

Sensors und systems for
combustion engineering

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1 General information

1.1 Complying with the requirements of equipment safety law

Follow the instructions!

The equipment must only be used in the manner described

It must be operated only by trained personnel. The equipment may only be operated and serviced by persons who are qualified to do so on the basis of their expertise and 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.

2 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.

3 LAMTEC SYSTEM BUS

- Data exchange between LAMTEC devices
- Activation of digital/analog input/output modules
- Interface with the following higher-level bus systems:
 - Profibus DP
 - CANopen
 - Modbus
 - Ethernet

3.1 Basic Features

The LAMTEC SYSTEM BUS (LSB) is based on the CAN bus with a fixed baud rate of 125 KB. Each device is addressed by means of a device ID.

All bus nodes receive the sent messages and can, if necessary, evaluate them or, if requested, make the associated message available on the bus. To do so, each node must check whether the transferred message address is relevant. The device ID is not important here and is only used to prevent bus conflicts and identify the sender for BUS diagnosis and troubleshooting purposes. Only the two bits of the system bus family are taken into account when the message address is analyzed, since the same message may be present in each of the families (e.g. 4 families, each with a separate O₂ value). Cross-family messages (e.g. the time or external temperature) can be defined in the lower message range.

3.2 Integrating the LAMTEC SYSTEM BUS Modules

The modules are addressed via a 2-digit decimal setting of between 1 and 99. The number automatically defines the function. Parameter setting for LAMTEC SYSTEM BUS for FMS/VMS and ETAMATIC.

3.3 Cable Lengths

The following cable lengths and cross-sections are recommended for the LAMTEC SYSTEM BUS:

0 - 40m 4 x 0.22 mm², twisted pair with shield, 120 OHM

40 - 300m 4 x 0.34 mm², twisted pair with shield, 120 OHM

300 - 500m 4 x 0.5 mm², twisted pair with shield, 120 OHM

Example cable type for fixed laying:

Unitronic BUS CAN 2x2x0,5mm², shielded
LAMTEC Item No. 05L05 2x2x0,5

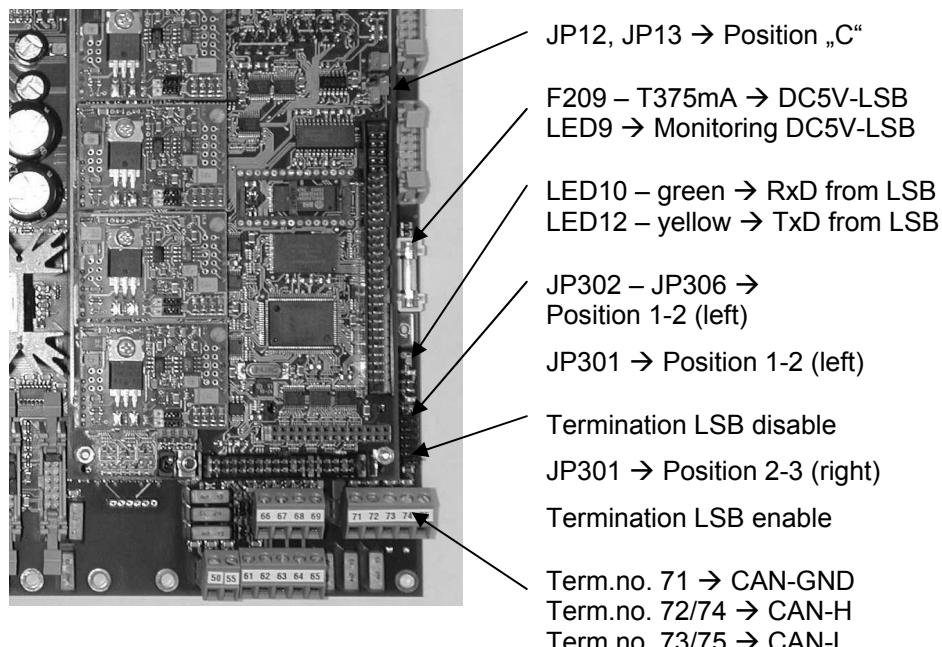
HELUKABEL CAN-BUS 4x1x0,5mm², shielded

3.4 LAMTEC SYSTEM BUS with LT1

3.4.1 Parameter Setting (as of Software Version 3V01)

- P3800 – Value 1 (default)
LAMTEC SYSTEM BUS – Version 1
- P3801 – ID9 devices (default)
If more than one LT exists in a family, they must have different IDs.
Can be set to ID9...ID16.
- P3802 – Device family 1 (default)
All devices that exchange values with each other must be set to the same family.
- P3803 – O₂-OUTPUT VALUE (default)
The LT sends its O₂-value for all devices in the same family.
- P3895 – LSB (default)
Switchover between LAMTEC SYSTEM BUS and CANopen.

3.4.2 Plug-In Jumpers, LEDs, Fuses, and Terminals



3.4.3 Function



NOTE:

With LT1, data can only be transferred via the LAMTEC SYSTEM BUS when the device is set to "MEASURE" and is not in "MAINTENANCE MODE" and no "FAULT" is present.

LEDs 10 and 12 flicker when communication is functioning smoothly.

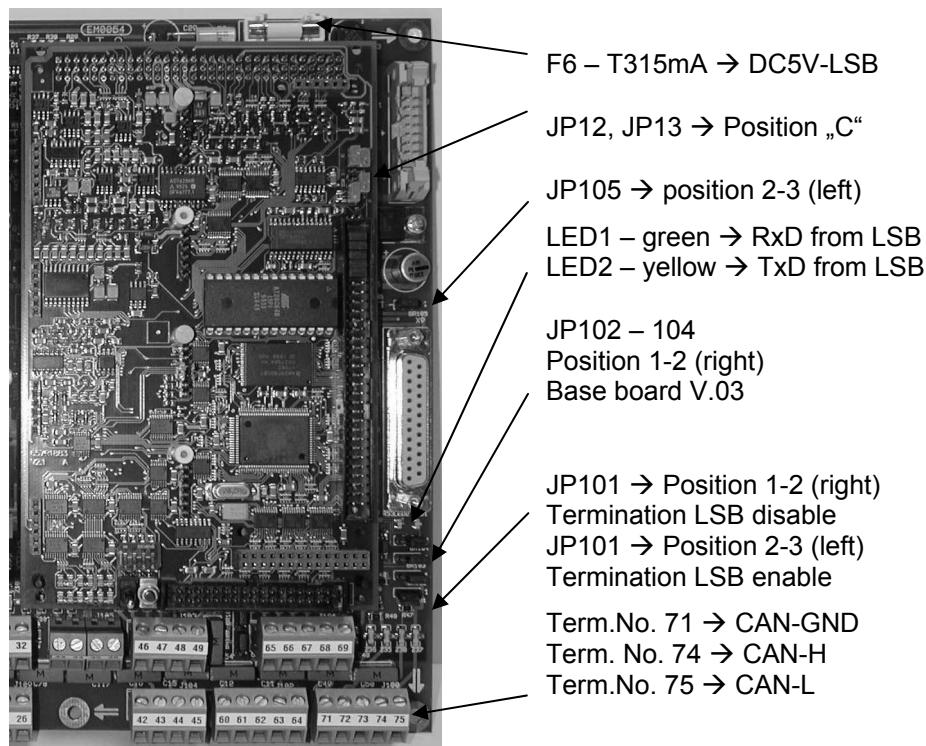
LED 9 monitors the operating voltage of the LSB. This LED must light up.

3.5 LAMTEC SYSTEM BUS with LT2

3.5.1 Parameter Setting (as of Software Version 1V14)

- P3800 – Value 1 (default)
LAMTEC SYSTEM BUS – Version 1
- P3801 – ID9 devices (default)
If more than one LT exists in a family, they must have different IDs.
Can be set to ID9...ID16.
- P3802 – Device family 1 (default)
All devices that exchange values with each other must be set to the same family.
- P3803 – O₂-OUTPUT VALUE (default)
The LT sends its O₂-value for all devices in the same family.
NO: The LT does not send an O₂-value for the devices in the family.
- P3804 – Send CO value for the family
NO (default): The LT does not send a CO value for the devices in the family.
MEASURED CO VALUE: The LT sends its measured CO value for all devices in the same family.

3.5.2 Plug-In Jumpers, LEDs, Fuses, and Terminals



3.5.3 Funktion



NOTE:

With LT2, data can only be transferred via the LAMTEC SYSTEM BUS when the device is set to "MEASURE" and is not in "MAINTENANCE MODE" and no "FAULT" is present.

LEDs 1 and 2 flicker when communication is functioning smoothly.

3.6 LAMTEC SYSTEM BUS with FMS/VMS

The FMS/VMS can only be connected to the LSB via a communications processor (as of software version K2b001). The electrical connection is established via a prefabricated 25-pole cable (length: 1m; item no.: 663P0305). This connection cable is also used to supply the communications processor with 24 V DC. An external power supply, therefore, is not required if an FMS/VMS is used (see Chapter 4).



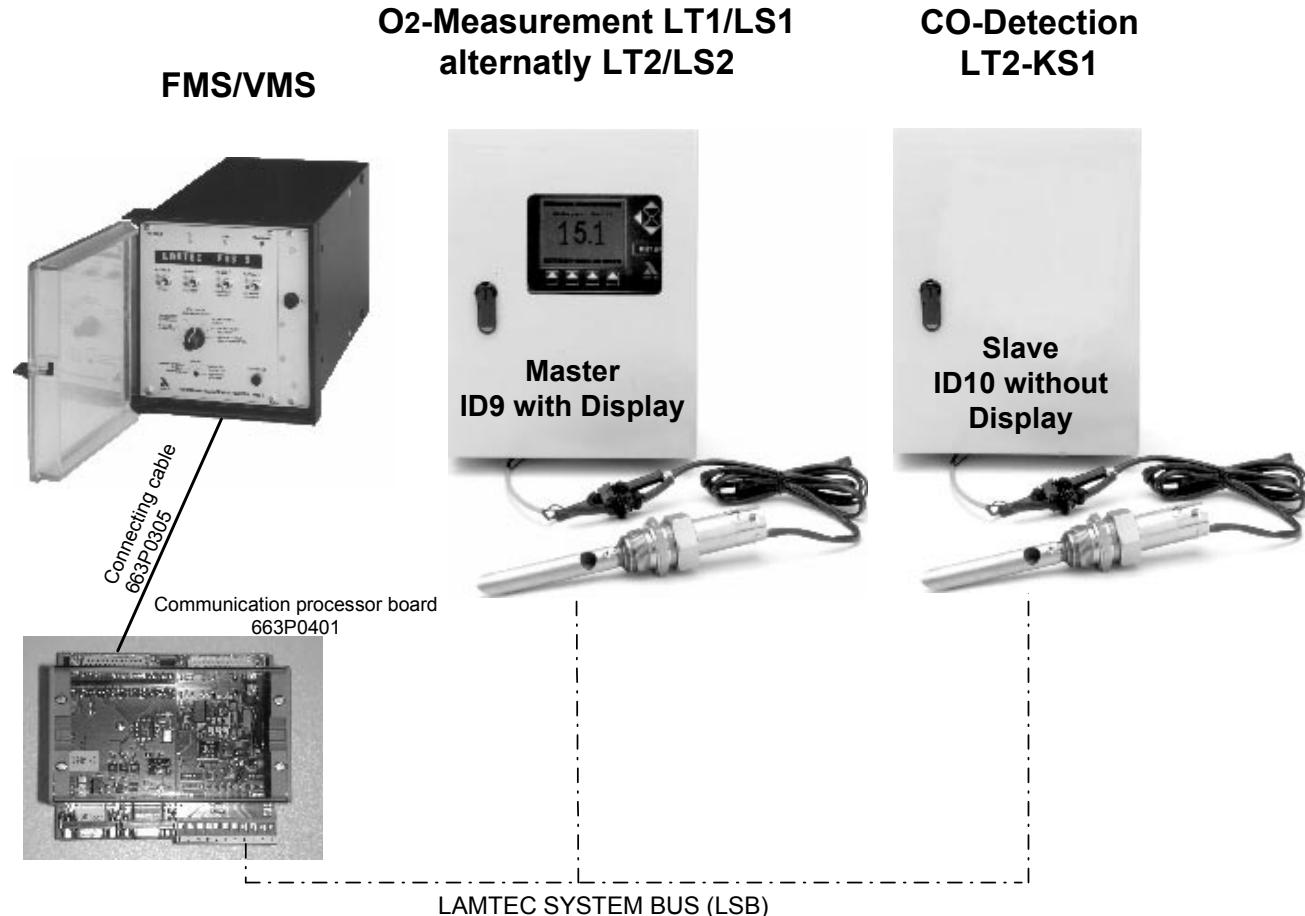
IMPORTANT

Apart from the communications processor, no further 24 V DC consumers must be connected to the FMS/VMS since this could otherwise overload the internal power supply unit.

3.6.1 Parameter Setting (as of Software Version 3.100 of November 6, 2000)

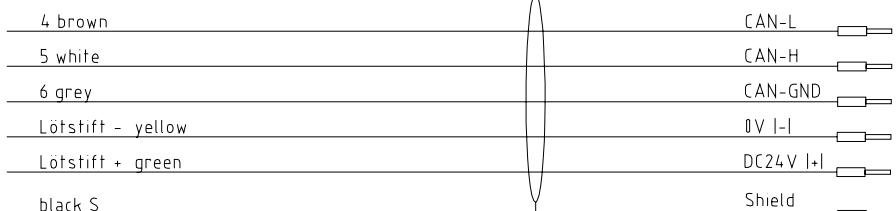
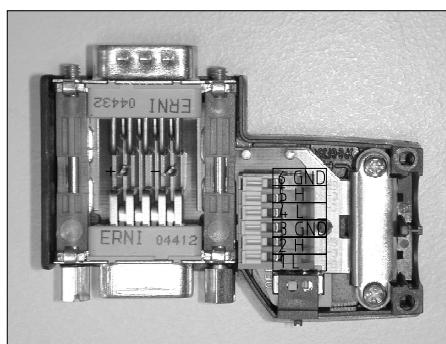
- P845 – Device family 1 (default)
All devices that exchange values with each other must be set to the same family.
- P846 – Value 2 (default)
LSB configuration
- P847 – ID1 devices (default)
If more than one device exists in a family, they must have different IDs.

3.6.2 Data Exchange Using a CO/O₂ Regulator with FMS/VMS as an Example



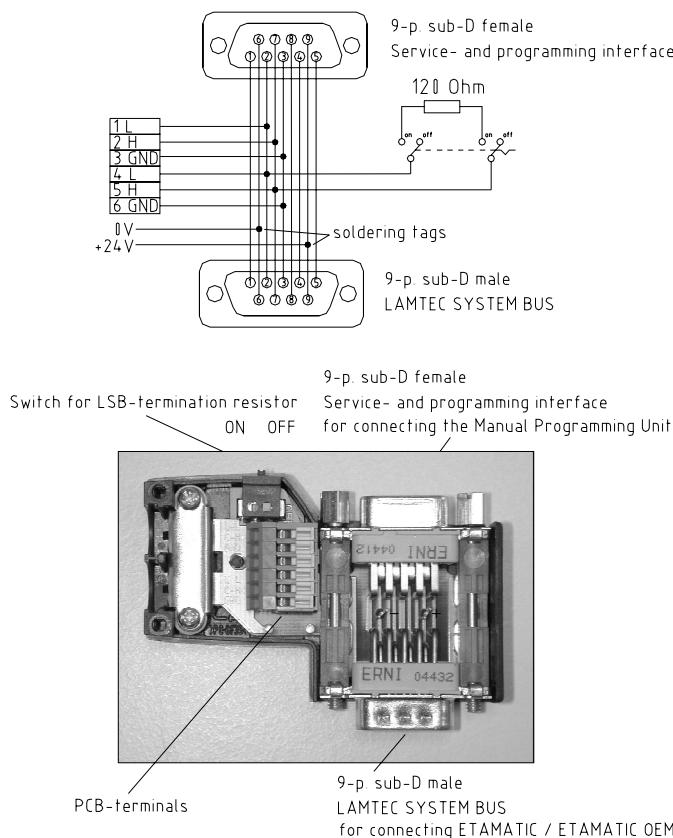
3.7 LAMTEC SYSTEM BUS with ETAMATIC

The LAMTEC SYSTEM BUS with ETAMATIC lies not on clamps, but on a 9-p. Sub D socket. For this connection there is a special cable.



The LAMTEC SYSTEM BUS-Cable 663 R 0421N supplies on the yellow and the green wire +24 VDC, which are supplied from the ETAMATIC/ETAMATIC OEM. These wires are (in delivered condition) isolated by additional rubber isolation.

In connection with the LT 1 or LT 2 the +24 VDC are not required and the wires have to be isolated. On connection of the Customer Interface, the Manual Programming Unit, the LSB-Modules or the Communication Processor the +24 VDC are required. In this case the rubber isolation has to be removed and the wires should be connected. The max. burden of the +24 VDC for the continuous operation is 300 mA. Shortly up to max. 400 mA.



The LSB-connector with its service interface is used to connect the ETAMATIC/ETAMATIC OEM and the LAMTEC SYSTEM BUS. The connector is equipped with PCB-terminals, which terminals are used and opened by an integrated lever. Therefore the open wire ends of the multiple wire Bus-cable simultaneous can be positioned and fixed. These terminals are designed to accept all kind of wires from 0,08mm²...0,5mm².

The connector supplies two cable inlets for an input and output for the LAMTEC SYSTEM BUS. With the existing cable the terminals 4, 5 and 6 are already connected. In case to connect the LSB to further LAMTEC-devices, the terminals 1, 2 and 3 are to be used (termination resistor OFF). Never use the service- and diagnose interface.

With the external switch the termination resistor can be enabled for the LSB-Bus.

663R0421N → 2m LSB connection cable

For connection of customer interface, LSB-modules or field bus modules at ETAMATIC.

663R0421N/5 → 5m LSB connection cable

663R0421N/10 → 10m LSB connection cable

663R0421N/15 → 15m LSB connection cable

663R0421N/20 → 20m LSB connection cable

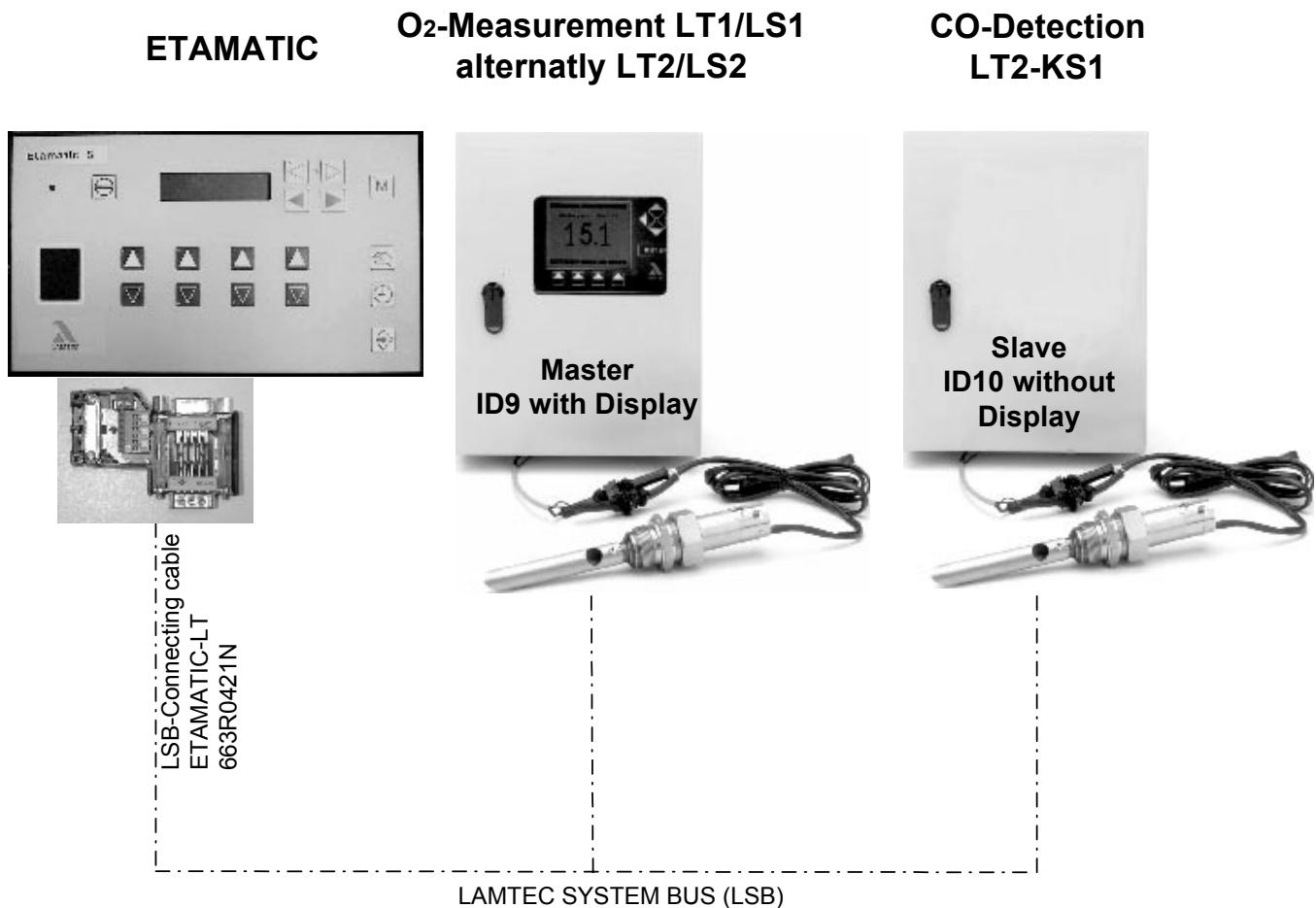
663R0421N/30 → 30m LSB connection cable

663R0421N/50 → 5m0 LSB connection cable

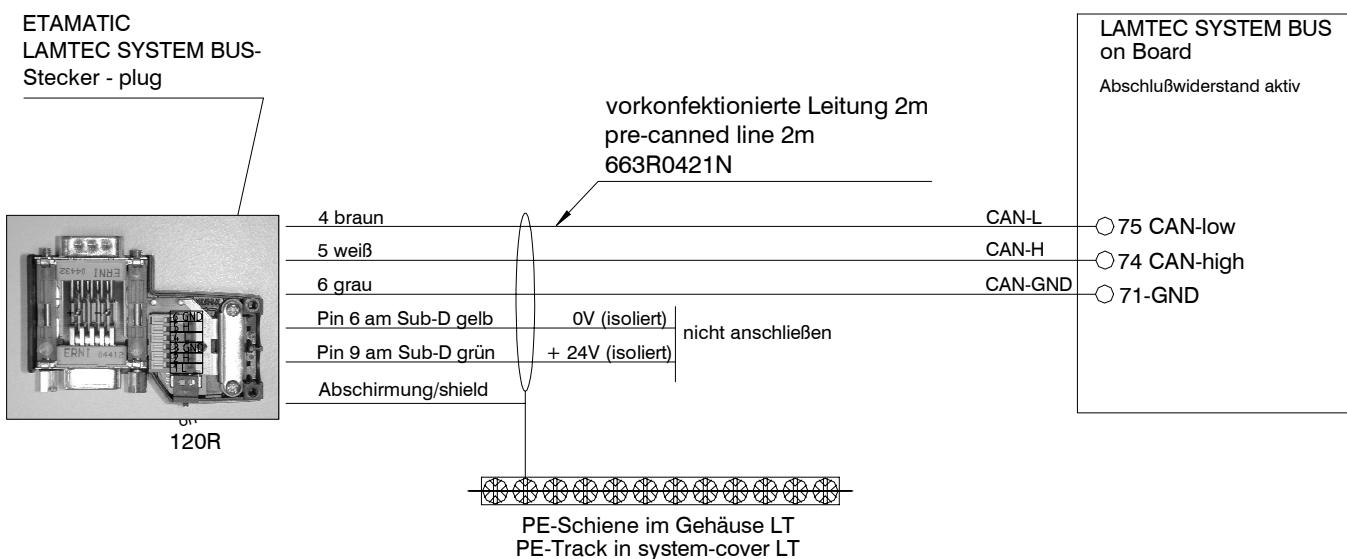
3.7.1 Parameter Setting (as of Software Version 3.100 of November 6, 2000) in ETAMATIC

- P845 – Device family 1 (default)
All devices that exchange values with each other must be set to the same family.
- P846 – Value 2 (default)
LSB configuration
- P847 – ID1 devices (default)
If more than one device exists in a family, they must have different IDs.

3.7.2 Data Exchange Using a CO/O₂ Regulator with ETAMATIC as an Example



3.7.3 Data Exchange Using ETAMATIC with LT as an Example



3.8 LAMTEC SYSTEM BUS with NEMS-16 in combustion engineering

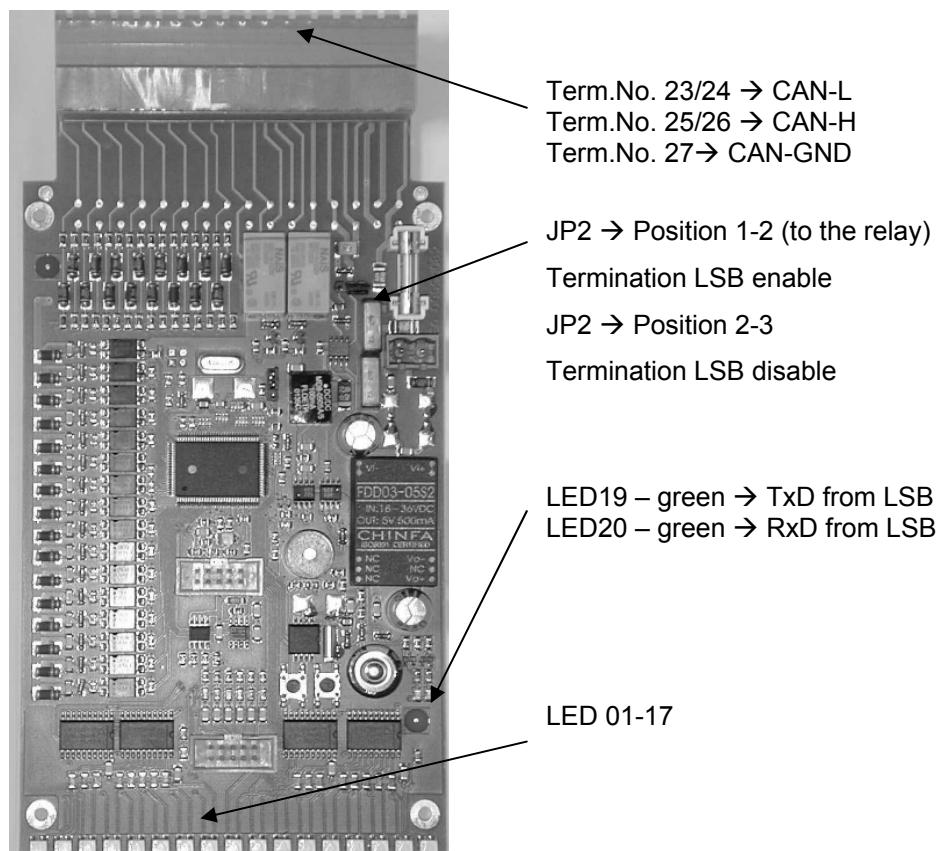
The NEMS 16 devices are prepared to interface the LAMTEC SYSTEM BUS (LSB) for communication with VMS/FMS and ETAMATIC. Through this connection and communication it is possible to combine burner controls and corresponding safety interlock circuits together with the very good visualization and comfortable manual handling.

The optional used display and manual keypad-terminal with graphic LCD-display offers the full NEMS 16 system access.

3.8.1 Parameter Setting

- Level L.N – Device family 1 (default)
Device 01-16 → Family 1
Device 17-32 → Family 2
Device 33-48 → Family 3
Device 49-64 → Family 4
- Level L.E - ID1 devices (default)
If more than one NEMS exists in a family, they must have different IDs. Can be set to ID1...ID16.

3.8.2 Plug-In Jumpers and Terminals



3.8.3 Function



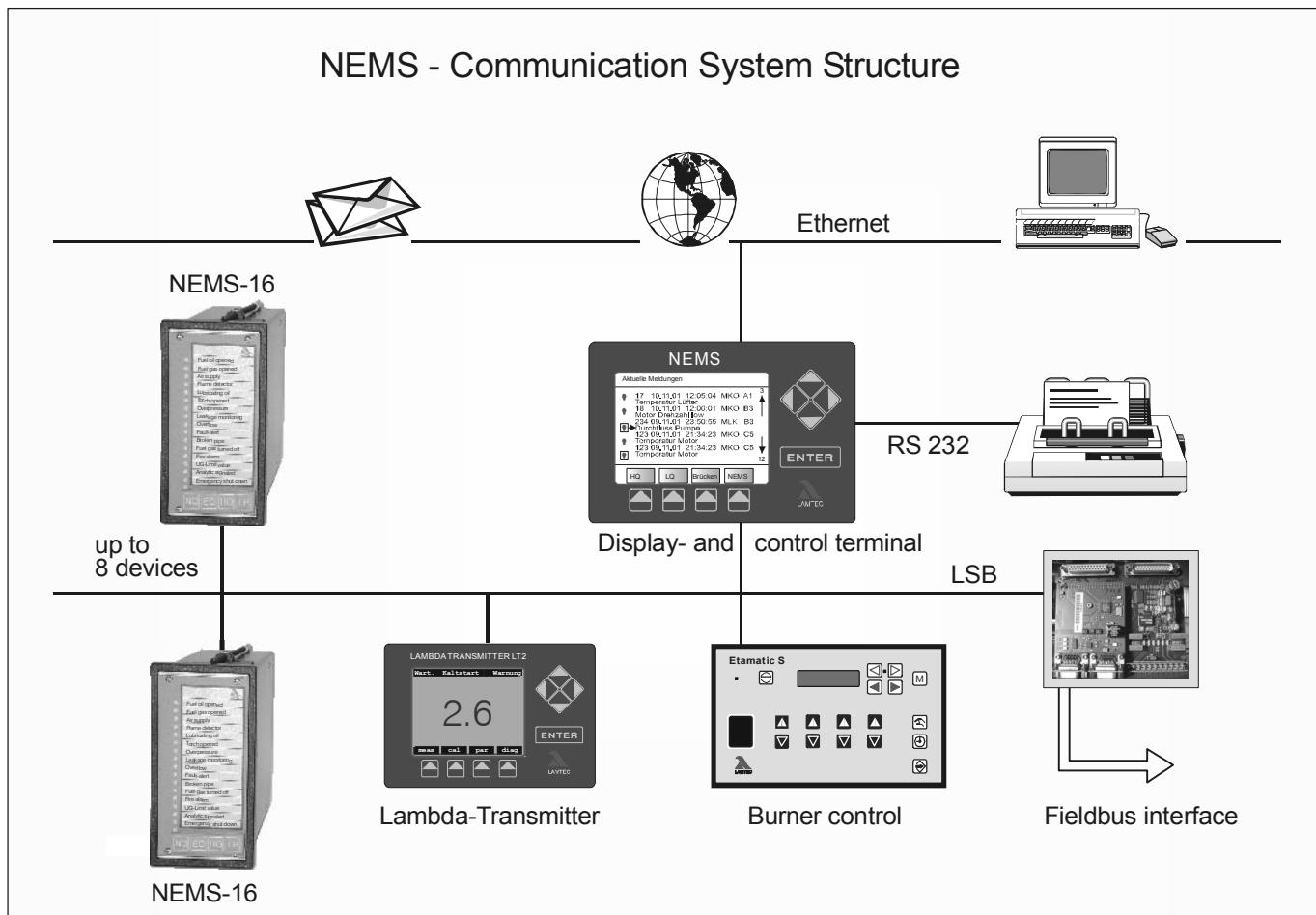
NOTE:

If more than one NEMS on the LSB have the same device ID, they automatically switch to configuration mode (sequence light). To set the device IDs, use key sequence "NQ" → "EQ" (EXIT with "NQ + EQ").

To check whether the bus is functioning properly, press "LP". All the LEDs in the system (01-16) light up when communication is functioning smoothly.

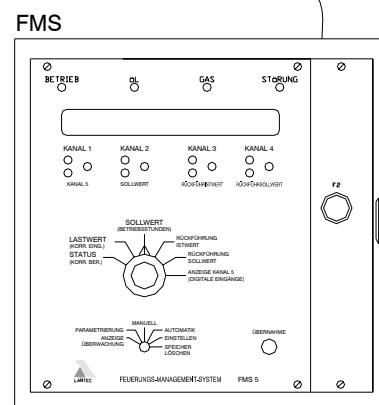
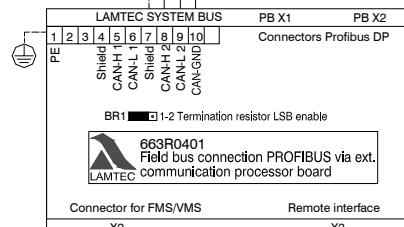
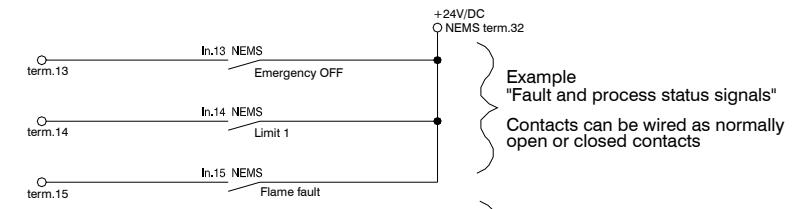
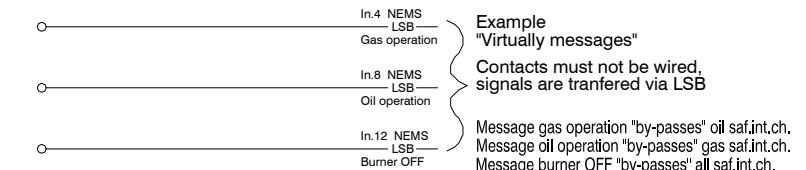
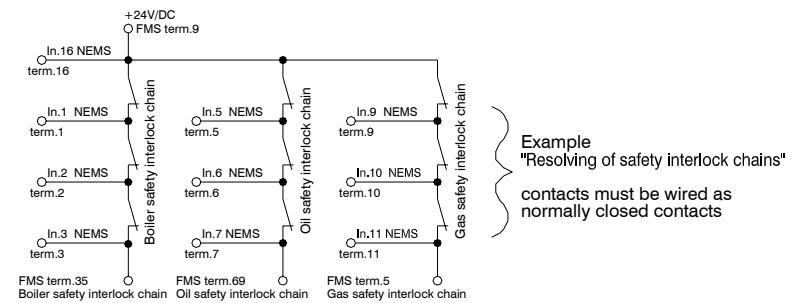
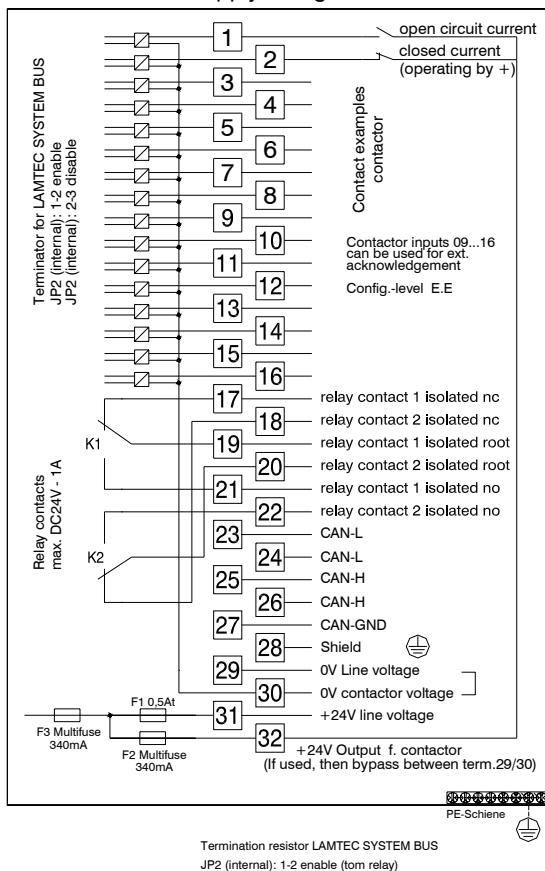
See also the NEMS operating instructions (publication no.: DLT5070).

3.8.4 Data Exchange Using a Signaling System with NEMS as an Example



3.8.5 Wiring example NEMS at FMS an Profibus

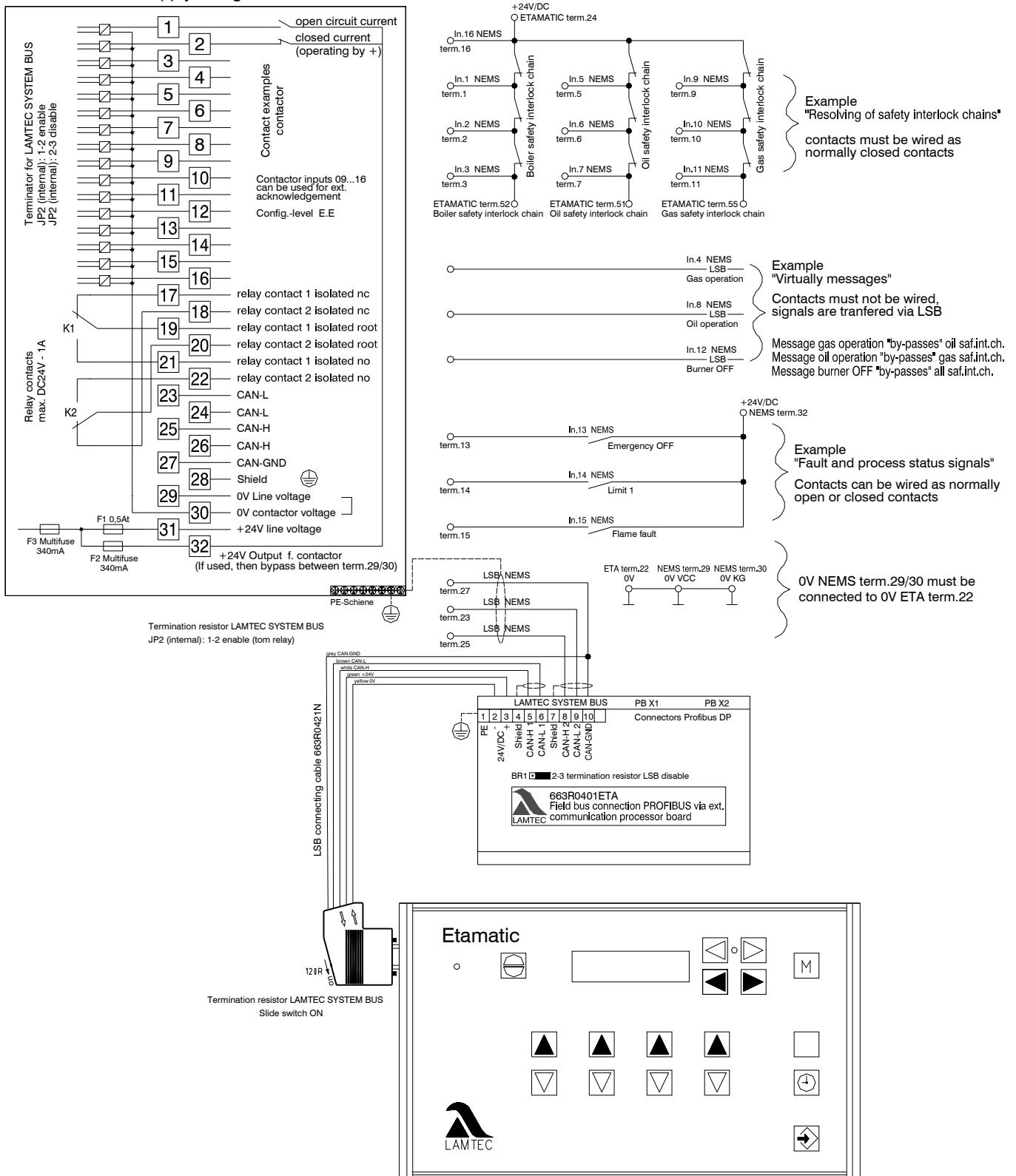
NEMS16 with supply voltage DC24V



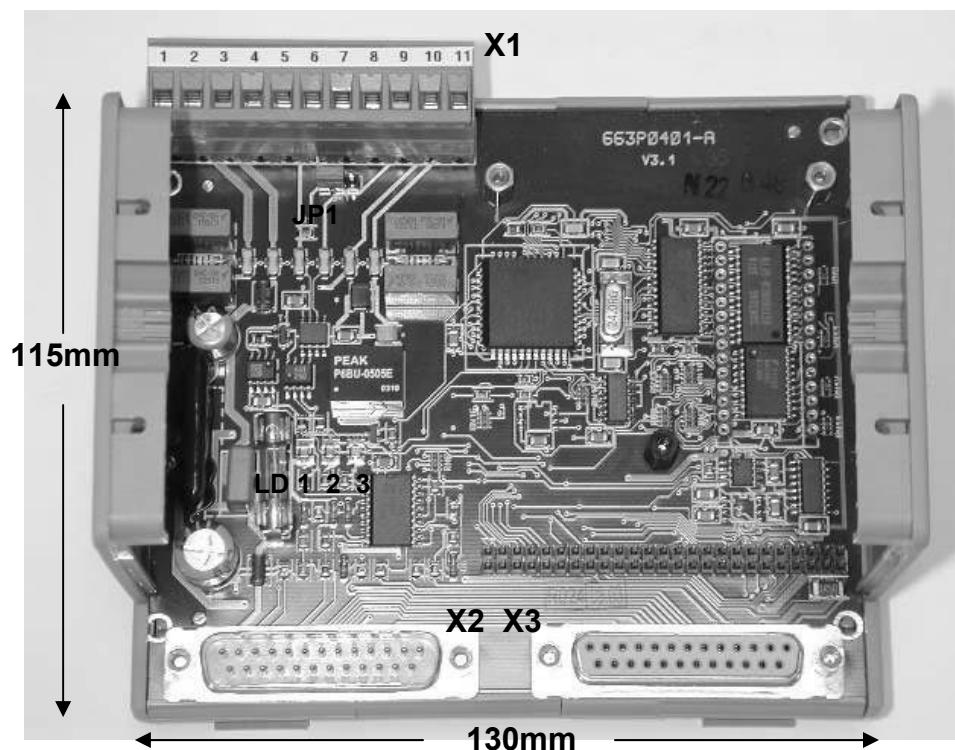
communication processor board
is supplied with 24V/DC via 25-pole
cable from FMS

3.8.6 Wiring example NEMS at ETAMATIC an Profibus

NEMS16 with supply voltage DC24V



4 Communication processor board



The communication processor board (as of software version K2b001) is the interface for the FMS/VMS with the LAMTEC SYSTEM BUS (LSB). It also acts as an interface with higher-level BUS systems for all LAMTEC devices.

- 24 V DC 150mA power supply
- DIN rail installation
- W 130 x H 85 x D 115mm
- Item no.: 663 P 0401



IMPORTANT

If an external power supply is used, check the fuse since no line-side fuse is installed (not for FMS/VMS).



IMPORTANT

If the communications processor is supplied with power from the FMS/VMS, no further 24 V consumers must be connected to the FMS/VMS since this could otherwise overload the internal power supply unit.

4.1 Description of Terminal Strip X1 – LAMTEC SYSTEM BUS (LSB)

- Terminal no. 2 - 0 V power supply (not in conjunction with FMS/VMS)
- Terminal no. 3 - +24 V DC power supply (not in conjunction with FMS/VMS)
- Terminal no. 4 and 7 - shield
- Terminal no. 5 and 8 - CAN-H
- Terminal no. 6 and 9 - CAN-L
- Terminal no. 10 - CAN-GND

4.2 Description of Terminal X2 – FMS/VMS Only

- Electrical connection for FMS/VMS
- Power supply
- Prefabricated connection cable
Item no.: 663 P 0305
Length: 1m (must not be extended)

4.3 Description of Terminal X3 – FMS/VMS Only

- REMOTE interface for FMS/VMS

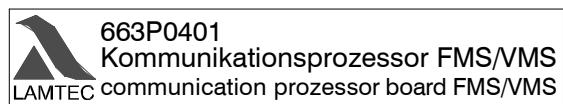
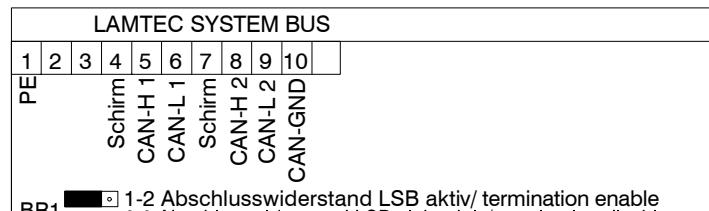
4.4 Description of the LEDs

- LED1 - yellow: steady light in normal operation
Flashes once briefly after Power On 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)
- If the connection to the FMS is faulty, the red LED flashes at approx. 4 Hz. The green LED remains switched off.
- When the connection has been restored, the red and green LED flash to indicate that data is being transferred to the FMS.
- When the communications processor is connected to the ETAMATIC / LT / NEMS via the LSB, the red LED flashes at 4 Hz after Power On. Once it has been successfully connected via the LSB, the red LED stops flashing. In this case, the red and green LEDs remain switched off.

4.5 Description of Plug-In Jumper JP1

- JP1 in position 1-2 (outwards)
Termination resistor LAMTEC SYSTEM BUS enable
- JP1 in position 2-3 (inwards)
Termination resistor LAMTEC SYSTEM BUS disable

4.6 Electrical Connection to FMS/VMS



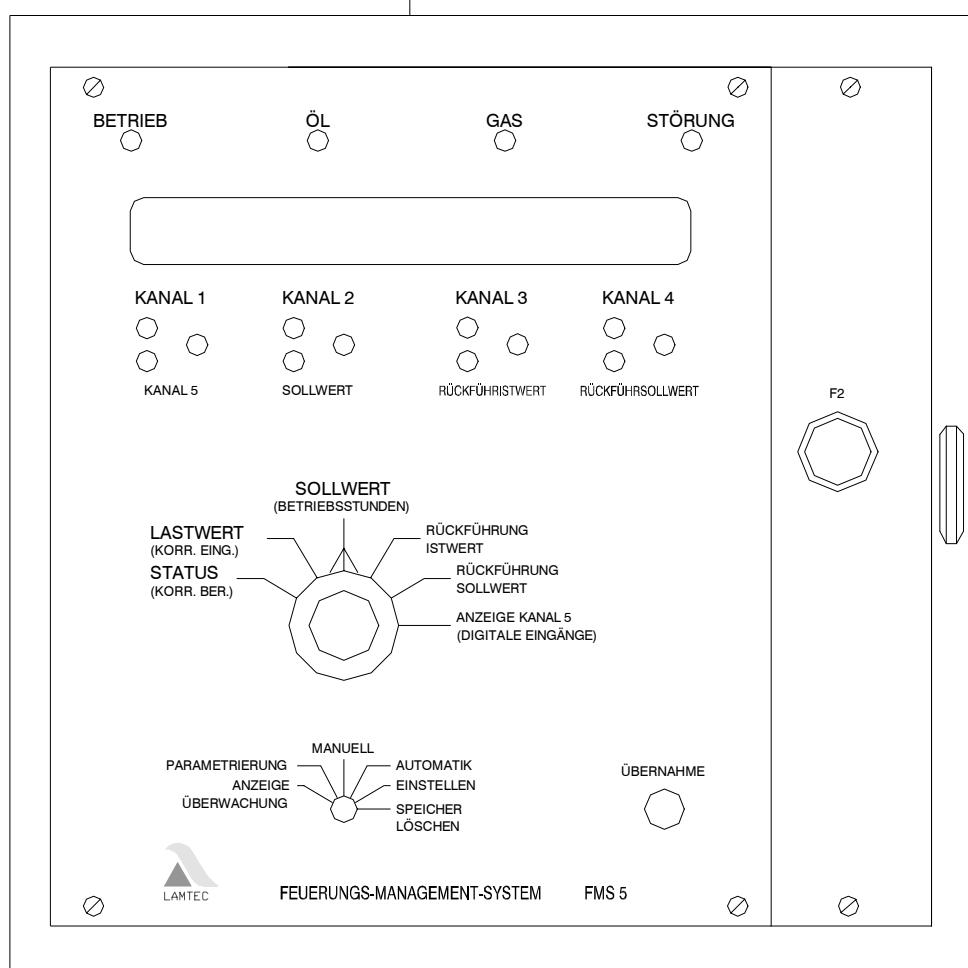
Anschluss / Connection FMS/VMS	Remote
X2	X3

Anschlusskabel
663P0305

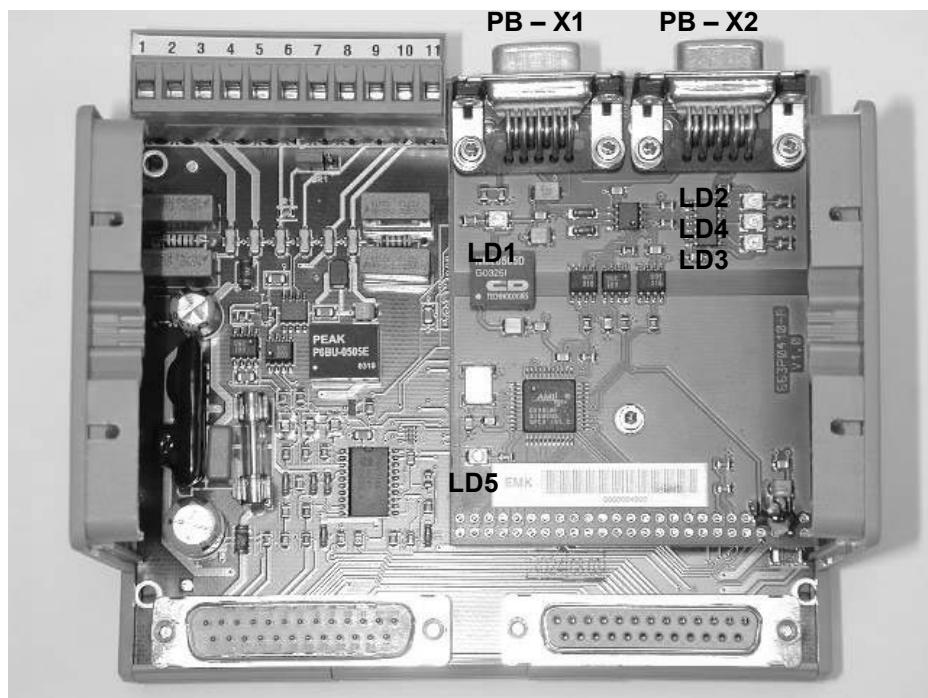
Zur 25-pol. Sub-D-Buchse
To 25p Sub-D-female plug

connecting cable 1m

Rückwand FMS/VMS
backplane FMS/VMS



5 Profibus DP



- Item no. for FMS/VMS 663 R 0401
- Item no. for ETAMATIC 663 R 0401ETA
- Item no. for LT1 663 R 0401LT
- Item no. for NEMS 663 R 0401NE

5.1 Description of Terminal PB-X1, PB-X2

- Profibus DP input/output

5.2 Description of the LEDs

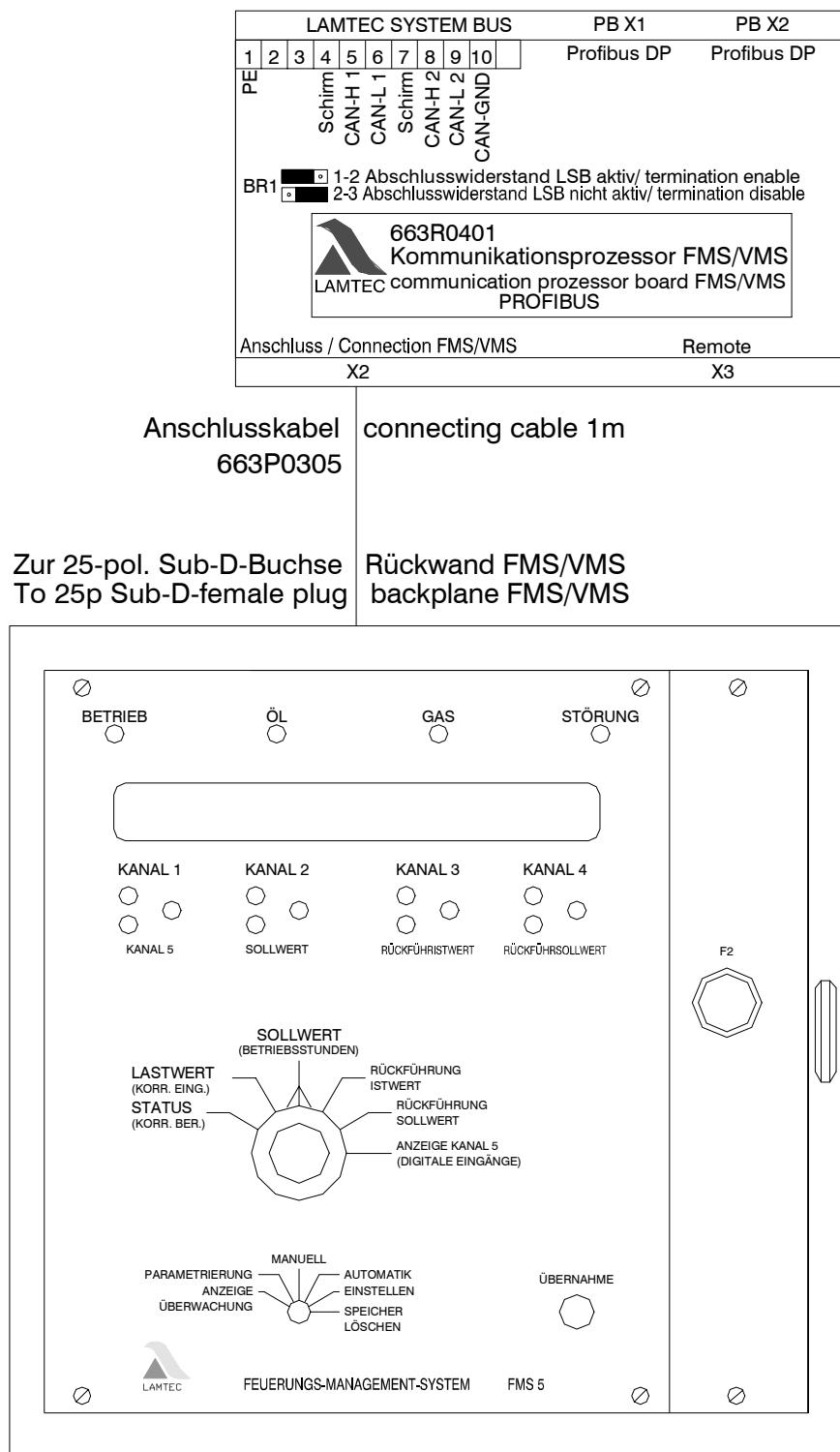
- LED1 green: steady light in normal operation: operating voltage indicator for electrically-isolated Profibus interface
- LED2 green: Profibus Tx LED to Profibus master
- LED3 yellow: Profibus Rx LED from Profibus master
- LED4 red: signals Profibus transmit/receive switchover of RS-485 driver (Tx enable).
- LED5 yellow: signals Profibus status "data exchange":
 - Switched off: "data exchange"
 - Steady light: **no** "data exchange" (statuses: GET_CONFIG, GET_PARAMETER, or all other error statuses)



NOTE:

For more information, see the PROFIBUS instructions for the relevant devices.

5.3 Electrical Connection to FMS/VMS

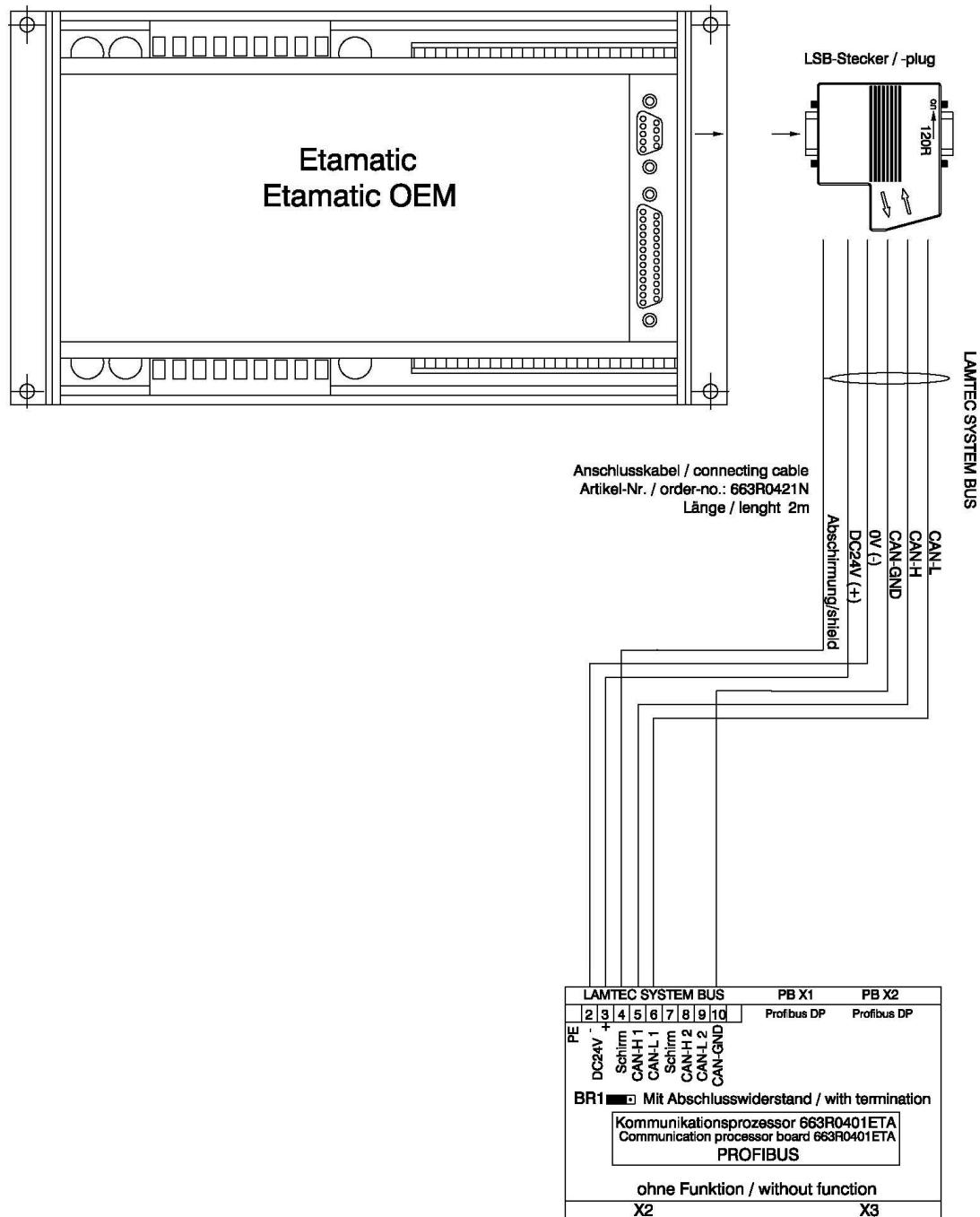


NOTE: See also Section 3.5.

PROFIBUS parameters in FMS/VMS: P887 – device address

P889 – 100ms (TIMEOUT)

5.4 Electrical Connection to ETAMATIC

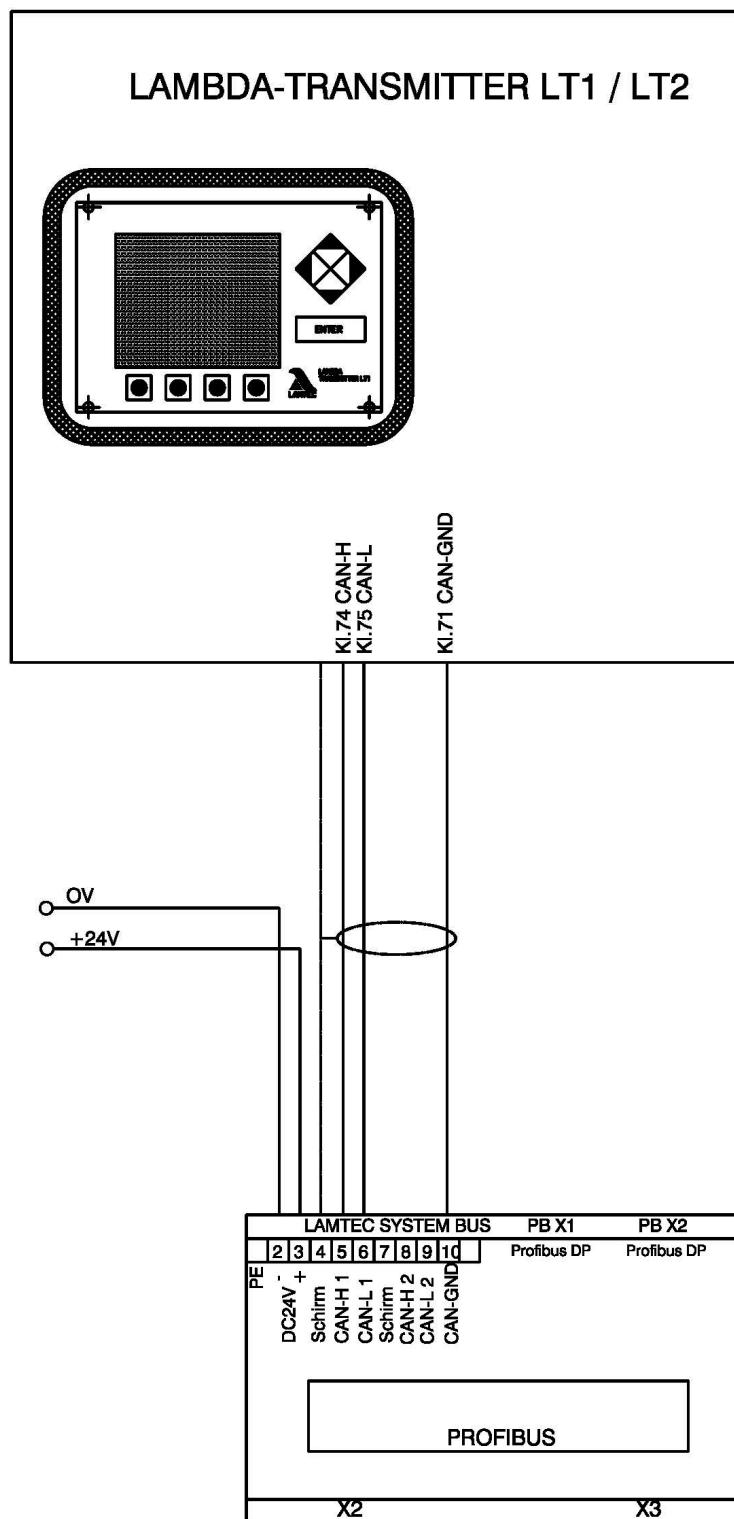


NOTE: See also Section 3.6.

PROFIBUS parameters in ETAMATIC: P887 – device address

P889 – 100ms (TIMEOUT)

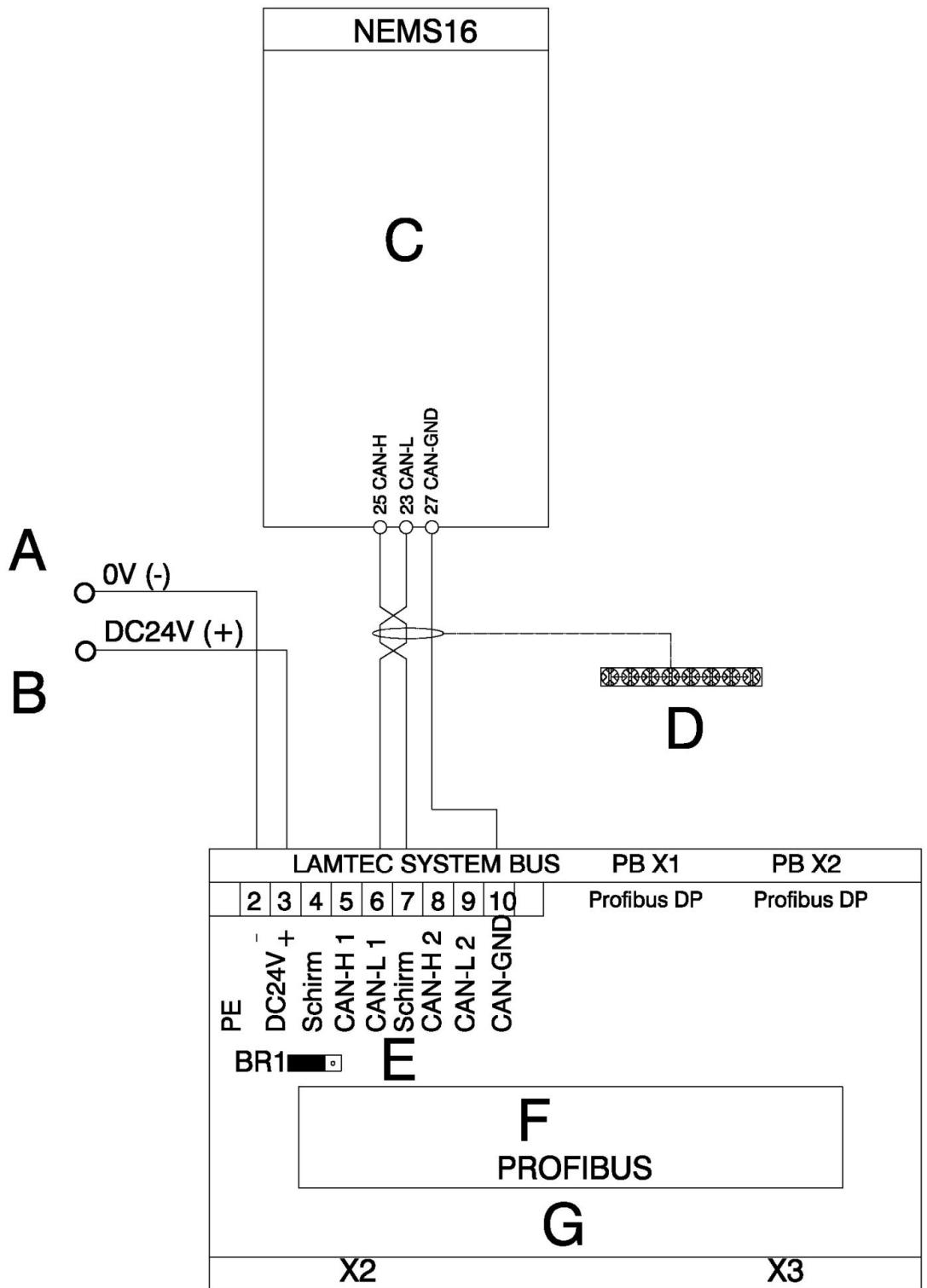
5.5 Electrical Connection to LT1/LT2



NOTE: See also Section 3.3.

PROFIBUS parameters in LT1/LT2: P1300 – P1318.

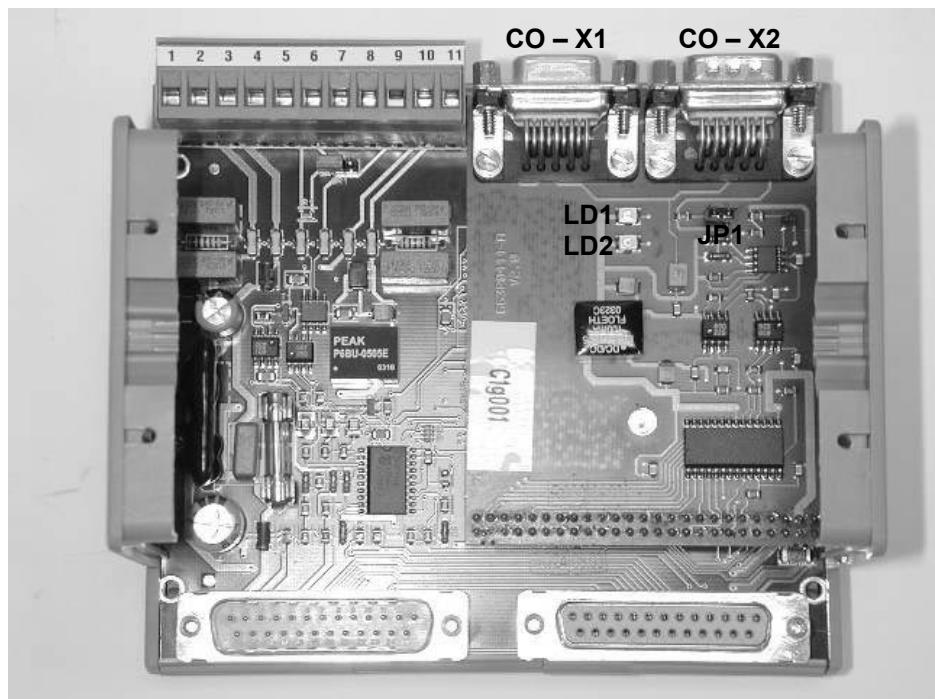
5.6 Electrical Connection to NEMS



NOTE: See also Section 3.7.

PROFIBUS in NEMS must be activated using the configuration software.

6 CANopen



- Item no. for FMS/VMS 663 R 0402/S

6.1 Description of Terminal CO-X1, CO-X2

- CANopen input/output

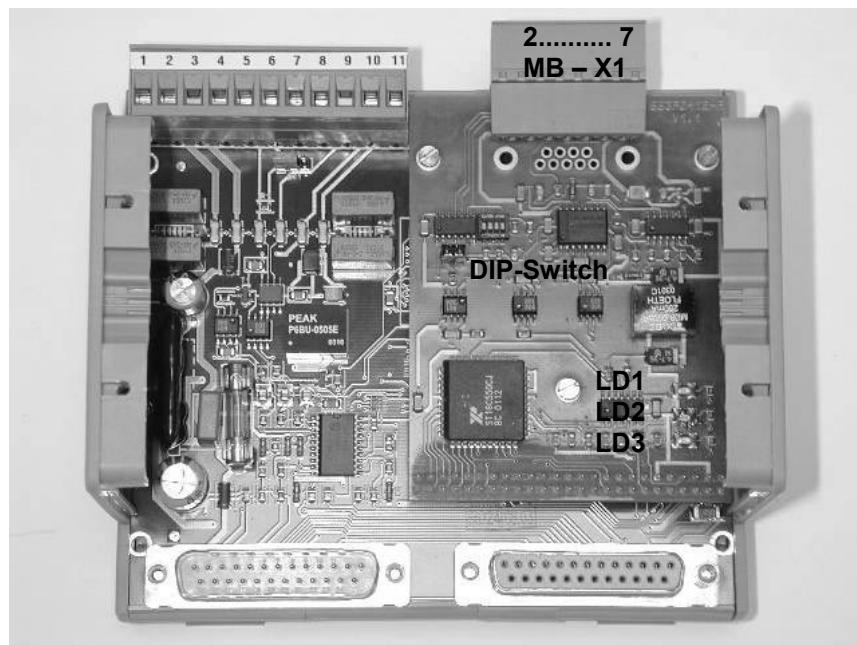
6.2 Description of the LEDs

- LED1 green: steady light in normal operation: operating voltage indicator
- LED2 yellow: CANopen Rx LED

6.3 Description of Plug-In Jumper JP1

- JP1 open
CANopen: termination resistor disable
- JP1 closed
CANopen: termination resistor enable

7 MODBUS



- Item no. for FMS/VMS 663R0403

7.1 Description of Terminal Strip MB-X1

- Terminal no. 2: RTS
- Terminal no. 3: RX +
- Terminal no. 4: RX –
- Terminal no. 5: TX +
- Terminal no. 6: TX –
- Terminal no. 7: shield

7.2 Description of the DIP Switch

- | | | |
|---------------|-----|---|
| • SW1 and SW2 | ON | • RS 485 |
| • SW1 and SW2 | OFF | • RS 422 |
| • SW3 and SW4 | ON | • Modbus with termination resistor (RS422) |
| • SW3 and SW4 | OFF | • Modbus without termination resistor (RS422) |
| • SW3 | ON | • Modbus with termination resistor (RS485) |

7.3 Description of the LEDs

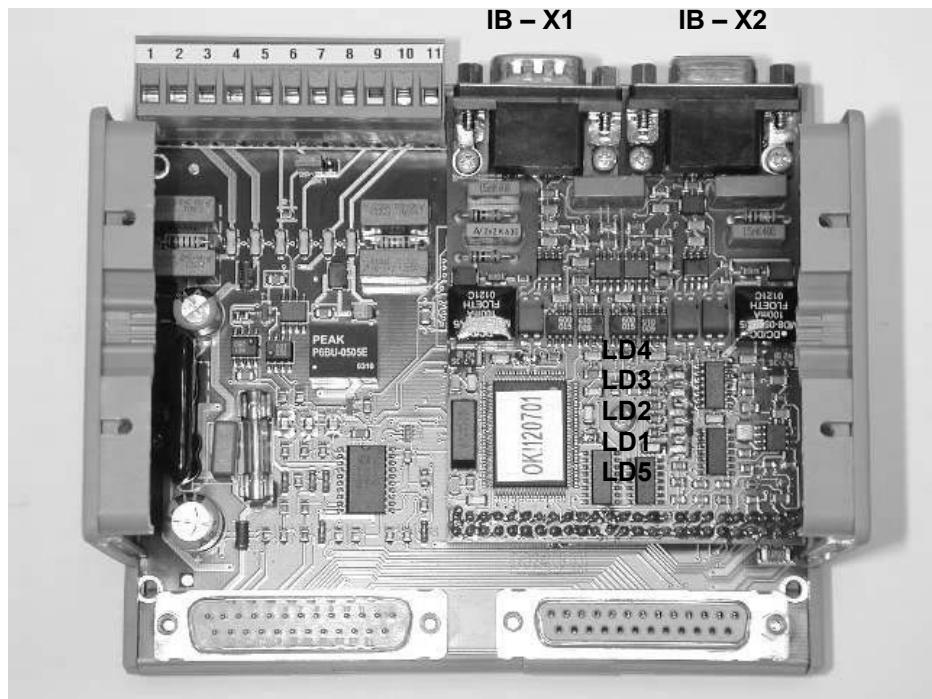
- LED1 green: TX LED: flashes when Modbus response is sent to master.
- LED2 red: RX LED: flashes when Modbus query message is received from master.
- LED3 yellow: direction switchover. Lights up when device is sending data or is ready to send data.



NOTE:

For more information, see the MODBUS instructions for FMS/VMS/ETAMATIC.

8 INTERBUS



- Item no. for FMS/VMS 663 R 0405

8.1 Description of Terminal IB-X1, IB-X2

- INTERBUS S input/output

8.2 Description of the LEDs

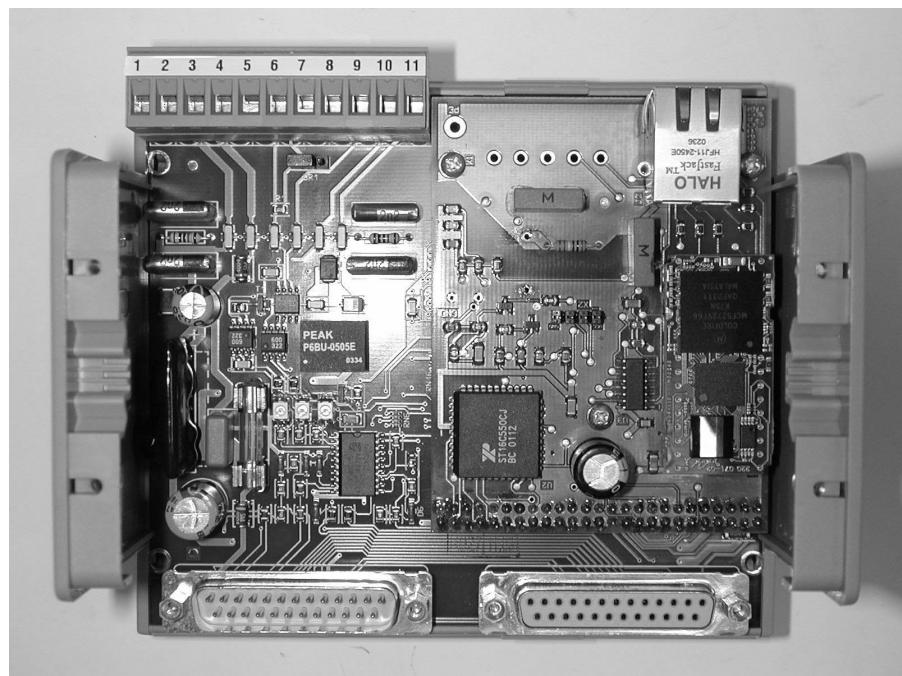
- LED1 yellow: SUPI TR LED (transmit/receive): no function in this SUPI configuration
- LED2 red: SUPI RD LED (remote bus disabled): "Remote out" interface disabled
 - Off: communication OK
 - Steady light: "Remote out" interface is disabled
- LED3 green: SUPI BA LED (bus active): Interbus transmit/receive communication at layer 2 level
 - Off: communication OK
 - Steady light: no communication
- LD4 green: SUPI CC LED (cable check): cable breakage indicator
 - Off: cable OK
 - Steady light: cable breakage
- LED5 green:
 - Off: SUPI in reset status
 - Steady light in normal operation



NOTE:

For more information, see the INTERBUS instructions for FMS/VMS/ETAMATIC.

9 Ethernet



- Item no. for FMS/VMS/ETAMATIC 663 R 0406
- IP address: 192.168.0.170

9.1 Description of the LEDs

LED indicator functions (seen from Ethernet socket):

- LED 1 (green):
Off => no Ethernet available (e.g. not connected)
Steady light => module is connected to Ethernet (Ethernet available)
Flashing => RxD / TxD activity (receive/transmit)
- LED 2 (green):
Off => Ethernet connection with 10 Mbit
Steady light => Ethernet connection with 100 Mbit
- LED 3 (red):
Off => OK (no duplicated IP address)
Steady light => duplicated IP address in network (error)



NOTE:

For more information, see the ETHERNET instructions for FMS/VMS/ETAMATIC.

10 CANbridge



The CANbridge is used for coupling the LAMTEC SYSTEM BUS at CANopen. Thereby it will be possible to receive and evaluate boiler datas from GESTRA.

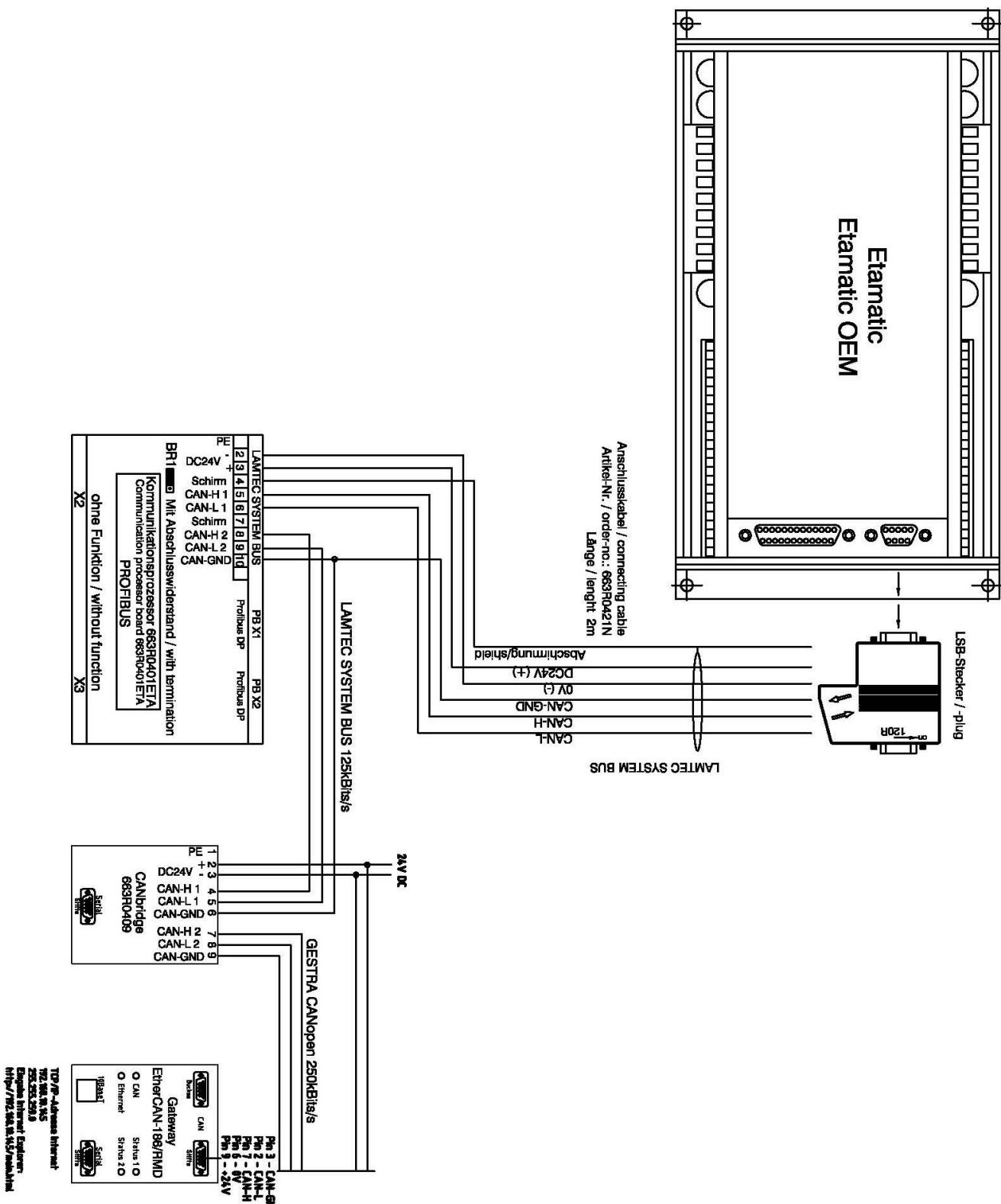
- Supply voltage 9...36V/DC
- Plastic DIN.rail case
- H110 x D75 x W22 mm
- Item number 663R0409
- LED's indicates the actuell condition of the coupled networks.



IMPORTANT

If an external power supply is used, check the fuse since no line-side fuse is installed.

10.1 Wiring example at ETAMATIC with PROFIBUS

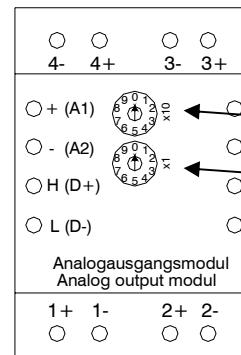
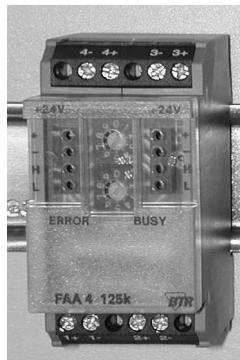


11 Analog Output Module 663R4025 (Voltage), 663R4029 (Current)

11.1 Functional Description

- 4 analog outputs 0 ... 10 V DC (non floating)
- 4 analog outputs 0 ... 20mA (non floating)
- Quick wiring of multiple modules with plug-in jumpers
- No programming required

The field bus modules are universal output modules that are activated via the LAMTEC SYSTEM BUS. The module is addressed via a settable address (1 to 99) and the output statuses are transferred in the data bytes. If an analog output module with the same address exists in the system, the voltage/current measured there is simulated at the relevant output.



Setting the address
10'th
1's

11.2 Functions of Addresses in connection with FMS / VMS / ETAMATIC

Address	Output 1	Output 2	Output 3	Output 4
03	Internal load 0...999 → 0...10V/0...20mA*	Output regulator actual value 0...320°C** → 0...10V/0...20mA*	Output regulator setpoint 0...320°C → 0...10V/0...20mA*	Actual O ₂ -value 0...25% → 2...10V/4...20mA*
07	Setpoint channel 1 (continuous output)*	Setpoint channel 3 (continuous output)*	Setpoint channel 4 (continuous output)*	Setpoint channel 5 (continuous output)*
11	Setpoint channel 2 (continuous output)*	Internal load 0...999 → 0...10V/0...20mA*	Actual O ₂ -value 0...25% → 2...10V/4...20mA	O ₂ -setpoint 0...25% → 2...10V/4...20mA
15	Actual O ₂ -value 0...25% → 2...10V/4...20mA	Monitor output*	Flame intensity 0-100% → 0...10V/0...20mA*	Current load spec. 0...999 → 0...10V/0...20mA*
23	Correction 1 0...999 → 0...10V/0...20mA	Correction 2 0...999 → 0...10V/0...20mA	Int. Mixed signal 0...999 → 0...10V/0...20mA	Not occupied

* = Configuration via parameter 848, Bit 8

0 = 0...10V / 0...20mA

1 = 2...10V / 4...20mA

** = only parameter to "0" (0...320°C) or
parameter 809 to "2" and parameter 811 to "<320" possible

11.3 Technical Specifications

11.3.1 Output Module

• Rated voltage $_{UN}$	24 V DC
• Current consumption	50 mA (max. 6 modules at Etamatic without CoP.)
• Power consumption	1.2 W
• Operating voltage range	0.8 ... 1.1 \times $_{UN}$
• Operating temperature range	0°C ... +55°C
• Storage temperature range	-25°C ... +70°C
• Suppressor circuit	Polarity reversal protection for operating voltage
• Function indicator	Green LED for BUS activity and power supply
• Operating indicator	Red LED for BUS error message
• Item no. voltage output	663 R 4025
• Item no. current output	663 R 4029
• Item no. for external power supply unit	663 R 4024



NOTE:

The modules can be arranged in series without gaps. Once 15 modules have been installed, a new external power supply must be connected.

If more than 15 modules are installed, the plug-in jumpers are overloaded and fuse.

If an external power supply is used, check the fuse since no line-side fuse is installed.

11.3.2 Analog Outputs (Voltage)

• Output current (10 V DC) (analog output)	5 mA
• Resolution	9.9165 mV/digit
• Output voltage	0 ... 10 V DC
• Measuring error/tolerance	$U = \{(N/32) \times 9.9165 \text{ mV} \pm 20 \text{ mV}\} \pm 1.1 \%$ U = output voltage in V N = numerical value (BUS)
• Response time (receive to transmit)	15 ms
• Recovery time	550 ms

11.3.3 Analog Outputs (Current)

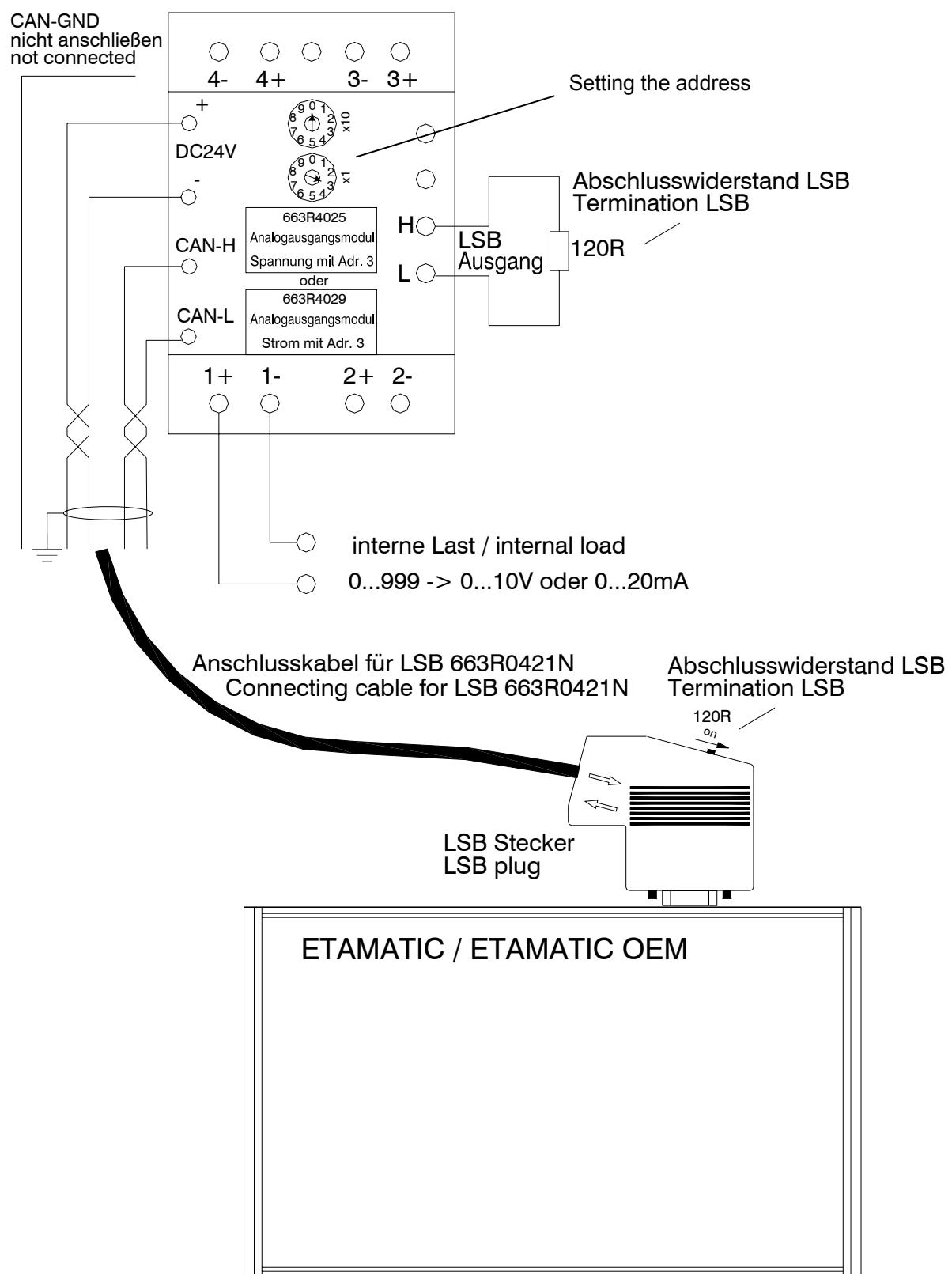
- | | |
|--|---------------|
| • Output current | 0....20mA |
| • Accuracy | 1% |
| • Load | Max. 300 Ohms |
| • Response time
(receive to transmit) | 15 ms |
| • Recovery time | 550 ms |

11.3.4 Housing

- | | |
|---|-------------------------------|
| • Degree of protection
(EN 60529) | Housing: IP50 Terminals: IP20 |
| • Relative humidity range to
IEC60721-3-3 | Ambient class 3k3 |
| • Connection cross-section for
device terminals | 2.5 mm ² |
| • Connection cross-section for
screw-type plug-in terminals
(BUS, supply) | 1.5 mm ² |
| • Weight | 95 g |
| • Dimensions | W x H x D = 35 x 68 x 60 mm |

11.4 Connection Example for ETAMATIC

Output of the Internal Load via Analog Output Module



12 Analog Input Module 663R4026

12.1 Functional Description

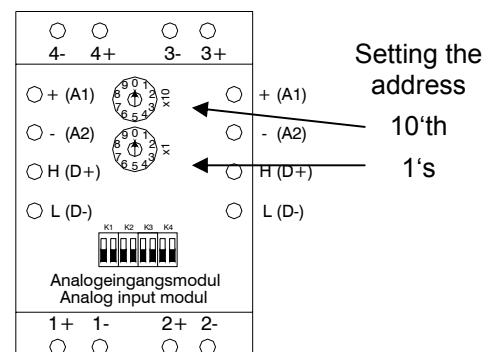
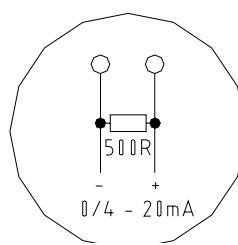
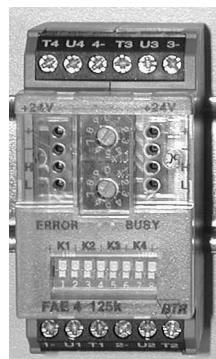
- 4 analog inputs
- Quick wiring of multiple modules with plug-in jumpers
- No programming required

The field bus modules are universal analog input modules for DIN rail installation that are activated via the LAMTEC SYSTEM BUS. The module is addressed via a settable address (1 to 99) and the input statuses are transferred in the data bytes. When the input status changes, a message is output immediately to the LAMTEC SYSTEM BUS.

The inputs can be switched to act as either a voltage or temperature measurement input. Two DIP switch can be used to set each input to the following:

- 0 ... 10 V DC (OFF-OFF)
- Ni1000 (-50°C ... +150°C) (ON-OFF)
- Pt1000 (-50°C ... +150°C) (OFF-ON)
- Pt1000 (0 °C ... +400°C) (ON-ON)

Compatible temperature sensors: Pt1000, Ni1000.



NOTE for current input:

0...3mA → 0---1.5 V, 3...4mA → 1.5...2 V, 4---20mA → 2...10 V

12.2 Functions of the Addresses in connection with FMS / VMS / ETAMATIC

Address	Input 1	Input 2	Input 3	Input 4
35	Load specification 2...10V → 0...999 1.5V...2V → 0 0...1.5V → Input off	Setpoint shift Load regulator 2...10V → 0...999 1.5V...2V → 0 0...1.5V → Input off	Actual output reg. val. 2...10V → 0...999 1.5V...2V → 0 0...1.5V → Input off	Oil/gas meter (in preparation)
39	O ₂ -value 2...10V → 0...40% 0...1.5V → Input off	Correction input 1 2...10V → 0...999 1.5V...2V → 0 0...1.5V → Input off	Correction input 2 2...10V → 0...999 1.5V...2V → 0 0...1.5V → Input off	Mixed signal 0...10V → 0...999 Configuration FMS/VMS/ETAMATIC P848

12.3 Technical Specifications

12.3.1 Input Module

• Rated voltage $_{UN}$	24 V DC
• Current consumption	50 mA (max. 6 modules at Etamatic without CoP.)
• Power consumption	1.2 W
• Operating voltage range	0.8 ... 1.1 \times $_{UN}$
• Operating temperature range	0°C ... +55°C
• Storage temperature range	-25°C ... +70°C
• Suppressor circuit	Polarity reversal protection for operating voltage
• Function indicator	Green LED for BUS activity and power supply
• Operating indicator	Red LED for BUS error message
• Test voltage input/BUS	Not galvanically isolated
• Item no.	663 R 4026
• Item no. of external power supply unit	663 R 4024



NOTE:

The modules can be arranged in series without gaps. Once 15 modules have been installed, a new external power supply must be connected.

If more than 15 modules are installed, the plug-in jumpers are overloaded and fuse.

If an external power supply is used, check the fuse since no line-side fuse is installed.

12.3.2 Analog Inputs

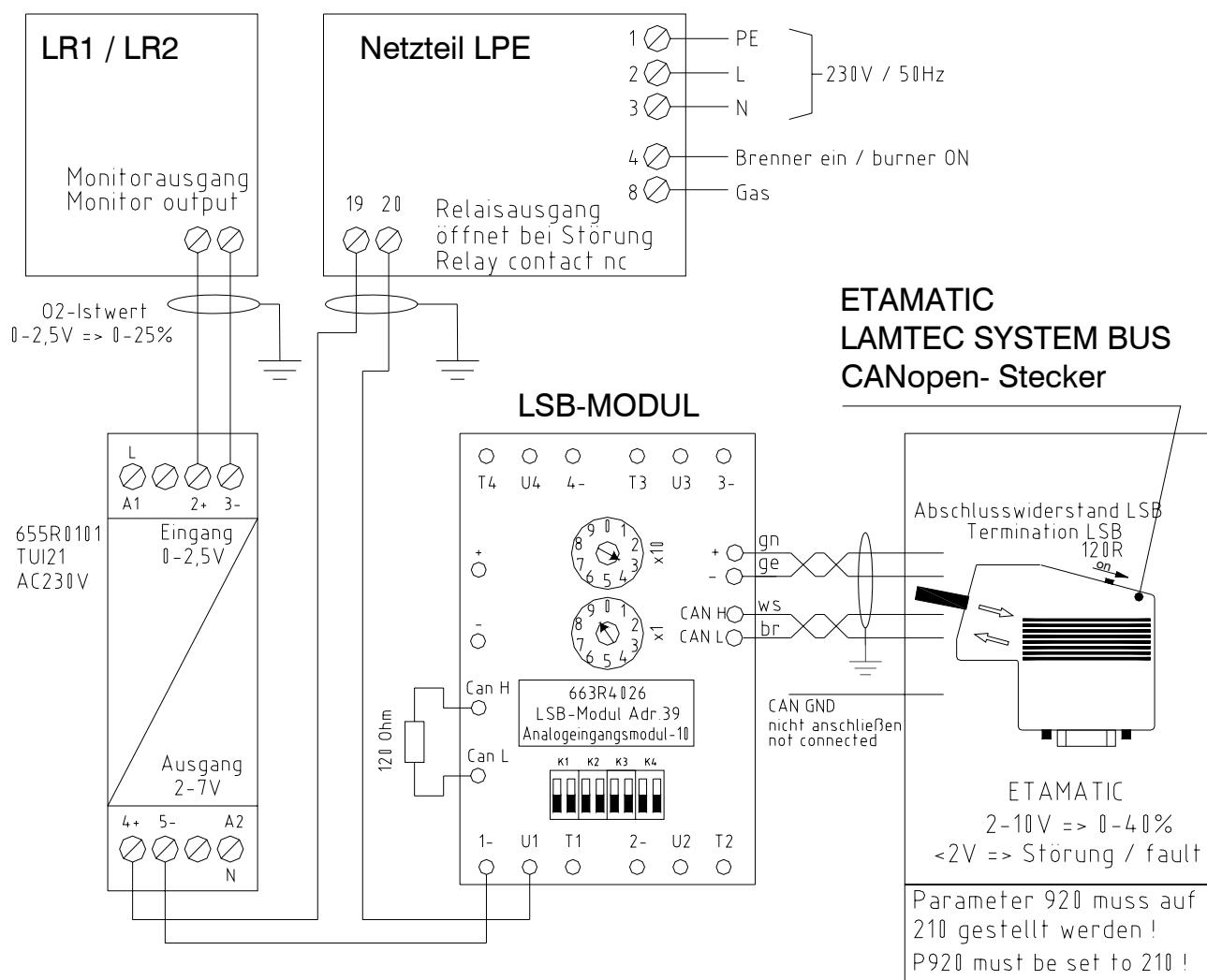
• Connectable temperature sensors	Pt1000 Ni1000
• Temperature meas. range	-50°C ... +150°C
Resolution	-50°C ... +150°C 10 bit (approx. 0.2 °C)
Measuring error	-50°C ... +150°C approx. ±0.2 °C
• Additional meas. range	Pt1000 0 °C ... +400°C
Resolution	0°C ... +400°C 10 bit (approx. 0.5°C)
Measuring error	0°C ... +400°C approx. ±0.5°C
• Voltage meas. range	0 ... 10 V DC
• Resolution	10 bit (10 mV/bit)
• Measuring error	Approx. ±20 mV
• Input resistance	200 kOHM
• Response time (receive to transmit)	15 ms
• Analog value update	At least every 3 s
• Recovery time	550 ms

12.3.3 Housing

• Degree of protection (EN 60529)	Housing: IP50 Terminals: IP20
• Relative humidity range to IEC60721-3-3	Ambient class 3k3
• Connection cross-section for device terminals	2.5 mm ²
	1.5 mm ²
• Connection cross-section for screw-type plug-in terminals (BUS, supply)	
• Weight	95 g
• Dimensions	W x H x D = 35 x 68 x 60 mm

12.4 Connection Example for ETAMATIC

LR1 Switch-In Via Analog Input Module

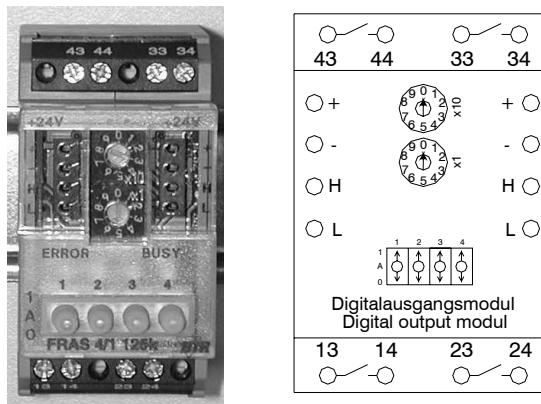


13 Digital Output Module 663R4027

13.1 Functional Description

- 4 relay outputs 250 V/AC, 6 A
- Quick wiring of multiple modules with plug-in jumpers
- Emergency manual operation level
- No programming required

The field bus modules are universal output modules for DIN rail installation that are activated via the LAMTEC SYSTEM BUS. The module is addressed via a settable address (1 to 99) and information about whether data is requested or commands have to be executed is transferred in the data bytes. In conjunction with a digital input module, the relay output module can be remote controlled.



663R4027
with 4x normally open contacts



Emergency manual operation level:

Position "1" → Output contact always closed

Position "A" → Output contact switches via LAMTEC SYSTEM BUS

Position "0" → Output contact always open

13.2 Functions of the Addresses in connection with ETAMATIC/FMS/VMS

Address	Output 1	Output 2	Output 3	Output 4
07	Pre-ventilation	Ignition	Firing burner	Post-ventilation
23	Curve set 1	Curve set 2	Curve set 3	Curve set 4
27	Curve set 5	Curve set 6	Curve set 7	Curve set 8
43	Fault O ₂ O ₂ -controlling disable *	Fault CO CO-controlling disable *	Ignition position reached	High load reached
59	Curve set changes	Mixed firing relay	Actual value > switch-on point	Contact maker Curve set change
63	Blow-out valve	Atomizer steam valve	Oil pump	

* from software version H5a003 / B6b001

13.3 Functions of the Addresses in connection with NEMS

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

Setting the address on the module, activating and setting the functionality via the configuration software.

Relais Output LSB-Module							Relais Input LSB-Module				
No.	Addr.	Active	Group global	Working/Closed	Function		No.	Addr.	Active	Group global	Edge pos/neg.
1	3	<input type="checkbox"/>	A..D	<input checked="" type="radio"/> <input type="radio"/>	statically		8	31	<input type="checkbox"/>	Keys	<input checked="" type="radio"/> <input type="radio"/>
2	7	<input type="checkbox"/>	E..H	<input checked="" type="radio"/> <input type="radio"/>	statically dynamically 1 sec impulse 1 sec internal acknowledgement acknowledgeable via LSB module		9	35	<input type="checkbox"/>	A..D	<input checked="" type="radio"/> <input type="radio"/>
3	11	<input type="checkbox"/>	I..L	<input checked="" type="radio"/> <input type="radio"/>			10	39	<input type="checkbox"/>	E..H	<input checked="" type="radio"/> <input type="radio"/>
4	15	<input type="checkbox"/>	M..P	<input checked="" type="radio"/> <input type="radio"/>			11	43	<input type="checkbox"/>	I..L	<input checked="" type="radio"/> <input type="radio"/>
5	19	<input type="checkbox"/>	Q..T	<input checked="" type="radio"/> <input type="radio"/>	statically		12	47	<input type="checkbox"/>	M..P	<input checked="" type="radio"/> <input type="radio"/>
6	23	<input type="checkbox"/>	U..X	<input checked="" type="radio"/> <input type="radio"/>	statically		13	51	<input type="checkbox"/>	Q..T	<input checked="" type="radio"/> <input type="radio"/>
7	27	<input type="checkbox"/>	Y, Z	<input checked="" type="radio"/> <input type="radio"/>	statically		14	55	<input type="checkbox"/>	U..X	<input checked="" type="radio"/> <input type="radio"/>
							15	59	<input type="checkbox"/>	Y, Z	<input checked="" type="radio"/> <input type="radio"/>
							16	63	<input type="checkbox"/>	Global	<input checked="" type="radio"/> <input type="radio"/>

Assigning the digital output modules to message groups and defining the functionality.

- Operating current: relay contacts in OK status open
- Closed-circuit current: relay contacts in OK status closed
- Static functionality:
Message coming – relay closed, message leaving – relay open
No response for newly-arrived messages
- Dynamic functionality 1sec:
Message coming – relay closed, message leaving – relay open
1s OK status for newly-arrived messages
- Functionality pulse 1sec:
Message coming – relay closed for 1 s
For newly-arrived messages – relay closed for 1 s
- Internally-acknowledgeable functionality:
Relay contacts switch to OK status only when acknowledged (key)
- Functionality acknowledgeable via LSB:
Relay contacts switch to OK status only when acknowledged via digital input module

13.4 Technical Specifications

13.4.1 Output Module

• Rated voltage $_{UN}$	24 V DC
• Current consumption	100 mA (max. 3 modules at Etamatic without CoP.)
• Power consumption	2.4 W
• Operating voltage range	0.8 ... 1.1 \times $_{UN}$
• Response time (receive – relay switches)	15 ms
• Release time (receive – relay switches)	15 ms
• Recovery time	200 ms
• Operating temperature range	0 °C ... +55 °C
• Storage temperature range	-25 °C ... +70 °C
• Suppressor circuit	Polarity reversal protection for operating voltage
• Relay status indicator	LED
• Function indicator	Green LED for BUS activity and power supply
• Operating indicator	Red LED for BUS error message
• Features	Manual operating level with checkback via BUS
• Item no.	663 R 4027
• Item no. for external power supply unit	663 R 4024



NOTE:

The modules can be arranged in series without gaps. Once 15 modules have been installed, a new external power supply must be connected.

If more than 15 modules are installed, the plug-in jumpers are overloaded and fuse.

If an external power supply is used, check the fuse since no line-side fuse is installed.

13.4.2 Digital Outputs

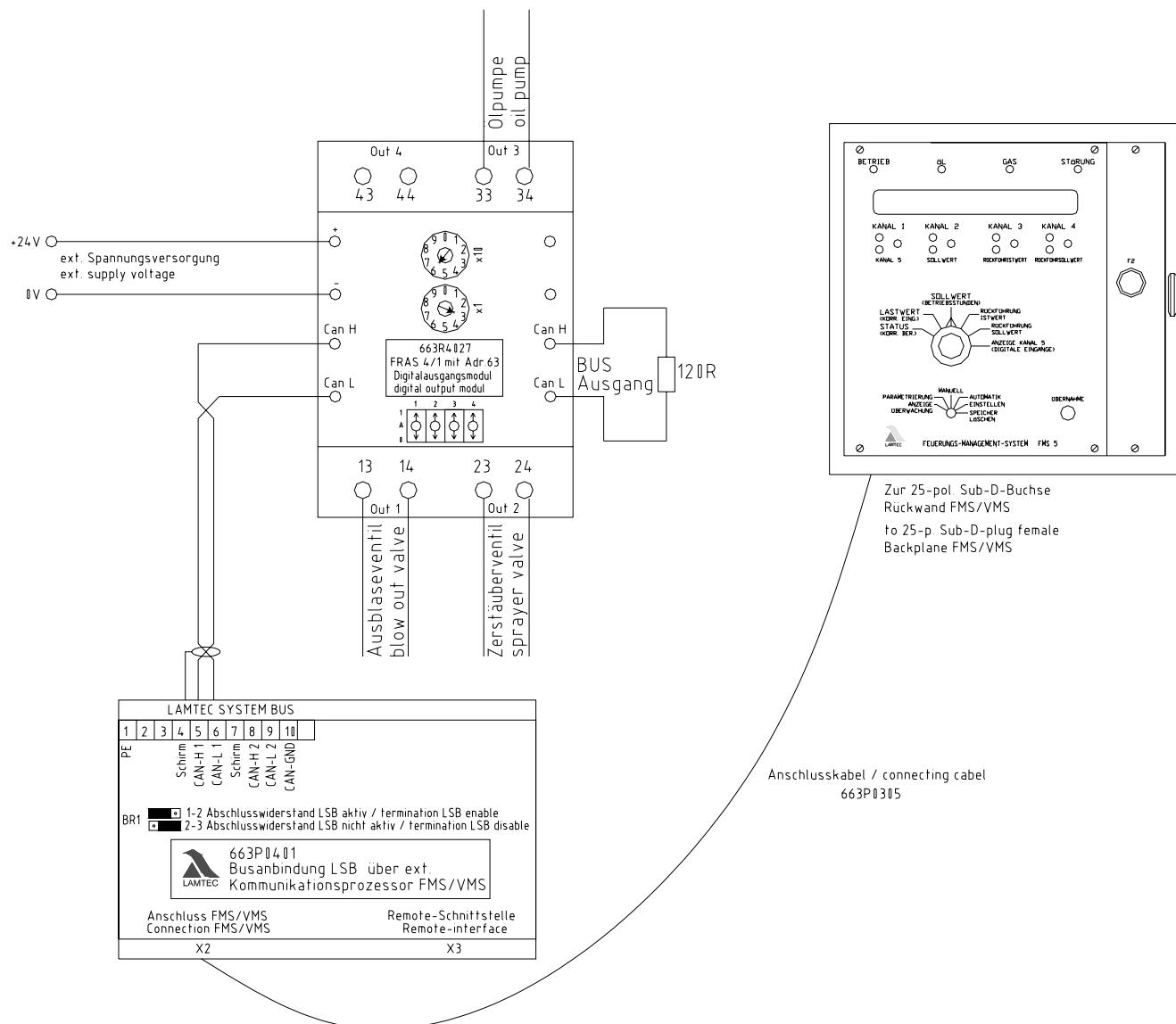
• Output contact / material	4 NO contacts_change over contacts / AgNI
• Switching voltage	Max. 250 V/AC
• Max. input/output current	12 A / 4 s at 10 % ED
• Continuous current	6 A/relay, but max. 12 A/module
• Contact fusing	6 A
• Mechanical lifetime	1x10 ⁷ switching cycles
• Electrical lifetime	1x10 ⁵ switching cycles
• Permissible operating freq.	360/h at rated load
• Insulation to VDE 0110	C
• Rated voltage	250 V/AC
• Overvoltage category	II
• Contamination level	2
• Test voltage for coil/contact	4000 V AC 50 Hz 1 min
• Test voltage for contact/contact	1000 V AC 50 Hz 1 min

13.4.3 Housing

• Degree of protection (EN 60529)	Housing: IP50 Terminals: IP20
• Relative humidity range to IEC60721-3-3	Ambient class 3k3
• Connection cross-section for device terminals	
• Connection cross-section for screw-type plug-in terminals (BUS, supply)	2.5 mm ²
• Weight	1.5 mm ²
• Dimensions	95 g
	W x H x D = 35 x 68 x 60 mm

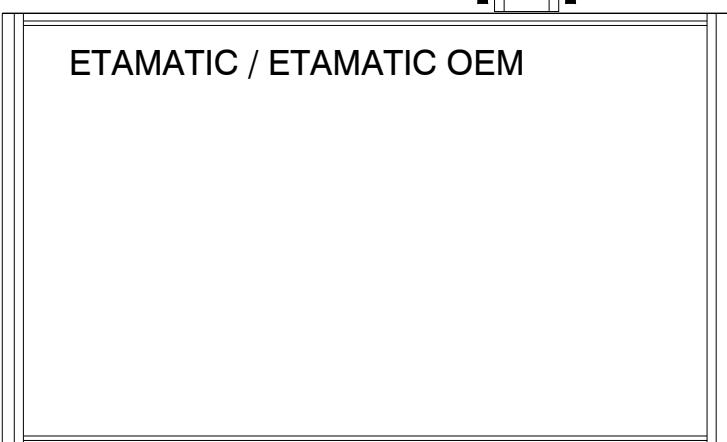
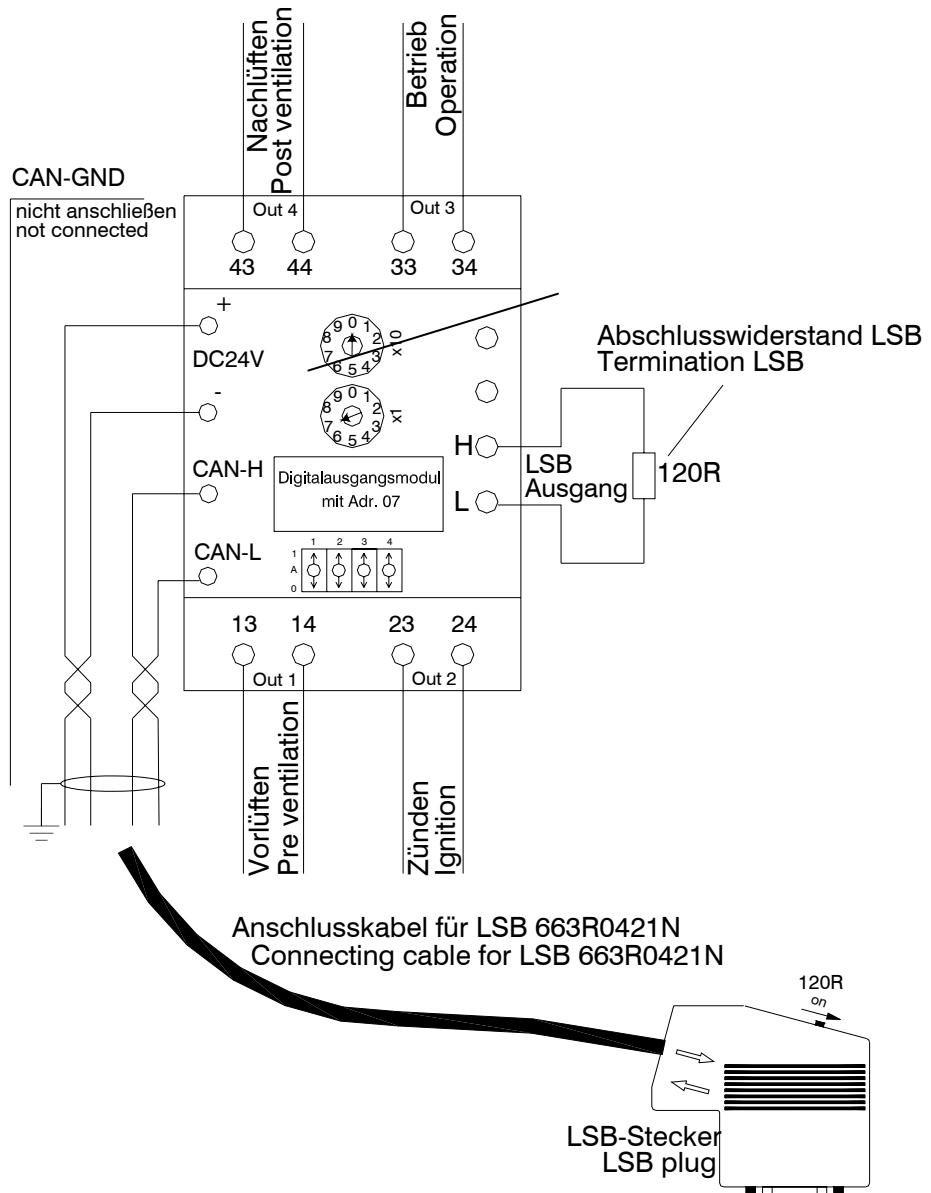
13.5 Connection Example for FMS/VMS

Oil Lance Blow-Out via Digital Output Module FRAS4/1



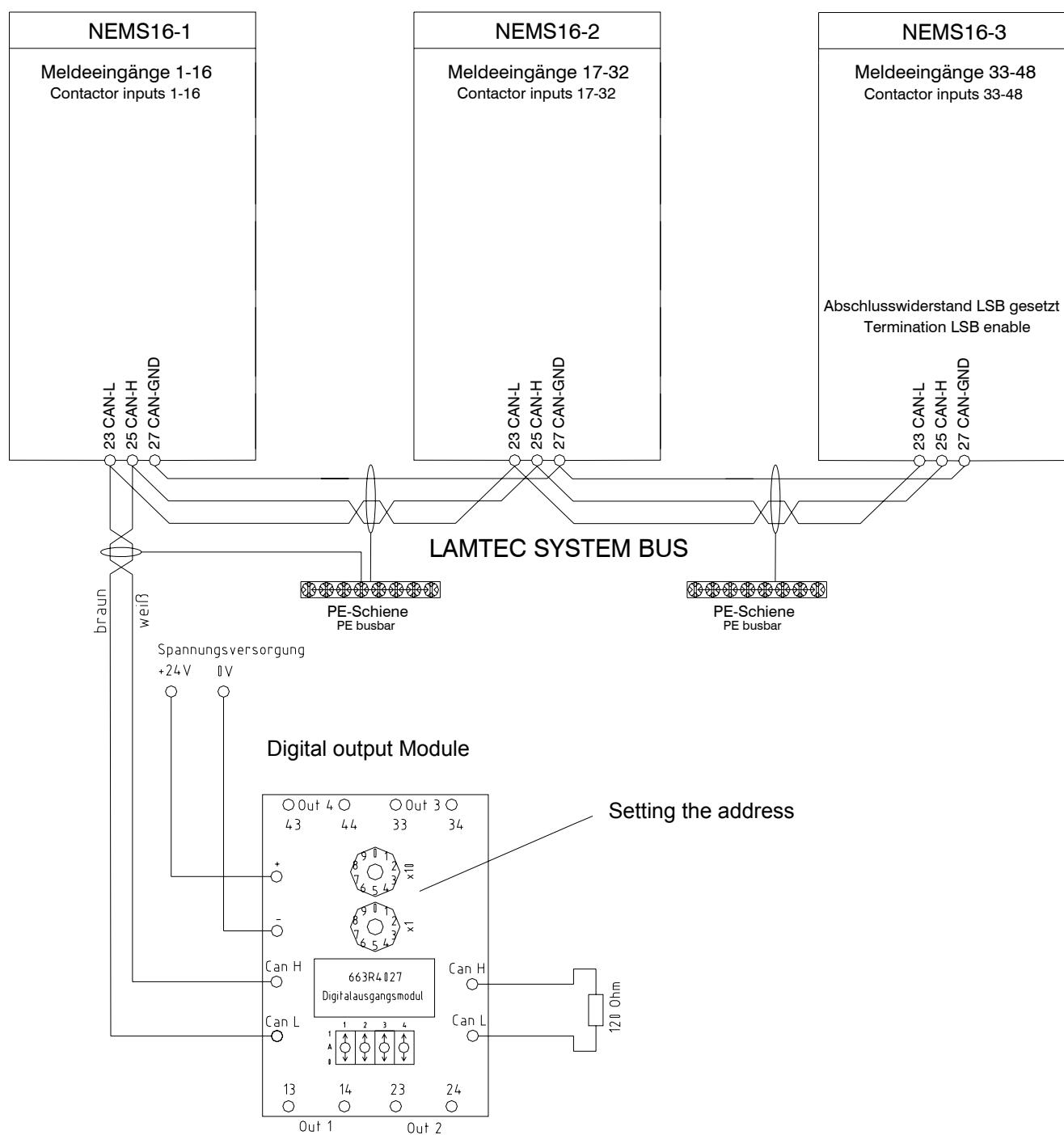
13.6 Connection Example for ETAMATIC

Digital Outputs via Digital Output Module



13.7 Connection Example for NEMS

Creating Message Groups as Digital Outputs

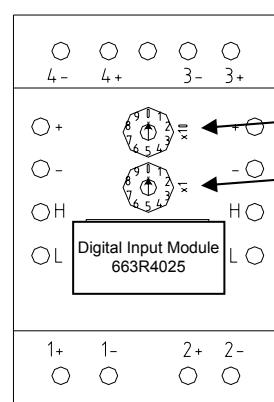
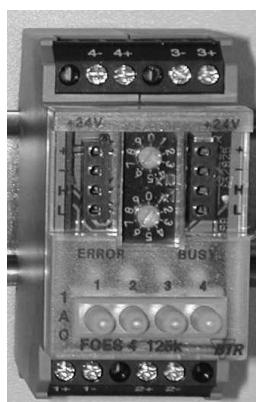


14 Digital Input Module 663R4028

14.1 Functional Description 663R4028

- 4 digital inputs 24 V DC
The inputs are **electrically isolated** 24 V DC voltage inputs.
- Quick wiring of multiple modules with plug-in jumpers
- Emergency manual operation level
- No programming required

The field bus modules are universal input modules for DIN rail installation that are activated via the LAMTEC SYSTEM BUS. The module is addressed via a settable address (1 ... 99) and the input statuses are transferred in the data bytes. When the input status changes, a message is output immediately to the BUS.



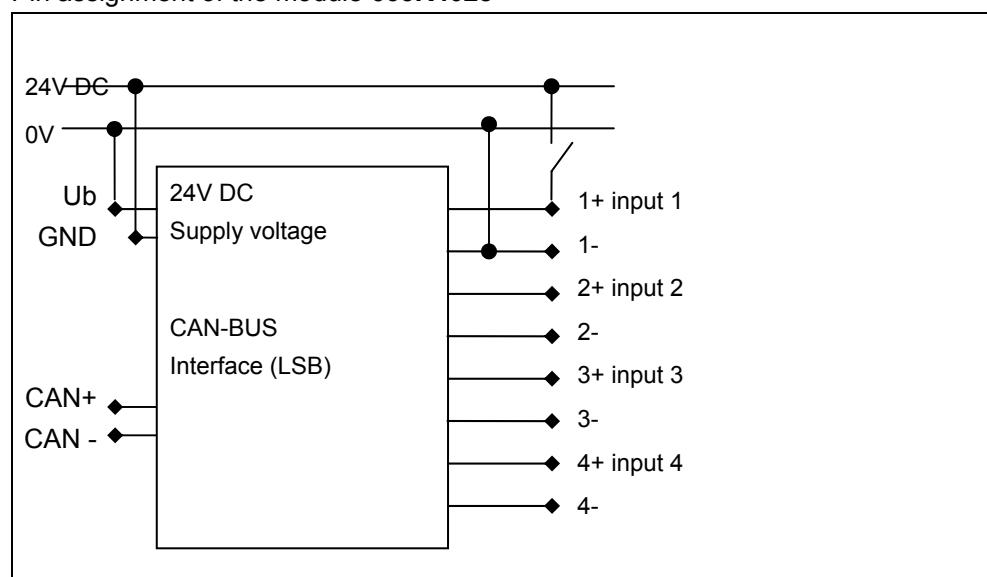
Emergency manual operation level:

Position "1" → Input is always HIGH

Position "A" → Input switches externally via contact

Position "0" → Input is always LOW

Pin assignment of the module **663R4028**



14.2 Functions of the Addresses in connection with ETAMATIC/FMS/VMS

Address	Input 1	Input 2	Input 3	Input 4
19	BURNER ON	FAULT RESET	REGULATOR ENABLE	EXTERNAL IGNITION POSITION
31	Burner control unit standby	Burner control unit permanent ventilation	Pre-ventilation suppression	
35	Curve set 1	Curve set 2	Curve set 3	Curve set 4
39	Curve set 5	Curve set 6	Curve set 7	Curve set 8
47	O ₂ regulator ON/OFF	CO regulator ON/OFF		

14.3 Functions of the Addresses in connection with NEMS

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

- Acknowledgement function only
- For either positive or negative trigger
- Address set on the module
- Activation via configuration software

14.4 Technical Specifications

14.4.1 Input Module

• Rated voltage $_{UN}$	24 V DC
• Current consumption	50 mA (max. 6 modules at Etamatic without CoP.)
• Power consumption	1.2 W
• Operating voltage range	0.8 ... 1.1 \times $_{UN}$
• Operating temperature range	0°C ... +55°C
• Storage temperature range	-25°C ... +70°C
• Suppressor circuit	Polarity reversal protection for operating voltage
• Function indicator	Green LED for BUS activity and power supply
• Operating indicator	Red LED for BUS error message
• Features	Manual operating level with checkback via BUS
• Test voltage input/BUS	2500 V AC 50 Hz 1 min
• Item no.	663 R 4028
• Item no. of external power supply unit	663 R 4024



NOTE:

The modules can be arranged in series without gaps. Once 15 modules have been installed, a new external power supply must be connected.

If more than 15 modules are installed, the plug-in jumpers are overloaded and fuse.

If an external power supply is used, check the fuse since no line-side fuse is installed.

14.4.2 Digital Inputs

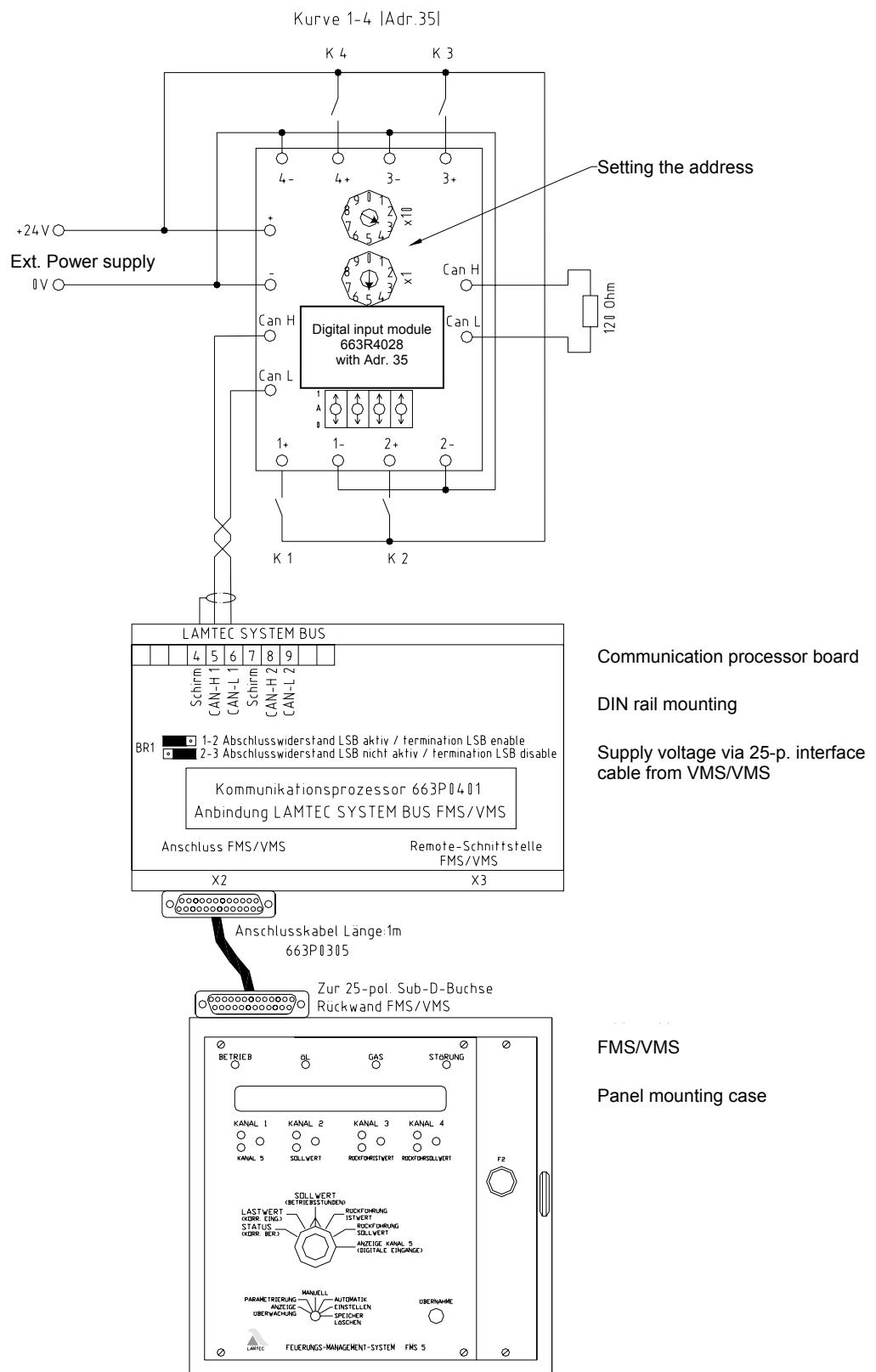
• Input voltage (control input)	30 V DC
• Input current (24 V DC) (control input)	6 mA
• High signal recognition	>7 V DC
• Low signal recognition	<3 V DC
• Response time (receive to transmit)	15 ms
• Recovery time	• 550 ms

14.4.3 Housing

• Degree of protection (EN 60529)	Housing: IP50 Terminals: IP20
• Relative humidity range to IEC60721-3-3	Ambient class 3k3
• Connection cross-section for device terminals	2.5 mm ²
• Connection cross-section for screw-type plug-in terminals (BUS, supply)	1.5 mm ²
• Weight	95 g
• Dimensions	W x H x D = 35 x 68 x 60 mm

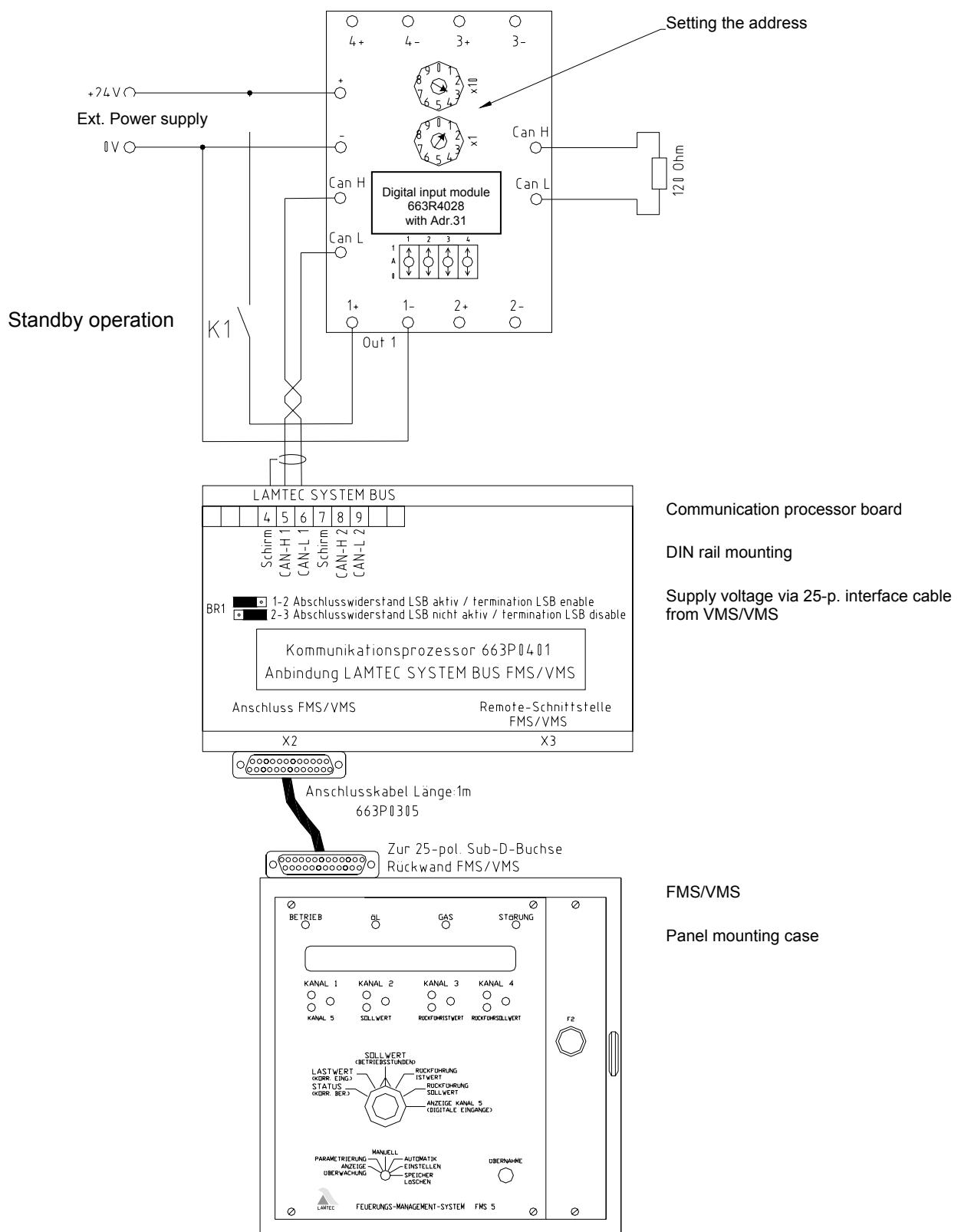
14.5 Connection Example for FMS/VMS

Fuel Selection via Digital Input Module 663R4028 (4 Curve Sets)



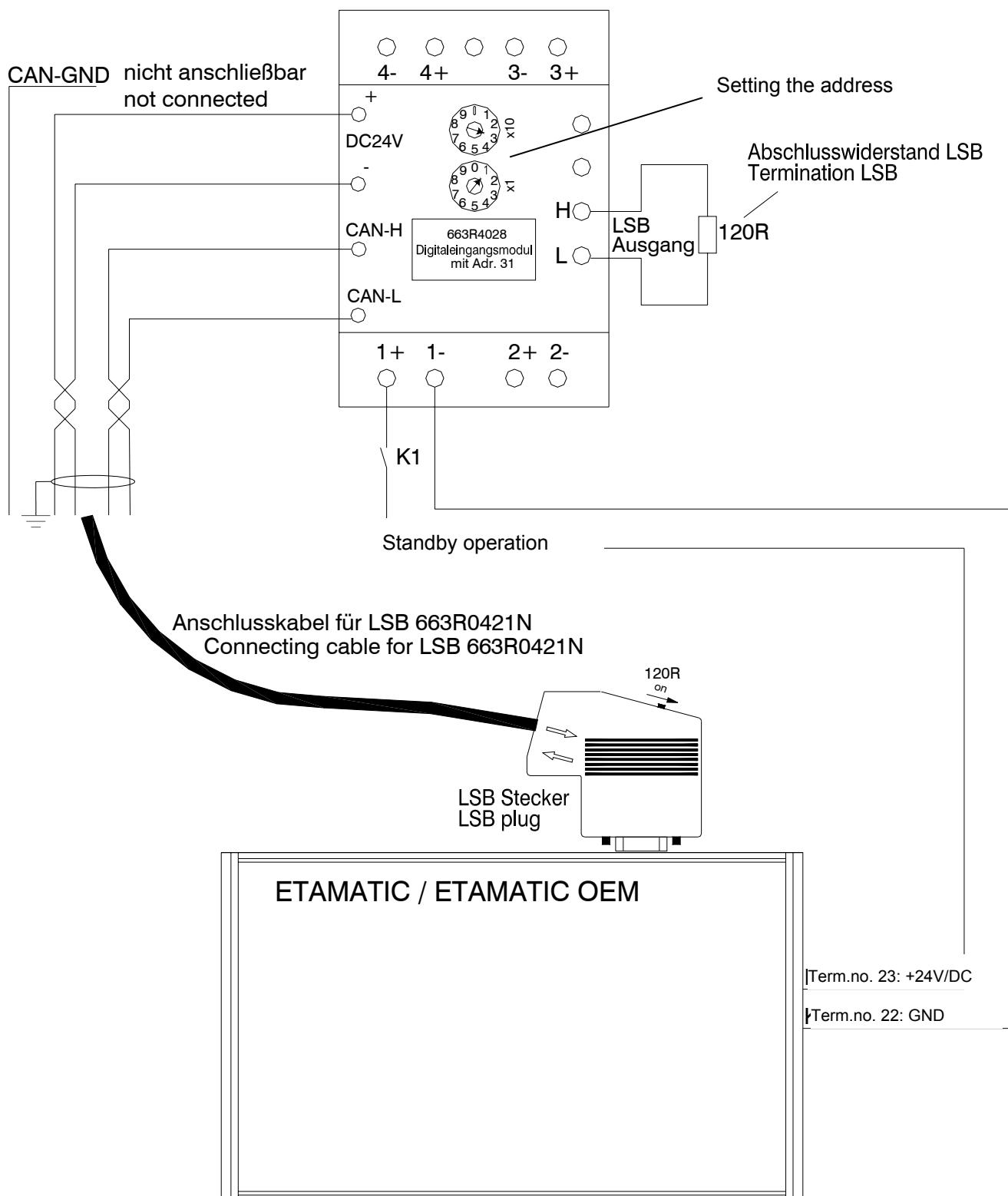
14.6 Connection Example for FMS/VMS

Standby Operation via Digital Input Module 663R4028



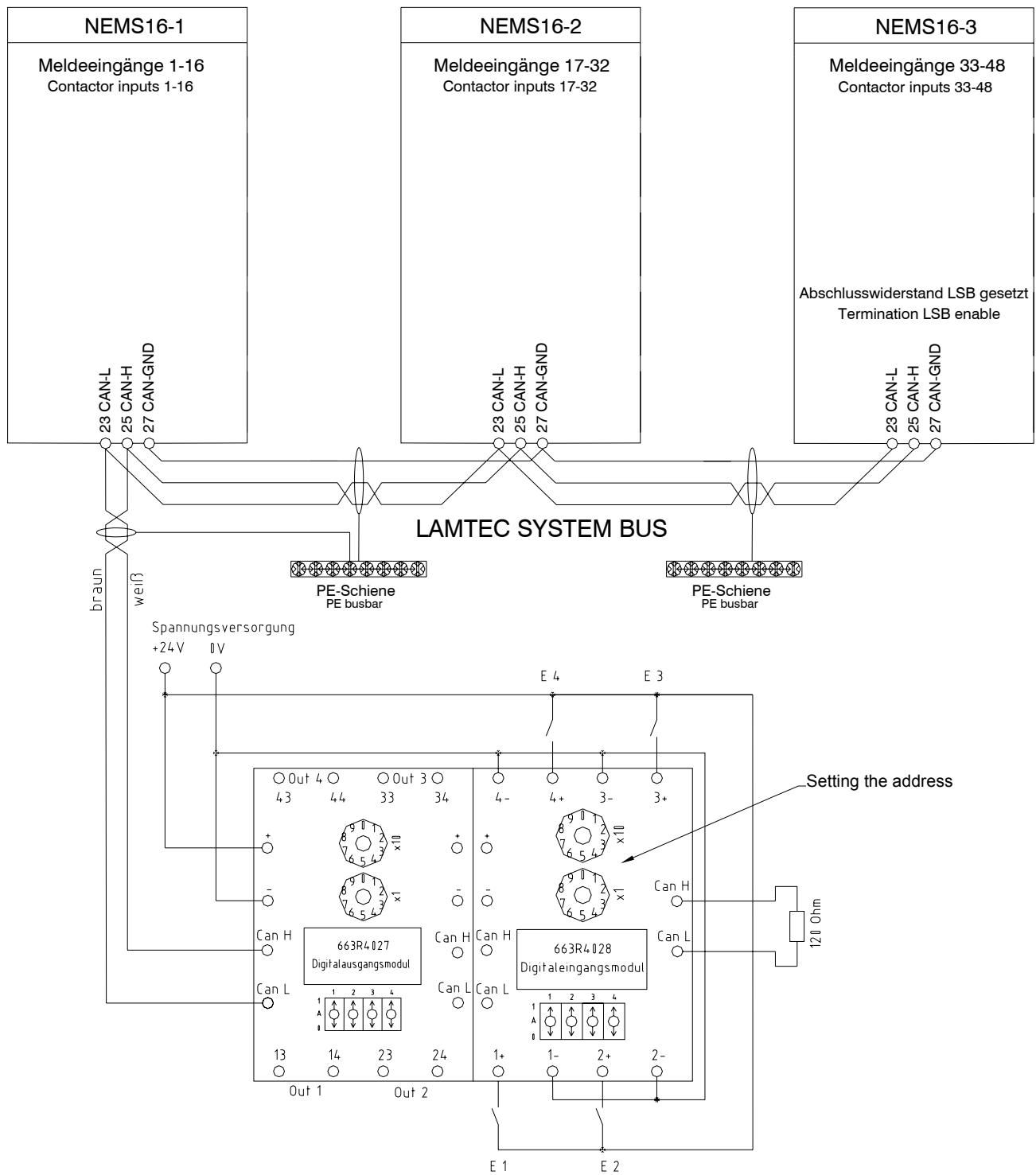
14.7 Connection Example for ETAMATIC

Standby Operation via Digital Input Module 663R4028



14.8 Connection Example for NEMS

Message Acknowledgement via Digital Inputs



15 Troubleshooting

15.1 No O₂ Value from LT1



NOTE:

LEDs 10 and 12 flicker when communication is functioning smoothly.

If these two LEDs are not flickering but flashing slowly or are steady, LSB data transfer is faulty.

See also Section 3.4

- With LT1 (as of software version 3v01), data can only be transferred via the LAMTEC SYSTEM BUS when the device is set to "MEASURE" and is not in "MAINTENANCE MODE".
- LED 9 monitors the operating voltage of the LSB. This LED must light up. If not, check fuse F209.
- Are all the plug-in jumpers set correctly?
- Are CAN-H and CAN-L connected correctly?
- Parameter setting OK (as of 4V00)?
- Is the LSB plug properly connected to the LT1 board?
- Termination resistor?

15.2 No O₂ Value from LT2



NOTE:

LEDs 10 and 12 flicker when communication is functioning smoothly.

If these two LEDs are not flickering but flashing slowly or are steady, LSB data transfer is faulty.

See also Section 3.5

- With LT2 (as of software version 1V14), data can only be transferred via the LAMTEC SYSTEM BUS when the device is set to "MEASURE" and is not in "MAINTENANCE MODE".
- Check fuse F6.
- Are all the plug-in jumpers set correctly?
- Are CAN-H and CAN-L connected correctly?
- Parameter setting OK (as of 1V15)?
- Is the LSB plug properly connected to the LT2 board?
- Termination resistor?

15.3 ETAMATIC does not display an O₂ Value

Parameters set correctly?

- P845 – Device family 1 (default)
All devices that exchange values with each other must be set to the same family.
- P846 – Value 2 (default)
LSB configuration
- P847 – ID1 devices (default)
If more than one device exists in a family, they must have different IDs.

Connection cable OK?

- Termination resistor set?
- For assignment, see Section 3.7.

15.4 FMS does not display an O₂ Value

Parameters set correctly?

- P845 – Device family 1 (default)
All devices that exchange values with each other must be set to the same family.
- P846 – Value 2 (default)
LSB configuration
- P847 – ID1 devices (default)
If more than one device exists in a family, they must have different IDs.

Communication processor board (software version K2b001) and wiring OK?

- Termination resistor?
- See Chapter 4.

15.5 The LSB modules do not display the required function

- Address set correctly?
- Power supply OK?
- Wiring correct?
- Terminating resistor connected?
- See Chapters 10...13.

Declaration of conformity

16 Declaration of conformity

Month/Year:November...../.....2003.....

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

Address: Impexstraße 5, 69190 Walldorf

Product designation: LAMTEC SYSTEM BUS - Modules
663 R 4025....663 R 4029

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

Number	Text
89/336/EWG	Electrical equipment within specific voltage limits

The appendix contains further details on compliance with these directives

Application of the CE mark: yes

Place, date: Walldorf, November 17, 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.

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

Month/Year:November...../....2003.....

Product designation: LAMTEC SYSTEM BUS – Modules

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:

Interference immunity against electromagnetic fields

EN 50082, Teil 2

ENV 50140

ENV 50204

Measuring of the interfering field strength 30-1000MHz

Measuring of the interfering voltage 9kHz – 30MHz

EN 50081, Teil 1

EN 55022

Interference immunity against escorted disturbances 0,15-80MHz

EN 50082, Teil 2

IEC 1000-4-6

Interference immunity against fast elect.

Transients

EN 50082, Teil 2

EN 61000-4-4

Interference immunity against unloading of static electricity

EN 50082, Teil 2

EN 61000-4-2

Interference immunity against surge voltages

EN 61000-4-5

17 Notices



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