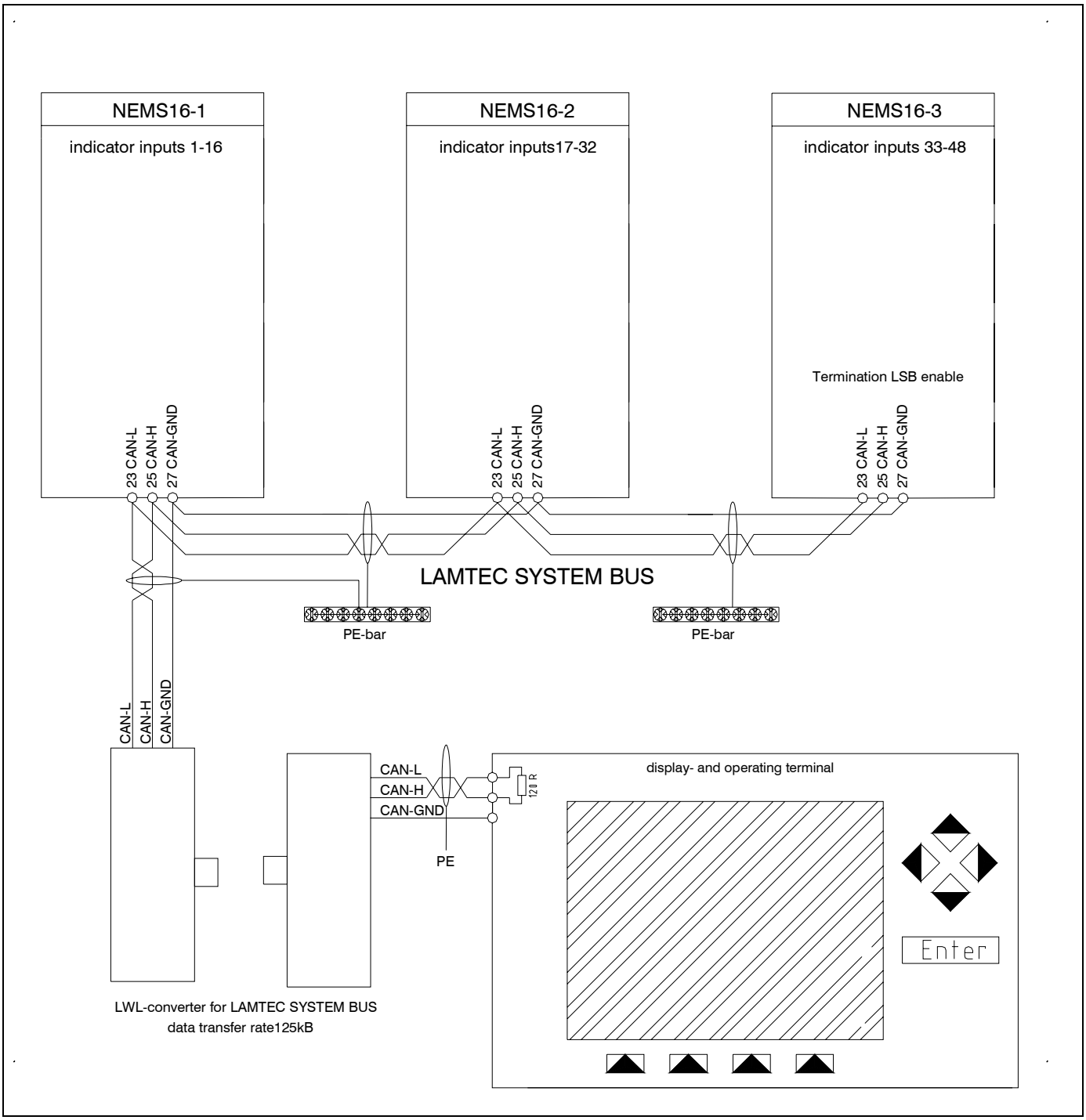


17.1.7 Connection Diagram Examples

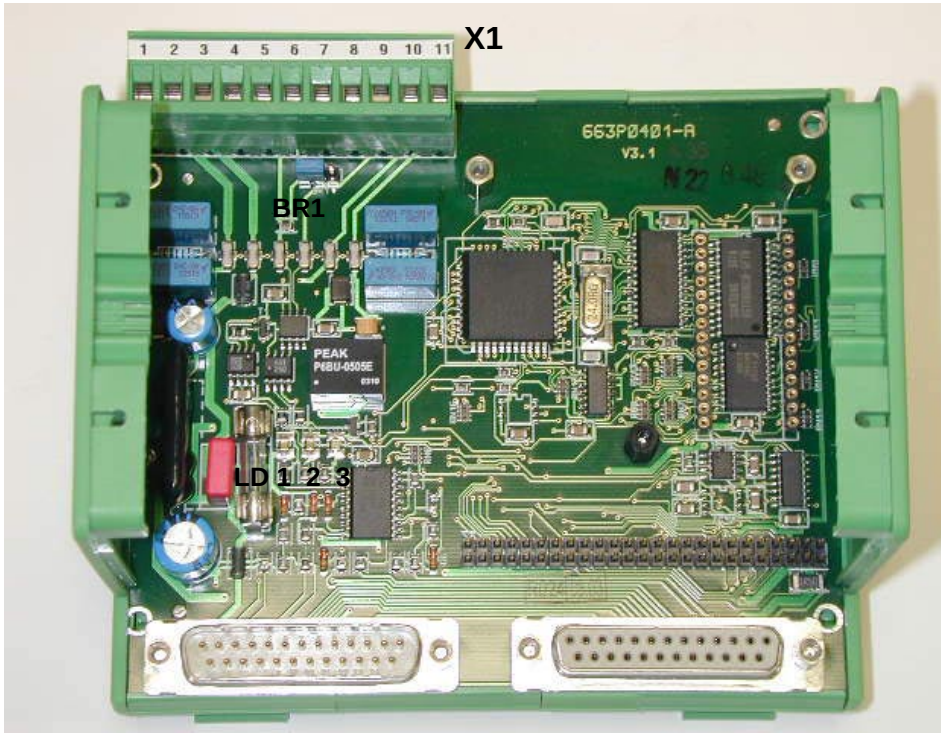
NEMS –Printer- Display- and Operating Terminal



NEMS –Display- and Operating Terminal via LWL Converter



17.2 Communication Processor Board



The communication processor is used for connection to superior BUS systems for all LAMTEC devices.

- Power supply 24V/DC-150mA
- H-rail
- w130 x h85 x d115mm

ACHTUNG!

With external power supply You have to pay attention of the fuse protection. The device don't have it's own input fuse (not with FMS/VMS)

17.2.1 Terminal bar X1 – LAMTEC SYSTEM BUS (LSB)

- Kl 1 – earthing
- Kl.2 – power supply0V (not in conjunction with FMS/VMS)
- Kl.3 - power supply +24V/DC (not in conjunction with FMS/VMS)
- Kl.4 und 7 - shielding
- Kl.5 und 8 - CAN-H
- Kl.6 und 9 - CAN-L
- Kl.10 – CAN-GND

17.2.2 Jumper BR1 –Terminator LSB

- BR1 in position 1-2 (outwards)
  terminator LAMTEC SYSTEM BUS activated
- BR1 in position 2-3 (inwards)
  terminator LAMTEC SYSTEM BUS not activated

17.2.3 LEDs 1...3

- LED1 - yellow: continuous light in normal operation
  flashes shortly one time after POWER ON and during XRAM test
- LED2 - green: Rx-LED from FMS
  (Hardwired with Rx-cable of RS232)
- LED3 - red: Tx-LED to FMS
  (Hardwired with Tx-cable of RS232)
- With missing contact to FMS the red LED flashes with approx. 4HZ. The green LED remains off.
- After successful connecting to FMS the red LED and the green LED show the actual data transfer to FMS with flashing.
- While the communication processor is wired to ETAMATIC / LE / NEMS via LSB only the red LED flashes with 4 Hz after POWER-ON first.
  After successful connection via LSB the red LED ceases to flash. In this case the red LED and green LED remains off.
- Nach erfolgreicher Verbindung über den LSB unterbleibt das Blinken der roten LED. In diesem Fall bleibt die rote und die grüne LED aus.

17.3 Digital output modules

• Rated voltage	DC24V
• DC current input	100 mA
• Power consumption	2,4 W
• Supply voltage	DC19,2V DC26,4V
• Controlling	LAMTEC SYSTEM BUS
• Response time (Transmit – relay switches)	15 ms
• Precharge time	200 ms
• Operation temperature	0 °C ... +55 °C
• Storage temperature	-25 °C ... +70 °C
• Protection circuit	pole protection of supply voltage
• Relay status indication	LED
• Function indication	Green LED for BUS activity and VCC
• Operation indication	Red LED for BUS faults
• Specials	Hand control elements
• Product no.:	663 R 4027
• Product no. ext. Power supply	663 R 4024

17.3.1 Output contacts

• Output contact / material	4 normally open contacts / AgNI
• Switching voltage	max. 250 V
• ON-/OFF current max.	12 A / 4 s with 10 % ED
• Permanent current	6 A/relay but max. 12 A/module
• Protection of the contacts	6 A
• Mechanical life span	$1x10_7$ switches
• Electrical life span	$1x10_5$ switches
• Permissible switching frequency	360/h bei Nennlast
• Isolation according to VDE 0110	C
• Calculated voltage	AC250V
• Overvoltage category	II
• Withstand voltage spool/contact	AC4000V 50 Hz 1 min
• Withstand voltage contact/contact	AC1000V 50 Hz 1 min

17.3.2 Housing

• Protection code (EN 60529)	Case IP50 clamps IP20
• Humidity IEC60721-3-3	Environment class 3k3
• Clamp dimensions outputs	2,5 mm²
• Clamp dimensions(BUS, supply voltage)	1,5 mm²
• Weight	95 g
• Dimension	w x h x d 35 x 68 x 60 mm

17.4 Digital input module

• Supply voltage	DC24V
• Current	50 mA
• Power consumption	1,2 W
• Controlling	LAMTEC SYSTEM BUS
• Product no.	663R4028
• DC current input (DC24V)	6 mA

17.4.1 Digital Inputs

• Input voltage max.	DC30V
• Input current (DC24V)	6 mA
• High-signal	>DC7V
• Low-signal	<DC3V
• Response time (Transmit to receive)	15 ms
• Precharge time	• 550 ms

17.4.2 Housing

• Protection code (EN 60529)	Case IP50 clamps IP20
• Humidity IEC60721-3-3	Environment class 3k3
• Clamp dimensions outputs	2,5 mm²
• Clamp dimensions (BUS, supply voltage)	1,5 mm²
• Weight	95 g
• Dimension	W x h x d 35 x 68 x 60 mm

18 Spare parts

Replacement electronics	680 R 5000V3.0
Replacement front panel	680 P 1019
Replacement keyboard	680 P 1023
Replacement keyboard cable	680 P 1024
Replacement terminals	04K 0166
Replacement panel installation case	04G 0303
Replacement AC230V/DC24V power supply unit	680 R 1009
Replacement installation mounting (2 off per set)	660 R 0080
Thermo paper for printer	680 R 1098

19 Accessories

Text- and configuration software for LAMTEC SYSTEM BUS Premium Version for up to 64 NEMS on LSB	680 R 1052
Text- and configuration software for LAMTEC SYSTEM BUS Light Version for up to 2 NEMS or a single device on LSB	680 R 1056
Text- and configuration software for RS232-interface	680 R 1053
Thermo printer in panel installation case DC24V, without winding device	680 R 1060
Thermo printer in panel installation case AC230V, without winding device	680 R 1065
Thermo printer in panel installation case DC24V, with winding device	680 R 1070
Thermo printer in panel installation case AC230V, with winding device	680 R 1075
Thermo printer for 19“-Rack, 3HE, DC24V without winding device	680 R 1080
Thermo printer for 19“-Rack, 3HE, AC230V without winding device	680 R 1085
Thermo printer for 19“-Rack, 3HE, DC24V with winding device	680 R 1090
Thermo printer for 19“-Rack, 3HE, AC230V with winding device	680 R 1095
Display and operating terminal in panel installation case, AC230V	680 R 6002
Display and operating terminal in panel installation case, DC5V	680 R 6003
Display and operating terminal in panel installation case, DC24V	680 R 6004
Display and operating terminal in panel installation case, DC110V	680 R 6005
Display and operating terminal in 19” rack, 6HE, DC24V	680 R 6007
Digital output module	663 R 4027
Digital input module	663 R 4028
Radio clock module DC24V	680 R 6020
Antenna for radio clock	680 R 6025

20 Configuration sheet

Serial number:	Device name:

LAMTEC SYSTEM BUS Family: (1-4) 1	LAMTEC SYSTEM BUS Address: (1-16) 1

First value: # | New value: | Filter time: 2ms | Contact chatter rejection: OFF

Relay 1 aus		Group 1	#	Group 2		Static	x	Dynamic		Acknow.		Horn ex.glob.	
Relay 2 aus		Group 1		Group 2		Static		Dynamic		Acknow.		Horn ex.glob.	

Horn ex.lok.		Watchdog		Printer fault									
Horn ex.lok.	#	Watchdog		Printer fault									

Indicator no.:	Text	Fault mode	Operation mode	Normal open contacts	Normal closed contacts	Indicator group 1	Indicator group 2
1		#		#		#	
2		#		#		#	
3		#		#		#	
4		#		#		#	
5		#		#		#	
6		#		#		#	
7		#		#		#	
8		#		#		#	
9		#		#		#	
10		#		#		#	
11		#		#		#	
12		#		#		#	
13		#		#		#	
14		#		#		#	
15		#		#		#	
16		#		#		#	

= Default settings x = Customer setting

21 Declaration of conformity

Month/Year: .....January ...../.....2003.....

Manufacturer: LAMTEC Meß- und Regeltechnik
für Feuerungen GmbH & Co KG

.....

Address: Impexstraße 5, 69190 Walldorf

.....

Product designation: NEMS process and fault status indicator device

.....

.....

The designated product complies with the stipulations in the following European directives:

Number	Text
89/336/EWG	Electrical equipment within specific voltage limits
73/23/EWG	Electromagnetic compatibility

The appendix contains further details on compliance with these directives

Application of the CE mark: yes

Place, date: Walldorf, 27 January 2003

Authorised
signature: .....

The appendices form part of this declaration.
This declaration certifies conformity with the directives specified but does not guarantee quality.
The safety information in the product documentation supplied is to be heeded.
This declaration of conformity only applies to the device supplied if it is marked with the corresponding marking.

Declaration of conformity

21.1 Appendix to the EC Declaration of Conformity or EC Manufacturer's Declaration

Month/Year: .....January...../.....2003.....

Product designation: NEMS process and fault status indicator device

.....

.....

.....

The compliance of the designated product with the stipulations in the above-mentioned directives is proven by its conformity with the following standards and regulations:

Harmonised European standards:

Reference number
EN 60730

LAMTEC Mess- und Regeltechnik
für Feuerungen GmbH & Co KG

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