Oppermann® Regelgeräte

Monitoring device TGÜ-BM 2.6 (Master) for car parks

- Gas control center with bus technology
- Up to 100 measuring points for CO, NO_2, LPG, CH_4
- Additional measuring points with repeater
- Zone expansion possible
- Menu-driven rotary pushbutton operation
- 5 variably adjustable alarm thresholds
- Password protected configuration level
- Large LCD plain text display
- 5 floating alarm relays
- Status and error display
- Virtual sensor for testing the system
- 4 digital inputs for simulation
- LON interface, LonMark compliant
- LAN (Ethernet) interface to the WorldWide Web
- ID address
- LED status display for the system

Technical data

Housing:	ABS plastic
Dimensions:	265 x 234 x 141 mm (L x W x D)
Protection class:	IP 65
Alarm switching points:	5 adjustable thresholds free choice of the time averages free choice of delay time free choice of hysteresis
Alarm relays:	4 switching relays 250 V/2.5 A for fan 1, fan 2 horn, warning light 1 switching relay 24 V DC/1 A for device error message 1 optocoupler output for BMS
Supply voltage:	230 V AC 50/60Hz
Ambient temperature:	0 °C up to +40 °C
Optional UPS:	24 V DC (60 min.)
Cable entry point:	9 x M16 x 1.5 1 x M25 x 1.5 (optional)
Connection:	spring clips 0.5 – 1.5 mm^2
Weight:	2 kg
Guidelines:	
- EMC directives:	EN 61000-6-2 EN 61000-6-3
- Low voltage directive:	EN 61010-1 VDI 2053
Data communication:	
- To the sensors	via 2 x RS485 interfaces, Modbus RTU (for cable lengths, see page 6)
to LON network	via 2 LON interfaces
Measuring head:	CO, NO_2, LPG, methane description on page 8

Variant: Switch panel mounting TGÜ-BMS 2.6

Technical data as with TGÜ-BM 2.6

Differences

Protection class:	IP 40
Accessories:	Dummy panel for TGÜ-BM 2.6 1.5 m connection cable Gasket for switch panel Installation instructions Installation accessories

System description

TGÜ-BM 2.6 is a bus-compatible measurement and control system used to monitor the air for toxic carbon monoxide, nitrogen dioxide or propane concentrations in underground car parks or similar enclosed spaces in which motor vehicles with internal combustion engines are operated.

Different types of gas sensors can be connected simultaneously.

50 CO/NO_2 measuring heads or 12 DUO measuring heads can be directly connected. **If the required number of sensors is greater than this amount, a repeater is connected to the Modbus cable. This increases the number of possible sensors to 210 CO/NO_2 pieces or 40 DUO pieces.**

1 alarm zone is integrated into the control center. If several alarm zones are realized (up to 4 pieces), an additional zone device (TGÜ-BS 2.6) is required for each zone. Each zone device is connected via the Ethernet interface with the control center.

The zone unit has no control element. The organization and control of the entire system is done via the control center. The interfaces to fans, transparent warning lights and horns, as well as the sensors, are arranged in the control center. At each zone unit an expansion of the number of sensors via the repeater (TGÜ-BR 2.6) is also possible. The connection between control unit and sensor is done using four wires, 2 for the supply and 2 for data transmission. Data transfer to the gas sensors is digital. Communication takes place via one (or two) RS-485 Bus segments. Modbus RTU is used as a communication protocol.

The control center cyclically queries the gas sensors and stores the instantaneous values for further processing. In this way even buses and sensors are monitored. Malfunctions are signaled.

The measuring signals of the gas sensor heads are digitized in the sensor electronics. The measurement data is temperature compensated, scaled and evaluated according to the set alarm thresholds.

In case the preset thresholds are exceeded, control commands for ventilators, transparent warning lights, horns, GSM (device alerts) and BCS (building control system) are passed via relay or optocoupler. 5 variable thresholds regarding average time, delay time and hysteresis can be set independently from each other.

For test purposes it is possible to simulate the alarm thresholds with an integrated virtual sensor.

Parametrization of the TGÜ is carried out via operating menu with display and rotating pushbutton.

The handling of the parameters via a web interface is based on the structure of the display menus.

The clear text display in the control center's LCD is selectable in German, English and Dutch.

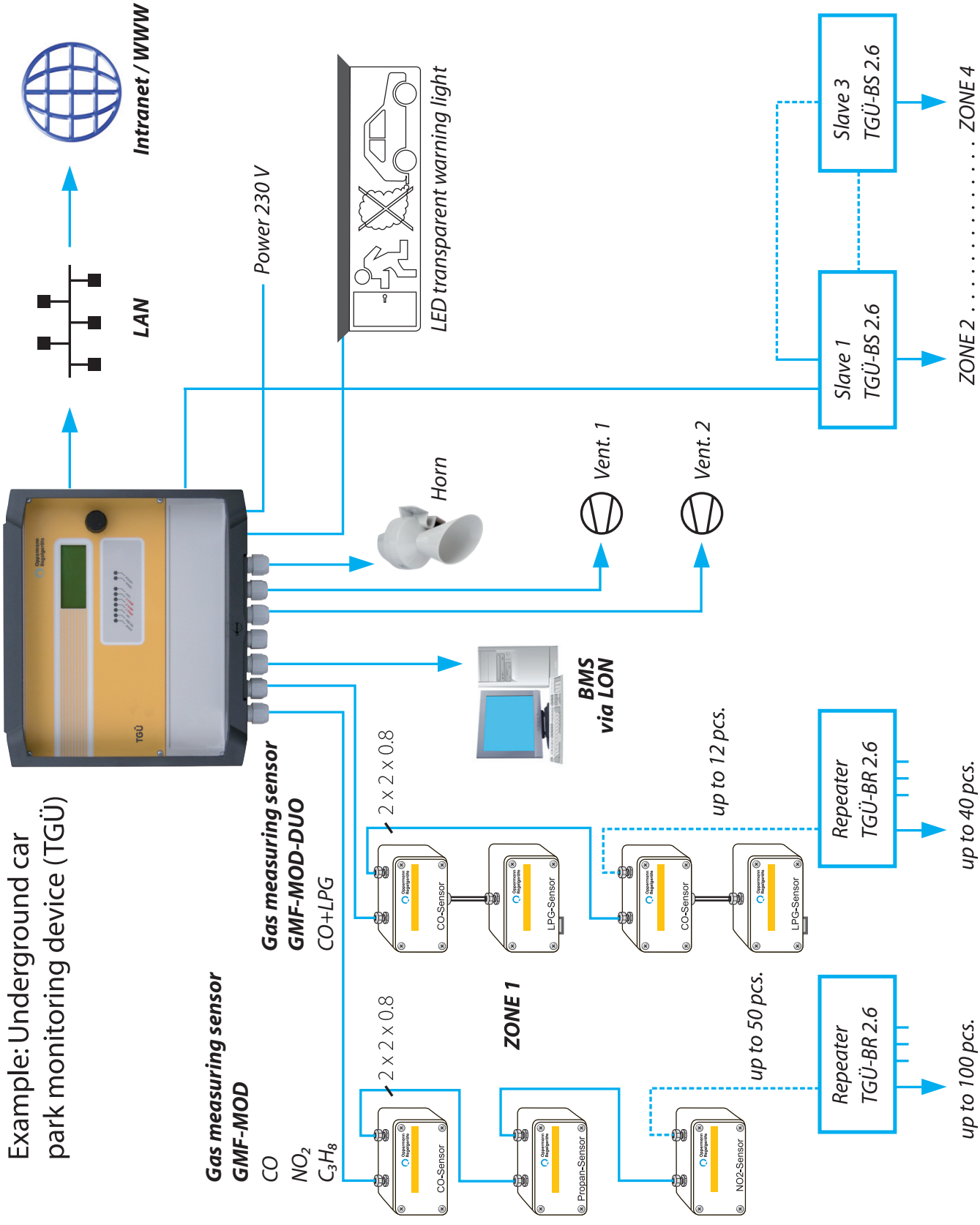
Access to main menu is password-protected to prevent improper use. The unit status is signaled simultaneously to the LCD display via 9 LEDs.

Communications within the entire system take place via the 2 built-in Ethernet interfaces. A Web connection is also possible.

A connection to BMS can also be realized via LonWorks. Status information is indicated by LonMark compliant objects.

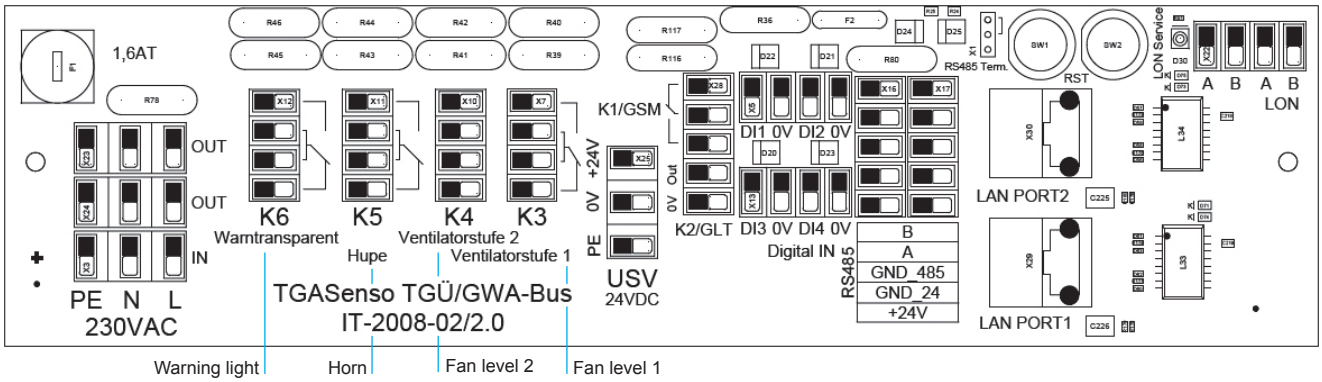
The calibration of the connected gas sensors is carried out at the sensors with an HB 1.0 manual control unit.

Supply voltage for the TGÜ-BM 2.1 is 230 VDC, the connection of an additional uninterruptible power supply (UPS) is provided.


Example: Underground car park monitoring device (TGÜ)
Intranet / WWW
LAN
Power 230 V
LED transparent warning light
Slave 3 TGÜ-BS 2.6
Slave 1 TGÜ-BS 2.6
ZONE 2 . . . . . ZONE 4
Horn
Vent. 1
Vent. 2
BMS via LON
Gas measuring sensor GMF-MOD-DUO CO+LPG
2 x 2 x 0.8
CO-Sensor
LPG-Sensor
up to 12 pcs.
Repeater TGÜ-BR 2.6
up to 40 pcs.
Gas measuring sensor GMF-MOD
CO
NO2
C3H8
ZONE 1
Propan-Sensor
NO2-Sensor
up to 50 pcs.
up to 100 pcs.

Connection board

Work on electrical systems or equipment must be carried out only by a qualified electrician or by instructed personnel under the direction and supervision of a qualified electrician according to electrotechnical regulations.



230 V AC Mains connection

The 230 V AC connection for supplying devices is carried out as a 3 x 3 block.

230 V AC		
PE	N	L

DC-UPS Connection (USV)

Important: The UPS 24 V DC supply voltage must be protected with a 2.5 A delay fuse!
If a decentralized UPS is used (e.g. 2410-12 from Schneider), a failure of the 230 V AC supply can be used for alarming by means of a contact output on this UPS.

230 V AC			USV		
PE	N	L	PE	0 V	+24 V

UPS

Alarm output

The contacts for the relay outputs (K6, K5, K4, K3, GSM) are marked in the dead state, contact load for K6, K5, K4, K3: 240 V/2.5 A. Contact load for K1 (GSM): 24 V DC/1A

Optocoupler output K2 (through-connected in "go state"), limit values for the optocoupler: 24 V DC / 100 mA / 150 mW, not short-circuit proof, no inverse-polarity protection.

WT (K6)			Hupe (K5)			Vent.2 (K4)			Vent.1 (K3)			GSM (K1)			GLT (K2)	
NC	C	NO	NC	C	NO	NC	C	NO	NC	C	NO	NC	C	NO	out	0V
Warning light			**Horn**			**Fan 2**			**Fan 1**			**Device error message**			**BMS**	

Digital inputs

The digital inputs are passive switching inputs (to be made externally by contact: ON/OFF)
DI1: horn: OFF
DI2: fan 1 or fan 2 or fan 1 + 2: ON
DI3: fan 1 or fan 2 or horn or warning light or GSM or BMS: ON
DI4: fan 1 or fan 2 or horn or warning light or GSM or BMS: ON

DI 1		DI 2 D		DI 3		DI 4	
	0V		0V		0V		0V

Measuring sensor Modbus connection

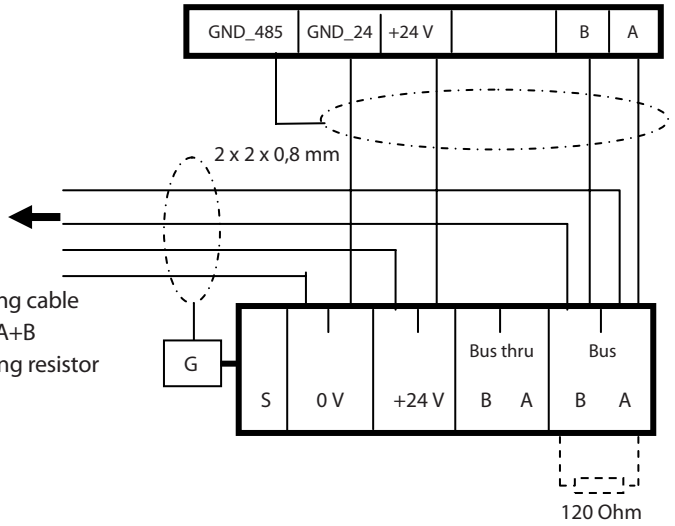
2 Modbus outputs (internally wired in parallel)

RS485 (Modbus) 1					RS485 (Modbus) 2				
GND_485	GND_24	+24 V	B	A	GND_485	GND_24	+24 V	B	A

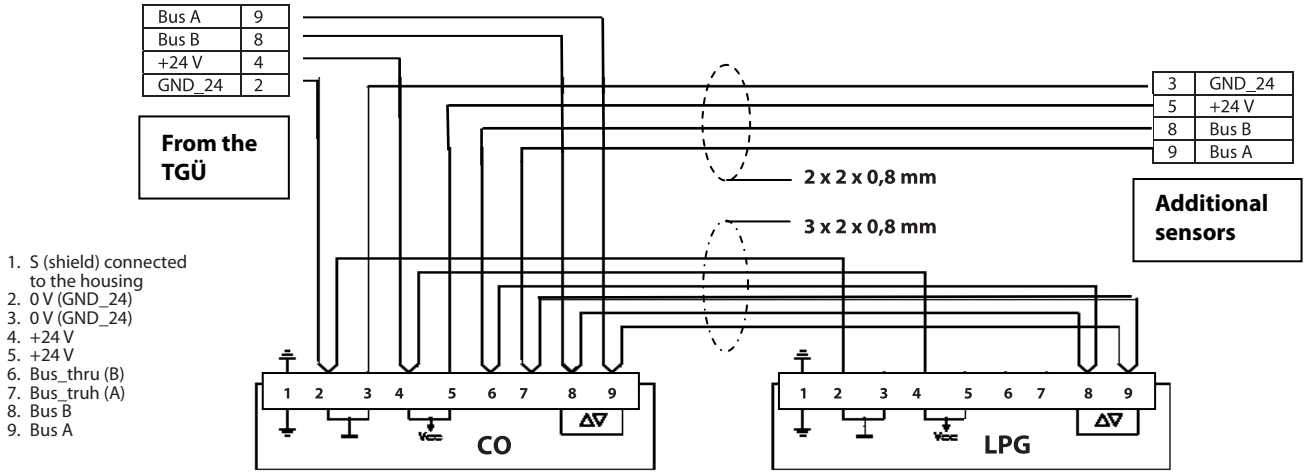
Wiring the sensors

additional sensors

To avoid reflections when using long cable lengths, the communication lines A+B must be provided with a terminating resistor of 120 ohm at both ends.



Wiring for GMF DUO.E/P.CO/LPG. MOD



1. S (shield) connected to the housing
2. 0 V (GND_24)
3. 0 V (GND_24)
4. +24 V
5. +24 V
6. Bus_thru (B)
7. Bus_truh (A)
8. Bus B
9. Bus A

Measuring sensor type	Wiring: JY (St) Y 2 x 2 x 0.8 mm²					
	BUS 1		BUS 2		BUS 1 + BUS 2	
	Max. length / m	# of sensors	Max. length / m	# of sensors	Max. length / m	# of sensors
GMF 4.E.CO.08.MOD	500	25	500	25	1000	50
GMF 4.E.CNO2.03.MOD	500	25	500	25	1000	50
GMF 4.P.C3H8.30.MOD	200	10	200	10	300	15
GMF 4.P.CH4.30.MOD	200	10	200	10	300	15
GMF DUO.E / P.CO / LPG.MOD	180	9	180	9	240	12

When wiring the Modbus (EN 50173) the technical guidelines must be considered.

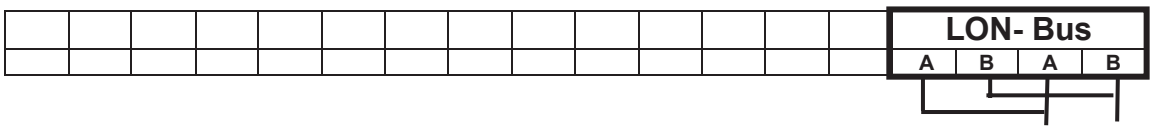
Bus cable

Only wiring cables which comply with the recommendations of the EIA 485 guidelines may be used for the Modbus.
A maximum of 50 Modbus sensors can be connected to a TGÜ. If more devices are connected to a TGÜ, multiple segments must be connected through repeaters.
The bus cable must be laid at a distance of at least 20 cm from other lines. It should be installed in a separate, conductive and grounded cable trunking.
It is important to ensure that no potential differences between devices can occur on the Modbus (perform equipotential bonding).
If cable lengths of 1000 m are exceeded (CO sensors) a repeater must be interconnected. The cable shield must be connected to the sensor in the housing (ground screws are available). In the TGÜ the cable shield is to be contacted to the terminal GND_485.

Ensure EMC-compliant wiring:

Signal and bus lines are susceptible to interference.
Motor cables tend to be prone to disruptions. Lines that are susceptible to interference and prone to disruption should be placed at the greatest possible distance from one another. The interference immunity of signal and bus cables increases when the cables are laid close to the ground potential. If possible, avoid long wires and make sure that they are installed in areas of less interference. Avoid long parallel segments of cable that are either susceptible or prone to interference

LON interfaces



1. Applied network variables (SNVT)

For communication in a LON network, one **node object** and five **SWITCH objects** are made available.

To comply with LON conformity, the following network variables are additionally available: nviRequest (SNVT_obj_request), nvoStatus (SNVT_obj_status) and nvoFileDirectory (SNVT_adress). These have no relevance for the alarm indicator's functionality.

2. Alarm conditions

Alarm 1 time averaging sensor: threshold 1 exceeded
Alarm 2 time averaging sensor: threshold 2 exceeded
Alarm 3 time averaging sensor: threshold 3 exceeded
Alarm 4 time averaging sensor: threshold 4 exceeded
Alarm 5 time averaging sensor: threshold 5 exceeded

3. Allocation of alarm conditions – network variables

Alarm	SNVT_switch	SNVT_setting S	NVT_alarm (priority_level)
Alarm 1	SNVT_switch [0]	SNVT_setting [0]	nvoAlarm
Alarm 2	SNVT_switch [1]	SNVT_setting [1]	nvoAlarm
Alarm 3	SNVT_switch [2]	SNVT_setting [2]	nvoAlarm
Alarm 4	SNVT_switch [3]	SNVT_setting [3]	nvoAlarm
Alarm 5	SNVT_switch [4]	SNVT_setting [4]	nvoAlarm

Table 1

4. SNVT_switch (95)

The standard network variable of type SNVT_switch includes two structural elements that indicate the current status of each alarm.

nvoSwitch [0..4]	value: 0%	state: 0 no alarm
	value: 100%	state: 1 alarm

5. SNVT_setting (117)

The standard network variable of type SNVT_setting includes three structural elements that indicate the current status of each alarm.

nvoSetting [0..4]	function: SET_OFF	setting: 0	rotation: 0	no alarm
	function: SET_ON	setting: 100	rotation: 0	alarm

6. SNVT_alarm (88)

The standard network variable of type SNVT_alarm is part of the node object and contains the alarm status.

However, if only alarms 3, 4 and 5 are brought to the display, a triggering of alarm 1 and /or alarm 2 has no change of state to follow.

The following enumerated types are used for display: alarm_type and priority_level.

nvoAlarm:	alarm_type: AL_NO_CONDITION	priority_level: PR_LEVEL 0 no alarm
	alarm_type: AL_NO_CONDITION	priority_level: PR_LEVEL 0 alarm 1
	alarm_type: AL_NO_CONDITION	priority_level: PR_LEVEL 0 alarm 2
	alarm_type: AL_ALM_CONDITION	priority_level: PR_LEVEL 1 alarm 3
	alarm_type: AL_ALM_CONDITION	priority_level: PR_LEVEL 2 alarm 4
	alarm_type: AL_ALM_CONDITION	priority_level: PR_LEVEL 3 alarm 5

7. Alarm display

When an alarm is issued by the underground car park monitoring unit, this state is represented on all three network variables (see Table 1).

In this way various network variables are available for the connection, but be careful in doing so that only alarms 3, 4 and 5 are displayed when using the network variable **SNVT_alarm** (see 6).

8. Connection to a LON network

8.1 Offline

For project planning of a LON network in which underground car park monitoring is to be included, the accompanying *.xif file can be used; all the network variables for the connection are available after its import.
Depending on the LON software it may also be necessary to download the files *.NXE, *.APB and *.XFB in addition to the *.xif file, in order to create a so-called device template.
If necessary, the appropriate files are to be delivered to the LON network.

8.2 Online

The LON nodes can be registered via a network scan using the service PIN on the LON network.
Then its configuration can be read from the device (including network variables made available).
The network variables are now available for the connection.

Ethernet interface

The device has 2 LAN (Ethernet/Cat5/RJ 45 sockets) interfaces for connecting the zone devices (BS 2.1) with each other, to the master (BM 2.1) and for connecting the system into a network (LAN/WAN).

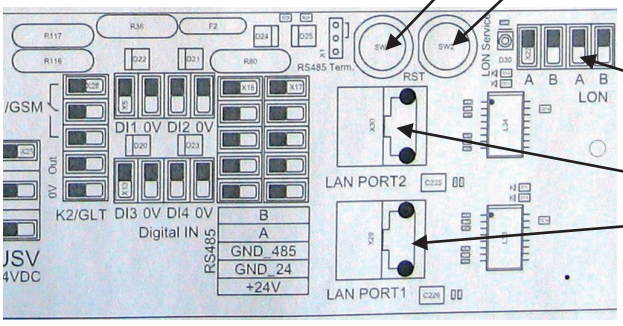
LAN	
Port 1	Port 2

Through this connection, contact to a maximum of 5 zone devices (TGÜ-BS 2.6) and to the Web is established.

The dialogues between the TGÜ-BM2.6, the zone devices and the Web takes place in parallel over different protocols.
Each TGÜ-BS2.6 has its own MAC (ID) address.
The TGÜ-BM2.6 can be configured in a password-protected sub-program:

- address
- NetMask
- Gateway

Function keys



Reset button for resetting the system

SET button for embedding the system into the LON network

Connection socket for the LON network cable

2 x RJ45 sockets / Cat5 interfaces for connecting to a network (LAN / WAN) and for connecting to the TGÜ-BS 2.6 zone unit (Slave)

Sensors to be connected to the TGÜ-BM 2.6

Carbon monoxide CO	Typ GMF 4.E.CO.08.MOD	Data sheet No.: 38100
Nitrogen dioxide NO_2	Typ GMF 4.E.NO2.03.MOD	Data sheet No.: 38101
Propane (LPG) C_3H_8	Typ GMF 4.P.C3H8.30.MOD	Data sheet No.: 38102
Natural gas (methane) CH_4	Typ GMF 4.P.CH4.30.MOD	Data sheet No.: 38103
Combi CO/LPG	Typ GMF DUO.E/P.CO/LPG.MOD	Data sheet No.: 38104

Note: All sensors are also possible in a version with housing type 5. See data sheet 38106/38107.

Ex-Ox-Tox Gasdetectie
Westerdreef 5V
2152 CS Nieuw-Vennep
Telefoon: 0252 620885
E-mail: info@exoxtox.nl
Website: www.exoxtox.nl