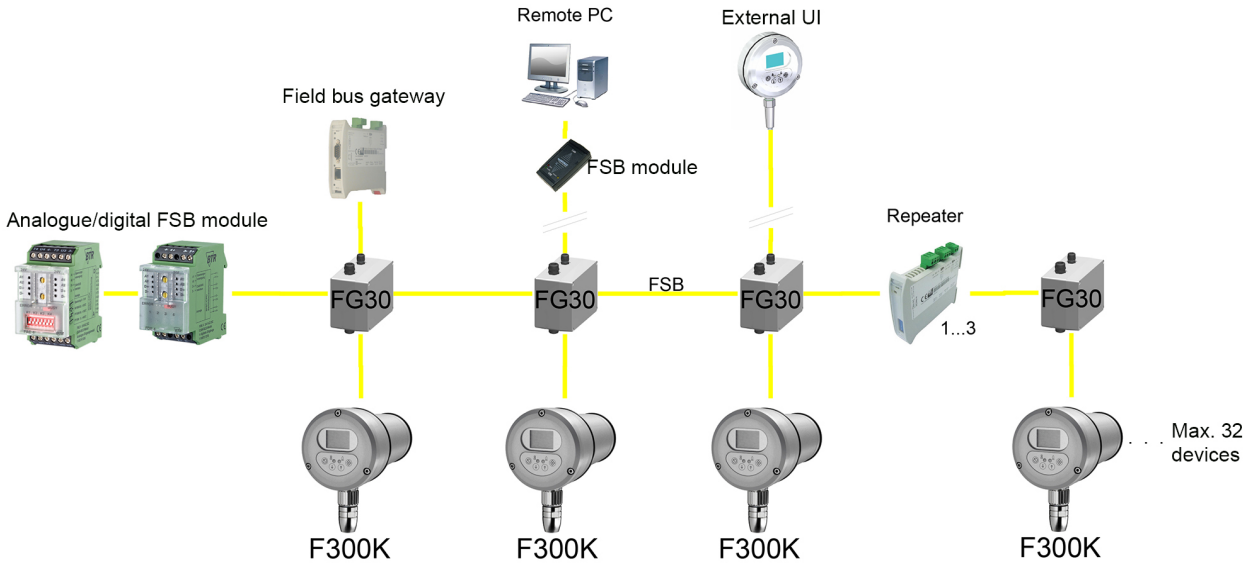
Offer and
project planning
assistance

Flamescanner-System-Bus (FSB)



**Sensors and systems
for combustion technology**

LAMTEC

Table of Contents

1 General

This document should provide you with an overview of the product. It should help you integrate the product quickly and easily into the project planning of your system.

This documents acts only as an introduction to the technology. A detailed description can be found in the product manual.

2 Safety

The following symbols are used in this document to draw the user's attention to important safety information. They are located at points where the information is required. It is essential that the safety information is observed and followed, and that applies, in particular, to the warnings.

DANGER!

This draws the user's attention to imminent danger. If it is not avoided, it will result in death or very serious injury. The plant or something in its surroundings could be damaged.

WARNING!

This draws the user's attention to the possibility of imminent danger. If it is not avoided, it may result in death or very serious injury. The plant or something in its surroundings could be damaged.

CAUTION!

This draws the user's attention to the possibility of imminent danger. If it is not avoided, it may result in minor injuries. The plant or something in its surroundings could be damaged.

NOTICE!

This draws the user's attention to important additional information about the system or system components and offers further tips.

The safety information described above is incorporated into the instructions.

In this connection, the operator is requested to:

1 Comply with the accident prevention regulations whenever work is being carried out.

2 Do everything possible in the circumstances to prevent personal injury and damage to property.

3 Product Overview

3.1 Flame scanner system bus

The flame scanner system bus (FSB) is based on a CAN bus with a fixed baud rate of 500 KB. Every device is addressed using a device ID.

3.2 Basic properties

- Maximum 32 F300Ks possible on the bus.
- Maximum bus length of 80m.
- Using repeaters, several bus segments with a bus length of 80m per segment are possible.
  → Recommendation: max. 8 F300Ks per bus segment.
- Via field bus gateway, implementation to MODBUS or Profibus possible.
- Integration of one analogue and digital FSB module each for continued recording Process data for troubleshooting/analysis function possible via F300K remote software.
- Parametrisation of all F300Ks on the FSB possible via an external UI.
- Visualisation and recording of flame data and parametrisation of the F300K via the F300K remote software.

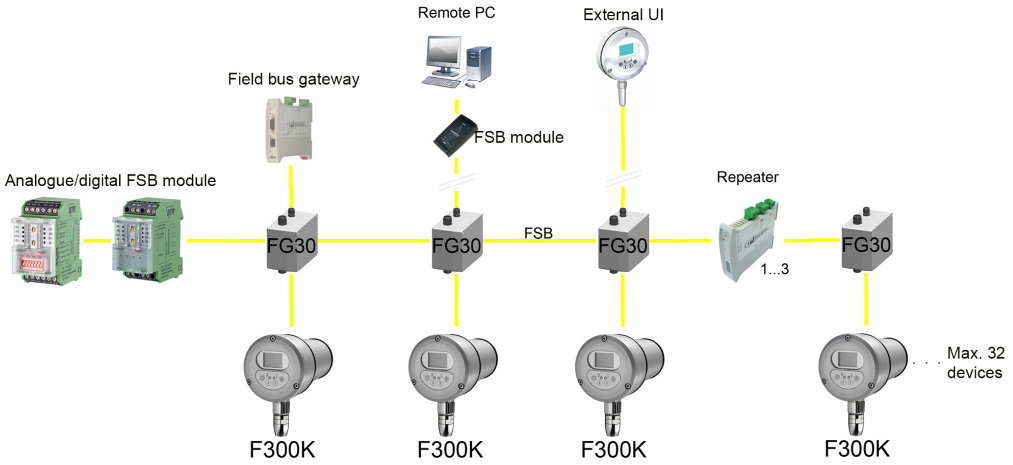


Fig. 3-1 Overview of FSB

3.3 Examples of Application

– 3 bus segments coupled via repeaters with the integration of a gateway, an external UI, F300K remote software, and digital and analogue FSB module.

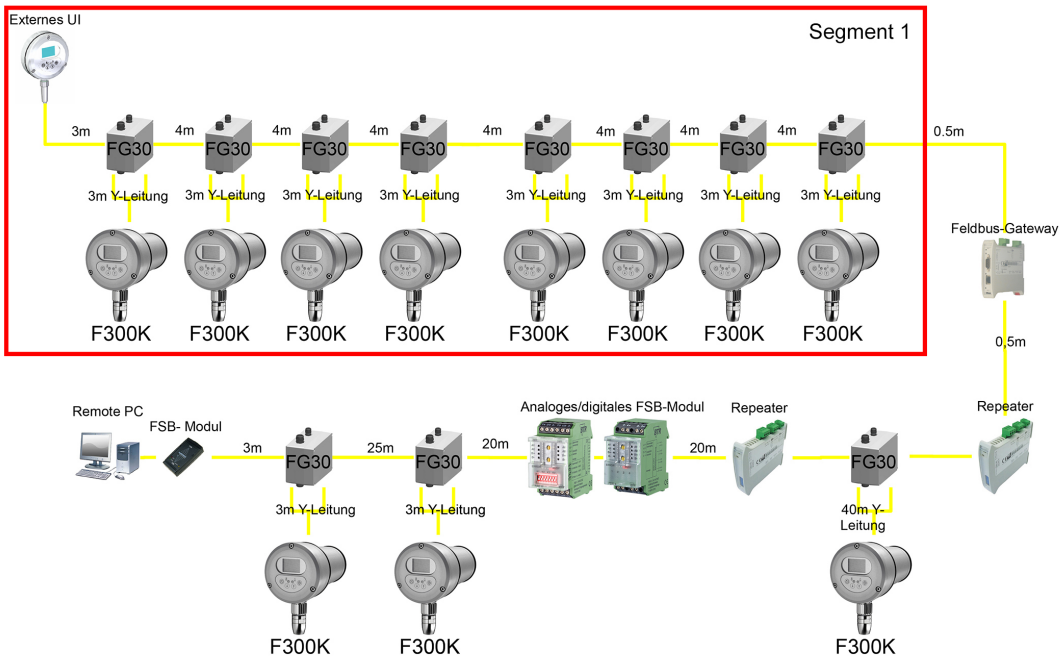


Fig. 3-2 Project planning example with 3 bus segments

Calculation example of the bus length for Segment 1:

– 8 F300Ks each with 3 m Y line → 3 m * 2 * 8 = 48 m
– External UI FB30 → 3 m
– 7 connecting lines, 4 m each → 4 m * 7 = 28 m
– 1 connecting line 0,5 m → 0,5 m * 2 = 1 m
– Overall length 80 m

NOTICE!

3 m connecting Y-line corresponds with an effective bus length of 6 m.

– 4 bus segments with maximum bus length of 80m each per segment and maximum number of F300Ks.

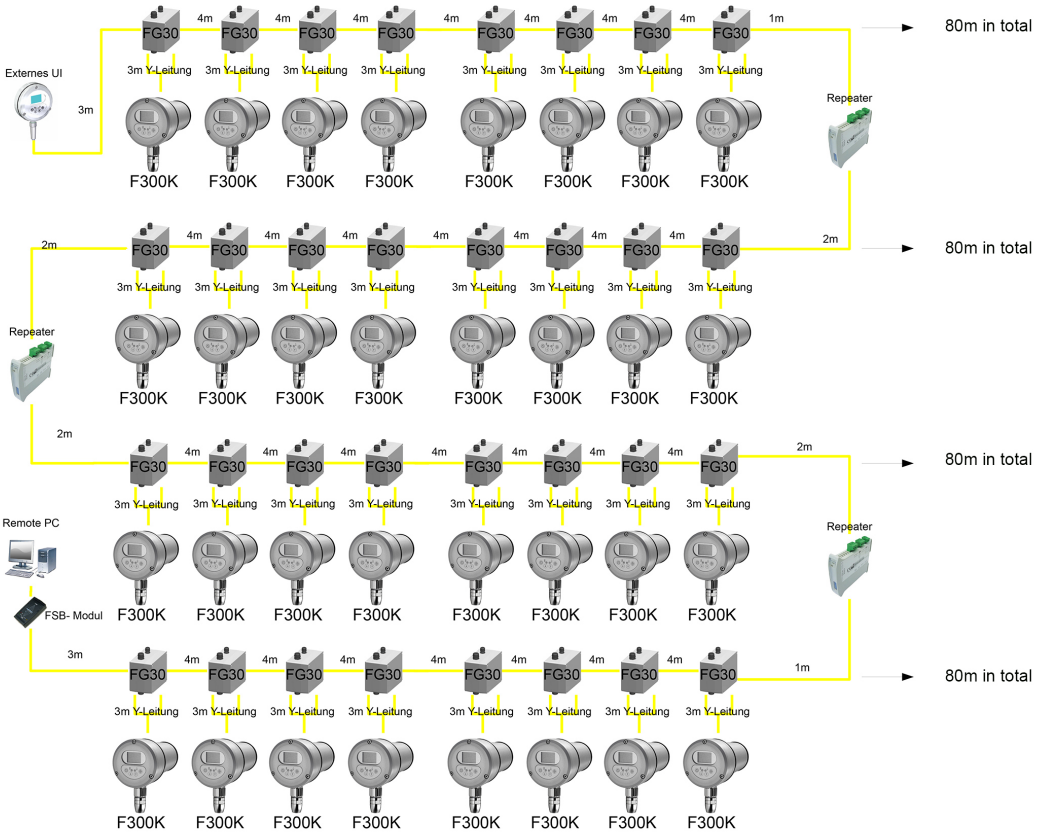


Fig. 3-3 Project planning example with 32 F300Ks

4 Installation Notes

4.1 General

The hardware of the FSB is based on the CAN bus. In general, valid guidelines regarding the laying of data lines must be observed during wiring.

The following basic rules for CAN bus wiring absolutely must be observed:

- A CAN network must not branch (exception: short taplines) and must be connected at both ends using the wave resistance of the line (generally 120 ohm ±10%) (between the CAN_L and CAN_H signals and not against GND).
- A CAN data line preferably requires twisted pairs and a line for conducting the reference potential CAN-GND!
  For optimum EMC properties, cable screening should be used for this purpose.
- Taplines must be kept as short as possible.
- A suitable line type must be used and the voltage drop on the line must be observed.
- The CAN lines should not be laid in the direct vicinity of interference sources. This cannot be avoided so double-screened lines are preferable.

4.2 Specifically for FSB

- The maximum bus length amounts to 80 m.
- Connection of the external UI as a tapline (maximum 6m) possible.
  → Recommendation: If the tapline is provided in the middle of a bus segment,
  80 m bus length + 6 m tapline are possible.
- In the case of the FSB wiring, the FSB ground (earth) must be conducted in the FSB line for all bus subscribers in the respective bus segment.
- The CAN interfaces of the FSB repeaters are isolated.
  → If the bus subscribers are centrally supplied,
  the FSB ground of the FSB interfaces must be jumpered at the respective repeater.
- Each bus segment must be terminated at both ends with a terminal resistance of 120 ohm.
- The FSB-GND corresponds with the device GND; to prevent interference, FSB-GND should not be connected with earth potential.

5 Commissioning

- According to the bus structure, the terminal resistances of the bus subscribers are placed at the end of a bus segment.

NOTICE!

The terminal resistances of F300K and the external UI can be configured using a parameter in the device and are active only when the supply voltage is switched on.
The hardware of the terminal resistances of the analogue/digital FSB module, gateway, or repeater are set via jumpers; for the precise procedure, see the documentation of the respective device.

- Configuring all F300Ks with their own bus ID

NOTICE!

At delivery, all F300Ks have a bus ID of 1; this ID must be reconfigured on the bus to a separate bus ID (1-32) for all F300Ks. This can take place via the external UI, the F300K remote software, or, if present, the external UI of the respective F300K.
When an external UI or the F300K remote software is used, the F300Ks must be connected to the bus one after another and each bus ID must be configured before the connection of the next F300K, starting with the highest bus ID.

6 Troubleshooting

Instructions for finding and eliminating the most frequent hardware fault causes in the Bus wiring

6.1 But terminal resistance

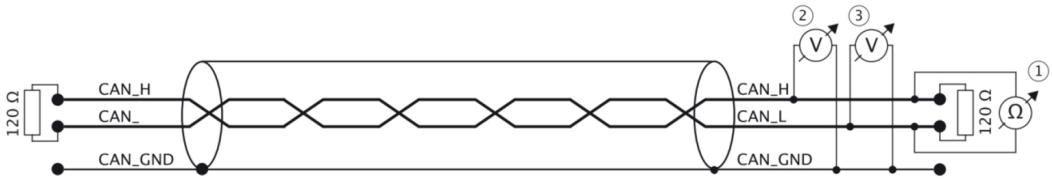


Fig. 6-1 Checking the bus terminal resistance

The bus terminal is used to adapt the resistance of a node to the resistance of the bus line used.
If the impedance is adapted incorrectly, the sent signal is not entirely taken up by the load and partially reflected to the transmission line, which can lead to frequent bus faults.
If the source, transmission line, and load impedance have the same value, the reflections are eliminated.
This test measures the overall resistance of both CAN data lines and the connected terminal resistances.

For testing, proceed as follows:

1 End any network communication while observing the following:
   – Quit any existing F300K remote software.
   – The external UI must be removed from the bus or de-energised.
2 Measure the CD resistance between CAN_H and CAN_L in the middle and at the ends of the network (1) (see the figure above).

The measured value should lie between 50 and 70 ohm.

If the measured value lies under 50 ohm, make sure:

1 There is no short circuit between the CAN_H and CAN_L lines.
2 No more than two terminal resistances are connected.
3 The transceivers of the individual nodes are not defective.

If the measured value lies above 70 ohm, make sure:

1 All CAN_H and CAN_L lines are correctly connected.
2 Two terminal resistances of 120 ohm each are connected to your CAN network (one at each end).

NOTICE!

If a bus terminal resistance was set via the external UI, a replacement resistance must be set at the corresponding position.

6 Troubleshooting

6.2 CAN_H/CAN_L voltages

Each node has a CAN transceiver that generates differential signals in the data lines. If the network communication is idle, the CAN_H and CAN_L voltages amount to about 2.5 V.
Defective transceivers can change these open-circuit voltages and interrupt network communication.

To test defective transceivers, proceed as follows:

1 Switch on all supply voltages.

2 End any network communication while observing the following:
   – Quit any existing F300K remote software.
   – The external UI must be removed from the bus or de-energised.

3 Measure the DC voltage between CAN_H and GND (2) (see the "Checking the bus terminal resistance" figure).

4 Measure the DC voltage between CAN_L and GND (3) (see the "Checking the bus terminal resistance" figure).

The measured voltage should lie between 2.0 V and 4.0 V.

If the voltage is less than 2.0 V or greater than 4.0 V, it is possible that one or more nodes have defective transceivers. In case of a voltage that lies under 2.0 V, the correct connection of the CAN_H and CAN_L lines must be checked. In case of a voltage that lies above 4.0 V, check for an increased voltage. To find a node with a defective transceiver, check the resistance of the CAN transceivers (see the "CAN transceiver resistance test" chapter).

6 Troubleshooting

6.3 CAN transceiver resistance test

CAN transceivers have their own switching circuit, which monitors CAN_H and CAN_L. Experience shows that electrical damage to one or both of the switching circuits can increase the leakage current in these switching circuits.

To measure the leakage current through the CAN circuits, a resistance measuring device must be used and:

1 the node must be disconnected from the network. Leave the node switched off ④ (see the figure below).
2 Measure the DC voltage between CAN_H and GND ⑤ (see the figure below).
3 Measure the DC voltage between CAN_L and GND ⑥ (see the figure below).

The measured voltage should lie between 2.0 V and 4.0 V.

The resistance should lie between 1 MOhm and 4 MOhm.
If the resistance is not within this range, the CAN transceiver is possibly defective

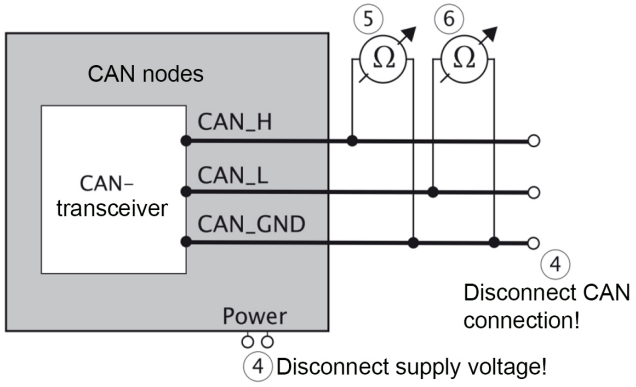


Fig. 6-2 Simplified wiring diagram of a CAN node

7 Service and Maintenance

Please contact LAMTEC Service/Support if you have any questions.

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8 Disposal Notes

NOTICE!

Improper or inadequate recycling harms the environment. Please observe the regional disposal regulations.

- ▶ The device itself is to be recycled as electronic waste to returned to the burner or boiler manufacturer.

8 Disposal Notes

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Die Angaben in dieser Druckschrift gelten vorbehaltlich technischer Änderungen.

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