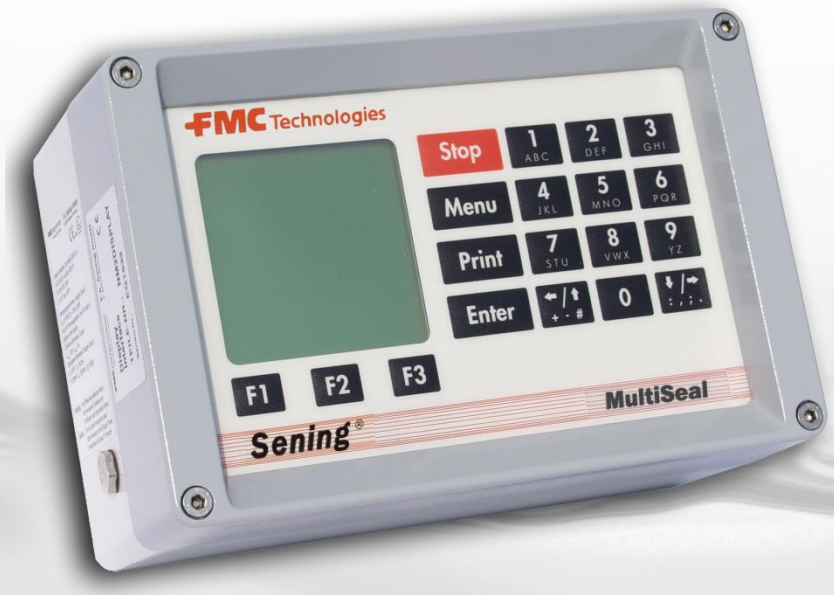
EN - Instruction Manual

Issue/Rev. 2.11 (06/23)
MN F15 001 EN ◄ ► DOK-416E

Electronic Sealing of Tank Truck Compartments

MultiSeal



Further documentation on this product:

Description	**Order no.**
EMIS2 Workshop and Installation Manual	MNF19008US / DOK-447E
MultiSeal Quick Guide	MNF15002EUS / DOK-417E

History

Revision	Date	Editor	Status	Description
1.10	September 01	R.Arndt	Release	Replacement of MultiSeal Main Unit (MSMAIN) and Display Interface (NM2DISPLAY) with Main Unit / Display (MSMAINDISP). More precise description of Print Menu chapter 5.1.1.6.
Rev. 2.00	March 2008	H.Schellin / jp	Release	Format modifications / new Drawings
Rev. 2.01	November 2010	RA / HS / jp	Release	a few changes
Rev. 2.10	June 2014	HS / jp	WIP	- New Layout - New Drawings
Rev. 2.11	June 2023	R. Leferink	Release	Wetleg-Monitoring added

Table of Contents (English)

1 General

1.1 Orientation aids for the manual

We have provided some orientation aids so that you can easily find the necessary information in this manual.

The information in this manual ranges from imperative safety procedures and standardized guidelines through to concrete handling procedures and advice. To differentiate these more easily, the information is marked with corresponding pictograms in front of the relevant text.

These are intended not just to draw particular attention to these passages, but also to make it easier to find the information you want. Therefore the pictograms are symbolic of the underlying textual content.

The following pictograms are used in this manual:

Danger sign
Danger of explosions caused by easily ignited gases and liquids here.

Risk of operating fault
Actions that may damage the equipment.

§ **Legal notice**
Actions that may have legal consequences.

Working step
Concrete action statements, e.g.: *“Press the <Enter> key”.*

▶ **Input necessary**
e.g. via numeric or function keys.

Positive response message
e.g. “The main menu now appears”

Negative response message
e.g. “If a fault message appears now...”

Background information
Short-Tip, e.g. “See more detailed information in chapter XX”.

Option
Special case.

Function
Functional description.

NOTE:
indicates a special situation.

ATTENTION:
particular attention is to be paid.

1.2 Safety instructions

Caution:
This information must be carefully read and observed before operating the unit.

1.2.1 Notes on Ex protection

The measuring systems are designed for flow measurements of highly flammable and flammable liquids (hazard classes AI and AIII) on tank trucks. Sparks and naked flames must be strictly avoided.

1.2.2 Special requirements

The measuring systems contain high-precision, high-quality components. Consequently, mechanical actions not directly relating to the operation of the unit (e.g. dropping the unit) must be avoided.

§ The measuring devices must be properly and officially calibrated. Any manipulation, whether intentional or unintentional, will break the calibration seal.

Make sure that no fuel is allowed to soak or flow into the ground!

1.2.3 Operating elements

CAUTION:
Do not open the housing cover when the unit is connected to the voltage supply!

Work must only be carried out on the Ex-e terminals when the unit is voltage free. National regulations must be satisfied when operating this unit. When performing operational checks, observe the guidelines laid out in IEC / EN 60 079-17.

1.2.4 Disposal

It is the operator's responsibility to obtain the necessary information about all relevant regulations and requirements from your local authorities. Ensure that the relevant materials are disposed of in an environmentally safe fashion.

§ The operator is responsible for ensuring compliance with all general and local regulations which are in force at the time of disposal.

1.2.4.1 Disposal of production materials and auxiliary materials

- Mineral oil products are extremely hazardous to the environment; they must not be allowed to enter the drains/sewage system or the ground.
- These materials and any objects contaminated with them should be disposed of via suitable waste disposal facilities.

Disposal of batteries

The batteries in the controller should be replaced by a skilled person. Used batteries must not be disposed of as standard domestic waste. Ensure that all used batteries are disposed of via suitable disposal facilities.

1.2.4.2 Disposal of a functional component or system

- When a functional component or system is taken out of service, we recommend that it should be sorted into its different types of waste and then disposed of or recycled as appropriate. Sort and separate iron, nonferrous metals, plastics, electronic waste, etc.
- Fuels, grease, oil and objects or lines contaminated with them must be disposed of separately.

1.2.5 Proper intended use

The measuring systems are to be used exclusively for delivery of low-viscosity mineral oils on tank trucks. The corresponding applicable safety regulations (e.g. Ex protection) must be complied with.

Any form of use which exceeds the scope described above is deemed to be improper use; the manufacturer is not liable for damages resulting from such improper use.

Proper use also includes compliance with the conditions set out by the manufacturer with regard to operation, installation and maintenance.

- The measuring systems must only be operated, serviced and repaired by personnel who are familiar with the equipment and who have been trained regarding the dangers involved.
- The manufacturer cannot be held liable for any damages arising as a result of unauthorized changes to the measuring systems.

2 General description of MultiSeal systems

The concept of MultiSeal Systems is to deliver to customers carefully measured, thin, mineral oil volume / amounts by means of secure and monitored transport in road tankers as **S**ealed **P**arcel **D**elivery.

- The tank section is electronically sealed after the load. The loaded amounts are entered in the load ticket.
- The status of the manlid covers and valves of the tank section are continuously monitored and every change retained in the log data.
- Even if the vehicle battery is disconnected the MultiSeal System maintains voltage from an internal battery enabling the monitoring to continue.
- The status of all compartments can be monitored for up to 100 hrs without additional current from the vehicle battery.
- After the load and before delivery to the customer a status report can be printed at any given time to record that the sections are sealed.
- By comparing the print-outs it can then be verified, for example, whether there had been any tampering during transportation from the fuel depot to the customer, possibly to remove some of the product.
- If the comparison of the print-outs indicates that there had been no tampering, i.e. no seal had been broken, it is then verified that the loaded amounts as per the tanker's delivery note are contained in the tanks.
- After the delivery the MultiSeal System indicates if the tanks are completely empty and there is no product remaining in the tank.
- Tampering with the sealed tanks is recorded directly. The tanks are then regarded as "unsealed".
- A "level gauge" – as required by some countries – becomes inapplicable when the MultiSeal System is fitted.

2.1 Sealed Parcel Delivery (SPD) function

The MultiSeal-System's SPD sensor interface employs linked SPD sensors to monitor all openings that can be used to remove the product as required. After load the tanker is electronically sealed. During transportation from the fuel depot to the petrol station the SPD sensor interface detects status changes in the monitored openings via the interconnected SPD Sensors that then lead to breaches of the seal.

Depending on the system options as described in section chapter 2.3 "Optional extensions" / page 15 the stored data can then be sent to a printer or an on-board computer (OBC) to be printed or displayed.

2.1.1 Start and end of loading and discharge

The main pneumatic switch in the pneumatic system recognises that the MultiSeal System is being operated either for load or for discharge. The driver has to start load by pressing the **<F1>** key or discharge with the **<F3>** key after a message on the display interface. In fuel tanker which are filled via the API coupling and delivery occurs via the in-line valves ('Left-Right Vehicles'), it is possible to install a delivery pneumatic switch on the delivery side and a filling pneumatic switch behind the K block on the filling side (see chapter 3.2.2 "Main pneumatic pressure switch - NM2DSS" / page 30). Pulling the relevant K block makes it possible to switch automatically into the filling and/or delivery mode. Manual operation is not required.

When opening the foot valves and the API couplings and in-line valves, the relevant SPD sensors evaluate the status of each compartment. The same applies to the wet-leg detectors. The end of a filling/delivery operation is signaled for each compartment by disconnecting the filling arms / delivery hoses and by closing the foot valves. At this moment, the automatic sealing of the compartments also occurs dring filling. If the main pneumatic switch is deactivated at the end of the filling / delivery operation, the system switches from filling / delivery mode back into transportation mode. Depending on the tanker operator’s requirements, the driver may also have to enter a new load plan before loading.

For more details on operation, refer to the Quick Guide **DOC-417**.

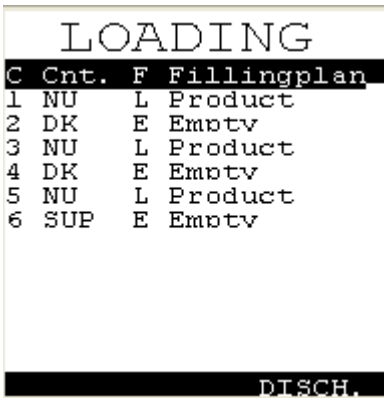
2.2 Wetleg-Monitoring

The Wetleg-Monitoring system is consisting of a MultiSeal main unit, to which wetleg-interface(s) are connected. The compartment filling states, depending on the respective wetleg-sensor information, are directly shown on the system display, according to the configuration.

The compartment-specific filling state information can be made available to external systems by connecting an additional EMIS2. In addition, the Wetleg-Monitoring system can be used to add wetleg monitoring functionality to MultiFlow systems.

Wetleg-Monitoring is a significantly slimmed-down version of the MultiSeal software and is only used to monitor and display the configured wetleg sensors. It does not support any SPD functions!

The different compartment-specific filling states are shown in detail in the display of the Wetleg-Monitoring system.



Empty compartments are shown within the filling plan as „Empty“. Compartments, which include product, are shown as „Product“.

NOTE:
Wetleg-Monitoring is not part of the MultiSeal software. It is a standalone software!

2.3 Optional extensions

Optional extension components can be added, which facilitate the operation and connect the MultiSeal System to external data processing systems.

2.3.1 Permanently-installed printer

A docket printer (DR 295 / DR298) can be installed permanently in the cabin to print out records outside the explosion risk area. Printer and trailer cables together with connectors are obtainable from F.A. Sening.

2.3.2 Temporary printer / laptop connection

An external printer in a portable case (CSI-DR-K) or a / laptop, which are allowed to be used in non-explosion risk areas only, can be connected with a special Printer cable to the MultiSeal System’s main unit (obtainable from F.A. Sening). The plug contact must be outside explosion area.

2.3.3 On-Board-Computer (OBC) connections through the EMIS2 interface

An additional variation of the MultiSeal System arises from the connection to an on-board computer. The MultiSeal System works as in the standard variation. Instead of a printer, the data is transmitted to an on-board computer through the EMIS2 interface.

2.4 Equipment options

2.4.1 Sealed Parcel Delivery (SPD) function with TAG interface (optional)

The general function is identical to Section 2.1. In addition to the components listed there, a TAG Interface (Part no. NM2TAG) can be connected. The use of these additional functions requires that fuel depots and petrol stations are equipped with TAGs. With the help of TAG interfaces and TAGs the start and end of load and discharge can be processed automatically without manual operation of the display interface. In addition, the load plan can be generated automatically without having to enter it manually.

Because the TAG functionality forms a part of the NoMix 2000 System, all requisite information relating to the function, the mechanical and electrical connections etc. are contained in the NoMix 2000 System's Workshop and Installation Manual.

2.4.2 Pneumatic tanker control

The modularly expandable MultiSeal System is able, by means of the installation of an I/O-interface (output driver interface for magnetic valve control), which can be connected to the internal CAN bus, to take over the entire pneumatic control of the tanker. Magnetic valves then automatically control the foot valves on load and discharge. The switching between load and discharge can be achieved through additional load and discharge magnetic release valves. Because the operation is carried out over the display interface, the pneumatic control blocks etc. can be disregarded.

2.4.3 NoMix functionality

By installing further interface component assemblies that are connected to the internal CAN Bus, such as the TAG Interface and the Output Driver Interface the MultiSeal System is easily expandable to the NoMix 2000

System (Cross-Over-Prevention system, discharge hose safety system, vapour hose safety system, overfill prevention. The NoMix system is described in the documents **DOK-415**, **DOK-453** and **DOK-454**.

3 Component assemblies of the MultiSeal system

☞ The complete table of the MultiSeal System's component assemblies with their relevant part numbers can be found in .

3.1 Electronic components

3.1.1 Main Unit (MSMAIN)

Part no. **MSMAIN**
Drawing: 51.351332 / S. 110
Wiring diagram: 61.351362 / S. 117

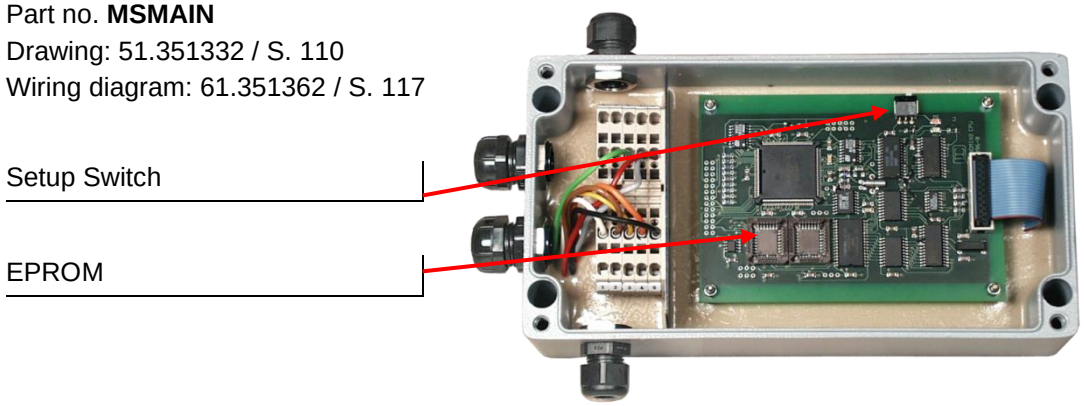


Figure 1: Main Unit - MSMAIN

The main unit (part no. **MSMAIN**) is the control centre of the MultiSeal System. Over the internal CAN bus it receives/sends data from/to the interface units, such as the display interface, wet leg sensor interface and SPD sensor interface. The data are stored and processed in the main unit. There is a continuous "Live Test" taking place between the main unit and all connected interface units to ensure that all interface units work faultlessly.

The data can be sent to the EMIS2 interface over the external CAN bus connection and then be forwarded via a RS-232 port to an on-board computer system (OBCS).

The internally stored data can be sent directly to a printer over the RS-232 printer interface.

In future, Part No. **MSMAIN** as well as the CPU panel for Main Unit / Display, Part No. **MSMAINDISP** can be used in the main unit.

3.1.2 Display interface (NM2DISPLAY)

Part no: **NM2DISPLAY**
Drawing: 61.351301 / S. 111
Wiring diagram: 51.351352 / S. 118

The Display Interface must always be fitted with right-hand cable glands. The display may never be situated above the terminal block!

Figure 2: Display interface - NM2DISPLAY

The display interface (part no. **NM2DISPLAY**) is connected to the main unit via the internal CAN bus just like all the other interface units. The MultiSeal System can be operated using the keypad.

3.1.3 Display interface - KEYBOARD FUNCTIONS Definition of symbols and key functions

Key	Function
F1 F2 F3	The function keys will execute the function shown in the bottom row of the display.
Stop	The **<Stop>** key enables all currently running delivery or loading processes to be stopped immediately. Menus can also be quit immediately.
Menu	The **<MENU>** key is used to access the menu control, e.g. for adjustment of the setup, execution of tests. In NoMix / MultiSeal, entering the loading plan, entering a bypass etc.
Print	The **<Print>** key is used to access the print menu in order to print: Parameter list (setup), gauge tables, logbook, screenshots and delivery receipts. In Multilevel of Gauging Table, screen shots and delivery documents.
Enter	The **<Enter>** key is used to confirm entries.
1 ABC ... 9 YZ 0	The **<numeric keys>** are used to start deliveries and to select submenus as well as for the input of numbers and letters.

Key	Function
 and 	Back / forward, scroll to the next display page and the input of special characters. In tank trucks with more than 10 compartments, the display can be scrolled to the upper or lower compartment numbers.

Table 1: Key functions

Important functions and inputs

- Entering the parameters / SETUP
  (adaptation of the MultiLevel system to different tank truck variants)
- Execution of tests during commissioning and troubleshooting
- Printout of the MultiLevel delivery receipts
- Printout of: parameter list (setup), gauge tables, logbook, screenshots
- Starting/stopping the delivery
- Display of detailed error messages

The sealing status is displayed permanently in the transport display in the status line (top line), such as:

- SEALED
- UNSEALED
- EMPTY

Furthermore, the product quality, the compartment status EMPTY (E) or FULL (F) and the compartment sealing status are displayed for each compartment.

- SEAL
- 2B-SEAL (manual / second seal during loading)
- 2A-SEAL (manual / second seal during delivery)

3.1.4 Display interface / open (NM2DISPLAY)

Part no: **NM2DISPLAY**
Drawing: 61.351301 / S. 111
Wiring diagram: 51.351352 / S. 118

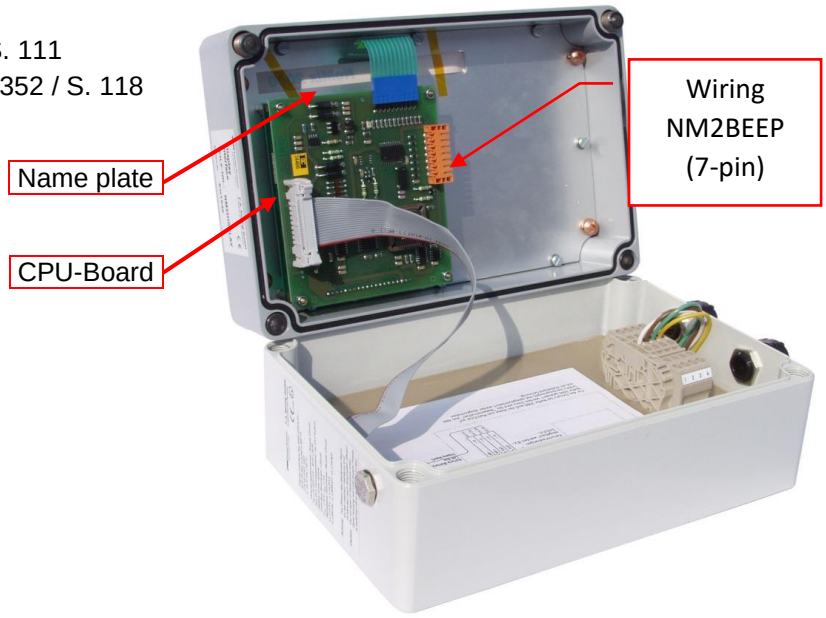


Figure 3: Display Interface / open - NM2DISPLAY

☞ The display interface is originally supplied with the label "MultiSeal". For use with NoMix 2000, the name must be changed from MultiSeal to NoMix 2000. This is done by pulling out the "name strip" from the slot, reversing it, pushing it back in again and fixing it with adhesive tape.

The MultiSeal Display interface has its own setup. The setup installation is described in detail in Section 49.

Second display interface

In the case of certain tanker types it may be useful to facilitate operation by installing a second display interface, e.g. in the case of a tanker that is filled on one side and discharged on the other. The address (node number) of the second display interface must be set in Display Setup as per Section 49.

3.1.5 Main Unit & Display - MSMAINDISP2

Part no: **MSMAINDISP2**
Drawing: 61.352024 / S. 113
Wiring diagram: 51.351673 / S. 119

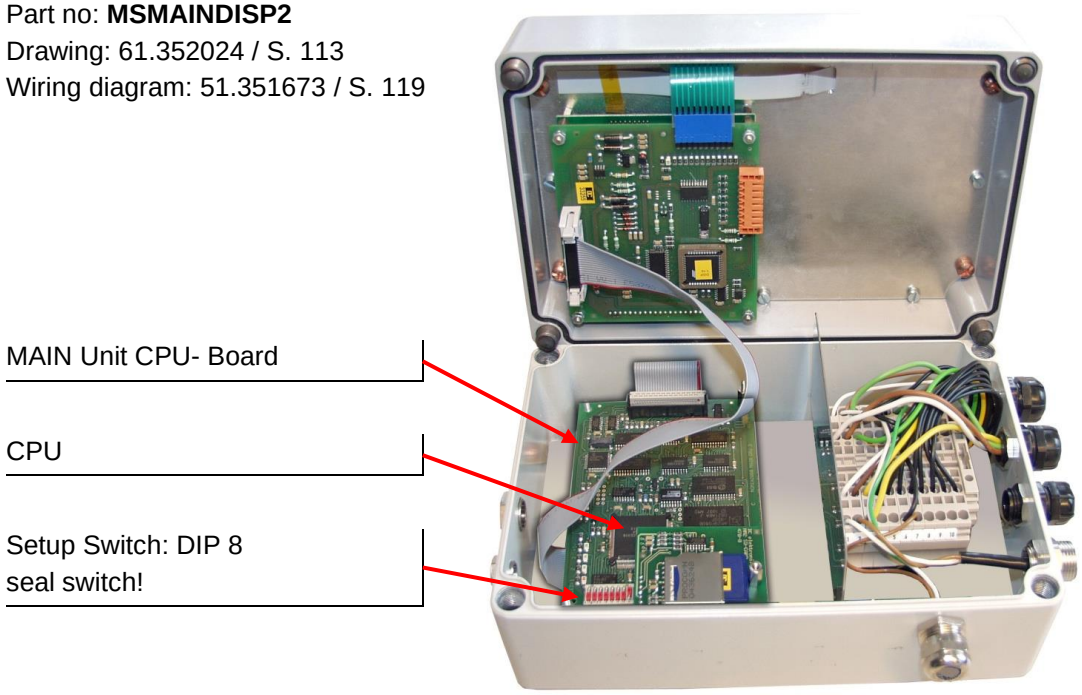


Figure 4: Display Interface 2 - MSMAINDISP2 / open - with SD-Card

To save space and weight the MultiSeal Main Unit, part no. **MSMAIN**, and the Display Interface, part no. **NM2DISPLAY**, are integrated in one box MSMAINDISP2.

The CAN-Bus connection between Main Unit CPU-board and Display CPU-Board is done internally in the molded common power supply. At the same time also the Main Unit CPU-Board was changed to a new type.

The main changes are:

- Bigger memory for the logbook
- An 8-pin dipswitch has been integrated. Now the setup switch is the dipswitch no. 8 (see also drawing no. **51.351675** / page 119).
- 2 additional LED's have been integrated (not relevant for MultiSeal)

☞ The wiring of Main Unit / Display has to be done according to drawing no. **51.351673** / page 128.

3.1.6 Wet leg sensor interface (NM2WET2)

Part no: **NM2WET2**
Drawing: 51.351334 / S. 120
Wiring diagram: 51.351346 / S. 120

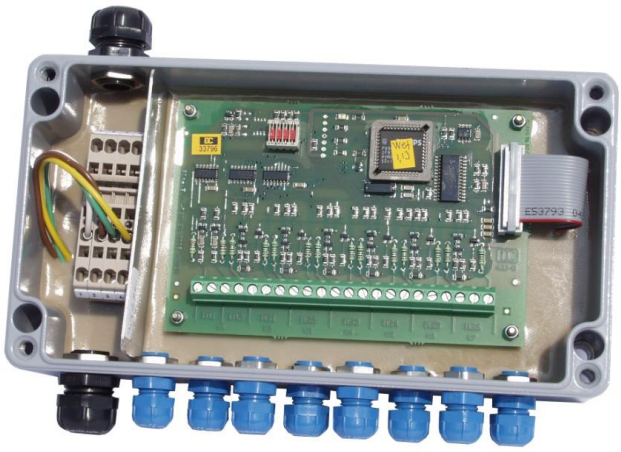


Figure 5: Wet leg sensor interface - NM2WET2

The wet leg sensor interface (part no. NM2WET2) analyses the fill status of the tank compartments via the wet leg sensors (part no. NS-2E/NS-2F) which have been installed in the pipe work of each individual tank compartment or directly in the API-couplings. The status of the compartment can be either empty or not empty/remainder. When a compartment is not empty, no instructions concerning the remaining product volume can be entered. Short-circuits and breaks, such as disconnecting the supply plug, result in the tanker compartment being unsealed. The status of the wet leg sensors or the changes in status are sent via the internal CAN bus to the main unit for further processing.

Apart from the wet leg sensor connections, there are two intrinsically safe inputs in the wet leg sensor interface. The first input is for connecting the main pneumatic pressure switch, part no. NM2DSS. The pressure switch detects whether the pneumatic system is being supplied with compressed air. This information is similarly sent over the internal CAN bus to the main unit.

Wet-leg sensor interface 2

Tanker vehicles comprising more than 6 compartments need to have a second wet-leg sensor interface that is also connected to the internal CAN bus. The address (node number) of the second or even the third wet-leg sensor interface must be set by using the DIP switch on the CPU board.

The node number of the wet-leg sensor interface is factory-set to node number 1 at the time of delivery. This node number remains valid provided

only one wet-leg detector interface is installed or when it is the first of a possible four.

- Node number 2 must be set for the second interface, and node number 3 must be set for the third interface, etc. in accordance with the following table.

Node number	DIP Switch no. 1 [2^0]	DIP Switch no. 2 [2^1]	DIP Switch no. 3 [2^2]
1	OFF	OFF	OFF
2	ON	OFF	OFF
3	OFF	ON	OFF
4	ON	ON	OFF
5	OFF	OFF	ON
6	ON	OFF	ON
7	OFF	ON	ON
8	ON	ON	ON

3.1.7 SPD sensor interface - MSSPD-N2

Part no: **MSSPD-N**
Drawing: 51.351706 / S. 115
Wiring diagram: 51.351347 / 121

Part no: **MSSPD-N2**
Drawing: 51.351334 / S. 116
Wiring diagram: 51.351346 / S. 122

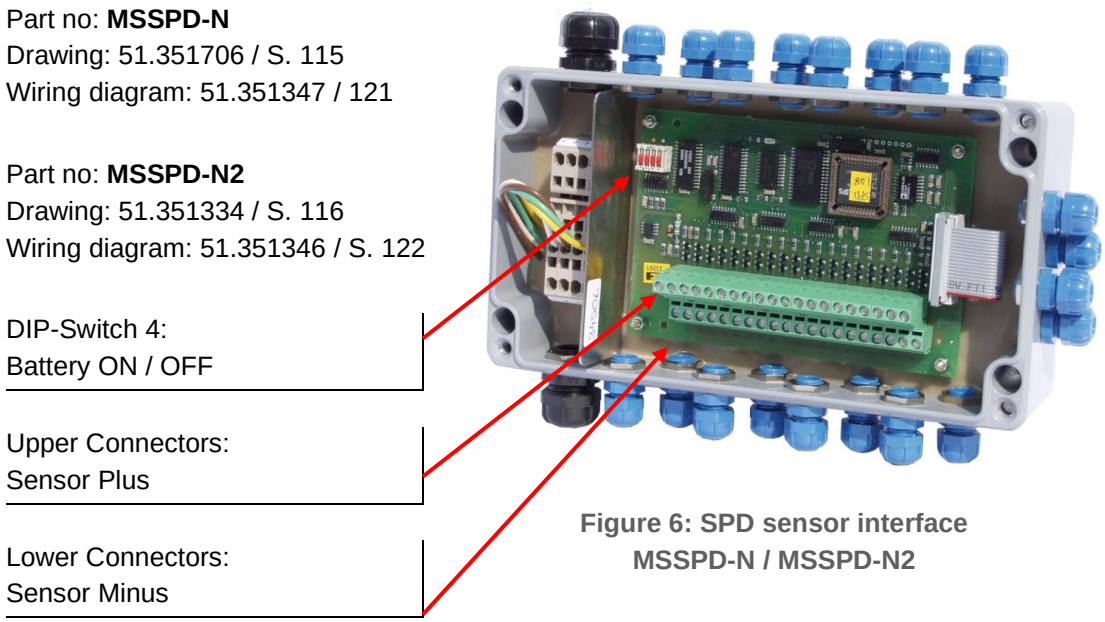


Figure 6: SPD sensor interface MSSPD-N / MSSPD-N2

By means of the SPD Sensor interface the openings through which the product can be removed are monitored via connected SPD sensors as required.

Second SPD sensor interface

On tank trucks which require more than 20 SPD sensors, it is necessary to install a second SPD sensor interface. This is also connected to the internal

CAN bus. The address (node number) of the second or even the third SPD sensor interface must be set using the DIP switches on the CPU board.

The node number of the SPD sensor interface is factory-set to node no. 1 at the time of delivery. This node number remains valid when only SPD sensor interface is installed or when it is the first of a possible four.

- Node number 2 must be set for the second interface, and node number 3 must be set for the third interface, etc. in accordance with the following table.

Node number	DIP Switch No. 1 [2^0]	DIP Switch No. 2 [2^1]	DIP Switch No. 3 [2^2]
1	OFF	OFF	OFF
2	ON	OFF	OFF
3	OFF	ON	OFF
4	ON	ON	OFF
5	OFF	OFF	ON
6	ON	OFF	ON
7	OFF	ON	ON
8	ON	ON	ON

3.1.8 Printer (DR-295 / DR 298)

Part no: **DR-295 / DR-298**

The system is delivered with the printer DR-U295 or DR-298 as on option, the operation of which is described below. Printer-specific special features are described separately.

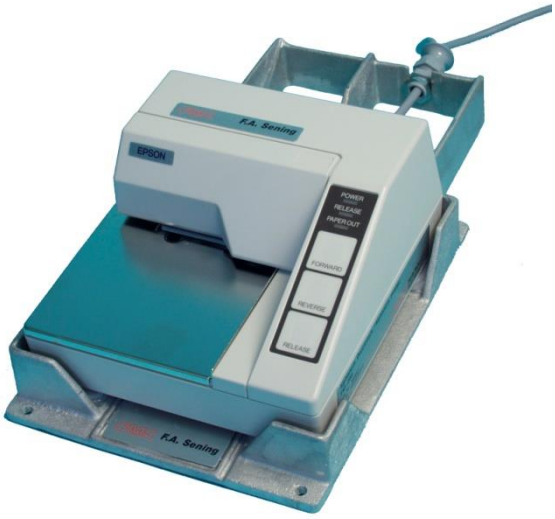


Fig. : Printer - DR-295

Turn on the printer using the power switch on its left side.

Only the latest printer models have this switch.

The printer is ready for printing when the **POWER** light is on.

Paper can be inserted only when both the **POWER OUT** and **RELEASE** lights are on.

- The **PAPER OUT** light is on when no paper is inserted in the printing section of the print head.
- The **RELEASE** light on indicates that the print head is lifted and the printer is in the paper release mode.

☞ Press the **RELEASE** button to lift the print head.

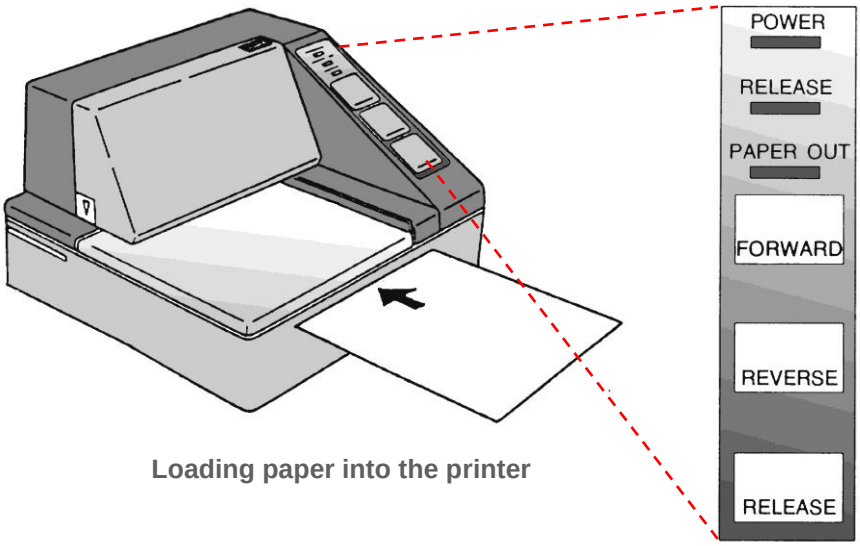
☺ The **RELEASE** light then indicates that the paper has been released from the print head, and may now be inserted or removed.

☞ Insert the paper from the front (see illustration) using the guiding rail on the right side until it is stopped by the form stopper.

☺ The **PAPER OUT** light goes out.

☞ Press the **FORWARD** button (**DR-U295**) or wait for max. 5 seconds until the paper is fed automatically (**DR-298**).

☞ The print head is lowered fixing the paper. The **RELEASE** light goes out and the printer is now ready to print.



Loading paper into the printer

Control Board of the Printer

🛠 You should not use paper that is perforated at the sides. The perforation indicates "PAPER OUT", so that printing is interrupted.

3.1.8.1 Printer configuration DR-295

☞ The following factory settings should be checked on the printer:

Switch	Position	Function
SW-1	ON	Ignore transmission error
SW-2	OFF	Input buffer 512 byte
SW-3	ON	Handshake XON/XOFF
SW-4	OFF	8 Bit
SW-5	OFF	Parity even
SW-6	ON	
SW-7	OFF	9600 Baud
SW-8	OFF	
SW-9	OFF	Pin6 Reset deactivated
SW-10	ON	Pin 25 Reset deactivated

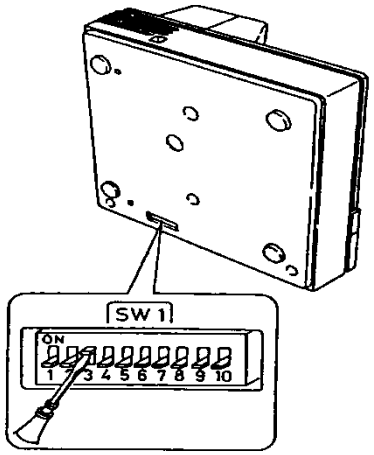


Table : Printer configuration DR-295

3.1.8.2 Printer configuration DR-298

The switches that determine the operating mode of the DR-298 are located in the interior of the unit (see manual).

☞ The following factory settings should be checked on the printer:

Switch	Position	Function
SW-1	ON	9600 Baud
SW-2	ON	
SW-3	ON	8 bit
SW-4	ON	Parity even
SW-5	ON	
SW-6	OFF	Handshake XON/XOFF
SW-7	ON	Printer mode ESC/POS (295)
SW-8	OFF	
SW-9	OFF*	Pin6 Reset deactivated
SW-10	OFF*	Pin 25 Reset deactivated

* switch setting arbitrary

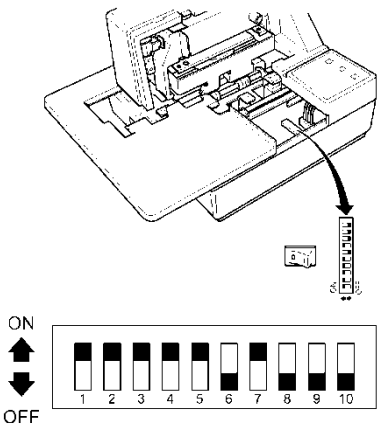


Table : printer configuration DR-298

3.1.8.3 Ink ribbon replacement

☞ Please remove the cover.

✍ The cover has a grip in the top right-hand corner and arrow markings in the bottom, rear, left-hand corner. Pull gently and the covering comes off easily.

- There is a black cassette containing the ink ribbon behind the cover.
- The ink ribbon cassette is easiest to pull out when the printer is in **RELEASE** and **PAPER OUT** status.
- The release status is indicated by the **RELEASE** lamp.

☞ If the lamp does not light up, please press the RELEASE button.

- Now pull the cassette gently by the grip towards the front until you feel it come loose.
- Move the cassette carefully towards the front so that the ink ribbon can be pulled away under the transport rollers.

☺ You can now insert the new ink ribbon cassette.

☞ Please tighten the ink ribbon a little before installation by turning the left-hand drive wheel for DR-295 or right-hand wheel for DR-298 in the direction indicated by an arrow.

- Please observe when inserting the cassette that the ink ribbon is threaded underneath the pressure rollers.
- Please press in the cassette until the pin on the back of the printer clicks in.
- Tighten the ribbon after the insertion once more on the drive wheel.
- Refit the cover.

✍ The ink ribbon cassette can be obtained from F.A. Sening:
DR-295 : Order no. **7100031**
DR-298 : Order no. **7100157**

3.2 Mechanical components

§ **As a matter of principle, exclusively mechanical components by F.A. Sening, including the sensors, may be used. The use of competitors' products will render the warranty null and void!**

3.2.1 Wet leg sensor (NS-2F)

Part no: **NS-2F**
Drawing: 51.351307 / S. 126
Wiring diagram: 51.351346 / S. 120

Fig. 7: Wet leg sensor - NS-2F

☞ The wet leg sensors (part nos. **NS-2F**) are to be installed with the aid of the welded nozzles at the lowest points of the piping that are still part of the respective compartments.

☞ This lowest point is located on the underside of the pipe in front of the flange of the line valve (as seen from the foot valve) or in the loading coupling.

☞ The wet leg sensors must always be installed vertically from below.

☞ The wet leg sensors are electrically connected with the terminals of the wet leg sensor interface.

If necessary, the detection level of the **NS-2F** wet leg sensors can be adjusted with the aid of different intermediate bushes. To increase the detection level, the bush has to be shortened with a lathe, or it can be left out completely.

For tank trucks with double-sided discharge and two wet leg sensors per compartment there is one of the sensor in the API coupling. The second in front of the outlet connection at the lowest point of the pipe on the opposite side.

3.2.2 Main pneumatic pressure switch - NM2DSS

Part no: **NM2DSS**
Drawing: 51.351438 / S. 124
Wiring diagram: 51.351346 / S. 120

Figure 8: Pneumatic switch - NM2DSS

☞ The pneumatic “main air pressure switch“ (part no. **NM2DSS**) is pneumatically connected behind the master switch.

☞ The electrical connection is at the first input into the first wet leg sensor interface (see diagram no. **51.351346** / page 120).

The pressure switch registers that the tank trucks pneumatic system is being supplied with compressed air.

All pressure switches must be installed with air connections pointing vertically / diagonally downwards.

3.2.3 API coupling (VKV1M-I)

Part no: **VKV1M-I**
Drawing: 51.251945 / S. 133

Figure 9: API coupling, pneumatically operated with proximity switch / VKV1M-I

The pneumatically operated API coupling, type VKV1M-I, is used in tank trucks which load and discharge through the API coupling. The opening of the coupling is monitored by an inductive proximity sensor.

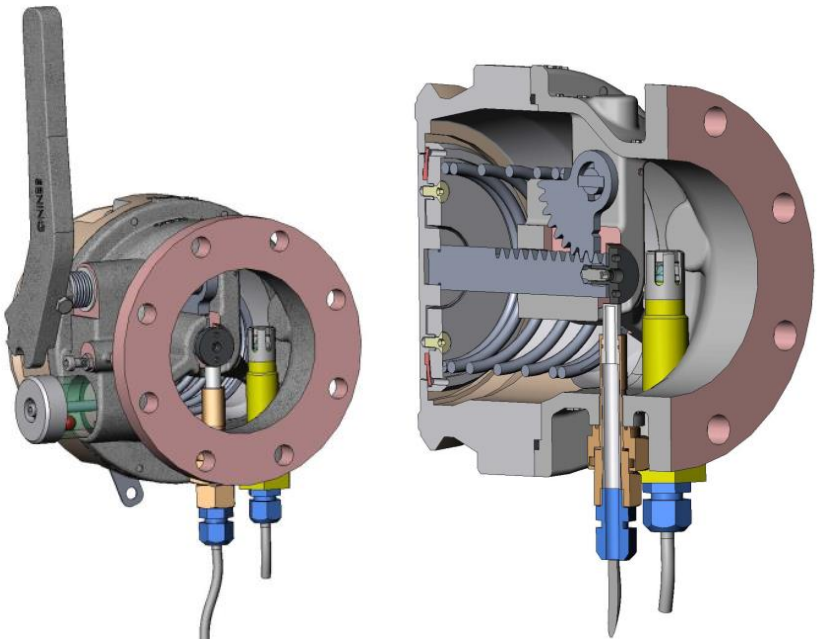


Figure 10: Cross-sectional view of the API coupling/ VKV1M-I

The lever API coupling, type VKV1M-I, is used in tank trucks which load and discharge through the API coupling. The opening of the coupling is monitored by an inductive proximity sensor.

3.2.4 Manlid cover with manlid sensor - MSDDST

General:
The manlid sensor has to be installed in a way that when the manlid is opened the sensor bolt remains in the “pulled” position (see the following picture).

Part no: **MSDDST**
Drawing: 51.251133 / S. 131

The opening of the manlid cover including the level gauges (when fitted) is similarly monitored by inductive proximity sensors (optional installation).

(Example)

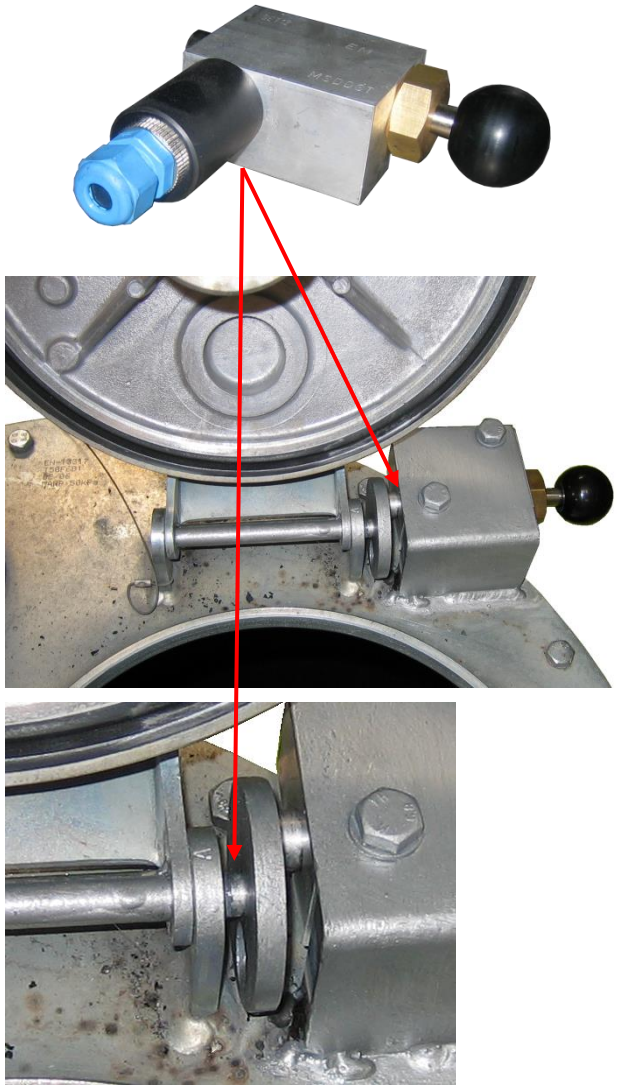


Figure 11: Manlid cover sensor MSDDST (Example)

3.2.5 Foot valve (BO100-SPD) with air pressure switch (MSDSO)

Part no: **BO100-SPD**

Part no: **MSDSO**

Figure 12: Foot valve (BO100-SPD) with air pressure switch (MSDSO)

The supervision of the foot valves (open or closed) takes place by means of a pneumatic pressure switch.

3.2.6 Line valve (DV100-4-SPD)

Part no: **DV100-4-SPD**
Drawing no.: E51.252376 / p.134

Figure 13: Line valve (DV100-4-SPD)

- The in-line valve DV100-4-SPD is used to start and to stop the delivery. The opening is also monitored by an inductive proximity sensor.
- If discharge should not go through the API coupling, the line valves on the other side of the truck can be used instead (not standard procedure).

3.2.7 Cabinet door sensor (RFID)

Part no: **RFID**
Drawing: 51.351985 / S. 130

Figure 14: Sensor RFID

- The RFID cabinet door sensor is part of the MultiSeal system and ensures tamper-proof monitoring of the valve cabinet doors on tank trucks.
- The transponder system consists of the reader and the transponder. Both are installed in Zone 1 in the cabinet of the tank car. The isolated Namur-sensor output of the reader is connected to the SPD-Sensor Interface.

4 Installation

§ **The installation of the system to a road tanker may only be carried out by a qualified company.**

☞ This qualified company carries out and tests the whole system according to the testing criteria set out in the operation and installation instructions. The correct fitting of the system is to be certified.

☞ Apart from the points outlined in the following, all the relevant regulations, such as IEC / EN 60079-14, must be observed during installation, operation and maintenance. Only if the instructions below are followed, long and trouble-free operation can be ensured.

4.1 Preventative measures

4.1.1 To avoid accidents (due to gas explosions)

Ex-protection regulations must be observed!
If cable glands at junction boxes has to be changed, only Ex approved cable glands shall be used.

The entire assembly is explosion-protected, tested and certified for electrical safety. Instructions on explosion advice signs must absolutely be observed. In case of malfunction, the defective unit may be replaced as a whole unit only.

The printer is intended for use outside explosion risk areas only. To protect it from the effects of the weather, it should preferably be installed in the cabin.

4.1.2 To meet the standard requirements

- The wiring must be implemented according to the attached wiring diagrams. The core colors correspond to those in DIN 47100 (see also national standards). Please observe without fail the prescribed core colors.

- Carry out the electrical installation in accordance with IEC / EN 60079-14 (see also national standards).
- It is not permissible to fit additional components into the housing or in the terminal box (e.g. additional terminals), since this would contravene the device approval.
- The Manufacturer's EMV Declaration of Conformity is only valid if the system has been installed exactly according to the manufacturer's instructions (Operation and Installation Instructions).

4.1.3 To ensure trouble-free operation

- When carrying out welding work on the vehicle, please disconnect current supply to all electronic components.
- The lead entries must always be mounted at the side or underneath in order to prevent the ingress of water into the housing.
- Unused PG glands on the terminal box or on the MultiFlow must be closed off watertight using blind plugs.
- The terminal and electronics boxes as well as the connectors must be protected against direct water spray (e.g. from the tires).
- All cables must be routed such that they are not damaged or kinked.
- The supplied blind plugs must be used on **AI** terminal boxes.
- In the **AIII** version all wire ends must be fitted with wire-end sleeves. No wire-end sleeves are required in the terminal box (only version **AI**).
- All electrical connections are implemented in either screw-secured plug-in connectors or terminals. The leads must be introduced into the housing through PG glands appropriate to the lead cross-section.
- The solenoid valves must be mounted upright, i.e. the solenoid coil must point upwards.
- For each fitting, a reliable electrical connection that meets the standard must be provided between any metal casing and the vehicle chassis. For this, corrosion resistant screws (V2A) with additional shake proof washers are to be used.

🛠 When shortening the cores, observe that absolutely no cable debris falls into the opened device, since this might lead to short-circuits on the PCB board.

🛠 Never produce a connection between the housing/sheath and the 0V strip. Failure to observe this point can give rise to malfunctions.

4.1.4 To facilitate future service work

- Terminal boxes should be fitted allowing easy access.
- The housings of the electronics system should always be accessible.
- Cables without connectors may be shortened.
- The cover mounting screws should be slightly lubricated before fitting (copper paste, graphite grease). Thus corrosion of the screws after long periods of operation is prevented and easy unscrewing enabled.

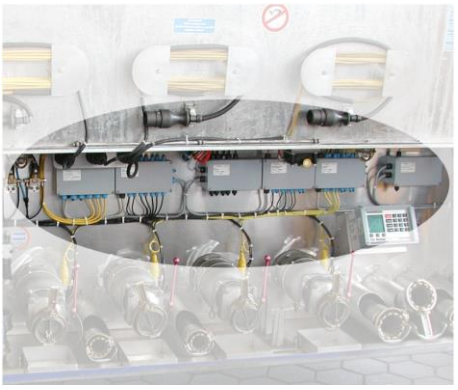
4.2 Routing the Cables in the Vehicle

The device/system is intended for use in a vehicle only.

To ensure fault-free operation, the guidelines described in the sections above must be observed on installation. If these guidelines are not observed, faults may occur.

§ If it can be proved that guidelines were not observed, or installation was carried out by unqualified personnel (violation of applicable regulations) we assume no liability for the malfunctions experienced and any further claims that may arise thereof.

All cables used must be fuel-resistant. For cabling in an area that is not intrinsically safe, explosion-grade cable must be used! For wiring the battery supply and the internal CAN bus the enclosed instructions part no. NM2KABEL only may be used..



Installed devices in the Tank Truck

All cables must be laid (protected) in such a way that they are not damaged, nor the operators injured, as a result of normal operation and use.

☞ Please lay a separate supply cable from the voltage source.

☞ Please use a cable of ≥ 1.5mm² cross-section.

☞ The cable need not be shielded.

☞ Tap off the voltage of +24V directly from the battery positive pole (Terminal 30) via a fused line using a lead fitted with a separate switch.

☞ Protect the system with an 8 A fuse.

☞ Obtain the +24V voltage through a secured cable directly from the battery's plus pole.

☞ Use this voltage supply only for the device/system.

☞ If the system is switched off via a switch, the switch must be placed in the +24V supply line only.

☞ The 0V line must not be switched.

☞ Never supply the printer with external voltage.

E X P L O S I O N H A Z A R D

Any kind of manipulation, either mechanical or electrical, is prohibited!

4.3 Maintenance

The devices must not be modified mechanically or electronically in any way.

🛠 During cleaning with a steam cleaner or with pressurised water, the devices should be protected from the water jet. Never aim the steam jet directly onto the devices!

§ We cannot accept responsibility for any damage caused by moisture in the equipment as a result of improper cleaning procedures.

For all devices, a regular safety check in accordance with industrial safety regulations must be carried out. Equipment and protective systems which fall under the scope of EC Directive 94/9/EC and are operated in hazardous areas are also classified installations. The standard IEC / EN 60079-17 shall be observed and there could be other country-specific policies applicable.

4.3.1 Maintenance plan

	daily	weekly	monthly	annually
Clean the outside of the device			**X**	
Visual testing	**X**			
Checking the LED `s				**X**
Examination of the case mounting for tight fit		**X**		
Check the cable and check function with GWG		**X**		

4.4 Checking functionality

Once the entire installation is complete, a full functions test must be carried out in addition to the setup tests as described in section chapter 6.1.7 "Test menu" / page 76. To do this a complete cycle of delivery, load and discharge should be simulated. Compare also Driver’s Quick Guide, DOK-417.

4.5 Mechanics

The installation of the API couplings etc. must be carried out as set out above and will not be described further.

4.6 Electronics

The main unit and the relevant interface assembly units, including the display interface, have to be installed in an instrumentation box on the trailer. The battery supply is conducted via the trailer cable, and data exchange with the printer is carried via the printer interface or via the “external“ CAN-Bus to the EMIS2 interface, to which an on-board computer is connected.

Detailed information about the installation of the EMIS2 interface you will find in the EMIS2 Instruction Manual DOK-447E as well as in the MultiSeal Instruction Manual DOK-416E.

4.6.1 Battery / Internal CAN Bus Wiring

For wiring the battery supply and the internal CAN bus between the main unit and all interface component assemblies only the cabling (part no. NM2KABEL) may be used. The shielding on the wiring is only there for mechanical protection - it serves no other purpose.

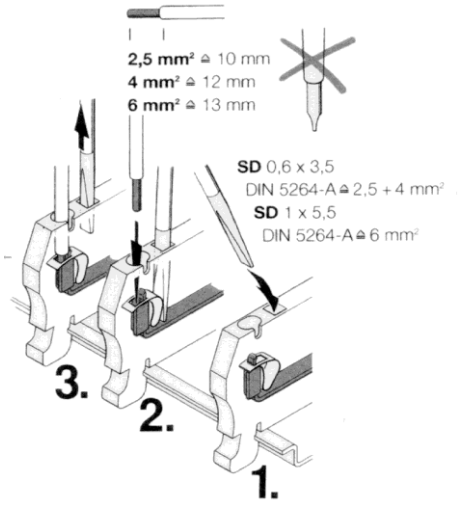
The MultiSeal main unit and the relevant interface component assemblies are to be connected depending on the variation and extension level, according to the following wiring diagrams:

Wiring Diagrams	Diagram Number.:	Page
Main unit detailed wiring diagram	51.351351	117
Display interface detailed wiring diagram	51.351352	118
Main Unit / Display detailed wiring diagram	51.351673	119
Wet leg sensor interface detailed wiring diagram	51.351346	120
SPD sensor interface detailed wiring diagram	51.351347	121

Additionally a corresponding wiring diagram should be attached to each casing lid, or the molded power supply of the display interface.

The terminal blocks for the battery, printer and CAN bus wiring have no screw-in contacts, but they are fixed with a spring clamp. The wires are no longer screwed in, but simply inserted from above.

To open a spring clamp, a screwdriver with a blade width of 2.5 mm is required



The following steps are necessary for secure connection of cores (see figure on the right):

- Crimp the core insulation.
- The use of ferrules is not required.
- Using the screwdriver depress the spring on the clamp.
- Insert the core into the open clamp.
- Remove the screwdriver.
- Test that the contact is solid by pulling on the core.

Warning:
The display interface must always be fitted with right-hand PG-screws. The display may never be situated above the terminal block!

☞ The order in which the interface component assemblies are connected to the main unit is preferably e.g.:

▶ **Example 1:**

❶ Main Unit (NM2MAIN) ↔
❷ Display-IF (NM2DISPLAY) ↔
❸ Restm. S.-IF (NM2WET2) ↔
❹ SPD-IF (MSSPD-N2)

or:

▶ **Example 2:**

❶ Main Unit (NM2MAIN) ↔
❷ SPD-IF (MSSPD-N2) ↔
❸ Restm. S.-IF (NM2WET2) ↔
❹ Display-IF (NM2DISPLAY)

4.6.2 Sensor contacts

4.6.2.1 Wet leg sensor interface

The wet leg sensors of type NS-2E or NS-2F in a single tanker compartment (max. 6) and the pneumatic main compressed air switch are to be connected as per diagram no.. 51.351346 (See also the wiring diagram attached to the casing lid).

☞ Set the node numbers for each device according to the following table:

Node Number	DIP Switch No. 1 [2^0]	DIP Switch No. 2 [2^1]	DIP Switch No. 3 [2^2]
1	OFF	OFF	OFF
2	ON	OFF	OFF
3	OFF	ON	OFF
4	ON	ON	OFF
5	OFF	OFF	ON
6	ON	OFF	ON
7	OFF	ON	ON
8	ON	ON	ON

4.6.3 Printer Connection

4.6.3.1 Permanently Installed Printer Connection (standard)

A printer that is permanently installed in the cabin is connected to the main unit's printer port via the trailer cable including the relevant terminal boxes. The supply of data from the trailer is carried via the trailer cable. The printer is protected by a 2 A fuse which is included in the trailer cable junction box.

4.6.3.2 Temporary Printer / Laptop Connection (optional)

In the case of the permanent printer connection not being provided in the cabin, an external printer in a portable case (CSI-DR-K) is available from F.A. Sening and can be connected via the printer connection socket part no. **SPD-DR-KA2**. It is also possible to connect a laptop to the printer connection socket.

The printer / laptop is <u>not</u> allowed to be used in explosion risk areas. The printer connection socket must be installed outside the explosion risk space. In order to connect the printer case / laptop, any voltage in the system must be switched off. The laptop may only be powered from its internal accumulator.

The cable connector to the main unit needs to be installed safely out of reach from water splashes.

5 Setting up

☞ Before switching the equipment on for the first time, please ensure once more that the wiring is connected correctly and seated properly.

☞ Insert the fuse to provide the MultiSeal system with voltage.

☹ If there is no indication (text) on the display interface, or not all LEDs in the main unit and the interface component assemblies are lit to indicate supply voltage,

☞ switch the equipment off **immediately** and check the entire wiring.

☺ If everything is correctly connected, the display shows e.g. the following function indication, and all LEDs indicating supply voltage in the main unit and all interface component assemblies are lit.

EMPTY

Tanker status

Status:

(conn., Disch., Load., SEALED, 2L-SEAL., 2D-SEAL.)

Content of compartments**:**

(KERO ; DERV ; SUP ::.)

Compartment number

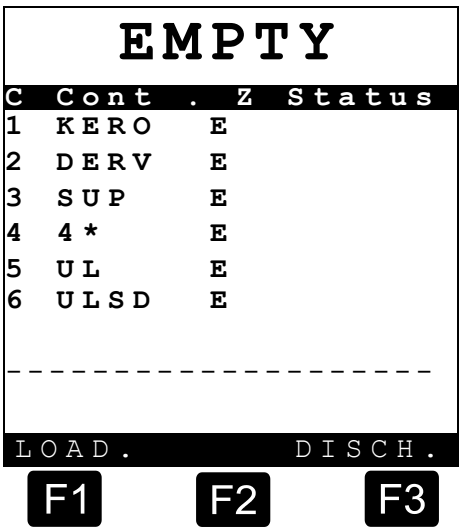
(1, 2, 3, 4, 5, 6)

LOAD.:

With **<F1>** → Loading mode

Dischar.

With **<F3>** → Discharge mode



☞ Once the pneumatic filling and delivery switches have been installed, there is no longer any need to switch between filling and delivery mode using function keys **<F1>** and **<F3>.**

6 Main Menu

The main MENU has the following appearance

☞ By pressing the **<MENU>** key you can get into the MultiSeal main MENU.

☞ By pressing the **<number key>** (for example **<1>** through **<8>)**, that precedes each function, you can get into the corresponding sub-menu.

☞ By pressing the **<F1>** key the command "**BACK**" is carried out; you revert to the normal function display.

Explanation of the sub-menu

1-Setup	→	chapter 6.1 / page 45 MultiSeal setup (not relevant for operational purposes)
2-Bplan	→	chapter 6.1.3 / page 74 Inputting the filling schedule (uncoded bottom filling / top filling)
3-LOG	→	chapter 6.1.4 / page 74 Retrieving and displaying the MultiSeal logbook (Bypassing the MultiSeal functionality)
4-Ereign.	→	chapter 6.1.5 / page 75 Retrieving and displaying recorded events that are saved in the events logbook (SPD) (SPD functionality)
5-Uhr	→	chapter 6.1.6 / page 76 Displaying the date and time
6-Test	→	chapter 6.1.7 / page 76 Selecting the Test MENU
7-Chip-Karte	→	chapter 6.1.7 / page 76 Selecting the Chip-card MENU
8-Debug	→	chapter 6.1.7 / page 76 Selecting the Debug MENU

6.1 SETUP MENU

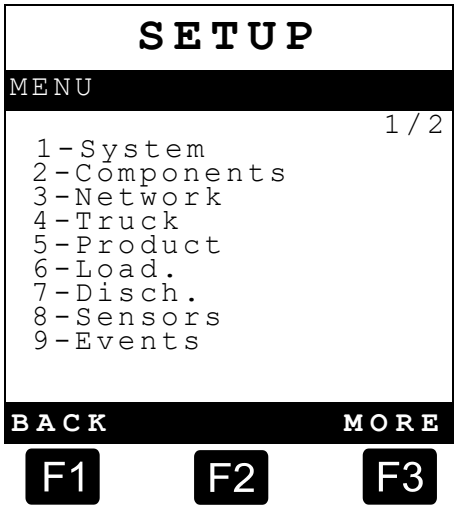
6.1.1 General

When setting up the MultiSeal Systems, "the tank builder" must adapt the system to suit the corresponding tanker. This takes place in the **"SETUP"** / **"Settings"** menu, which in turn has further sub-menus.

Explanation of the sub-menu

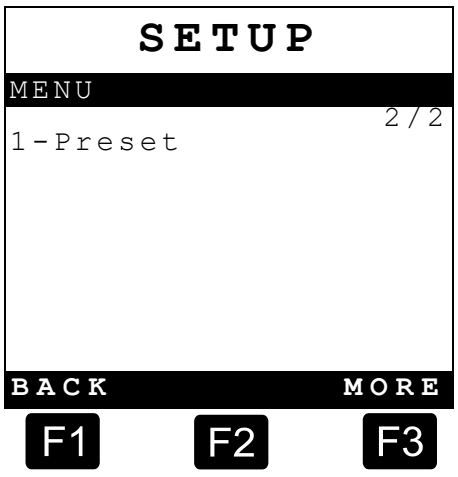
☞ By pressing the **<number key>** that precedes each function, you can get into the corresponding sub menu.

☞ If **'1/2'** is shown at the top of the display and **"MORE"** is visible above the **<F3>** key, this means that there is also a second Setup page; it is selected by pressing the **<F3>** key.



SETUP-Schalter

In order to ensure that safety parameters cannot be changed willfully, certain parameters can only be altered by changing a hardware switch in the main unit (see diagram no. **51.350371**). The SETUP switch is the 8th DIP switch on the MAIN CPU board. If the corresponding red LED is illuminated, the setup is freely-selectable and all parameters can be changed..



Depending on the tanker equipment, some of the sub-menus may not to be visible.

Explanation of the sub-menu

1-System	→	chapter 6.1.2 / page 49
2-Components	→	chapter 6.1.2.2 / page 54
3-Network	→	chapter 6.1.2.3 / page 54
4-Tanks	→	chapter 6.1.2.4 / page 57
5-Product	→	chapter 6.1.2.5 / page 60
6-Load.	→	chapter 6.1.2.6 / page 64
7-Discharge	→	chapter 6.1.2.7 / page 66
8-Sensors [1]	→	chapter 6.1.2.8 / page 66
9-Events	→	chapter 6.1.2.9 / page 71
1-Pre-settings	→	chapter 6.1.2.10 / page 72

If parameters relevant to safety are changed in the Setup by a qualified company, the function tests relevant to these changes must be carried out again.

§ The regulated installation of the Setup must be certified by a qualified company and recorded on a relevant form.

Caution:
When the installation is complete the switch must be turned off, i.e. the red LED goes out.

☞ Now only the parameters that are not relevant to safety can be altered by entering a password. After the main unit's lid is screwed down, a casing screw must be ***sealed with lead*** and marked with the company logo.

General procedure:

- If, for example, the SETUP Truck submenu has been accessed accidentally (wrong key was pressed), whereas a change was intended in the SETUP System, the SETUP Truck submenu can be quit immediately via the **<STOP>** key, without having to go through all the parameters.
- If you have advanced too far in one of the SETUP menus (**<F1>** key for Continue was pressed) and would like to change or review the previous parameter, you can step backward through the SETUP menu using the

[1] Nur bei SPD-Funktionalität

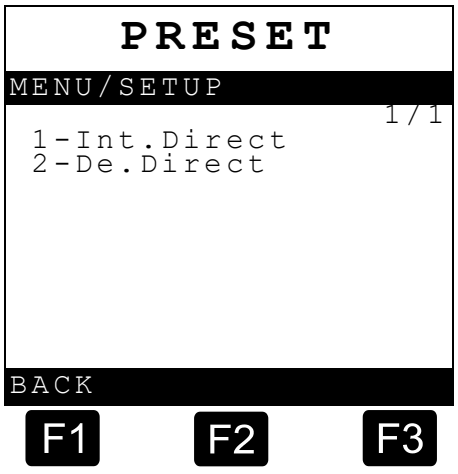
"**<-**" key or **<F1>** key. You do not have to run through all the parameters of the SETUP menu and then start again from the beginning.

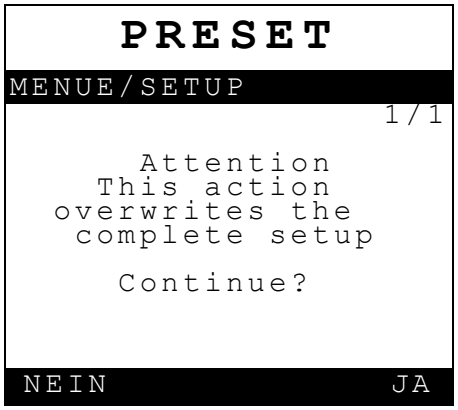
- For SETUP parameters that only require setting of a "**0**" or "**1**" in certain places, e.g. SETUP Products., Parameter: "used products", the setting can optionally be made with the numeric keys "**0**" and "**1**". The "**1**" key, for example, is pressed twice to change from "**00**..." to "**11**...". A change from, e.g. a setting of **"00..."** to a setting of **"11..."**, can be effected by pressing the **<numeric key> <1>** twice.
- Alternative procedure: After pressing the **<Enter>** key, select the parameter to be changed with the **<F1>** or **<F3>** key and change it with the **<F2>** key (switch-over) from "**0**" to "**1**" or from "**1**" to "**0**"..

In principle, in all setup menus the parameters are changed or adjusted according to the instructions in the respective display. As the first step, a tank truck type should be pre-selected in Setup 9 that is closest to the tank truck being processed. This will correctly set most SETUP parameters. Some parameters will have to be adjusted for the individual tank truck.

Parameters in Setup Presets

The numeric keys can be used to select the respective tank truck type. The following display will appear:





The function keys **<F1>** and **<F3>** can be used to execute the functions shown in the last row of the display:

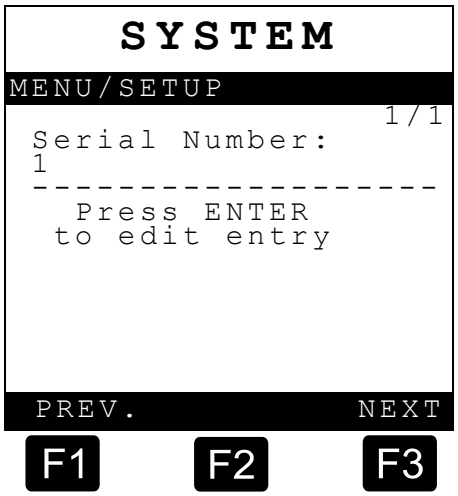
F1 F2 F3

chapter 6.1.2.10 "Presets (Tanker Types)" / page 72

Example for a setup change in other submenus:

With the function keys **<F1>** and **<F3>** you can execute the functions that are displayed on the bottom line at the time:

- **<<F1>** = PREV. → Back to the previous setup parameter
- **<F3>** = NEXT → Forward to the next setup parameter



Apart from the function keys **<F1>** and **<F3>** you can also go backwards to the previous or forwards to the next parameter by pressing the arrow keys on the keypad.

Changes:

Changes in the SETUP can be made in all the following setup sub-menus as follows:

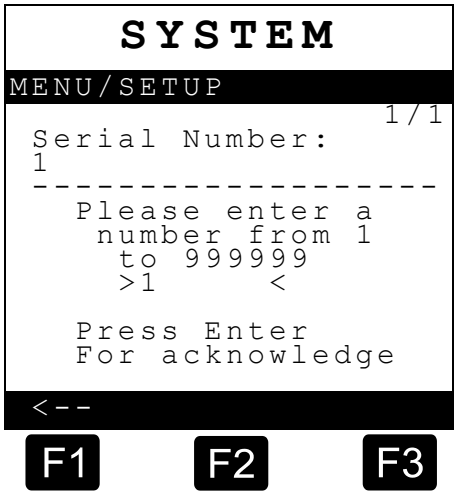
- Press **<ENTER>**

Follow the instructions to make changes

- Press **<ENTER>** to confirm changes

Example of a SETUP change of the serial number:

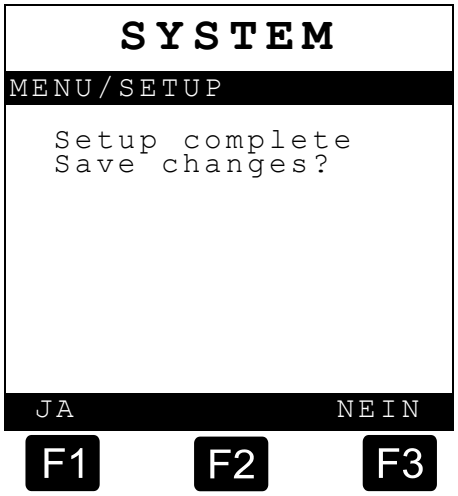
☞ Please enter a 6-digit number using the **<number keys>** and confirm by pressing **<ENTER>**.



☞ Once you have completed the setup or you have pressed the **<STOP>** key at the end of the setup, the following message appears:

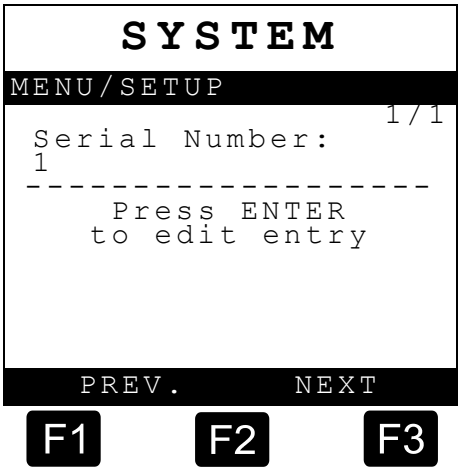
☞ With the function keys **<F1>** and **<F3>** you can execute the functions that are displayed on the bottom line at the time:

- **<F1>** = YES → Setup is saved; return to setup main menu
- **<F3>** = NO → Setup is run again



6.1.2 Setup System

☞ The setting takes place as described in chapter 6.1 "SETUP MENU" / page 45 (General Procedures).



Parameter description	Possible content	Security feature
Serial number	6-digit number	Switch
Tank Truck Identification	15-digit number	Password
Operation language	German	Password
	English	
	Russian	
Date order	**Day-month-year**	Switch
	Month-Day-Year	
Manual Sealing [2]	**YES** No. Man. Seals [2] / [3] at **Loading**	Switch
	YES No. Man. Seals [2] / [3] at **Discharge**	
	NO Limited	
Power OFF breaks seal [1]	**YES**	Switch
	NO	
Seal at Rest-amount [2] / [3]	**YES**	Switch
Automatic mode change	**YES**	Switch
	NO	
Printer access	**Exclusive access**	Switch
	Shared access	
	Network	
	Not installed	
Baud rate	9600	Password
No. of lines	55	Switch
No. of columns	35	Switch
Identification necessary	**YES**	Switch
	NO	
Customer No. necessary [4]	**YES**	Switch
	NO	
Password	5- digit number	Password

[2] Only with SPD functionality.
[3] Available from software version 1.70.
[3] Only visible if "Manually seals allowed" is set to <limited>.
[4] Available from software version **1.70** onwards.

6.1.2.1.1 Serial number

The serial number of the main unit (MSMAIN) has to be entered here.

- **Serial number:** The serial number of the Main Unit & Display …M2MAINDISP is entered as a 6-digit number here.

6.1.2.1.2 TKW identifier (identification)

The serial number of the fuel tanker identifier is entered here. This may be 15 digits in length and may contain letters and numbers.

6.1.2.1.3 Operating language

The operating language can be selected in this menu. Various languages can be selected, depending on which version is installed.

6.1.2.1.4 Date sequence

Here you can define the sequence in which the date should be displayed. There are 2 options available:

- <Day-Month-Year>: Enter (DDMMYYYY)
- <Month-Day-Year>: Enter (MMDDYYYY)

6.1.2.1.5 Manual sealing permitted

- If this parameter is set to **<YES>**, it is possible to distinguish between **<Number of Manual Seals while Loading>** and **<Number of Manual Seals during Delivery>**. That means that even if filling at the tank farm is interrupted, or if the delivery is split between two gas stations, a new seal can be applied manually. If set to **<NO>**, no 'Manual Sealing' is permitted.
- Indicates whether the compartments can be sealed manually in filling or delivery mode. If the parameter is set to **<YES>** or **<Limited>**, the user has the option of using the function keys to seal all the compartments that are not empty.

- **Yes:** Manual sealing permitted.
- **No:** Manual sealing n o t permitted.
- **Limited [1]:** Limited sealing permitted.

Comment

Note:
From software version 1.70 or higher, the *extended* function is available.

If the parameter is set to **<Limited>**, the parameters "**No. of man. seals during loading**" and "*No. of man. seals during delivery*" are visible.

This parameter is only visible with NoMix if a sensor interface is installed (see Setup components, Parameter "*Number of SPD sensor interfaces*") and if parameter '"*Seal compartments*" is set to **<YES>**.

The sealing of manually sealed compartments differs from automatically set seals in the status text, so a distinction can be made between different types of seals.

6.1.2.1.6 Switching off breaks seal

With MultiSeal the SPD sensors must be monitored continuously. To this end, the system is connected with the permanent power supply. The system should not be switched off during operation. If the setup parameter is set to **<YES>**, the seals of all compartments are broken if the system is switched off.

6.1.2.1.7 Automatic mode change

The 'Automatic mode change' can be enabled or disabled here using **<YES>** or **<NO>**.

6.1.2.1.8 Printer

- **Exclusive access:** only the MultiSeal system has access to the printer.
- **Shared access:** *) other devices apart from MultiSeal also have access to the printer.
- **Network:** *) The printer is connected to an on-board computer / TMC, for example, within a network. MultiSeal or others devices have no direct access to the printer.
- **Not installed:** no printer is installed.

**) Comment: These parameters are not yet supported by the October 2003 version of the software..*

6.1.2.1.9 Baud rate

The factory setting for the die F.A. Sening printer is as follows and should not be changed:

- **Baud rate**: 9600

If the printer data should be transferred to a laptop an individual baud rate of 4800, 9600, 19200, 38400, 57600 or 115200 can be used. For a quick

data transfer it is recommended to use the highest Baudrate of 115200. The MultiSeal Baud rate has to be the same as the laptop baud rate.

6.1.2.1.10 No. of rows / no. of columns

The factory setting for the die F.A. Sening printer is as follows and should not be changed:

- No. of rows**:** 55
- No. of columns**:** 35

6.1.2.1.11 Request identification

If this parameter is set to **<YES>**, the driver must enter several items of data to the MultiSeal at the start of each loading and delivering operation. They serve to enable the mode. Without these entries neither the loading nor the delivery mode can be accessed.

To enable, the driver must enter the following data:

- **Shift no.:** Format: max. 4 characters, numeric
- **Tour no.:** Format: max. 4 characters, numeric
- **Loading station or petrol station no.:** Format: max. 8 characters, numeric

- The shift and journey number are recorded in the event log and appear on the report printout.

6.1.2.1.12 Requesting a customer number

With **<YES>** or **<NO>**, it is also possible to decide if the customer number should be entered by the driver at the start of each filling and delivery mode. As with "Request Identification", refer to this point.

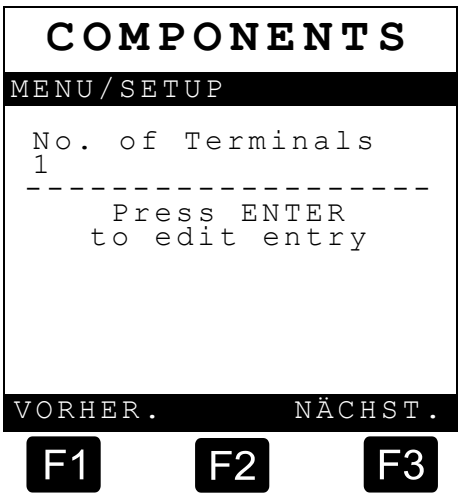
6.1.2.1.13 Password

Via the MultiSeal password, certain setup parts (non-safety-relevant parameters) can be changed. Other, safety-relevant parameters can only be changed after activating a hardware switch in the MSMAINDISP2 main unit.

- **Possible selection:** 5 numeric characters

6.1.2.2 Setup Components

☞ In Setup Components you can determine which and how many interface component assemblies are installed. The setting takes place as described in section chapter 6.1 "SETUP MENU" / page 45 (General Procedures).

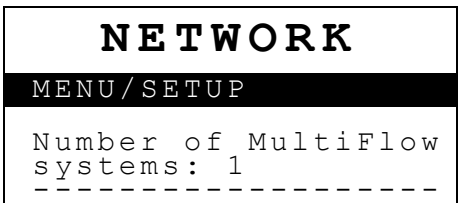


Parameter description	Possible content	Security feature
No. of Terminals	1 or 2	Switch
No. of Wet leg sensor-IF	1	Switch
No. of Overfill prevention amplifiers *)	0	Switch
No. of TAG-Scan-IF *)	0	Switch
No. Hallsensor-IF *)	0	Switch
No. of SPD Sensor IF	0 or 4	Switch
No. of level sensor IF	0 or 4	Switch
Echo Can frames to RS232	YES	Switch
	NO	
SPD-IF scan period in sec.	1 to 255	Switch

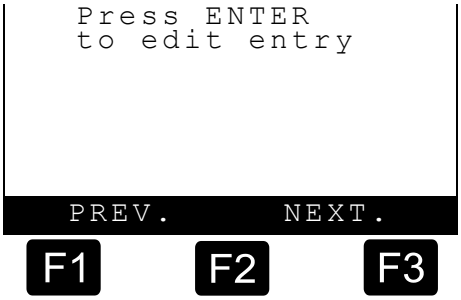
***)** *parameter not relevant for MultiSeal tank trucks. They have to be set to "0".*

6.1.2.3 Setup Network

The MultiSeal system also has what is referred to as an external CAN bus. This is a communication connection via which MultiSeal data can be sent to an EMIS interface. Via the EMIS interface, data can be transmitted to other devices, e.g. to an On-Board-Computer (OBC).



☞ Whether or not the MultiSeal system is connected to an EMIS interface is specified in Network setup. If **<YES>** is set, further detailed settings are required. The procedure is described in chapter chapter 6.1 "SETUP MENU" / page 45 (General procedure).



Parameter description		**Possible content t**	**Security feature**
MultiFlow number		0 to 2	Switch
0-2 →	MultiFlow No.1 node number:	0 to 31	Switch
MultiLevel installed		YES NO	Switch
YES →	MultiLevel node number:	0 to 31	Switch
EMIS2-Interface - communication		YES NO	Switch
YES →	EMIS2-node number:	0 to 31 Standard: 21	Switch
Parameter description		**Possible content**	**Security feature**
Save events		YES NO	Switch
Events sent to		21	Switch
Own node number		11	Switch
CAN bus connection required		YES NO	Switch

6.1.2.3.1 Number of MultiFlow units

▶ **Possible choice:** **0 to 2**

The number of conncted MultiFlow devices can be entered here.

6.1.2.3.2 MultiFlow node number

If a MultiFlow device is connected, the node number can be specified here. Several ECUs can be connected to the communication line (CAN bus) on a fuel tanker with MultiFlow communication. Every connected ECU has its own node number.

▶ **The MultiFlow node number is:** 0 to 31

6.1.2.3.3 MultiLevel installed

▶ **Possible choice:** Yes / No

Setting to show if a MultiLevel device is installed in the fuel tanker.

6.1.2.3.4 MultiLevel node number

If a MultiLevel device is connected, you can specify its node number here.

▶ **The MultiLevel node number is:** 0 to 31

6.1.2.3.5 EMIS2 interface communication possible

▶ **Possible selection**: YES / NO

Specifies whether or not an EMIS interface is installed on the tank truck.

6.1.2.3.6 EMIS2 node number

On a tank truck with EMIS2 interface communication, several electronic systems can be connected with the communication line (CAN bus). Each connected electronic system has its own node number.

▶ **EMIS2 node number:** 21

6.1.2.3.7 Save events

▶ **Possible selection**: YES / NO

If "yes" has been set, all events are registered and stored.

6.1.2.3.8 Events sent to

On a fuel tanker with EMIS interface communication, several ECUs can be connected to the communication line (CAN bus). Every connected ECU

has its own node number. If the MultiSeal events are to be transmitted to EMIS, the EMIS node number must be set:

▶ **Setting**: Events sent to: 21

6.1.2.3.9 Own node number

▶ **MultiSeal has node number** 11.

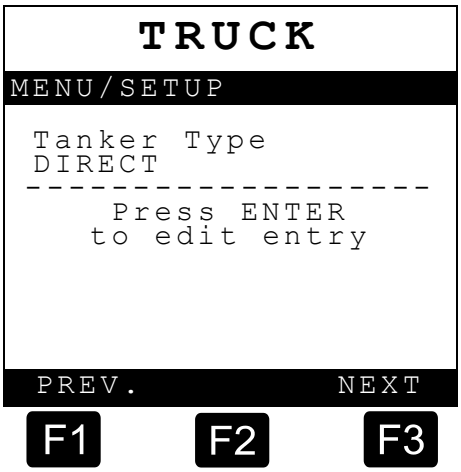
6.1.2.3.10 CAN bus connection required

▶ **Setting** = yes**:** It is imperative that the CAN bus connection between MultiSeal and EMIS2 is intact. Otherwise the complete system goes into fault state.

▶ **Setting**: = no: If a fault occurs in the CAN bus connection, MultiSeal continues to operate as a stand-alone system without EMIS2 connection.

6.1.2.4 Setup Truck

☞ Tank truck-specific parameters are set in Truck setup. The procedure is described in chapter chapter 6.1 "SETUP MENU" / page 45 (General procedure).



Parameter description	Possible content	Security feature
Tank truck type	Direct Meter *)	Switch
Number of compartments	1-12	Switch
Number of overfill preventions	0-4	Switch

Parameter description	Possible content	Security feature
Air pressure switch installed	YES NO	Switch
2nd wet leg sensors	NO in pipe in compartment	Switch
Hose supervision	YES NO	Switch

**) parameter not relevant for UK/US tanker.*

6.1.2.4.1 Tank truck type

The difference in relation to the MultiSeal system between a direct delivery fuel tanker and a measuring system fuel tanker is that in the direct delivery fuel tanker, the in-line valves on the delivery side also need to be monitored.

6.1.2.4.2 Number of compartments

Set the number of compartments here.

▶ **Possible selection**: 1 to 12

6.1.2.4.3 Number of overfill preventions

Set the number of overfill preventions here.

▶ **Possible selection**: 0 to 4

6.1.2.4.4 Pneumatically operated switch present

▶ Setting: „Yes“

By means of the main pneumatic switch, set to 3.2 bar, Part No. NM2DSS, the MultiSeal system recognizes that a sufficiently high level of air pressure is present. It is only possible to switch from the transportation screen to the filling or delivery mode using the operator keyboard or additional filling and pneumatic delivery switches if there is sufficient pneumatic pressure in the system.

The main compressed air switch is connected pneumatically directly behind the tilt valves. The electrical connection is established at input 1 of the wet leg sensor interface according to drawing no.: E**51.351346** / page 120. The pressure switch, which is activated at an air pressure of 3.2 bar ± tolerances, is continuously

monitored by the MultiSeal system. If the air pressure is below 3,2 bar, or if the air pressure falls below 3,2 bar, discharge / loading cannot be started or is immediately interrupted.

6.1.2.4.5 2nd wet leg sensors

The possible installation locations for the 2nd wet-leg detector can be entered here.

▶ **Possible selection:** ► NO
► in the pipe
► in the compartment

6.1.2.4.6 Hose supervision

▶ **Possible selection**: YES / NO

With the MultiSeal system, it should be ensured in all cases that the product loaded at the tank farm in accordance with the cargo documents is fully discharged at the gas station. If for any reason the foot valve is closed while the API coupling is opened or the in-line valve is closed for some reason, and the wet-leg detector alters its status from wet to dry, the compartment must not be declared as being empty. A distinction is made between the fill level of the compartment and of the pipework for this purpose. However, because the compartments are not fitted directly with 'empty' detectors, their status needs to be established indirectly.

The level monitoring principle

Level monitoring is based on the following basic principles:

- As long as a compartment is open and the wet leg sensor reports "dry", the compartment must be empty.
- If the wet leg sensor for an open compartment reports "wet", the compartment cannot be empty.
- If a compartment is closed, the state of the wet leg sensor is stored and forms a compartment filling state.

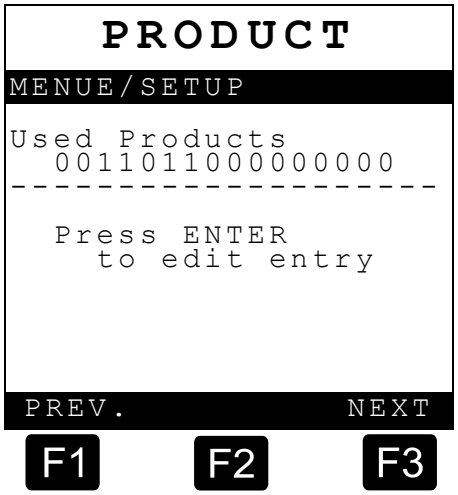
From this stored compartment filling state and the current state of the wet leg sensor, the following combination can be established:

Stored compartment filling state	State of the wet leg sensor	Compartment state (also detailed display)
not empty	wet	not empty
not empty	dry	not empty
empty	wet	Remaining volume
empty	dry	empty

No account can be taken of dripped off quantities after closing an **"empty"** compartment.

6.1.2.5 Setup Product

In Setup Product you can setup the available products as well as the product names. The setting takes place as described in chapter chapter 6.1 "SETUP MENU" / page 45 (General Procedures).



Parameter description	Possible content		Security feature
Used products	0011011000000000		Switch
Unused products	0000000000000000		Switch
Product No. 3, Diesel	Name:	DK	Switch
	Hazard class	AIII	
	Ref. Code:	2	
	TAG-Code	68	
	GWG-Code	12	
	Hall-Code:	12	
	Altern. prod. loading.	0	
	Altern. prod. del.	0	

Parameter description	Possible content		Security feature
Product No. 4, Unleaded gasoline	Name:	BI	Switch
	Gefahrenkl.	AI	
	Ref. Code:	3	
	TAG-Code	92	
	GWG-Code	9	
	Hall-Code:	10	
	Alter. Prod. Bef.	0	
	Alter. Prod. Abg.	0	
Product No. 6, Unleaded Super	Name:	SU	Switch
	Gefahrenkl.	AI	
	Ref. Code:	5	
	TAG-Code	95	
	GWG-Code3		
	Hall-Code:	9	
	Alter. Prod. Bef.	0	
	Alter. Prod. Abg.	0	
Product No. 7, Unleaded Super Plus	Name:	SUP	Switch
	Gefahrenkl.	AI	
	Ref. Code:	6	
	TAG-Code	98	
	GWG-Code	6	
	Hall-Code:	5	
	Alter. Prod. Bef.	0	
	Alter. Prod. Abg.	0	

In order to ensure that no changes to the product codes can be made when there is still product loaded, the menu can only be opened when the tanker is completely empty.

6.1.2.5.1 Used products

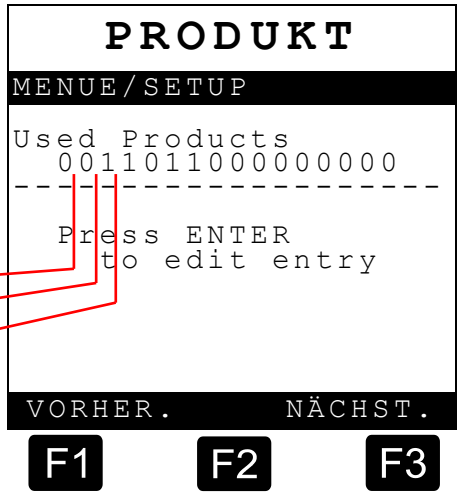
Table of products used in Germany:

Product definition

PTB/ Ref-Code	Name	Tag-Code	Hall-Code	GWG-Code	Gefahrg.-Kl	Leaded / Unleaded
1	HEL	69	n.a.	n.a.	AIII	ul
2	DK	68	12	12	AIII	ul
3	BI	92	10	9	AI	ul
4	SUV	98	6	10	AI	l
5	SU	95	9	3	AI	ul
6	SUP	98	5	6	AI	ul

One sets which products should be used here. Only the used products also appear during manual inputting of the loading schedule.

In the following example, only the products no. 3 (DK), 4 (BI), 6 (SU) und 7 (SUP) are released.



- Product 1
- Product 2
- Product 3
- etc.

☞ After pressing the **<ENTER>** key, use **<1>** and **<0>** on the numeric keypad to enter the used /not used products.

- **“0”** = used Product
- **“1”** = not used Product

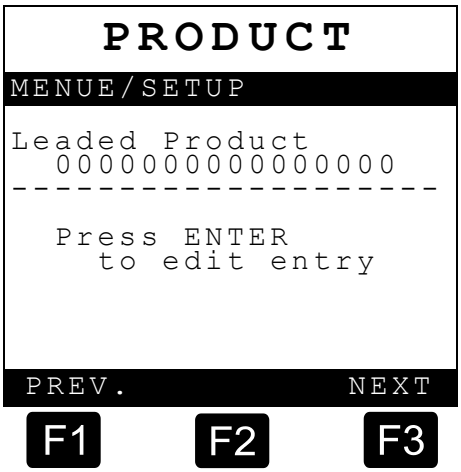
6.1.2.5.2 Leaded products

This is where one sets which products are unleaded and which are leaded.

In the following example, no leaded products are set (German standard).

☞ After pressing the **<ENTER>** key, the numeric keys **<0>** and **<1>** are used to set the leaded / unleaded products.

- **"0"** = Unleaded product
- **"1"** = Leaded product

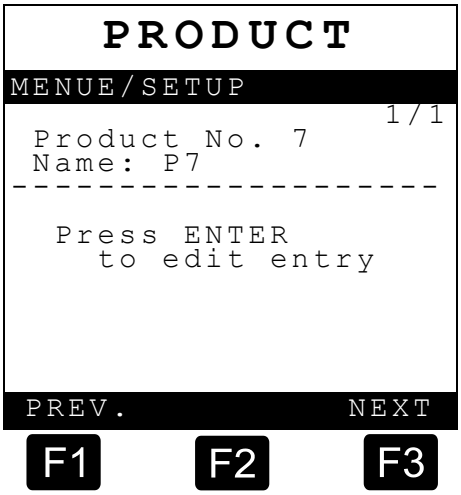


6.1.2.5.3 Product Names

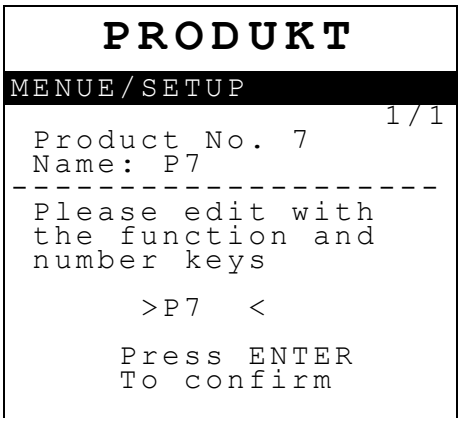
In the 'Product name' setup, set up all the product names. Up to four characters are possible in each case for each product name.

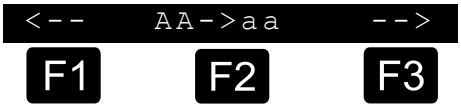
PRODUCT Menu

☞ After pressing the **<ENTER>** key the following screen is shown:



Example for chanP7 < auf >SUP <:





- Press **<7 (STU)>** key twice within a short period: → **S**
- Press **<F3>** key for next character
- Press **<7 (STU)>** key four times within a short period: → **U**
- Press **<F3>** key for next character
- Press **<6 (PQR)>** key twice within a short period: → **P**
- Press **<ENTER>** to confirm

Use **<F2>** to switch between upper and lower case letters.

6.1.2.5.4 Other product-specific parameters

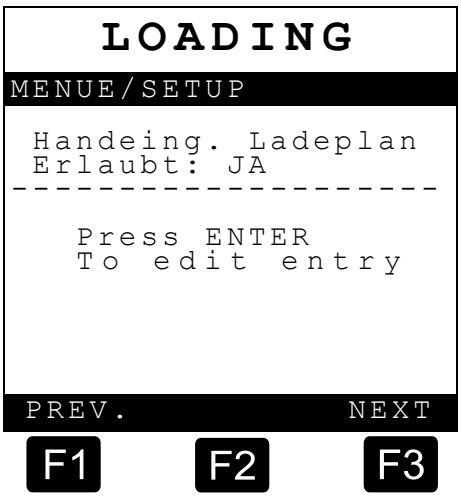
In the following section, other product-specific parameters that are of no relevance to the MultiSeal system are requested and/or set, e.g.:

- Hazard class
- Reference code

The parameters listed in the table in Chapter chapter 6.1 "SETUP MENU" / page 45 are factory settings. As a general rule, these do not need to be set or altered. If other new products are to be defined, the respective codes must be agreed with F.A. Sening.

6.1.2.6 Setup Loading

In the Filling setup menu, you can set the fill-specific parameters. The setting process is equivalent to the one described in chapter 6.1 "SETUP MENU" / page 45 (General Procedure).



Parameter description	Possible content	Security feature
Manual inputting of filling schedule permitted	Yes	Switch
	No	
Manual input of filling schedule termination time	10 – 120 minutes	Switch
Wet leg sensor switch-on time (sec)	0-10	Switch

6.1.2.6.1 Manual inputting of loading schedule permitted.

▶ **Possible selection**: YES / NO

Here, you can set, whether manually setting the loading schedule is permitted. At the current development stage, a setting of **'YES'** is requiredm here. That manual inputting can be prohibited, and that only encoded filling operations can then be approved is only permitted in the configuration level described in Chapter 2.3.1, "Sealed Parcel Delivery (SPD) function with TAG interface (product identifier)".

6.1.2.6.2 Manual inputting of load schedule termination time

▶ **Possible selection**: 10 to 120 minutes

Only relevant in configuration level described in Chapter 2.3.1, 'Sealed Parcel Delivery (SPD) function with TAG interface (product identifier)'. A factory setting of **60 minutes** should be maintained here at this time.

6.1.2.6.3 Wet leg sensor switch-on time

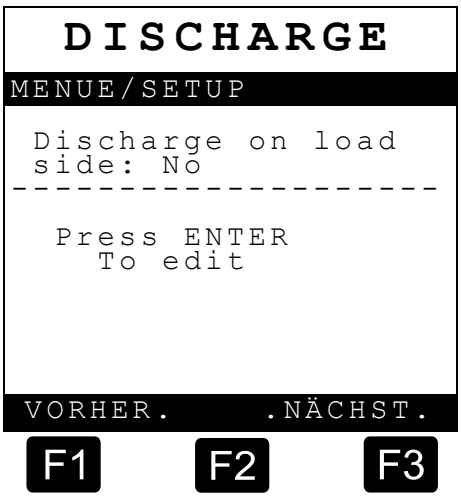
▶ **Possible selection**: 0 to 10 seconds

The time that can be set here specifies the delay between the time at which the wet leg sensor changes its state from empty to full and the time at which this change is processed.The fill status of the compartments changes from '**EMPTY (E)**' to '**Filled (F)**'.

The wet-let detector running time only become an important factor in the MultiSeal development stage with product detection - Time of adopting the connected product code in the load schedule. During a standard MultiSeal operation, this is of secondary importance and should be set to **3 seconds**.

6.1.2.7 Setup Discharge

☞ In the Delivery setup, you set the delivery-specific parameters. This setting takes the form described in Chapter chapter 6.1 "SETUP MENU" / page 45 (General Procedure).



Parameter description	Possible content	Security feature
Discharge on load side	Yes No	Switch
Wet leg to dry - timeout (sec.)	0-60	Password

6.1.2.7.1 Discharge on load side

▶ **Possible selection**: YES / NO

This parameter is used to specify whether delivery via the loading coupling is permitted.

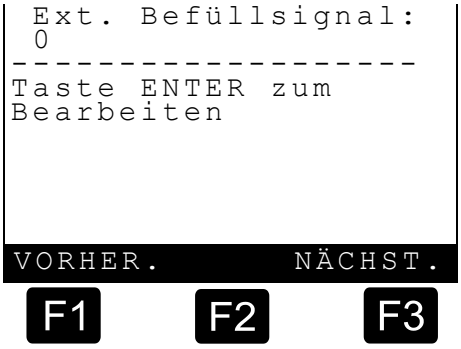
6.1.2.7.2 Wet leg to –dry- timeout

▶ **Possible selection**: 0 to 60 seconds

The time that can be set here specifies the delay between the time at which the wet leg sensor changes its state from full to empty and the time at which this change is shown in the display. Changing from **'Filled (F)'** to **'EMPTY (E)'.**

6.1.2.8 Setup SPD-Sensors

☞ With the Setup setting of SPD sensors, there are differences in terms of the applicable software version of the MultiSeal Main Unit and the hardware version of the SPD sensor interface. Configuration 4, described in the following section, will become a standard in future.



Configuration 1

▶ Main Unit software version < 1.20 and SPD sensor interface Part No. **MSSPD.**

- The Main Unit software version < 1.20 only supports one sensor threshold value
  → (analog NCC / analog NOC).
- The SPD sensor interface, Part No. MSSPD, evaluates the sensor signals in analog fashion, and only one sensor threshold value
  → (analog NCC / NOC) is supported.

Configuration 2

▶ Main Unit software version ≥ 1.20 and SPD sensor interface Part No. **MSSPD.**

- In the Main Unit software version ≥ 1.20, three different threshold values can be set and these cause the API couplings to respond in the event of different opening strokes (analog NCCs 1 thru 3 and analog NOCs 1 thru 3).

  → Analog NCC 1 / NOC 1: Respond in case of small opening stroke

  → Analog NCC 3 / NOC 3: Respond in case of larger opening stroke

- The SPD sensor interface, Part No. **MSSPD**, evaluates the sensor signals in analog fashion, and even in conjunction with the Main Unit Software Version ≥ 1.20, only one sensor threshold value
  → (analog NCC 1 / NOC 1) is supported.

Configuration 3

▶ Main Unit Software Version < 1.20 and SPD Namur sensor interface, Part No. **MSSPD-N**.

- Main Unit Software Version < 1.20 only supports one sensor threshold value (analog NCC / analog NOC).
- The SPD Namur sensor interface, Part No. MSSPD-N evaluates the sensor signals digitally. Three different threshold values are supported (analog NCCs 1 thru 3 and analog NOCs 1 thru 3).

  → Analog NCC 1 / NOC 1: Respond in case of small opening stroke
  → Analog NCC 3 / NOC 3: Respond in case of larger opening stroke

- However, in conjunction with Main Unit Software Version < 1.20, only the threshold value for analog
  → NCC 1 / NOC 1 is used.

Configuration 4

▶ Main Unit Software Version ≥ 1.20 and SPD Namur sensor interface, Part No. **MSSPD-N.**

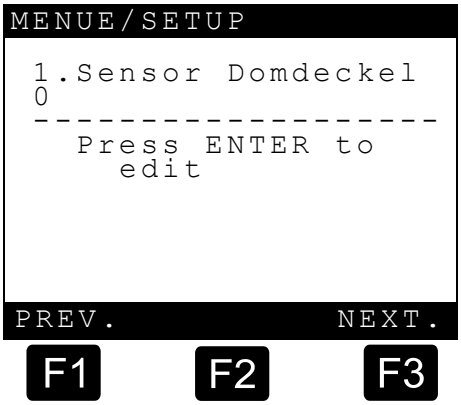
- In the Main Unit software version ≥ 1.20, three different threshold values can be set and these cause the API couplings to respond in the event of different opening strokes (analog NCCs 1 thru 3 and analog NOCs 1 thru 3).

  → Analog NCC 1 / NOC 1: Responds in case of small opening stroke
  → Analog NCC 3 / NOC 3: Responds in case of larger opening stroke

- The SPD Namur sensor interface, Part No. MSSPD-N evaluates the sensor signals digitally. Three different threshold values are supported (analog NCCs 1 thru 3 and analog NOCs 1 thru 3).
  → Analog NCC 1 / NOC 1: Responds in case of small opening stroke
  → Analog NCC 3 / NOC 3: Responds in case of larger opening stroke

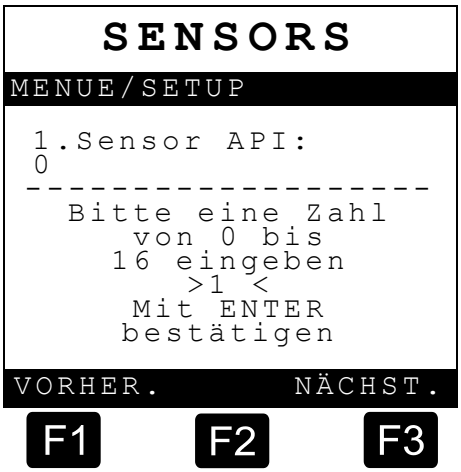
☞ Sensors are factory-set to the threshold value of analog **NCC 1 / NOC 1**. For that reason, this setting should also be used during initial startup (commissioning).

SENSORS



☞ In Setup Sensors you can assign the sensors to the SPD sensor interface. The setting takes place as described in section chapter 6.1 "SETUP MENU" / page 45 (General Procedures) .

☞ If one sensor group is assigned the input **"0"**, as in this example the manlid cover sensor, this means that there are no sensors installed. This applies to all sensors and sensor groups.



☞ When sensors are installed as a group, as in this example the API coupling sensors, please first enter to which input the first sensor (Compartment 1) is connected, e.g. Input **"1"**.

☞ The sensors of the remaining compartments are then each automatically assigned the next input in turn. Therefore it must be ensured that the different sensor groups do not overlap.

☞ Next please enter the sensor type. See table in section see chapter 10 "SPD sensors" / page 102.

- Digital / Make
- Digital / Break
- Analog / Make 1
- Analog / Break 1
- Analog / Make 2 *)
- Analog / Break 2 *)
- Analog / Make 3 *)
- Analog / Break 3* *)

*) *Only within configuration 4 (see above)*

☞ When changing to the SPD sensors setup, the configuration of all sensors is queried.

1. Ext. **f**illing signal (external filling signal sensor)
2. Ext. delivery signal (external delivery signal sensor)
3. 1. Sensor dome (dome cover sensor) *)
4. 1. Sensor API (API coupling sensor) *)
5. 1. Sensor BV (foot valve sensor) *)
6. 1. Sensor DV (in-line valve sensor) *)
7. 1. Sensor water (water sensor) *)
8. 1. Sensor overfill protection (overfill sensor) *)
9. Sensor parking brake
10. Sensor overpressure gas pendulum
11. Sensor vacuum gas pendulum
12. Sensor key status
13. Sensor fittings cabinet left
14. Sensor fittings cabinet right

**) Sensor groups, each with one sensor per compartment*

External filling signal

Using the pneumatic filling compressed air switch (Part No. **MSDSO**), it is possible on certain fuel tanker models (left filling, delivery on right) to switch into filling mode automatically. The compressed air switch behind the K block on the filling side is connected pneumatically. Electrically, it is preferably connected to the first input on the SPD sensor interface.

External delivery signal

Using the pneumatic delivery compressed air switch (Part No. **MSDSO**) it is possible on defined TKW variants (filling left, discharge on right) to switch into delivery mode automatically. The compressed air switch behind the K block on the delivery side is connected pneumatically. Electrically, it is preferably connected to the second input on the SPD sensor interface.

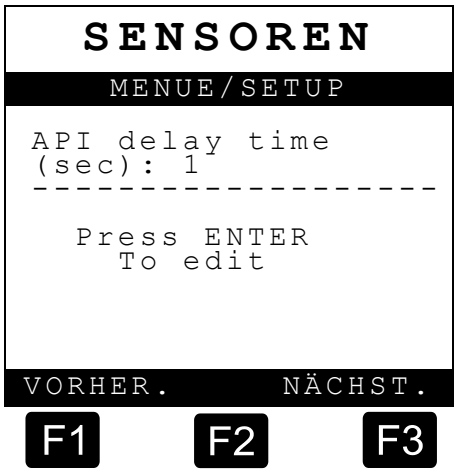
☞ All the connected sensors are configured here. The data to be entered here depend on the assignment of sensors in the SPD sensor interface.

Use the **previously filled out** preprinted form located at a later point in this document chapter 10.2 "Example of SPD sensor assignment" / page 104 for this.

☞ For the API couplings, an API coupling delay time can additionally be set:

- **<0> to <2>** seconds. This suppresses brief opening / closing when loading arms are linked up at a later printout.

A setting of 1 second delay time is recommended.



6.1.2.9 Events

☞ In this Setup directory, it is possible to define which additional events should be saved in the event logbook. (see chapter 6.1.8.5 "Event report" / page 85)

Parameter-Beschreibung	Möglicher Inhalt	Sicherung
Record the ANA	JA NEIN	Schalter
Record Hall sensors	JA NEIN	Schalter
Record GWG sensors	JA NEIN	Schalter
Record TAG information	JA NEIN	Schalter
Record QA information	JA NEIN	Schalter
Record Gasp. information	JA NEIN	Schalter

Parameter-Beschreibung	Möglicher Inhalt	Sicherung
Record GPSÜ test	JA	Schalter
	NEIN	

6.1.2.10 Presets (Tanker Types)

☞ The Setup Tanker is intended to facilitate the setup when taking a tanker into use for the first time. By selecting a tanker type the entire setup is set for a particular tanker type with the functions relevant to it. (see also chapter chapter 6.1.2.10 "Presets (Tanker Types)" / page 72). Additionally, further small adjustments need to be made in individual "**sub-setups**".

The setting takes place as described in section chapter 6.1 "SETUP MENU" / page 45 (General Procedures).

`1-Int.direct`
International direct delivery Fuel tankers

`2-De.direct. w. overfill protection`
German direct delivery Fuel tanker with overfill protection on the fuel tanker side

`3-German meas. system w. overfill protection`
German measuring systems Fuel tanker with tanker-sided overfill

`4-Direct del. w/out overfill protection`
German direct-delivery fuel tanker without overfill protection on the fuel tanker side

`5-Germ.meas. sys. w/out overfill protection`
German measuring system fuel tanker without overfill protection on the fuel tanker

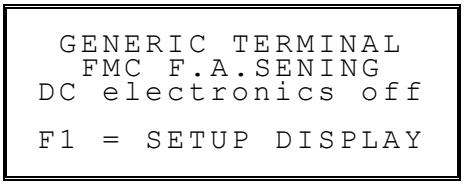
☞ A **(+)** before the setup parameter means that it is visible for this type of fuel tanker and therefore also needs to be set.

A **(-)** before the setup parameter means that it is not visible for this type of fuel tanker (does not appear on the screen display) and therefore cannot be set.

6.1.2.11 Setup Display Interface

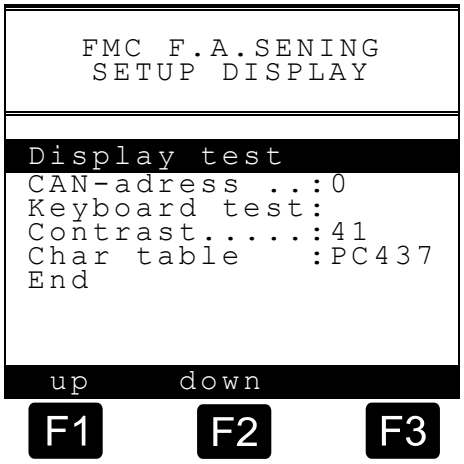
The display interface has its own setup. In order to get into the setup, the **<F1>** key has to be pressed and keep pressed while switching on the battery power. A display and keypad test is also integrated into this menu.

☞ Please press **<F1>** to enter SETUP.

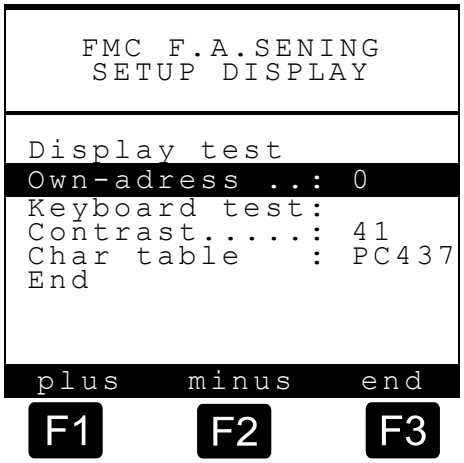


☞ With the function keys **<F1>** and **<F2>**, **„up“** and „**down“**, any of the Setup parameters can be selected, e.g. CAN Address.

☞ In order to alter the parameter the **<ENTER>** key must be pressed; the following message appears.



☞ With the **<F1>** and **<F2>** keys, “Plus“ and “Minus“, the CAN Address in question can then be set and saved with **<F3>** „End“.



- Display Interface 1: Address 0
- Display Interface 2: Address 1
- Display Interface 3: Address 2
- Display Interface 4: Address 3

Further settings:

- Contrast: 0 to 100
- Character Set: The installed character set must not be altered!

Tests:

- Display Test: All ASCI characters are displayed, the test is ended automatically.
- Keypad Test: The key that is being pressed is displayed; the key pad test is ended by pressing the <ENTER> key twice.

☞ To complete the setup / test, select the line „End“ with the function keys and press **<Enter>**.

6.1.3 Manual inputting of load schedule

The inputting of a load schedule is necessary, in order to have the loaded product in both the screen display as well as on printouts at a later date of the loaded product in the load schedule.

☞ Inputting the load schedule

- Press the **<Menu>** key to access the main menu.
- Press **<2>** for manual inputting of the filling schedule.
- Change product quality of compartment 1, follow instructions on the screen.
- Press **<F3>** for the next compartment and continue as described above. If it is not necessary to alter the product quality, press **<F3>** directly to access the next compartment.
- Once the load schedule is complete, press **<F1>** 3 times to save the load schedule and to exit from the main menu.

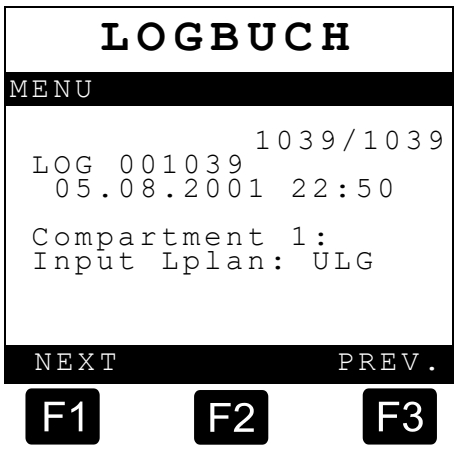
Comment:
Changing the product quality is only possible for an empty compartment!

6.1.4 Log book

The log book is an electronic memory that can store data that in some way deactivate or influence the MultiSeal monitoring functions (e.g. hardware fault, manual input of the loading plan, change-over of date and time).

These actions can then be viewed sequentially by date under a consecutive number via the log book function. The log book can only be viewed, it cannot be deleted. Once the log book has reached the maximum number of entries, the first entry will be overwritten during the next action. (ring buffer)

Example of a log book display



☞ The **<F1>** or **<F2>** keys can be used to scroll through the log book (backward or forward).

☞ The increment size for scrolling through the log book can be changed with the **<Enter>** key.

- 1 x **<ENTER>** = increment of **10**
- 2 x **<ENTER>** = increment of **100**
- 3 x **<ENTER>** = increment of **1000**
- 4 x **<ENTER>** = returns to increment of **1**

☞ Pressing the **<STOP>** key takes you back to the main menu.

The logbook is not printed out in daily, problem-free operation. After problems occur, you are then able to obtain targeted information about events that have occurred after the event.

6.1.5 Event log book

The event report is not used in daily, problem-free operation. After problems occur, e.g. broken seals etc., you are then subsequently able to obtain targeted information about events that have occurred. In the event report, all events, status changes and activities, e.g. the opening of valves, are recorded.

- Opening / closing of the API couplings
- Opening / closing of the foot valves
- Wet leg sensor changes
- etc.

Event log book display

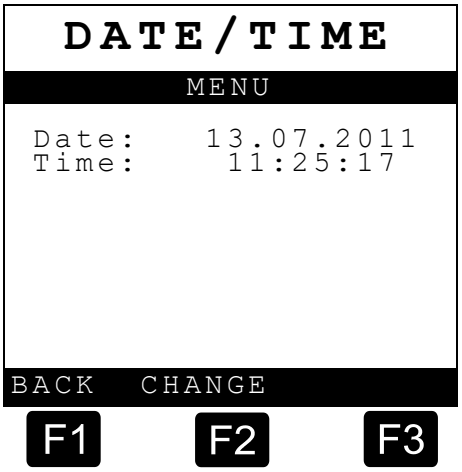
The display to the right indicates that, on ***05.08.2001 at 22:50***, the API coupling of compartment 6 was opened.

Pressing the **<STOP>** key takes you back to the main menu.

6.1.6 Date and time

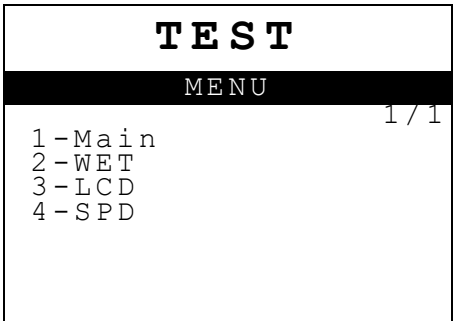
The submenu for setting of the date and time is reached from the main menu. Any change of the date or the time is entered in the MultiSeal log book.

Follow the display instructions for setting the date and time. Then enter the date and time via the numeric keys. After the day has been entered, e.g.: "**13**", the cursor automatically jumps to the month etc.



6.1.7 Test menu

With the test menu you can carry out extensive tests on the MultiSeal System's component assemblies.

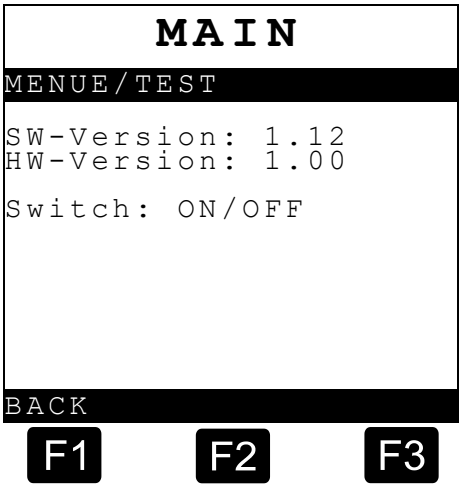


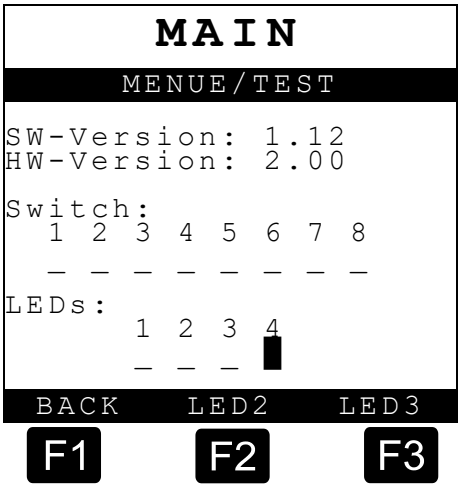
☞ By pressing the number that precedes the function, you can get into the test sub-menu.

6.1.7.1 Main Unit

In the software version 1.12 the main unit has been added to the test menu.

- Depending on the hardware version different variants are displayed.
- Hardware version 1.00 corresponds to the original Main Unit CPU-Board, predominantly used in Main Unit, part no. MSMAIN, Hardware version 2 correspond to the Main Unit – Board used in Main Unit / Display, part no. MSMAINDISP.



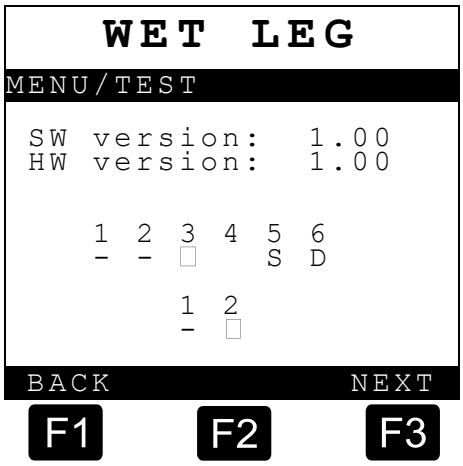


Note to hardware version 2.00:

- The setup switch is dipswitch no. 8.
- Numbering of the LEDs:
  1 = Setup-Switch (red)
  2 & 3 = software controlled (green)
  4 = Power indication (always on) (green)

6.1.7.2 Wet leg sensor test

Please carry out the wet leg sensor test for all compartments. The signs for the wet leg sensors in their respective compartments mean:



- ▯ : Compartment status = Empty
- □ : Compartment status = Remainder, compartment not empty
- **S** : Short-circuit in the sensor or sensor lead
- **D** : Break in the sensor or sensor lead circuit or sensor disconnected.

The signs for both the intrinsically safe inputs mean:

- ▯ : Input Open, not active
- □ : Input Closed, active

Whenever the Setup is released using the Setup switch in the MultiSeal Main Unit, the sensor statuses of short-circuit (S/C) and open circuit (O/C) are not evaluated. An open circuit, disconnection of the wet-leg detector's plug-in connection, then results in a filled compartment. This can also be used during tests to simulate a filled compartment during commissioning or service work, even without product.

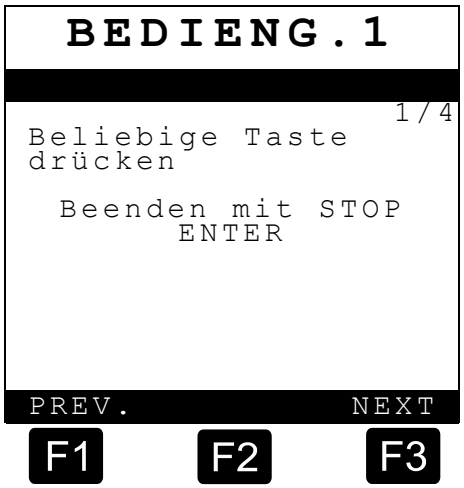
6.1.7.3 Display / keypad test

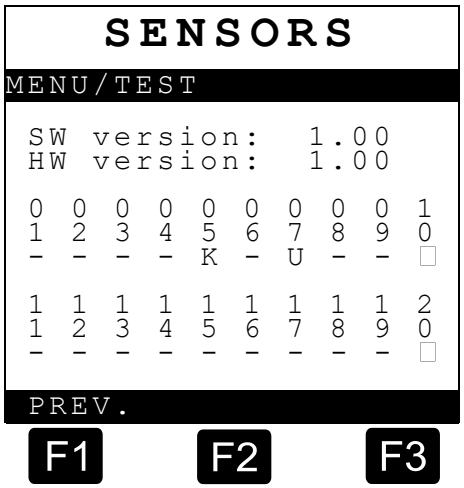
Every key pressed is shown in the display.

- Example: **ENTER**.
- Exit the keypad test by pressing the “**Stop**” key**.**

6.1.7.4 SPD sensors test

The following describes the testing of the SPD sensors:





☞ **The following are displayed:**

- ▶ ▯ : Sensor passive (e. g. API closed)
- ▶ □ : Sensor active (e.g. API opened)
- ▶ **K** : Sensor or sensor line with short-circuit
- ▶ **U** : Sensor or sensor line with open circuit

☞ Please activate the respective sensors for each compartment by opening the valves or by turning on the pressure switches with compressed air.

☺ The switch status displayed must be changed

from „▯“ to „□ “

Additionally it can be observed which input the tested sensor is connected at any one time (Input K1 to K20).

6.1.7.5 CAN bus test

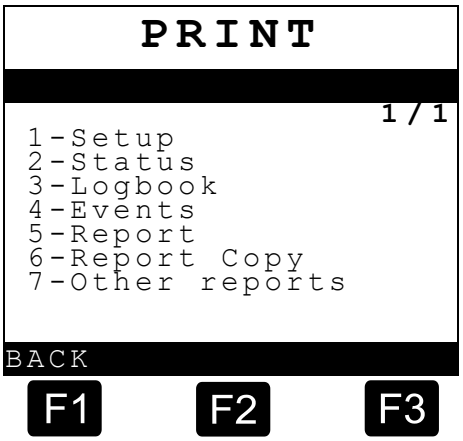
The CAN bus test is used for switching off every interface component assembly with the exception of the display interface in case of serious errors in communication with one or more interface component assemblies. This takes place in the “Setup Components”. At the same time the interface component assemblies that are switched off in Setup Components must also be physically disconnected from the CAN bus. In order to do that, the four leads that come out of the moulded power supply, battery supply and CAN bus must be released from the terminal block clamps.

6.1.8 Print menu

The print menu can be accessed by pressing the <**Print**> key.

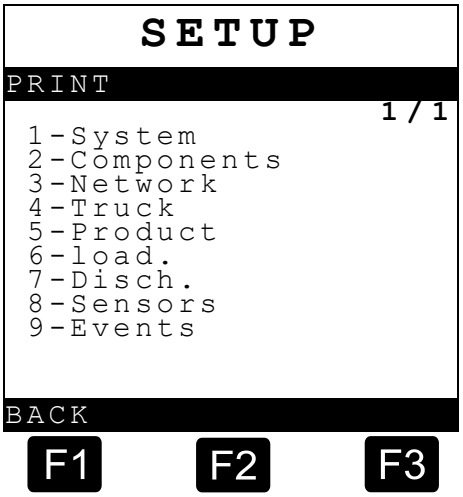
☺ The following message is displayed.

☞ You can get into the sub-menus by pressing the number key that precedes the function.



6.1.8.1 Setup

☞ You can start the printout of sub-menus by pressing the number key that precedes the sub-menu.



6.1.8.2 Status

☞ To start the status report printout you have to press the **<2>** key. The printout of the status report starts immediately.

The status report contains the particular seal conditions of the individual compartments as well as further information for each compartment.

- Status report number
- Software version of MultiSeal Main Unit
- Date of printout
- Time of printout

- Serial number of MultiSeal Main Unit
- Sealed compartments: date and time of sealing
- Manually sealed compartments: date and time of sealing at loading
- Manually sealed compartments: date and time of sealing at discharge
- Unsealed compartments: date and time of unsealing, event which caused the unsealing.

6.1.8.2.1 Status report before loading (Example)

Event printout	Explanation
Statusrep. No. 000005 MultiSeal Ver. 1.20 11.11.2 S/N: 000001 14:25:27 ----------	Heading with report no., Main Unit software version no. and series no., Date and Time of printout
Compartment 1: DERV EMPTY 17.09.2002 13:40	Product grade Compartment 1 = DERV Status Compartment 1= Empty, Date/Time
Compartment 2: KERO EMPTY 17.09.2002 13:40	Product grade Compartment 2 = KERO Status Compartment 2= Empty, Date/Time
Compartment 3: LRP EMPTY 17.09.2002 13:41	Product grade Compartment 3 = LRP Status Compartment 3= Empty, Date/Time
Compartment 4: UL EMPTY 17.09.2002 13:41	Product grade Compartment 4 = UL Status Compartment 4= Empty, Date/Time
Compartment 5: DERV EMPTY 17.09.2002 13:41	Product grade Compartment 5 = DERV Status Compartment 5= Empty, Date/Time
Compartment 6: KERO EMPTY 17.09.2002 13:41	Product grade Compartment 6 = KERO Status Compartment 6= Empty, Date/Time
--- End of print ---	

6.1.8.2.2 Status report after loading / before discharge (Example)

Event printout	Explanation
Statusrep. No. 000006 MultiSeal Ver. 1.20 11.11.2002 S/N: 000001 14:28:54 ----------	Heading with report no., Main Unit Software version no. and series no., Date and Time of printout
Compartment 1: DERV SEALED 11.11.2002 14:28	Product grade Compartment 1 = DERV Status Compartment 1 = Sealed, Date/Time

Compartment 2: KERO SEALED 11.11.2002 14:28	Product grade Compartment 2 = KERO Status Compartment 2 = Sealed, Date/Time
Compartment 3: LRP SEALED 11.11.2002 14:28	Product grade Compartment 3 = LRP Status Compartment 3 = Sealed, Date/Time
Compartment 4: UL SEALED 11.11.2002 14:28	Product grade Compartment 4 = UL Status Compartment 4 = Sealed, Date/Time
Compartment 5: DERV SEALED 11.11.2002 14:28	Product grade Compartment 5 = DERV Status Compartment 5 = Sealed, Date/Time
Compartment 6: KERO SEALED 11.11.2002 14:28	Product grade Compartment 6 = KERO Status Compartment 6 = Sealed, Date/Time
--- End of print ---	

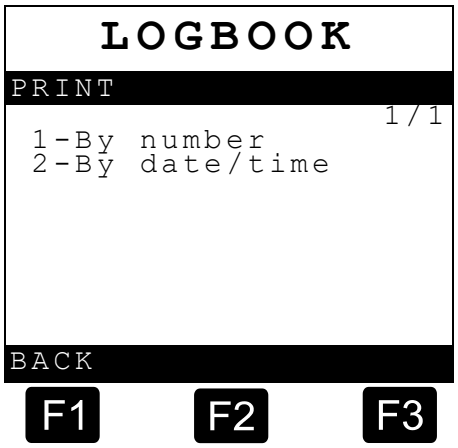
6.1.8.2.3 Status report, other possible compartment status entries (example)

Event printout	Explanation
Statusrep. No. 000008 MultiSeal Ver. 1.20 11.11.2002 S/N: 000001 14:43:13 ----------	Heading with report no., Main Unit Software version no. and series no., Date and Time of printout
Compartment 1: DERV SEALED 11.11.2002 14:41	Product grade Compartment 1 = DERV Status Compartment 1 = Sealed, Date/Time
Compartment 2: KERO MAN.LOAD.SEAL 11.11.2002 14:41	Product grade Compartment 2 = KERO Manual Seal at Loading, Date/Time
Compartment 3: LRP MAN.DEL.SEAL 11.11.2002 14:41	Product grade Compartment 3 = LRP Manual Seal at Discharge, Date/Time
Compartment 4: UL UNSEALED 11.11.2002 14:42 API-Coupling 4: Opened 11.11.2002 14:42	Product grade Compartment 4 = UL Status Compartment 4 = Unsealed, Date/Time, Reason for Unsealing: API-Coupling Compartment 4 was opened, Date/Time
Compartment 5: DERV EMPTY 11.11.2002 14:42	Product grade Compartment 5 = DERV Status Compartment 5 = Empty, Date/Time
Compartment 6: KERO SEALED 11.11.2002 14:41	Product grade Compartment 6 = KERO Status Compartment 6 = Sealed, Date/Time
--- End of print ---	

6.1.8.3 Logbook

☞ To start the logbook printout you have to press the key **<3>**.

☺ The following message is displayed.



1. Printing out logbook entries by number.
2. Printing out logbook entries within a specified time frame.

☞ After pressing key **<1>** enter a start number and an end number.

- Enter the start logbook number using the **<numeric keys>**.
- Press **<ENTER>** to confirm.
- Enter the end logbook number using the **<numeric keys>**.
- Press **<ENTER>** to confirm.
- Press **<F1>** „BACK“ for correction.
- Press **<F3>** „PRINT“ to start the printout.

☞ After pressing key **<2>** enter a period from start date / time to end date / time.

- Enter the start date using the **<numeric keys>**.
- Press **<ENTER>** to confirm.
- Enter the start time using the **<numeric keys>**.
- Press **<ENTER>** to confirm.
- Enter the end date using the **<numeric keys>**.
- Press **<ENTER>** to confirm.
- Enter the end time using the **<numeric keys>**.
- Press **<ENTER>** to confirm.
- Press **<F1>** „BACK“ for correction.
- Press **<F3>** „PRINT“ to start the printout.

6.1.8.4 Logbook printout (example)

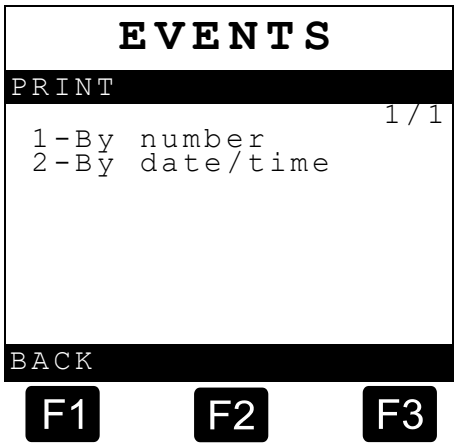
Event Printout	Explanation
Logbook MultiSeal Ver. 1.12 12.11.2002 S/N: 000001 13:55:37 ---------- -----	Heading with Main Unit Software version no. and serial no., date and time of printout
000001 12.11.2002 13:54 Hardware defect Logbook Inv.Content/Checksum	Defect / fault on EEPROM (storage of logbook) on main unit CPU-board
000002 12.11.2002 13:55 Hardware defect Real time clock Internal Error	Defect / fault on real time clock circuit on main unit CPU-board
000003 12.11.2002 13:56 Hardware defect Loading plan Inv.Content/Checksum	Defect / fault on battery buffered RAM (storage of loading plan) on main unit CPU-board. Ribbon cable between power supply and CPU-board was disconnected
000004 12.11.2002 13:57 Hardware defect Logbook Recording gaps	The system has detected recording gaps in the logbook
000005 12.11.2002 13:57 Hardware defect Setup (EEPROM) Inv.Content/Checksum	Defect / fault on EEPROM (storage of logbook) on main unit CPU-board
000006 12.11.2002 13:58 Hardware defect Sev.interrupt. (INT)	Defect / fault on the main unit CPU-board
000007 12.11.2002 13:58 Hardware defect Stack Overflow	Defect / fault on the main unit CPU-board
000008 12.11.2002 13:59 Entry date/time Date: 15.11.2002 Time: 07:17:00	Date and time have been reset
LOG 004803 12.11.2002 13:50 Hardware defect EMIS switched off	No connection to the EMIS Interface
LOG 004808 12.11.2002 13:50 No Response: Wet leg sensor IF 1	No connection to wet leg sensor interface 1 No connection to SPD Sensor Interface 1

LOG 004816 12.11.2002 13:51 No Response: Sensor IF 1	No communication to display interface 1
LOG 004821 12.11.2002 13:51 No Response: Terminal 1	Changing of compartment 5 loading plan from DERV to KERO
LOG 004755 12.11.2002 10:14 Compartment 5: DERV Input L-Plan: KERO	Changing of compartment 5 loading plan from KERO to DERV
LOG 004798 12.11.2002 13:48 Compartment 1: KERO Input L-Plan: DERV	
--- End of print ---	

6.1.8.5 Event report

☞ To start the event report printout you have to press the key **<4>**.

☺ The following message is displayed.



1. Printing out events by number
2. Printing out events within a specified time frame

☞ The printout has to be done according to chapter 6.1.8.3 “Logbook” / page 83.

6.1.8.5.1 Printout of Events (Example)

Below an event printout of a discharge and a loading is shown for only one compartment.

6.1.8.5.2 Discharge (Example)

Discharge: (Start)

Event printout	Explanation
Event rep. MultiSeal Ver. 1.12 12.11.2002 S/N: 000001 13:55:37 ----------	Heading with Main Unit Software version no. and serial no., date and time of printout
LOG 004486 11.11.2002 14:28 Operation mode: Menu	**<Print>** key pressed -> Print menu
LOG 004487 11.11.2002 14:28 Status report no. 000006 printed	Status report no. 6 was printed
LOG 004490 11.11.2002 14:29 Operation mode: Status	Print Menu was left --> Status screen
LOG 004491 11.11.2002 14:29 Discharge signal: active	Discharge air pressure switch was activated, **<F3>** pressed for discharge
LOG 004492 11.11.2002 14:29 Operation mode: Discharge	Change to Discharge mode
LOG 004493 11.11.2002 14:29 Loading plan 1:S 2:S 3:S 4:S 5:S 6:S DK BI SU SUP DK BI	Loading plan before discharge, all compartments sealed (S)
LOG 004494 11.11.2002 14:29 In-line valve 1: Opened	In-line valve compartment opened
LOG 004495 11.11.2002 14:29 Compartment 1: Unsealed	Compartment 1 unsealed
LOG 004496 11.11.2002 14:30 Foot valve 1: Opened	Foot valve compartment 1was opened
LOG 004497 11.11.2002 14:30 Compartment 1: Discharge ready Connected: NU	Compartment 1 → discharge ready, no product grade information (NU)
LOG 004498 11.11.2002 14:30 Compartment 1: Discharge Started	Discharge Compartment 1 declared to be started Wet leg sensor compartment 1 changed from wet condition to dry condition
LOG 004514 11.11.2002 14:30 Wet.Sensor 1: Dry	Compartment 1 declared to be empty
LOG 004515 11.11.2002 14:30 Compartment 1: Empty	In-line valve compartment 1 was closed

LOG 004520 11.11.2002 14:30 In-line valve 1: Closed	
LOG 004521 11.11.2002 14:30 Compartment 1: Discharge Stop	Discharge of compartment 1 was stopped Foot valve compartment 1 was closed
LOG 004522 11.11.2002 14:30 Foot valve 1: Closed	**<Print>** key pressed -> Print menu
LOG 004556 11.11.2002 14:31 Operation mode: Menu	Status report no. 7 was printed
LOG 004557 11.11.2002 14:31 Status report no. 000007 printed	Worksheet no. 5 was printed
LOG 004558 11.11.2002 14:32 Worksheet no. 000005 printed	
--- ---	

End of discharge

6.1.8.5.3 Loading (Example)

Loading: (Start)

Event printout	Explanation
LOG 004459 11.11.2002 14:28 Operation mode: Menu	**<Print>** key pressed -> Print menu
LOG 004460 11.11.2002 14:28 Status report no. 000008 printed	Status report no. 8 was printed
LOG 004461 11.11.2002 14:29 Operation mode: Status	Print Menu was left --> Status screen
LOG 004562 11.11.2002 14:39 Loading signal: active	Loading air pressure switch was activated, **<F1>** pressed for loading
LOG 004563 11.11.2002 14:39 Operation mode: Loading	Change to loading mode
LOG 004564 11.11.2002 14:39 Operation mode: Menu	<Menu> key pressed to enter the loading plan
LOG 004565 11.11.2002 14:39 Loading plan 1:E 2:E 3:E 4:E 5:E 6:E LRP KERO DERV UL LRP KERO	Loading plan before loading, all compartments empty (E)
LOG 004566 11.11.2002 14:39	

Compartment 1: DK Man.Load.Input: US	Manual loading input compartment 1: Change from von Diesel to gasoline (US)
LOG 004572 11.11.2002 14:40 Operation mode: Loading	After leaving the menu change to loading mode
LOG 004573 11.11.2002 14:40 API coupling 1: Opened	Loading arm connected, opening API coupling 1
LOG 004579 11.11.2002 14:40 Foot valve 1: Opened	Foot valve compartment 1 opened
LOG 004580 11.11.2002 14:40 Compartment 1: Loading ready Manual input: US	Compartment 1 loading ready, because API coupling and foot valve were opened. The product grade has been changed manually to US.
LOG 004581 11.11.2002 14:40 Compartment 1: Loading start	Loading for compartment 1 declared to have started
LOG 004597 11.11.2002 14:40 Rest.-Sensor 1: Wet	Wet leg sensor compartment 1 changed from dry condition to wet condition
LOG 004598 11.11.2002 14:40 Compartment 1: Not empty	Compartment 1 declared to not be empty
LOG 004609 11.11.2002 14:41 Foot valve 1: Closed	Foot valve compartment 1 has been closed
LOG 004621 11.11.2002 14:41 API coupling 1: Closed	Loading arm connected, API coupling 1 closed
LOG 004627 11.11.2002 14:41 Compartment 1: Loading Disconn.	Foot valve compartment 1 has been closed and loading arm was disconnected
LOG 004631 11.11.2002 14:41 Compartment 1: Sealed	Compartment 1 has been sealed electronically
LOG 004644 11.11.2002 14:41 Loading signal: passive	Loading air pressure switch was deactivated
LOG 004645 11.11.2002 14:41 Operation mode: Status	Change to status screen
LOG 004646 11.11.2002 14:39 Operation mode: Menu	**<Print>** key pressed -> Print menu
LOG 004647 11.11.2002 14:43 Status report no. 000009 printed	Status report no. 9 was printed

End of loading

6.1.8.5.4 Other events

Event printout	Explanation
LOG 004393 11.11.2002 14:22 Power on	The MultiSeal-System has been switched on powered from by the truck battery
LOG 004394 11.11.2002 14:22 Air pressure: High	Main air pressure switch was activated
LOG 004395 11.11.2002 14:22 Air pressure: Low	Main air pressure switch was deactivated
LOG 004394 11.11.2002 14:22 Fixing brake: Applied	Fixing brake applied, detected by a pressure switch
LOG 004395 11.11.2002 14:22 Fixing brake: Released	Fixing brake released, detected by a pressure switch
LOG 004417 11.11.2002 14:22 Compartment 2: Man.seal at disch.	Compartment 2 has been sealed manually after discharge, e.g.for a split discharge at two filling stations
LOG 004418 11.11.2002 14:22 Compartment 2: Man.seal at loading.	Compartment 2 has been sealed manually after loading, e.g.for a split loading at two filling stations
LOG 004419 11.11.2002 14:22 Loading Shift: 1234 Trip : 8765 Loading st.: 12345678	The following data has been entered for a loading process: Shift no. 1234 Trip no. 8765 Loading station no. 12345678
LOG 004420 11.11.2002 14:22 Discharge Shift: 4321 Trip : 5678 Filling st.no.: 87654321	The following data has been entered for a discharge process: Shift no. 4321 Trip no. 5678 Filling station nor. 87654321
LOG 004422 12.11.2002 13:57 Hardware defect logbook recording gaps	The system has detected recording gaps in the logbook
LOG 004423 12.11.2002 13:57 Setup switch: ON	The setup switch in the main unit has been activated. Setup is enabled
LOG 004424 12.11.2002 13:57 Setup switch: OFF	The setup switch in the main unit has been deactivated. Setup is disabled.
LOG 004425 12.11.2002 13:57 Setup changed: Man. loading plan allowed: YES	Setup has been changed, the manual entry of the loading plan is enabled
LOG 004426 12.11.2002 13:57	

Setup changed: Man. loading plan allowed: NO	Setup has been changed, the manual entry of the loading plan is disabled

6.1.8.6 Reports (worksheet)

Reports can be printed from Software Version 1.11 upwards.

To start the status report printout you have to press the key **<5>**. The printout of the report starts immediately.

All reports that have taken place after the last printout will be printed. In this manner it is possible to create a complete tour or shift report.

6.1.8.6.1 Report of a Loading and Discharge (Example)

Loading: (Start)

Event printout	Explanation
Worksheet no. 000005 MultiSeal Ver. 1.12 11.11.2002 S/N: 000001 14:32:07 ----------	Heading with worksheet no., Main Unit Software version no. and series no., Date and Time of printout
_____ _____ Truck Sign	Hand written truck identification, e.g. number plate; driver's signature
---------- L O A D I N G ----------	
Start: 11.11.2002 14:26 004406 End: 11.11.2002 14:28 004483	Start of loading, date/time, log. no. End of loading, date/time, log. no.
1:L 2:L 3:L 4:L 5:L 6:L DERV LRP UL KERO KERO LRP	Compartment state before loading: E = empty Loading plan before loading
Comp. 1, DERV: Uncoded: KERO 14:27-14:28 Not empty	Manual input loading plan, change from DERV to KERO Loading time compartment 1,state: not empty
Comp. 2, LRP: Uncoded: UL 14:27-14:28 Not empty	Manual input loading plan, change from LRP to UL Loading time compartment 2,state: not empty
Comp. 3, UL: Uncoded: LRP 14:27-14:28 Not empty	Manual input loading plan, change from UL to LRP Loading time compartment 3,state: not empty

Comp. 4, KERO: Uncoded: UL 14:27-14:28 Not empty	Manual input loading plan, change from KERO to UL Loading time compartment 4,state: no empty
Comp. 5, KERO: Uncoded: DERV 14:27-14:28 Not empty	Manual input loading plan, change from KERO to DERV Loading time compartment 5,state: no empty
Comp. 6, LRP: Uncoded: KERO 14:28-14:28 Not empty	Manual input loading plan, change from LRP to KERO Loading time compartment 6,state: no empty
1:S 2:S 3:S 4:S 5:S 6:S BI SU SUP DK BI SU	Compartment state after loading: S = Sealed Loading plan after loading
A B G A B E	
Start: 11.11.2002 14:29 004493	Start of discharge, date/time, log no.
End: 11.11.2002 14:31 004554	End of discharge, date/time, log no.
1:S 2:S 3:S 4:S 5:S 6:S DERV LRP UL KERO KERO LRP	Compartment state before discharge: S = Sealed Loading plan before discharge
Comp. 1, BI: Connected: NU 14:30-14:30 Leer	Discharge compartment 1, DERV uncoded (NU) Discharge time compartment 1, state: empty
Comp. 2, SU: Connected: NU 14:30-14:30 Leer	Discharge compartment 2, LRP uncoded (NU) Discharge time compartment 2, state: empty
Comp. 3, SUP: Connected: NU 14:30-14:30 Leer	Discharge compartment 3, UL uncoded (NU) Discharge time compartment 3, state: empty
Comp. 4, DK: Connected: NU 14:30- 14:31 Leer	Discharge compartment 4, KERO uncoded (NU) Discharge time compartment 4, state: empty
Comp. 5, BI: Connected: NU 14:31-14:31 Leer	Discharge compartment 5, KERO uncoded (NU) Discharge time compartment 5, state: empty
Comp. 6, SU: Connected: NU 14:31-14:31 Leer	Discharge compartment 6, LRP uncoded (NU) Discharge time compartment 6, state: empty
1:L 2:L 3:L 4:L 5:L 6:L BI SU SUP DK BI SU	Compartment state after discharge: E = empty Loading plan after discharge
--- End of printout ---	

End of discharge

6.1.8.6.2 Additional Compartment States

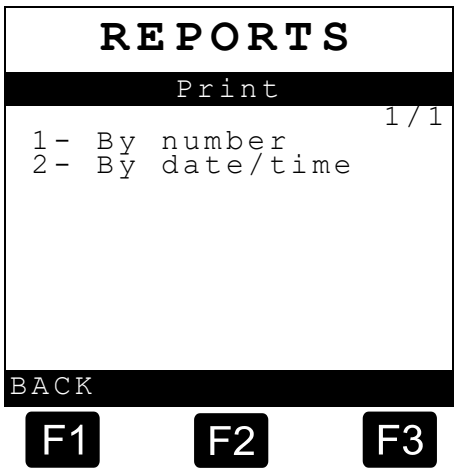
Event printout	Explanation
1:L 2:G 3:R 4:S 5:SB 6:SA BI SU SUP DK BI SU	The following compartment states can be displayed: Comp. 1 = **E**: Empty compartment Comp.2 = **L**: Loaded, not sealed compartment Comp.3 = **R**: Rest volume in the pipe system Comp.4 = **S**: Sealed (loaded) compartment Comp.5 = **SL**: Hand sealed (loaded) compartment, Seal at Loading Comp.6 = **SD**: Hand sealed (loaded) compartment, Seal at Discharge

6.1.8.6.3 Copy Report

☞ To print a copy of the last report the numeric key **<6>** has to be pressed after supplying the printer with paper. A copy of the last report will be printed immediately.

6.1.8.6.4 Other reports

☞ To start the printout of other reports you have to press the key **<7>**. The following message is displayed:



1. Printing out reports by number
2. Printing all reports within a specified time frame

☞ The printout has to be done according to chapter 6.1.8.3 “Logbook” / page 83 (Logbook printout).

6.1.8.7 Print data to laptop

It is also possible to send the print data not to a printer but to a laptop. The connection to the printer cable with socket, part no. **SPD-DR-KA2**, is described in chapter chapter 4.6.3.2 "Temporary Printer / Laptop Connection (optional)" / page 42. How to configure and use the laptop is described in an extra documentation, DOK-433.

6.1.9 Wetleg-Monitoring Setup

Differring to a MultiSeal system, the setup menu for a Wetleg-Monitoring system looks like this:

The setup for the Wetleg-Monitoring include the following parameter. For a more detailed description, please refer to the previous chapters!

System	
	Serial nmmer
	Truck identifier
	Operation Language
	Date order
	Printer
	Printer Baudrate
	Nr. of lines
	Nr. of columns
Components	
	Nr. of Terminals
	Nr. of Wetleg-IF
Network	
	MultiLevel installed
	EMIS communication enabled

	EMIS node number
	Record events
	Events stored by
	Own node number
	CAN communication forced
Truck	
	Number of compartments
	Air pressure switch installed
	2nd wetleg sensors
Product	
	Used Products
	Leaded Products
	Product Names
	Other product-spezific parameters
Loading	
	Manual loading plan
	Manual loading plan timeout
	Wetleg to-wet-timeout
Discharge	
	Wetleg to-dry-timeout

7 Faults in the MultiSeal System

Troubleshooting and fault correction must be carried out by a service workshop. When working, the warnings on the casings and the EN 60079-14VDE 0165 in general should be observed. An appropriate, in this case explosion-protected measurement instrument (for example, digital multimeter by EX-ELEC type DIGEX-A), must be used. Before disconnecting or withdrawing connectors, or before clamping or unclamping leads in terminal blocks, the electronics must be switched off.

7.1 Error messages, troubleshooting, correction

Error - (Message)	Possible cause	Correction
• Blank display, supply voltage indicator LEDs i the main unit and in the interface component assemblies are not lit	• Supply voltage of 24 V in the main uni and in the interface component assemblies is not available (diagram **51.351351** between clamps and 2). • Power supply to the display interface defective • Serious CAN bus failure.	• Ensure the supply voltage, check for conduct from the board network to the main unit and to the interface component assemblies. • If only the supply voltage indicator LED in the display interface does not light up → Replace the display interface. • Proceed as per section chapter 6.1.7.5 "CAN bus test" / page 79.
Display message: Generic Terminal FMC F.A.SENING DC electronics off F1=Setup Display	• There is no communication link between the main unit and the operating device or devices, or the operating device is defective. Diagram no. **61.351362** **51.351351** **51.351352**	• The wiring of the internal CAN Bus (green and yellow cores) between the main unit and all interface component assemblies should be checked. • If the wiring is in order → Replace the display interface. • If the fault is not corrected → Replace the main unit.
Display message: ERROR No connection with interface Wet leg Sensor 1.	• The wet leg sensor interface has no supply voltage or there is no communication link between the main unit and the wet leg sensor interface o the wet leg sensor interface is defective. Diagram no. **61.351362** **51.351346**	• The wiring of the supply voltage (white an brown cores) and the internal CAN Bus (green and yellow cores) between the main unit and all interface component assemblies should be checked. • If the wiring is in order → Replace the wet leg interface. • If the fault is not corrected → Replace the main unit.
Display message: ERROR No connection with interface Sensor 1	• The SPD sensor interface has no supply voltage or there is no communication link between the main unit and the SPD sensor interface or the SPD sensor interface is defective. Diagram no. **61.351362** **51.351347**	• The wiring of the supply voltage (white an brown cores) and the internal CAN bus (green and yellow cores) between the main unit and all interface component assemblies should be checked. • If the wiring is in order → Replace the SPD sensor interface. • If the fault is not corrected → Replace the main unit.

Error - (Message)	Possible cause	Correction
Display message: Hardware error EMIS switched off	• The EMIS interface has no supply voltage or there is no communication link between the main unit and the EMIS interface or the EMIS interface i defective. Diagram no. **61.351351** Wiring plans DOK-432	• The wiring of the supply voltage and the internal CAN bus between the main unit and the EMIS interface should be checke • If the wiring is in order → Replace the EMIS interface. • If the fault is not corrected → Replace the main unit.
Display message: A wet leg sensor indicates not empty	• Remainder in the compartment.	• Empty the compartment • With activated pipeline monitoring the piping system has run empty without the bottom valve was opened. → Open foot valve.
	• Glass prism of the wet leg sensor is heavily soiled.	• Unscrew the level sensor and wipe clean with a soft, clean and fluff-free cloth.
	• Wet leg sensor defective.	• Connect the level sensor to the level sensor lead in a compartment which previously indicated "empty". If the level sensor still indicates not empty the level sensor must be replaced.
	• Connector lead or wet leg sensor interface NM2WET defective Diagram no. **51.350346**	• If the level sensor had at a previous point test been triggered, reconnect the level sensor to the appropriate lead and in the level sensor interface connect it to anothe input clamp which had previously indicate "empty". If the level sensor indicates now "not empty", the first thing to replace is the connector lead. Should the fault still persi the level sensor interface must be replaced.
Message displayed in the wet leg sensor test menu: **"S" or "D"**	• Short-circuit or break in the wet leg sensor lead	• Unclamp the wet leg sensor lead in the w leg sensor interface and disconnect the socket from the wet leg sensor. Check the cable with an ohm meter for short-circuits and breaks and replace the cable if necessary.
	• Wet leg sensor defective	• If the wet leg sensor lead indicates no faults, the wet leg sensor must be checke with an ohm meter for short circuit; replac the wet leg sensor if necessary.
	• Wet leg sensor interface defective	• If the wet leg sensor lead and the wet leg sensor indicate no faults, the wet leg sensor must be tested by connecting it to another compartment. If a short-circuit or break is still indicated the wet leg sensor interface must be replaced.
• One or more keys on th operating device do not function.	• The keypad on the operating device is defective	• Carry out Keypad Test (see section chapter 6.1.7.3 "Display / keypad test" / page 78). If the keys still do not function, the operating device needs to be replaced
• The printer does not pri	• The printer is not connected correctly	• Check the printer and printer lead as per section chapter **Fehler! Verweisquelle konnte nicht gefunden werden.** "**Fehler Verweisquelle konnte nicht gefunden werden.**" / page **Fehler! Textmarke nich definiert.**.
	• Printer defective	• Not lighting the display LEDs: → Then check the fuse in the trailer cable terminal box. • If the printer connection (Printer lead) indicates no faults, replace the printer.

Error - (Message)	Possible cause	Correction
• Altered Setup has not been saved, the preset values reappear	• Fault in EEPROM memory (Electrical Erasable Programmable Read-Only Memory) in the main unit saving the Setup	• Replace the main unit

8 Part Numbers of the MultiSeal Component Assemblies

Component assembly	Part no.	Description
Electronic components		
Main Unit	MSMAIN	MultiSeal Main Unit
Display Interface	NM2DISPLAY	Display and Operating Device
Main Unit / Display	MSMAINDISP	MultiSeal Main Unit / Display
Wet leg sensor interface	NM2WET	Wet leg sensor interface
SPD-Sensor Interface	MSSPD MSSPD-N	SPD Sensor Interface SPD Namur Sensor Interface
EMIS Interface (old)	CS-GW-EMIS	Interface with an On-Board-Computer-System
EMIS Interface (new)	EMIS II	Interface with an On-Board-Computer-System, replacing part no. CS-GW-EMIS
Printer	DR-295 DR-298	Docket printer
Electromechanical components		
Wet leg sensor	NS-2E	Wet leg sensor
Main Air Pressure Switch	NM2DSS	Main air pressure switch
Pneumatic filling switch	MSDSO	Pneumatic filling switch, installed behind the K block on the filling side
Pneumatic delivery switch	MSDSO	Pneumatic delivery switch, installed behind the K block on the delivery side
Cable set	NM2KABEL	Cable set for wiring the voltage supply and the internal CAN Bus
Sealing caps	NM2PG	Sealing cap set for PG7, PG9 and PG11
Printer connector	SPD-DR-KA2	Printer connector
OBC / EMIS2 connector	MS-OBC-KA	OBC / EMIS2 Connector Cable, 3-wire connector cable between truck / trailer junction box and 9-pin Sub-D connector to the OBC.
Laptop connection cable to the EMIS / Main Unit via SPD-DR-KA2	MS-PC-KA	Laptop connecting cable to the EMIS / Main Unit, 3-pin access line between printer connector socket and 9-pin Sub-D connector to connect to the laptop
Trailer cable	AK	F.A.S trailer cable
Mechanical components		
API-Coupling	VKAP100-I	Pneumatic driven API-Coupling with inductive approximation sensor
API-Coupling	VKAP100-I2	Pneumatic driven API-Coupling with inductive approximation sensor
API-Coupling	VKVP-I	Pneumatic driven API-Coupling with inductive approximation sensor (replacement for VKAP100-I2)
API-Coupling	VKV100-2I	Loading coupling with inductive approximation sensor
API-Coupling	VKV-I	Loading coupling with inductive approximation sensor (replacement for VKV100-2I)
API-Coupling	VKAM100-1I	Lever-API-Coupling (India) with inductive approximation sensor
API-Coupling	VKVM-I	Lever-API-Coupling with inductive approximation sensor (replacement for VKAM100-1I)
Foot valve super-flat	BO100-F1-SPD	Foot valve DN100 super-flat pressure-relieved, with screen with SPD pneumatic switch incl. 2 x 4100357 and 6300055
Foot valve flat	BO100-F2-SPD	Foot valve DN100 flat pressure-relieved, with screen with SPD pneumatic switch
Foot valve 90 degrees	BO100-SPD	Foot valve DN100 90 degrees with SPD pneumatic switch

Component assembly	Part no.	Description
Foot valve T-SPD	BO100-T-SPD	Foot valve DN100 T-shape pressure-relieved, with screen with SPD pneumatic switch
In-line valve	DV100-3I	In-line valve with inductive approximation sensor
Manuals		
	DOK-416	Workshop and Installation Manual
	DOK-417	Driver Description

Table 2: Part Numbers of the MultiSeal Component Assemblies

9 Software replacement

9.1 Main Unit

☞ Before software is replaced the tanker's setup must be recorded or printed out, so that when the new software is being set up all vehicle-specific parameters can be reintroduced into the set up.

The EPROM (containing software) is situated in the main unit on the main CPU board (diagram no. 51.351332, no. 51.351371, no. 61.351557 and no. 51.351675).

It has a 32-PIN "PLCC" case (rectangular case with one corner cut off) on which there is a sticker with the software version number (e.g. 1.00). On the PCB board there is a socket that also has a corner cut off. When removing the EPROM from the socket, a special "PLCC extraction tool" available in shops, is required in order to remove the EPROM without damaging it. Both claws of the extraction tool must be inserted into the two gaps on the EPROM socket. After that, press both shafts of the extraction tool together. This causes the EPROM to lift out of the socket.

☞ Before inserting the new EPROM, its contacts should be checked for damage ("Any bent connector pins"?).

☞ The new EPROM should then be inserted into the socket and carefully pressed in with the fingers until there is a noticeable click.

🛠 **The cut-off on the EPROM must match the cut-off on the socket.**

☞ After the EPROM replacement on the main CPU board the entire Setup Menu settings must be reinstalled / checked.

9.2 Interface component assemblies

In the case of all interface component assemblies the software is integrated in the microprocessor. In order to replace the software the microprocessor must be replaced. As an example, the SPD sensor interface is shown in the diagram no. 51.351372. The procedure is exactly the same as the instructions in section chapter 9 "Software replacement" / page 100.

Caution:

If it is necessary to replace the processor in which the software is integrated, the internal battery has to be switched off before the processor is removed. Switch off the battery by moving dipswitch no. 4 into the "OFF"-position. When the processor change is done dipswitch no. 4 has to be moved back into the "ON"-position to reactivate the battery (see also drawing no. 51.351372 / page chapter 0 "51.351372" / page 129**)!**

10 SPD sensors

10.1 SPD sensor properties

	SPD Sensors	Polarity / Core Color Number of Connector Leads		Sensor Type
Rail with Air Pressure switch	MSDSO	Core + Core -	Brown White	NC Analog Break (Opener analogue)
Foot Valve	BO100-SPD	Core + Core -	Brown White	NC Analog Break (Opener analogue)
	BO100-F1-SPD	Core + Core -	Brown White	NC Analog Break (Opener analogue)
	BO100-F2-SPD	Core + Core -	Brown White	NC Analog Break (Opener analogue)
Manlid	MANLID20-SPD	Core + Core -	Brown White	NO Analog Make (Shutter analogue)
	MANLID16-SPD	Core + Core -	Brown White	NO Analog Make (Shutter analogue)
	MSDDST	Core + Core -	Brown White	NO Analog Make (Shutter analogue)
API	VKV1-I	Core + Core -	Brown White	NO Analog Make (Shutter analogue)
	VKV1M-I	Core + Core -	Brown White	NO Analog Make (Shutter analogue)
	VKV1MB-I	Core + Core -	Brown White	NO Analog Make (Shutter analogue)
	VKV1PA-I	Core + Core -	Brown White	NO Analog Make (Shutter analogue)
Line Valve	DV100-4D	Core + Core -	Brown White	NC Analog Break (Opener analogue)

Cabinett Door	RFID	Core + Core -	Brown White	NC Analog Break (Opener analogue)

Table 1: SPD Sensor

10.2 Example of SPD sensor assignment

As an example, a 6-compartment tanker where the API couplings and foot valves are monitored.

SPD sensor interface input	Connected Sensor / Coupling	Tanker compartment
K1	API Coupling	1
K2	API Coupling	2
K3	API Coupling	3
K4	API Coupling	4
K5	API Coupling	5
K6	API Coupling	6
K7	Foot valve sensor (MSDSO)	1
K8	Foot valve sensor (MSDSO)	2
K9	Foot valve sensor (MSDSO)	3
K10	Foot valve sensor (MSDSO)	4
K11	Foot valve sensor (MSDSO)	5
K12	Foot valve sensor (MSDSO)	6
K13	In-line valve (DV100-3I)	1
K14	In-line valve (DV100-3I)	2
K15	In-line valve (DV100-3I)	3
K16	In-line valve (DV100-3I)	4
K17	In-line valve (DV100-3I)	5
K18	In-line valve (DV100-3I)	6
K19		
K20		

10.3 Template for the SPD sensor assignment

SPD sensor interface input	Connected Sensor / Coupling	Tanker compartment
K1		
K2		
K3		
K4		
K5		
K6		
K7		
K8		
K9		
K10		
K11		
K12		
K13		
K14		
K15		
K16		
K17		
K18		
K19		
K20		

11 Abstract from ElexV (§12)

Inspections

(1) The operator must arrange for the electrical devices to be inspected for the proper condition of their assembly, installation and operation by a qualified electrician or directed and supervised by a qualified electrician.

1. before first use

2. in specific time intervals.

The periods must be calculated so that resulting deficiencies, which must be assumed, are determined in a timely manner. The inspections according to sentence 1 no. 2 must be carried out every three years. They may be omitted if the electrical devices are constantly monitored by a responsible engineer.

(2) During the inspection, related standard engineering practices must be followed.

(**3)** If requested by the relevant authority, a test book with specific entries must be kept.

(4) In case of damage or in special cases, the regulating authority may arrange a special inspection by an expert. The operator must arrange that an assigned inspection, executed according to sentence 1, is carried out.

Abstract from Bundesarbeitsblatt 3/1997 page 101
(German Labor Bureau Sheet 3/1997)

12 Address and contact details

Our service department will be happy to assist and can be contacted as follows:

Measurement Solutions
F. A. Sening GmbH
Regentstrasse 1
D-25474 Ellerbek

Tel.:	+49 (0)4101 304 - 0	(Switchboard)
Fax:	+49 (0)4101 304 - 152	(Service)
Fax:	+49 (0)4101 304 - 133	(Sales)
Fax:	+49 (0)4101 304 - 255	(Order processing)
Web:	www.technipfmc.com	

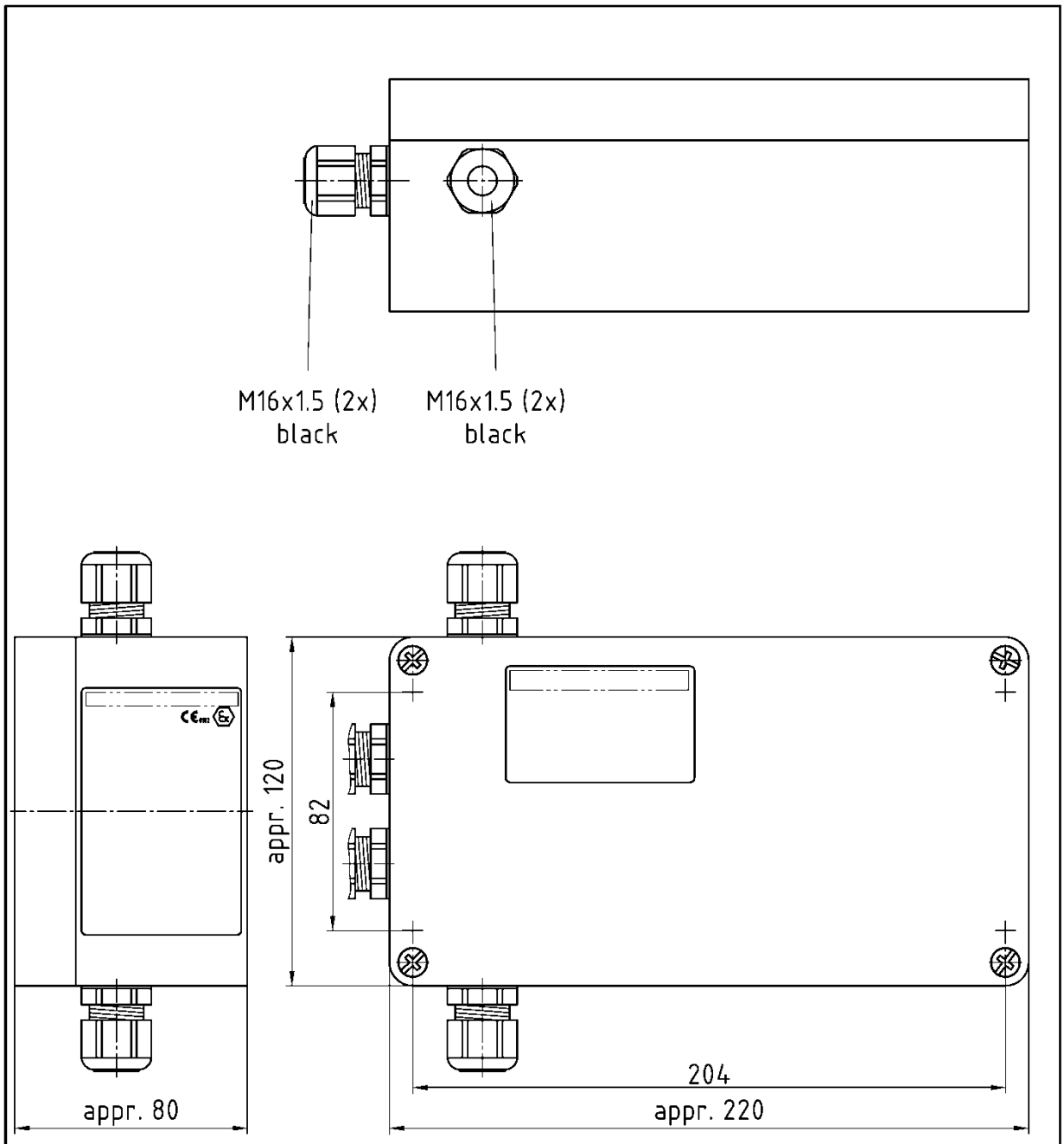
Appendix A. Drawings and Approvals

Drawings and approvals

Index

Drawings

51.351332 - Main Unit (MultiSeal) complete - MSMAIN



DOK-416E
"Schutzvermerk nach DIN 34 beachten"

Main Unit (MultiSeal), kpl.
complete

FMC Technologies
F.A. Sening GmbH
D-25474 Ellerbek, Germany

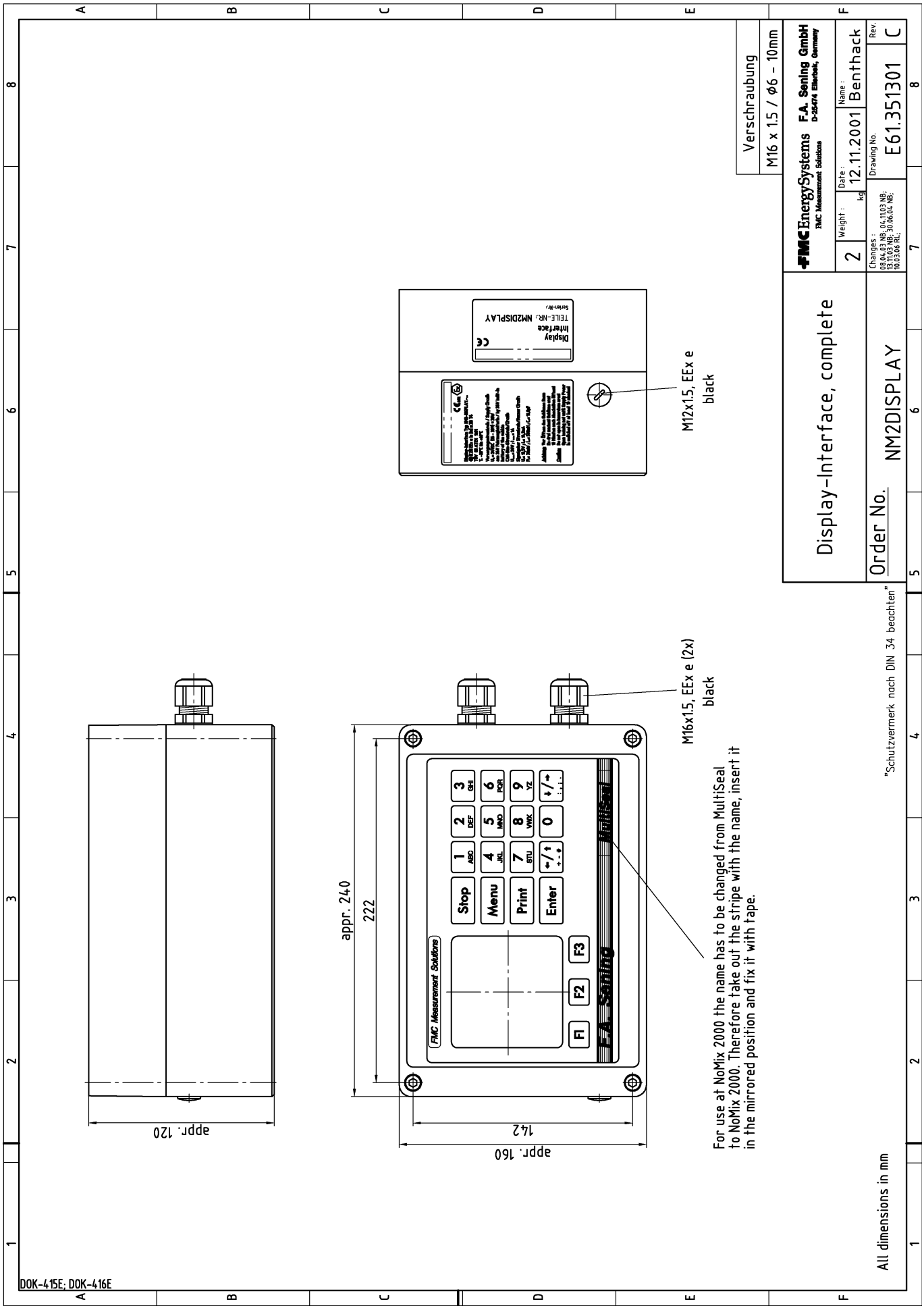
	Weight :	Date :	Name :
	kg	25.11.2002	Benthack

Part-No. MSMAIN

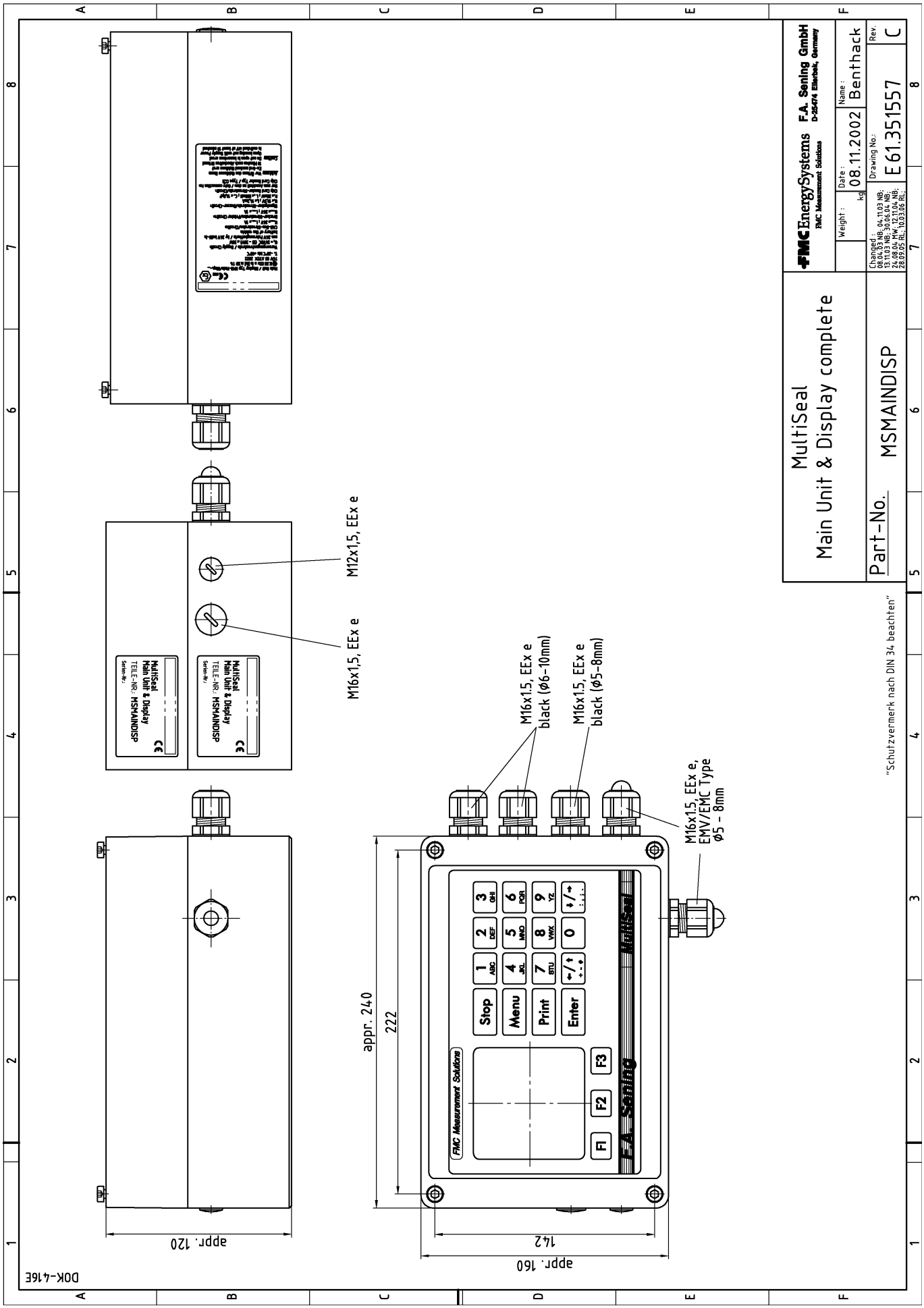
Changed: ECN No.	Date	Name
	10.03.06	RL;
20734	29.09.09	RL;

Drawing No.: E51.351332

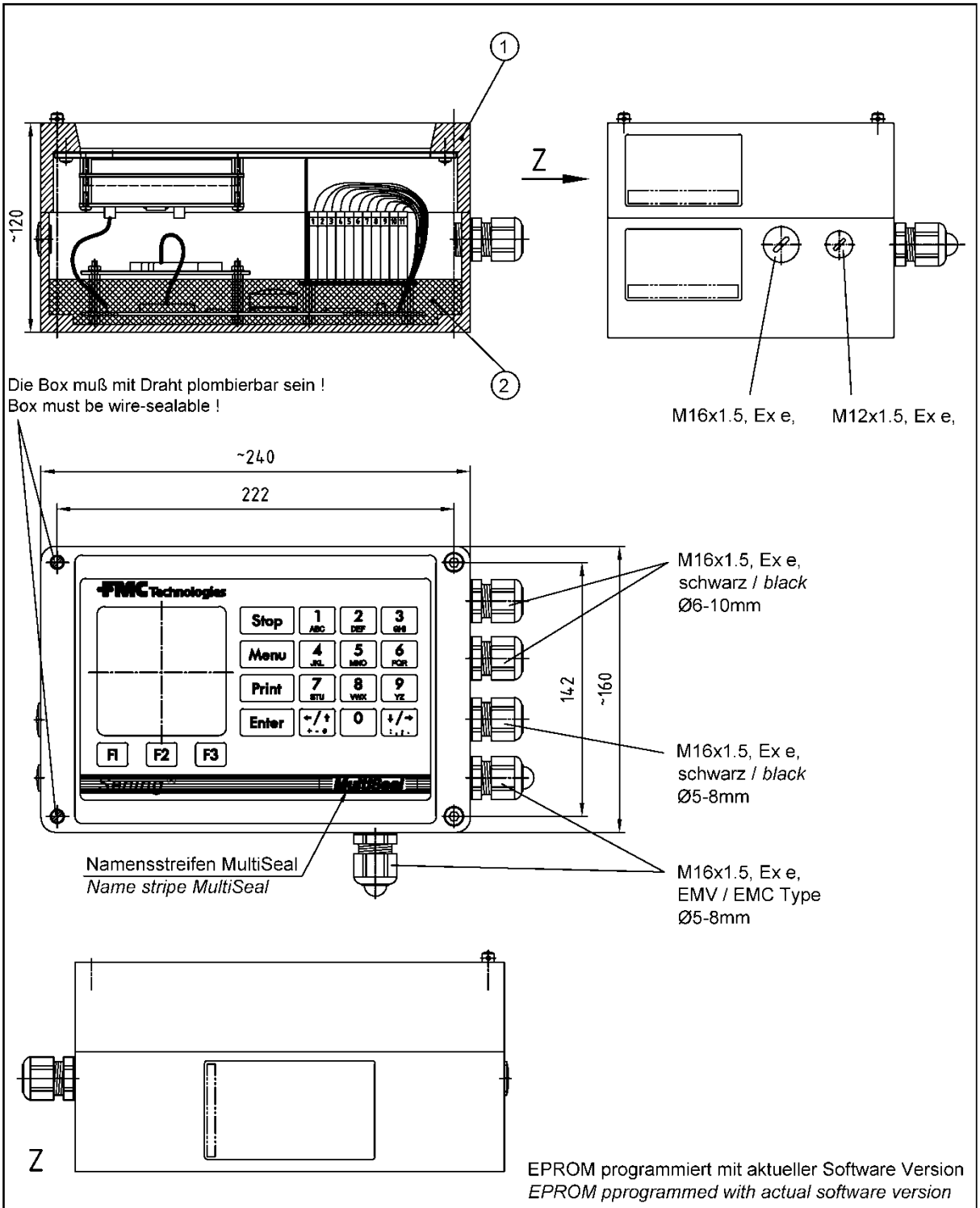
Rev. A


Verschraubung
M16 x 1.5 / ϕ6 – 10mm
FMC EnergySystems
FMC Measurement Solutions
F.A. Sening GmbH
D-25474 Ellerbek, Germany
2
Weight: kg
Date: 12.11.2001
Name: Benthack
Drawing No.
E61.351301
Rev. C
Changes: 08.04.03 NB; 04.11.03 NB; 23.11.05 NB; 30.06.04 NB; 10.03.06 RL;
Display-Interface, complete
Order No.
NM2DISPLAY
"Schutzvermerk nach DIN 34 beachten"
All dimensions in mm
DOK-415E; DOK-416E
Display Interface
TEILE-NR.: NM2DISPLAY
Serien-Nr.:
M12x1.5, EEx e
black
M16x1.5, EEx e (2x)
black
appr. 240
222
appr. 120
142
appr. 160
Stop
Menu
Print
Enter
F1
F2
F3
FMC Measurement Solutions
F.A. Sening
For use at NoMix 2000 the name has to be changed from MultiSeal to NoMix 2000. Therefore take out the stripe with the name, insert it in the mirrored position and fix it with tape.

61.351557 - MultiSeal Main Unit & Display complete - MSMAINDISP



DOK-416



EPROM programmiert mit aktueller Software Version
EPROM pprogrammed with actual software version

Pos./ Item	Teile-Nr./ Part-No.	Stück/ Quant.	Benennung	*Description*
2	352033	1	Gehäuse-Unterteil	*Housing-bottom part*
1	351930	1	Gehäuse-Oberteil	*Housing-top part*

ALL TOLERANCED DIMENSIONS ARE FOR INSTALLATION ONLY.
ALL OTHER DIMENSIONS ARE FOR REFERENCE ONLY.

FMC Technologies
F.A.Sening GmbH, Regentstr. 1, 25474 Ellerbek, Germany

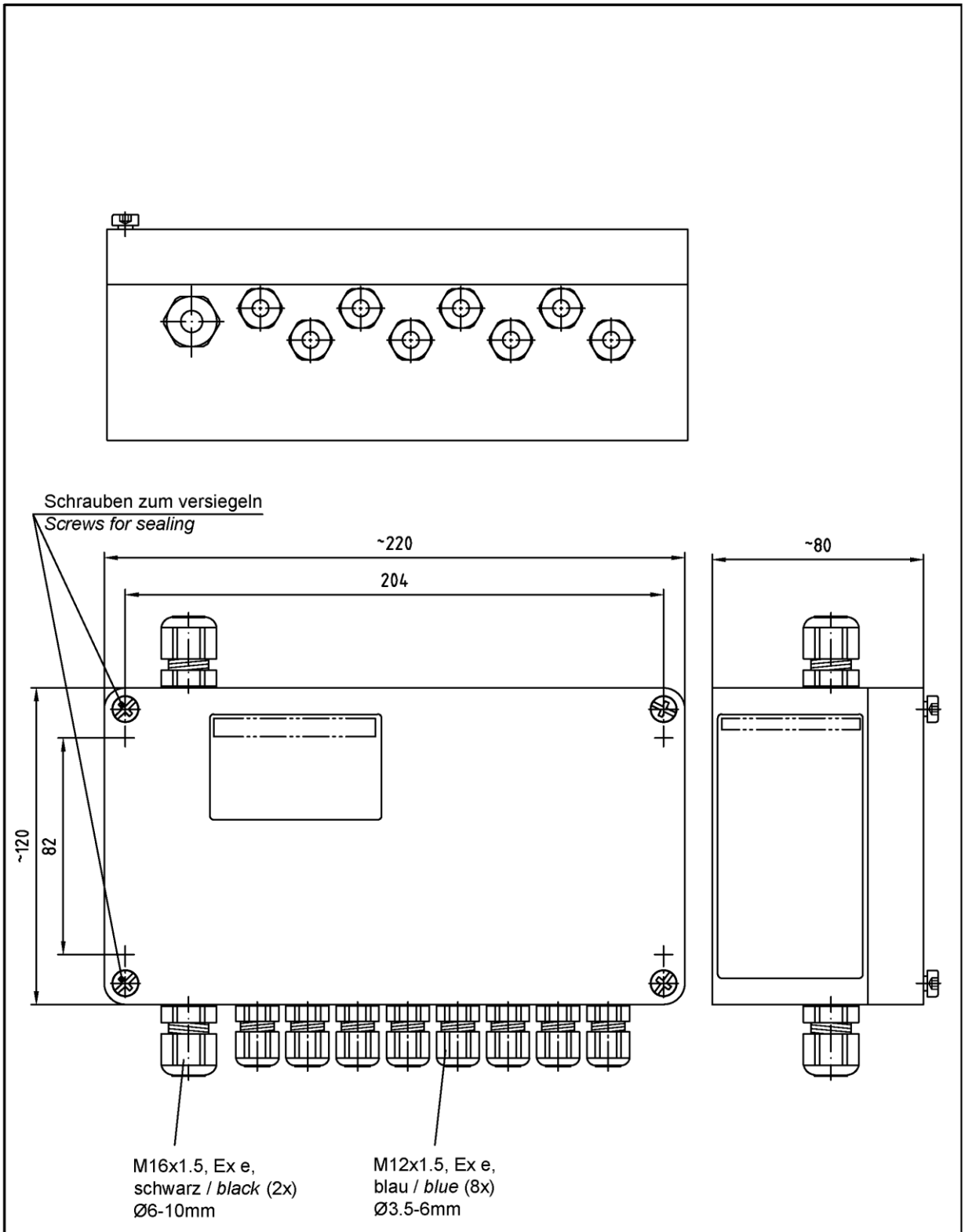
Method 1 | Method 3

	Date / Datum	Name
Drawn	14.03.2007	Larsen
Checked		

Item name / Benennung
Main Unit + Display, komplett / complete
made for / zugehörig zu
MSMAINDISP2

Scale / Maßst.	1:3	Item-No. / Teile-Nr.	Drawing No. / Zeichnungs-Nr.	Rev.	Sheet / Blatt 1
Size / Format	ISO - A4	MSMAINDISP2	352024_51	00E.00	of / von 1
Weight / Gewicht	4,3 kg				

"Schutzvermerk nach DIN ISO 16016 beachten"



"Schutzvermerk nach DIN ISO 16016 beachten"

ALL TOLERANCED DIMENSIONS ARE FOR INSTALLATION ONLY.
ALL OTHER DIMENSIONS ARE FOR REFERENCE ONLY.

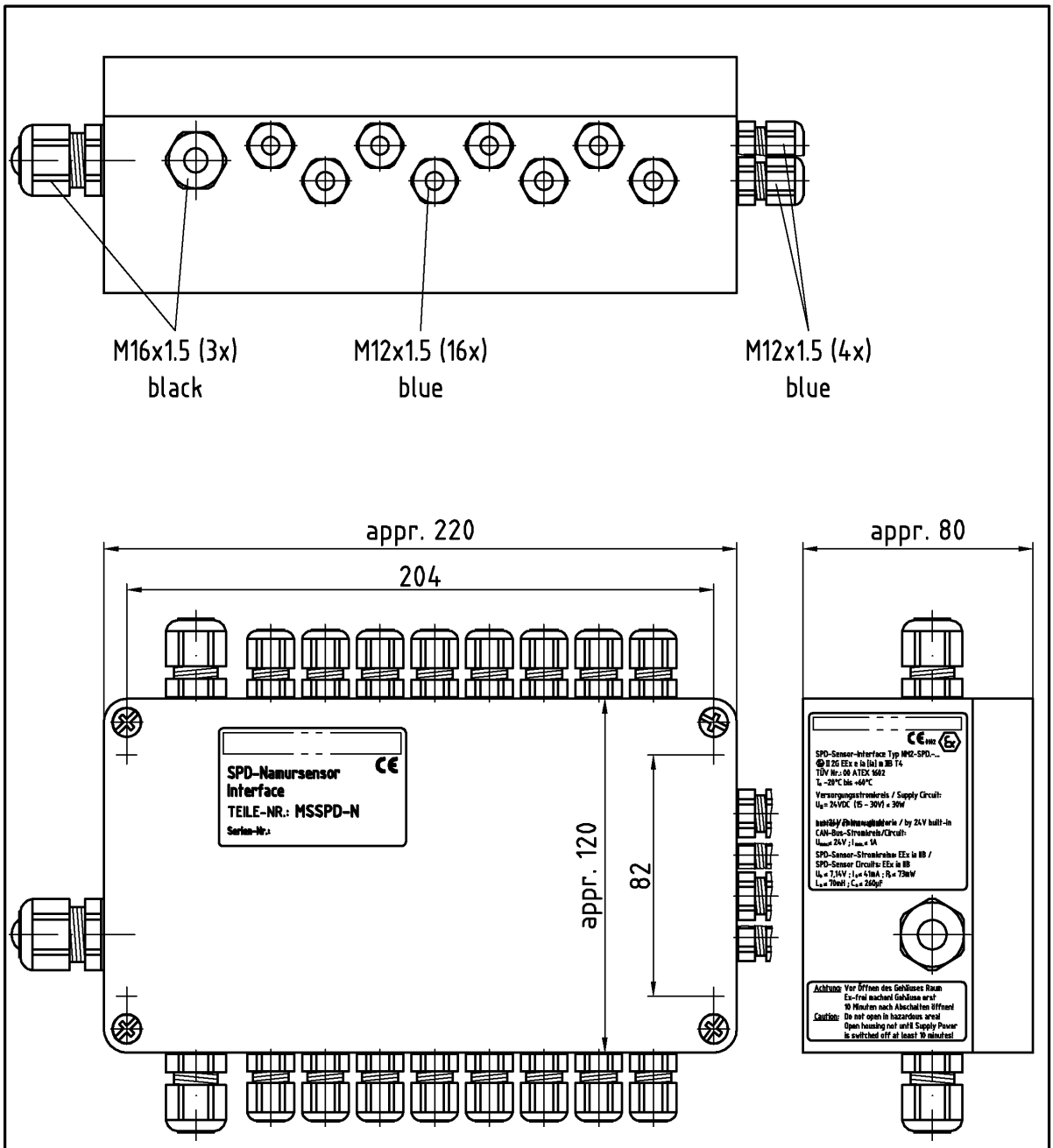
FMC Technologies
F.A.Sening GmbH, Regentstr. 1, 25474 Ellerbek, Germany

	Date / Datum	Name
Drawn	24.04.2008	Birkmann
Checked		

Method 1 | Method 3

Item name / Benennung: Restmengensensor- / Wetleg sensor - Interface
made for / zugehörig zu: komplett / complete

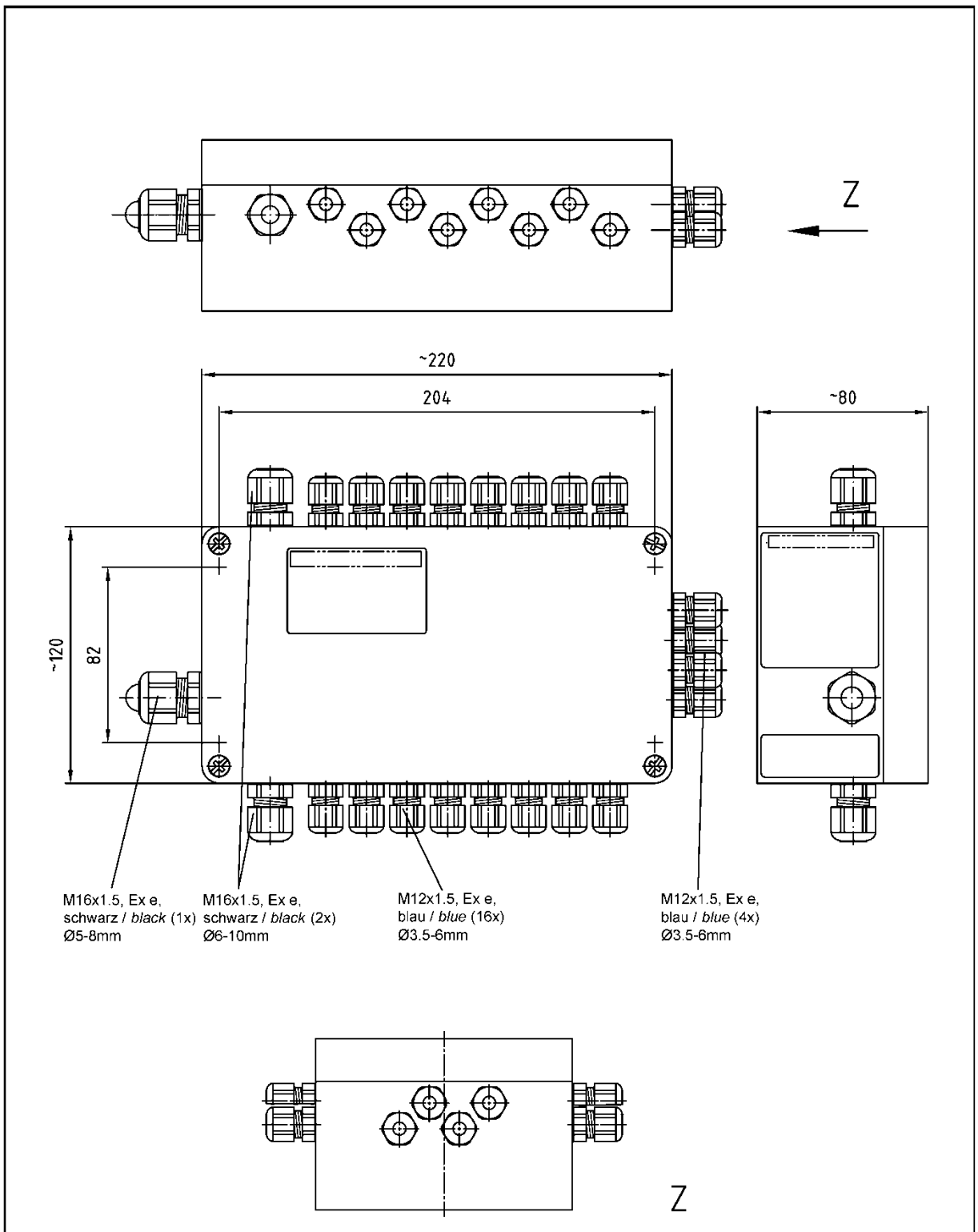
Scale / Maßst.	1:2	Item-No. / Teile-Nr.	Drawing No. / Zeichnungs-Nr.	Rev.	Sheet / Blatt
Size / Format	ISO - A4	NM2WET2	352091_51	00B.00	1
Weight / Gewicht	2,3kg				of / von 1



Cable Glands
M16 x 1.5 / ϕ6 – 10mm
M12 x 1.5 / ϕ3,5 – 6mm

SPD-Namursensor-Interface complete	FMC Technologies F.A. Sening GmbH D-25474 Ellerbek, Germany		
	Weight : kg	Date : 30.06.2003	Name : Arndt
Part-No. MSSPD-N	Changed : 03.08.04 NB; 10.03.06 RL; 24.05.07 RL;	Drawing No.: E51.351706	Rev. A

DOK-415E; DOK-416E "Schutzvermerk nach DIN ISO 16016 beachten"



"Schutzvermerk nach DIN ISO 16016 beachten"

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FMC Technologies
F.A.Sening GmbH, Regentstr. 1, 25474 Ellerbek, Germany

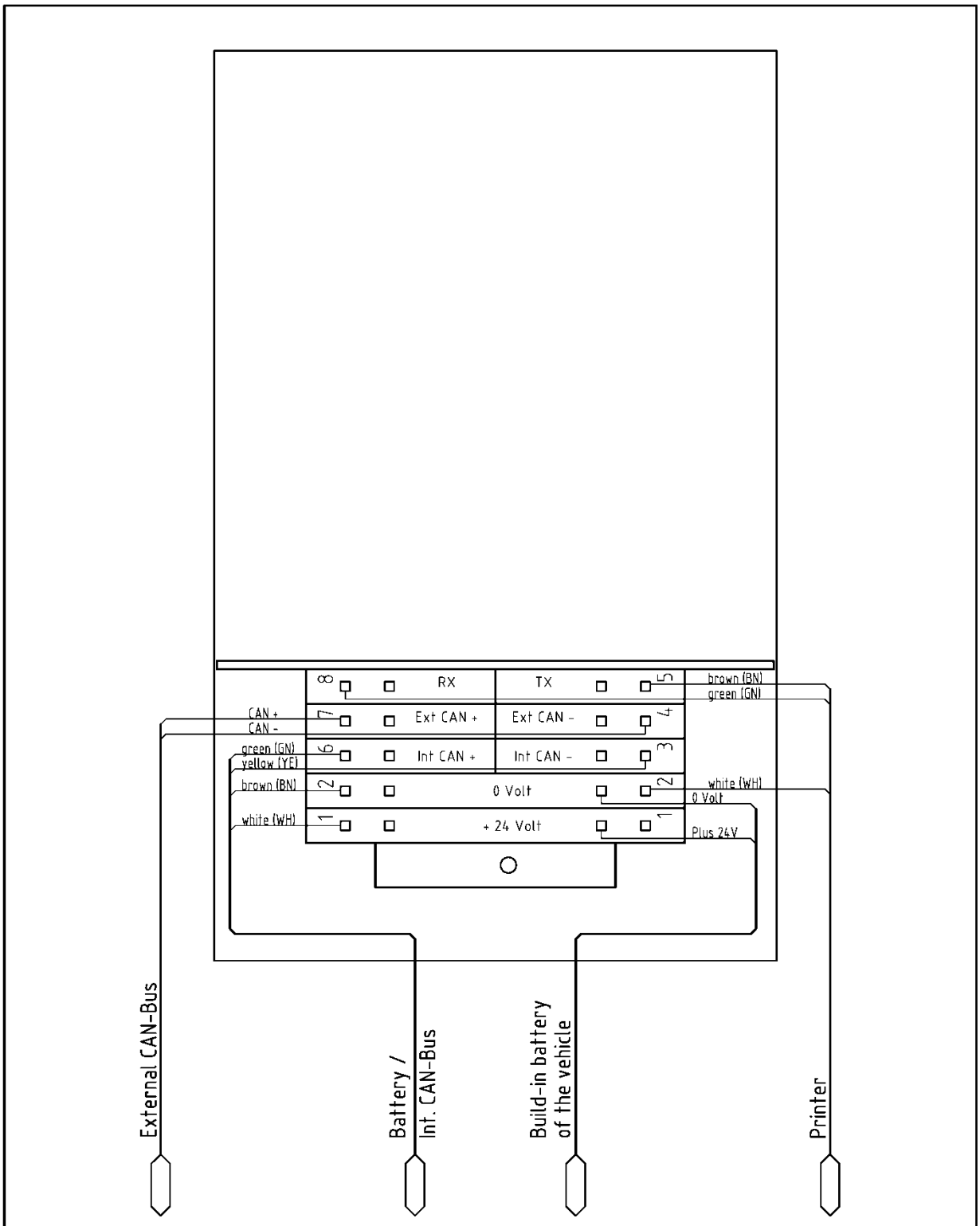
	Date / Datum	Name
Drawn	26.06.2008	sbi
Checked		

Method 1 Method 3

Item name / Benennung: SPD-Namursensor-Interface, komplett / complete
made for / zugehörig zu

Scale / Maßst. 1:2.5	Item-No. / Teile-Nr.	Drawing No. / Zeichnungs-Nr.	Rev.
Size / Format ISO - A4	MSSPD-N2	352116_51	00A.00
Weight / Gewicht 2,5 kg			

Sheet / Blatt 1
of / von 1



DOK-415E; DOK-416E
"Schutzvermerk nach DIN 34 beachten"

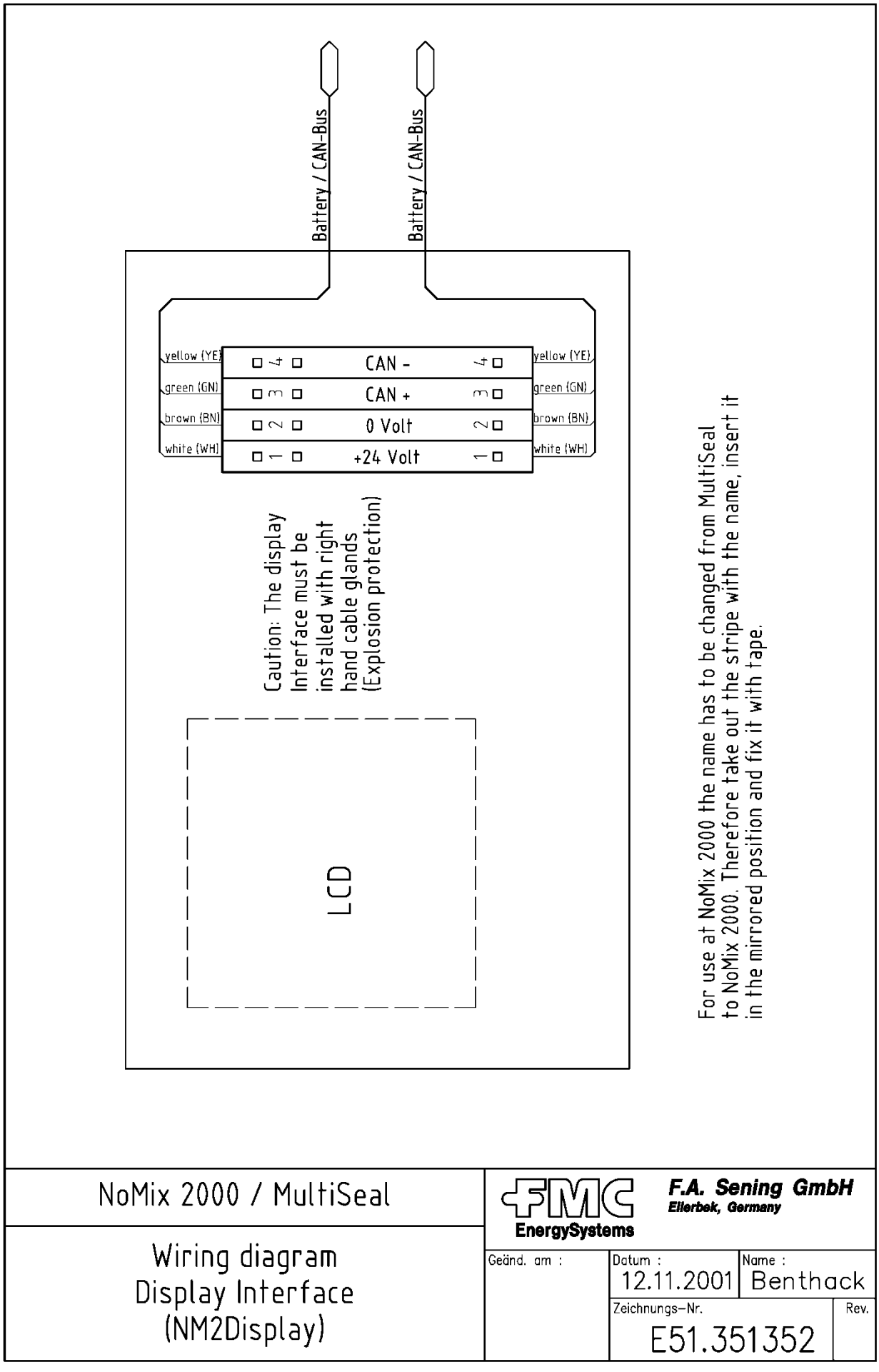
NoMix 2000 / MultiSeal

Wiring diagram
Main Unit
(NM2MAIN / MSMAIN)

FMC EnergySystems
FMC Measurement Solutions

F.A. Sening GmbH
D-25474 Ellerbek, Germany

Changes :	Date : 19.11.2002	Name : Benthack
	Drawing No. E51.351351	Rev.



DOK-415E; DOK-416E
"Schutzvermerk nach DIN 34 beachten"

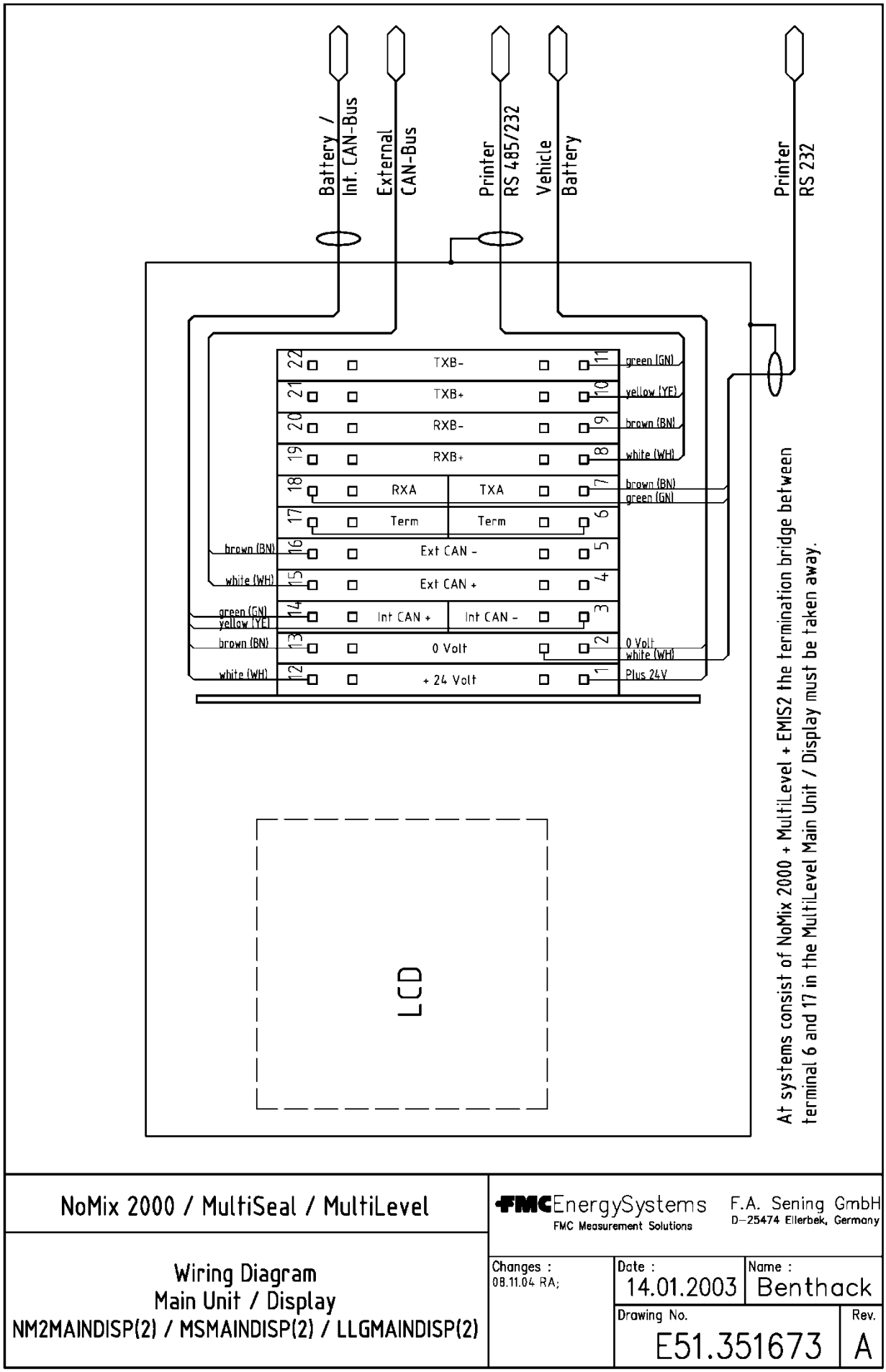
NoMix 2000 / MultiSeal

Wiring diagram
Display Interface
(NM2Display)

FMC EnergySystems

F.A. Sening GmbH
Ellerbek, Germany

Geänd. am :	Datum : 12.11.2001	Name : Benthack
	Zeichnungs-Nr. E51.351352	Rev.



DOK-415E; DOK-416E
"Schutzvermerk nach DIN 34 beachten"

NoMix 2000 / MultiSeal / MultiLevel

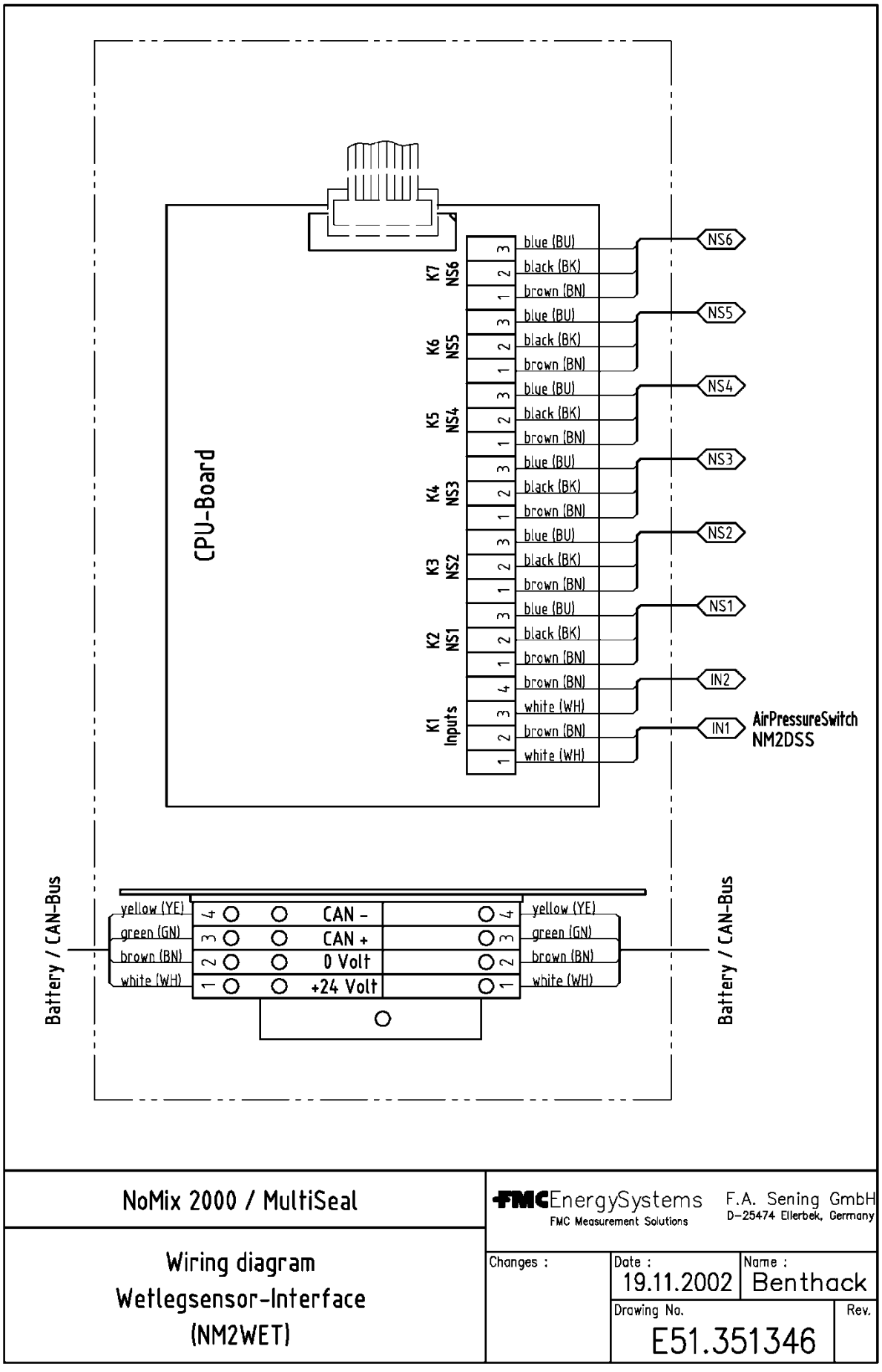
Wiring Diagram
Main Unit / Display
NM2MAINDISP(2) / MSMAINDISP(2) / LLGMAINDISP(2)

FMC EnergySystems
FMC Measurement Solutions

F.A. Sening GmbH
D-25474 Ellerbek, Germany

Changes :	Date :	Name :
08.11.04 RA;	14.01.2003	Benthack

Drawing No.	Rev.
E51.351673	A



DOK-415E; DOK-416E
"Schutzvermerk nach DIN 34 beachten"

NoMix 2000 / MultiSeal

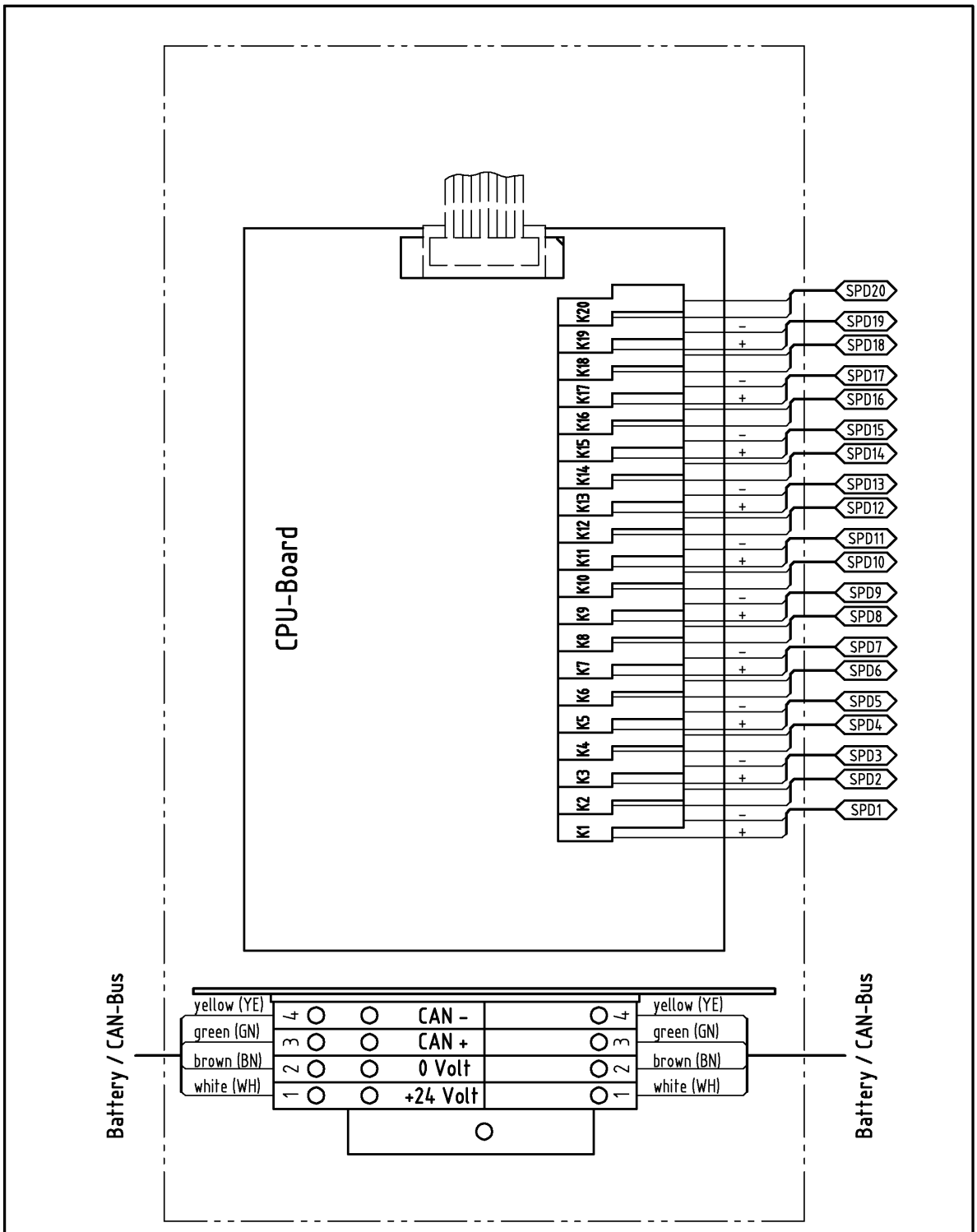
Wiring diagram
Wetlegsensor-Interface
(NM2WET)

FMC EnergySystems
FMC Measurement Solutions

F.A. Sening GmbH
D-25474 Ellerbek, Germany

Changes :	Date :	Name :
	19.11.2002	Benthack

Drawing No. E51.351346 | Rev.



DOK-415E; DOK-416E
"Schutzvermerk nach DIN 34 beachten"

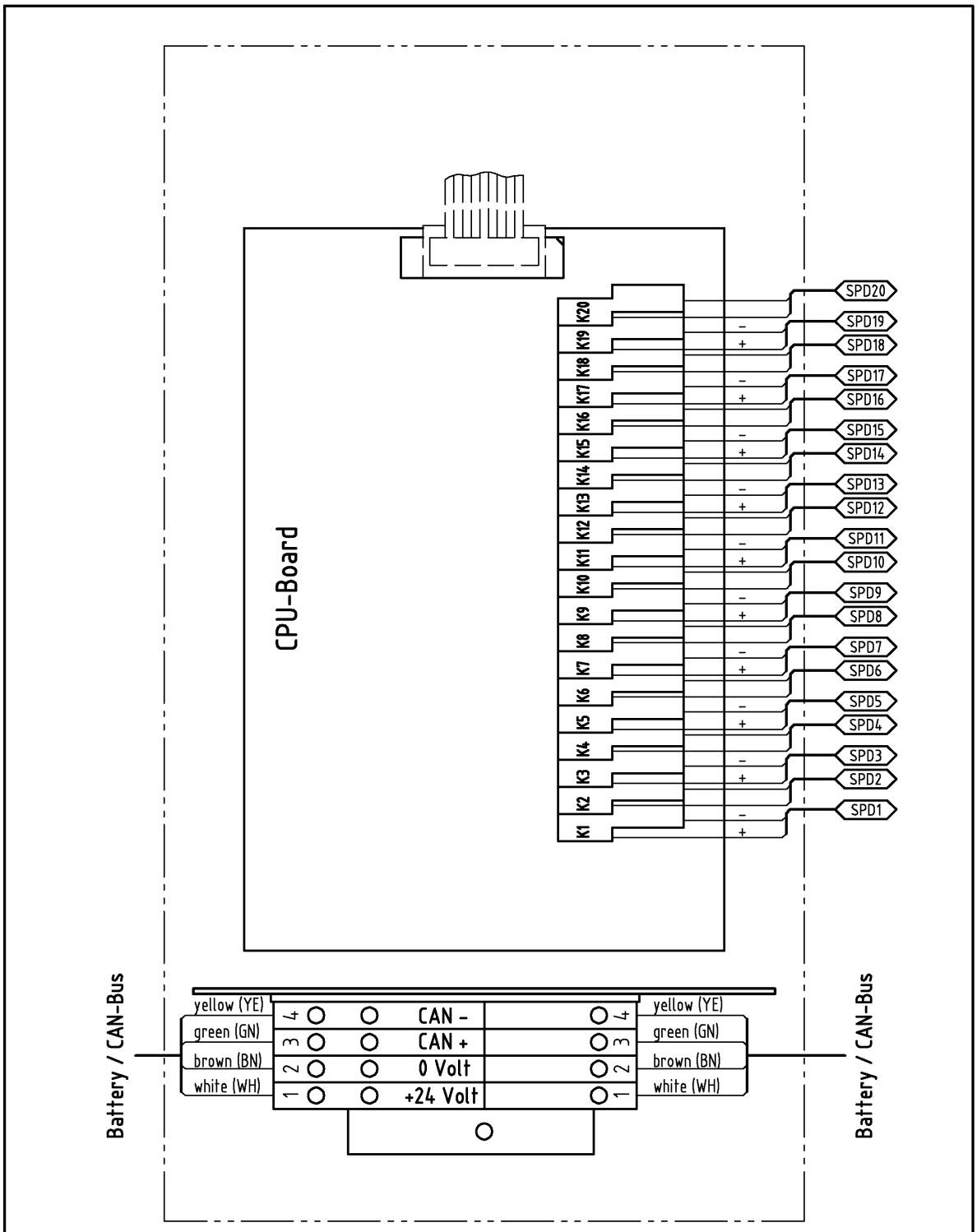
NoMix 2000 / MultiSeal

Wiring diagram
SPD-Sensor-Interface
(MSSPD)

FMC EnergySystems
FMC Measurement Solutions

F.A. Sening GmbH
D-25474 Ellerbek, Germany

Changes :	Date :	Name :
	19.11.2002	Benthack
	Drawing No. E51.351347	Rev.



DOK-415E; DOK-416E
"Schutzvermerk nach DIN 34 beachten"

NoMix 2000 / MultiSeal

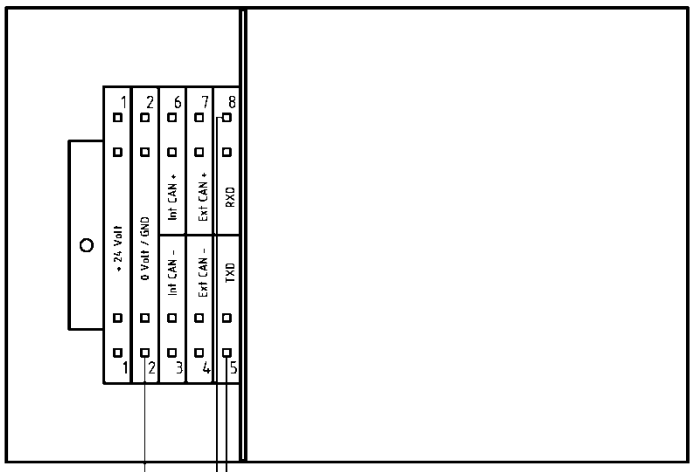
Wiring diagram
SPD-Sensor-Interface
(MSSPD)

FMC EnergySystems
FMC Measurement Solutions

F.A. Sening GmbH
D-25474 Ellerbek, Germany

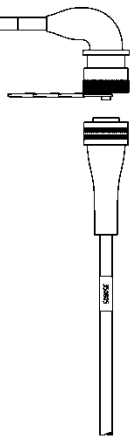
Changes :	Date :	Name :
	19.11.2002	Benthack

Drawing No. E51.351347 | Rev.



white (WH)
green (GN)
brown (BN)

Cable SPD-DR-KA2



Cable GW3
Laptop connection cable MS-PC-KA

Caution!

The socket of the printer cable part no. SPD-DR-KA2 must be installed outside the hazardos area!

DOK-415E; DOK-416E
"Schutzvermerk nach DIN 34 beachten"

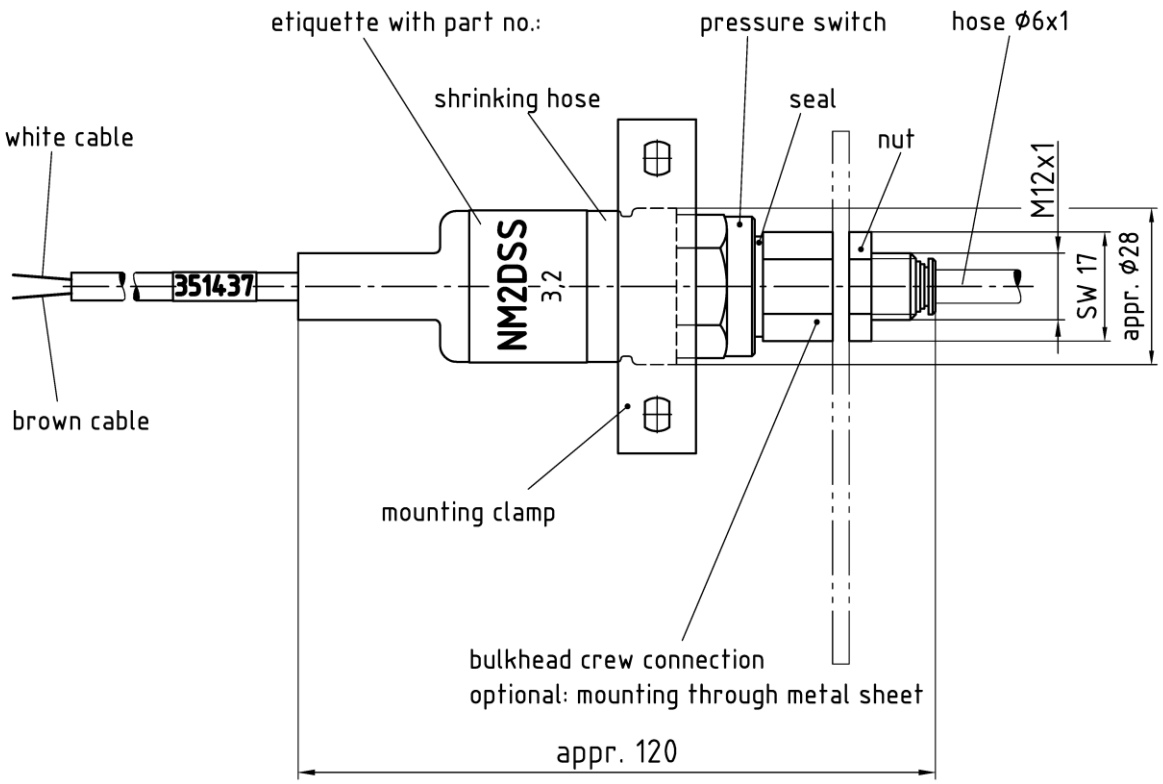
MultiSeal/NoMix 2000

Wiring Diagram
Temporary Laptop
Connection

FMC EnergySystems
FMC Measurement Solutions

F.A. Sening GmbH
D-25474 Ellerbek, Germany

Changes :	Date : 29.01.2003	Name : Benthack
	Drawing No. E51.351361	Rev.



Mounting in the cabinet:

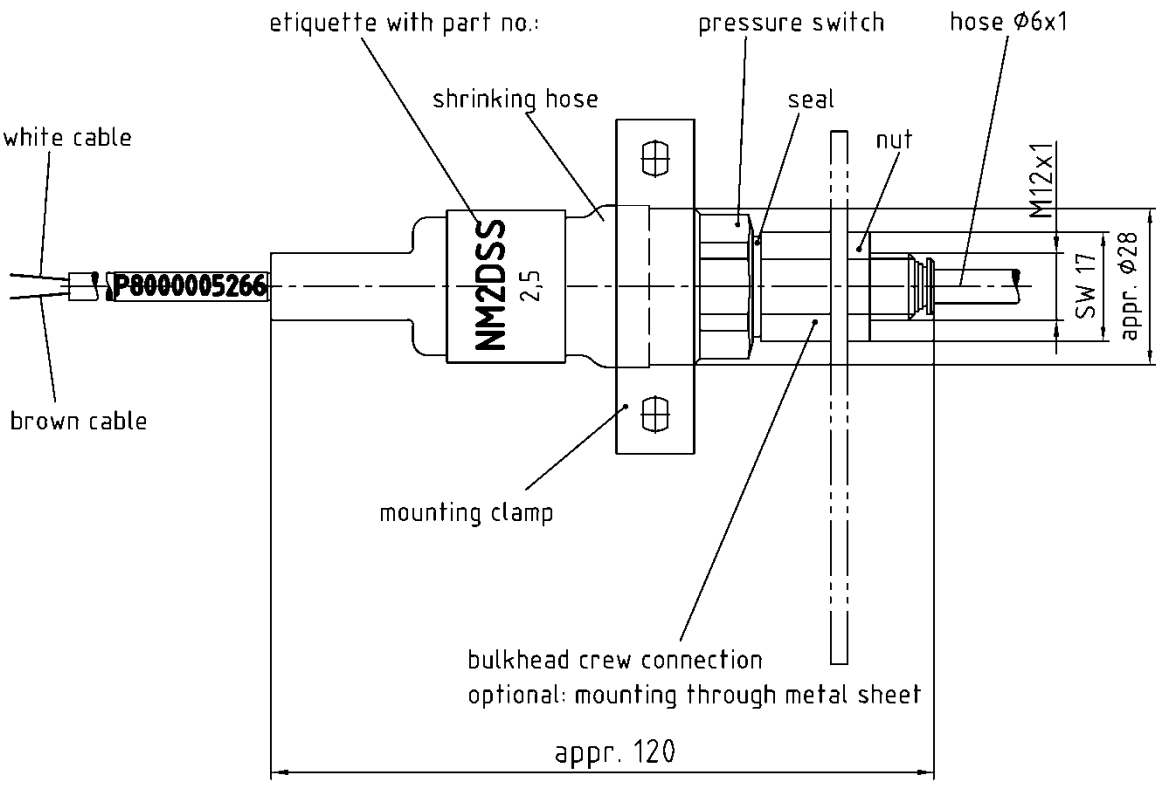
Make it in a safe mechanical attachment !!

On installatio it is important to make sure, that the air connection from below is carried out (vertical mounting position) or that the assembly is carried out horizontally (horizontal mounting position) .

switching pressure: 3,2 bar
membrane: NBR
cable sheath: PUR
cable length 5m

DOK-454; DOK-416;
"Schutzvermerk nach DIN ISO 16016 beachten"

Diaphragm pressure switch NM2DDS for NOMIX2000/MultiSeal	FMC Technologies	F.A. Sening GmbH D-25474 Ellerbek, Germany	
	Weight : kg	Date : 06.07.2009	Name : Larsen
Part-No. NM2DSS	Changed: ECN No. 20878 / Date 19.02.10 / Name RL;	Drawing No.: E51.351438	Rev. A



Mounting in the cabinet:
Make it in a safe mechanical attachment !!
On installatio it is important to make sure, that the air connection from below is carried out (vertical mounting position) or that the assembly is carried out horizontally (horizontal mounting position) .

switching pressure: 2,5 bar
membrane: NBR
cable sheath: PUR
cable length 5m

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ALL OTHER DIMENSIONS ARE FOR REFERENCE ONLY.

FMC Technologies
F.A.Sening GmbH, Regentstr. 1, 25474 Ellerbek, Germany

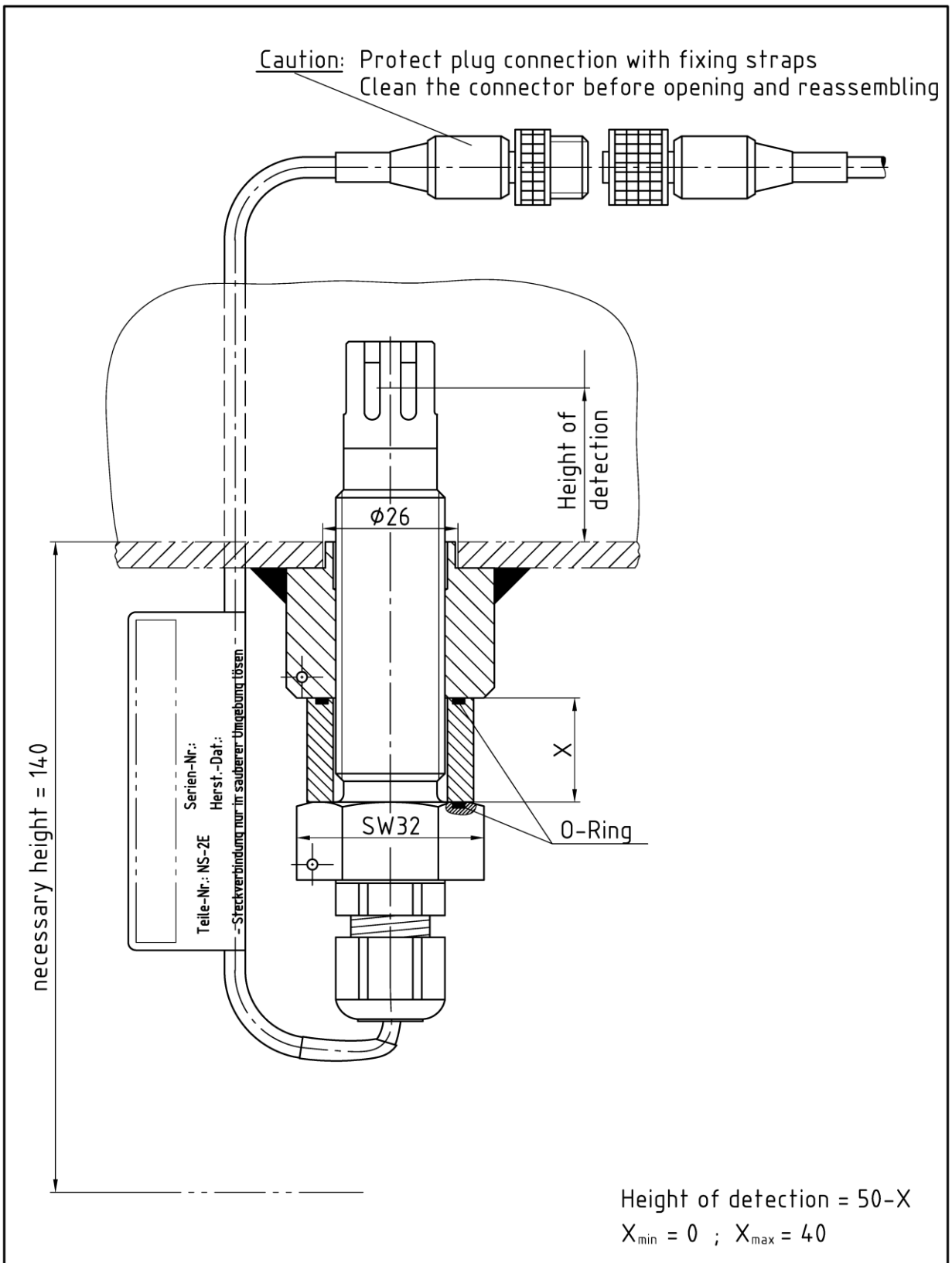
	Date / Datum	Name
Drawn	21.12.2010	Larsen
Checked		

Method 1 Method 3

Item name / Benennung: Diaphragm pressure switch
made for / zugehörig zu for SPD functionality

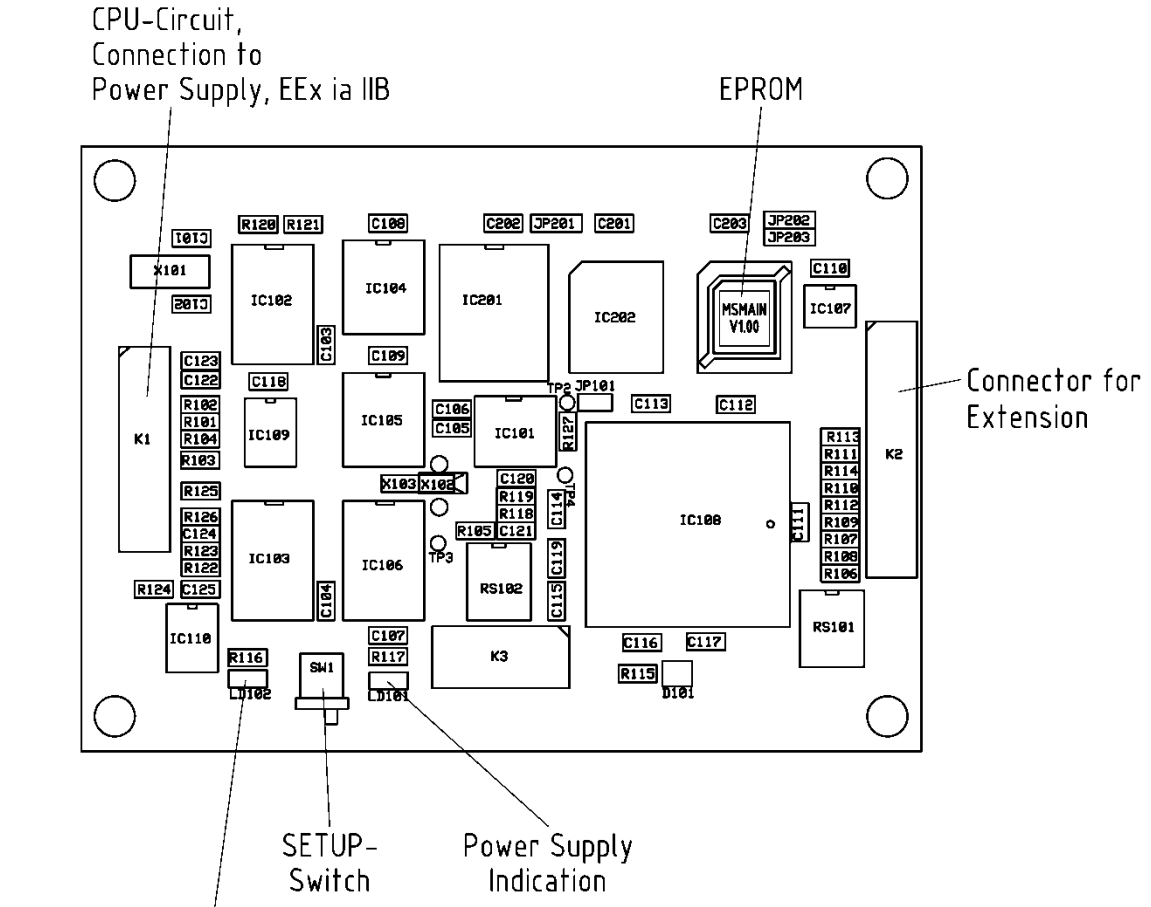
Scale / Maßst. 1:1.2	Item-No. / Teile-Nr.	Drawing No. / Zeichnungs-Nr.	Rev. / Sheet / Blatt 1
Size / Format ISO - A4	MSDSO	351434__E51	00B.00 / of / von 1
Weight / Gewicht kg			

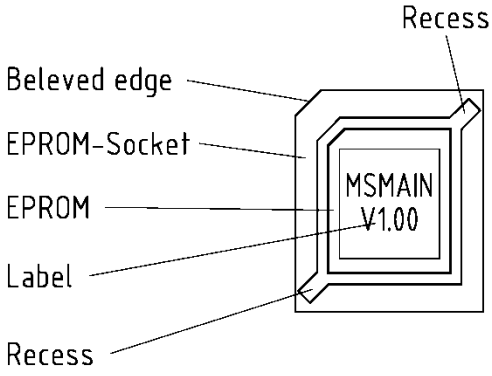
DOK-454; DOK-416;
"Schutzvermerk nach DIN ISO 16016 beachten"



Sensor NS-2E complete	FMC Technologies F.A. Sening GmbH D-25474 Ellerbek, Germany		
	Weight : kg	Date : 19.11.2001	Name : Benthack
Part-No. NS-2E	Changed: ECN No. / Date / Name: 10.03.06 RL;	Drawing No.: E51.351307	Rev.

DOK-415E;DOK-416E
"Schutzvermerk nach DIN 34 beachten"

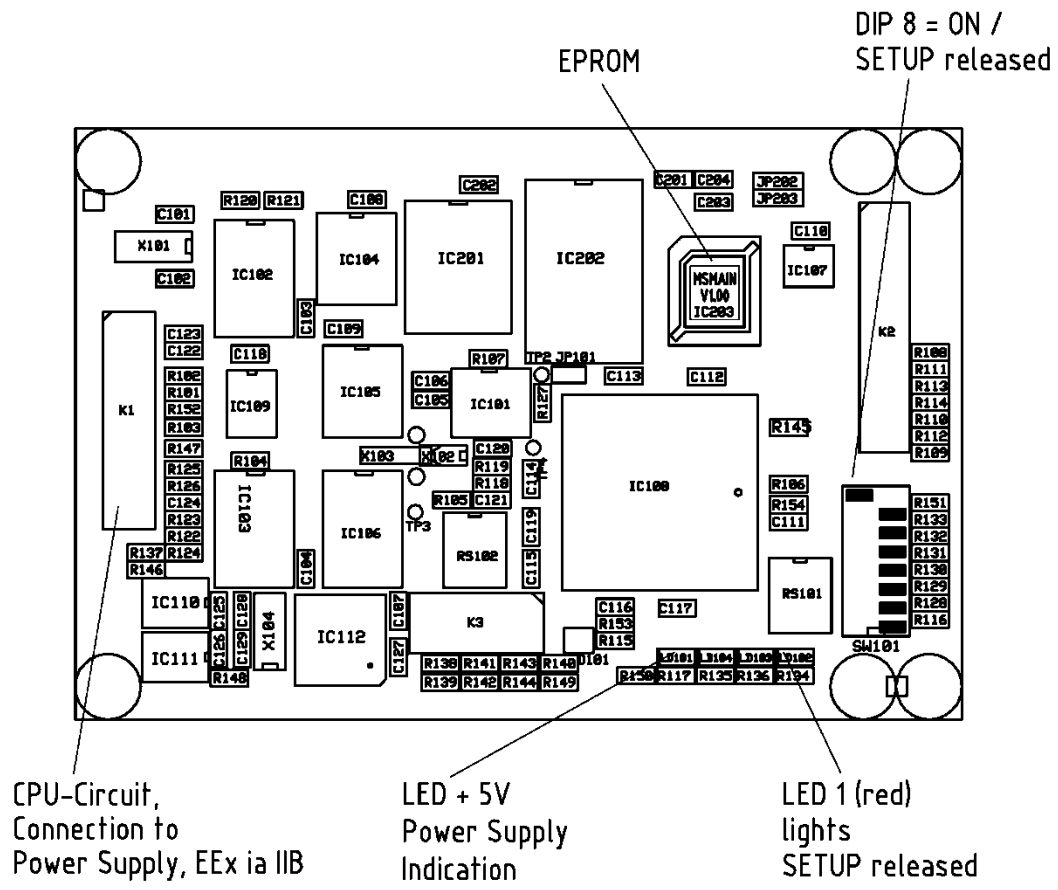


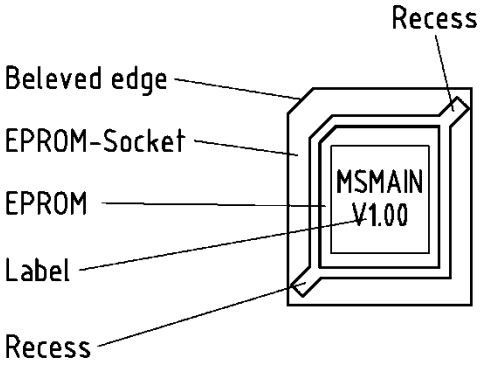


CAUTION: To remove the EPROM from the base, a special PLCC removal tool must be used (see also instruction).

DOK-416E
"Schutzvermerk nach DIN 34 beachten"

MultiSeal Main Unit	FMC EnergySystems / FMC Measurement Solutions — F.A. Sening GmbH, Ellerbek, Germany	
EPROM-Removal / SETUP-Switch Main CPU-Board - Instruction manual -	Geänd. am :	Datum : 31.08.2000 / Name : M. Kracht
	Zeichnungs-Nr. E51.351371	Rev.

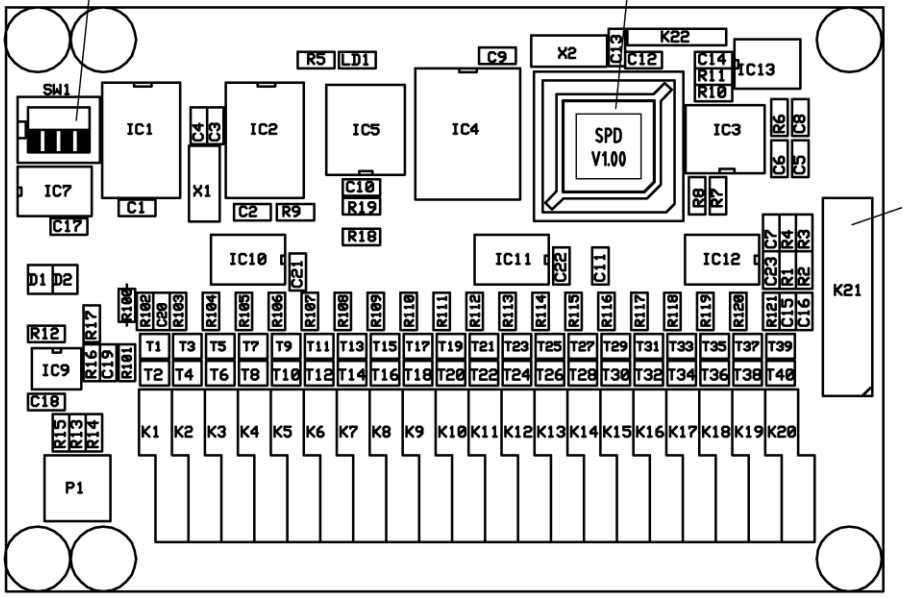


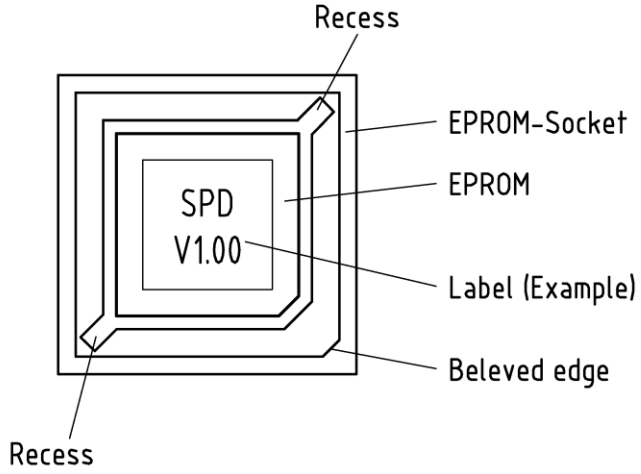


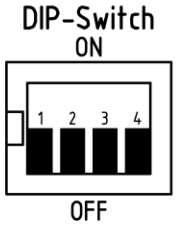
CAUTION: To remove the EPROM from the base, a special PLCC removal tool must be used (see also instruction DOK-415E and DOK-416E).

NoMix 2000/MultiSeal Main Unit / Display	FMC EnergySystems FMC Measurement Solutions	F.A. Sening GmbH D-25474 Ellerbek, Germany	
EPROM-Removal / SETUP-Switch Main CPU-Board - Instruction Manual -	Changes : 26.08.04 RA;	Date : 29.01.2003	Name : Benthack
		Drawing No. E51.351675	Rev. A

DOK-415E; DOK-416E
"Schutzvermerk nach DIN 34 beachten"







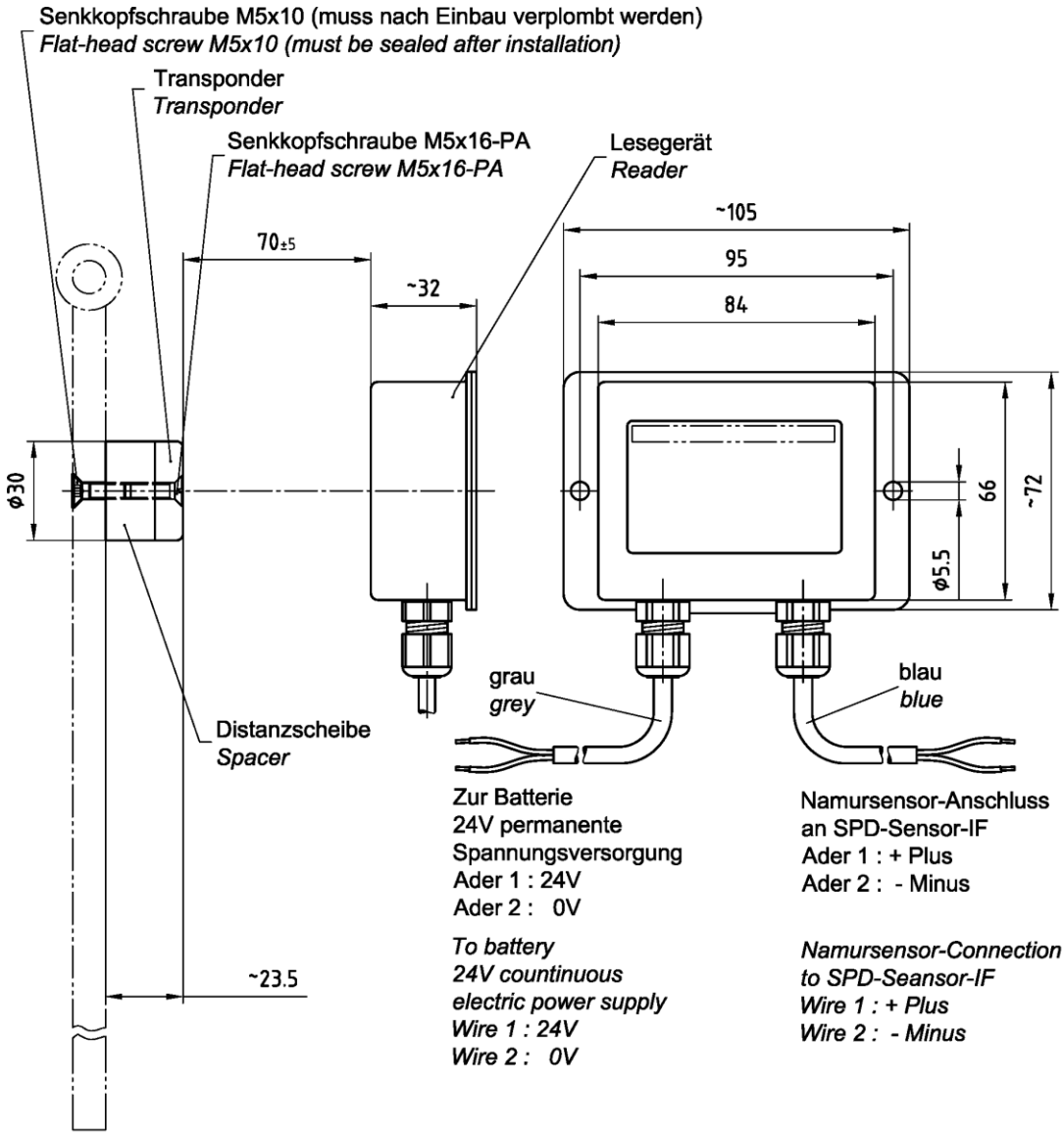
1-3: SPD-Sensor-Interface Adress
4 : Battery switch
4 = ON : Internal Battery is switched On
4 = OFF : Internal Battery is switched Off

IMPORTANT: Before removal of the processor the Dipswitch 4 must be moved to "OFF" (Internal Battery switched off).

CAUTION: To remove the EPROM from the base, a special PLCC removal tool must be used (see also instruction).

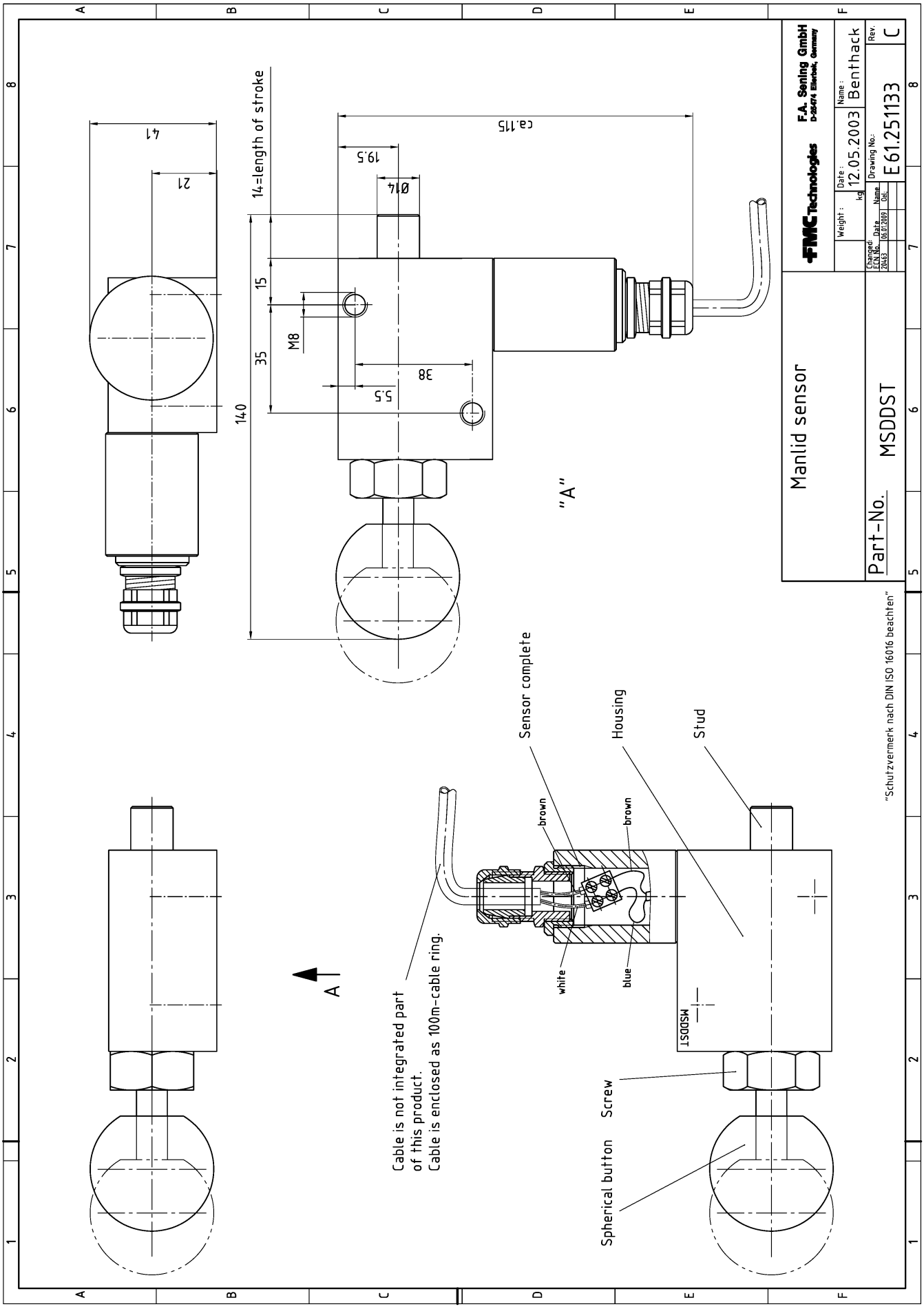
DOK-416E
"Schutzvermerk nach DIN 34 beachten"

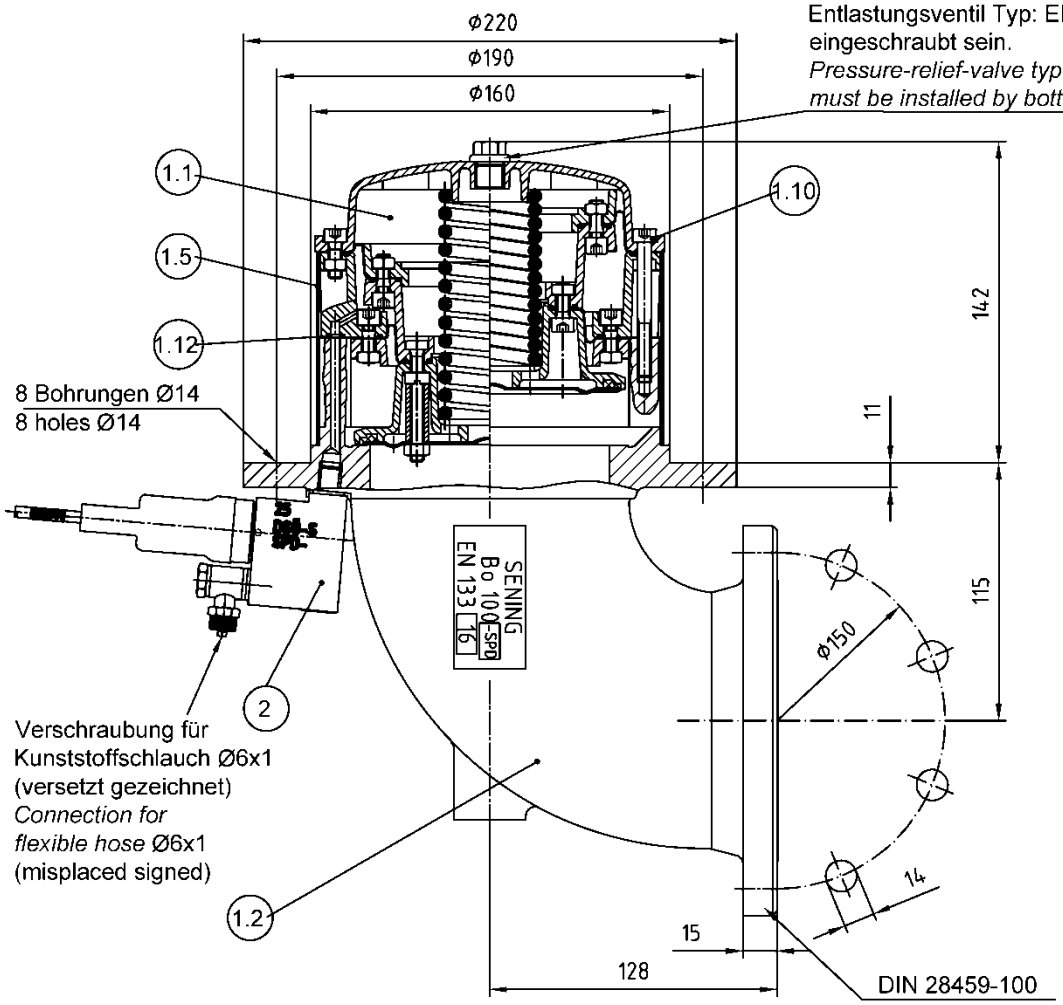
MultiSeal Interfaces	FMC EnergySystems (FMC Measurement Solutions) F.A. Sening GmbH Ellerbek, Germany	
Processor / Software-Removal CPU-Boards - Instruction manual -	Geänd. am :	Datum : 31.08.2000 / Name : M. Kracht
		Zeichnungs–Nr. E51.351372 / Rev.



"Schutzvermerk nach DIN ISO 16016 beachten"

Transponder RFID	FMC Technologies — F.A. Sening GmbH, D-25474 Ellerbek, Germany		
	Weight : 0,75 kg	Date : 05.07.2006	Name : Larsen
Part-No. RFID	Changed: ECN No. / Date / Name: 29.06.07 RL; 08.07.11 RL;	Drawing No.: 51.351985	Rev. B


F.A. Sening GmbH
D-58474 Ellerbek, Germany
FMC Technologies
Name : Benthack
Date : 12.05.2003
Weight : kg
Drawing No.: E 61.251133
Rev. C
Changed: ECN No. 20463
Date 06.01.2009
Name
Del.
Manlid sensor
Part-No. MSDDST
"Schutzvermerk nach DIN ISO 16016 beachten"
14-length of stroke
ca.115
19.5
Ø14
15
35
140
M8
38
5.5
41
21
"A"
A
Sensor complete
Housing
Stud
brown
brown
white
blue
MSDDST
Cable is not integrated part of this product.
Cable is enclosed as 100m-cable ring.
Screw
Spherical button



Betätigungsluftdruck:
von 250 bis 750 kPA

Operation air pressure:
from 250 to 750 kPa

Temperaturbereich:
-20°C bis +60°C

Temperature range:
-20°C to +60°C

Werkstoffe:
Gehäuse: Al
Dichtungen: NBR und FPM

Material:
Housing: Al
Seals: NBR und FPM

Nach EN 13316
PN10

According to EN 13316
PN10

Pos./ Item	Teile-Nr./ Part-No.	Stück/ Quant.	Benennung	Description
2	352346	1	Druckschalter	*Pressure switch*
1.12	6000600	1	O-Ring	*O-Ring*
1.10	4100135	4	Zylinderschraube	*Hexagon head cap screw*
1.5	17716 A	1	Sieb	*Strainer*
1.2	17294 E	1	Gehäuse	*Housing*
1.1	17578 H	1	Bodenventiloberteil	*Bottom valve top part*

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ALL OTHER DIMENSIONS ARE FOR REFERENCE ONLY.

FMC Technologies
F.A. Sening GmbH, Regentstr. 1, 25474 Ellerbek, Germany

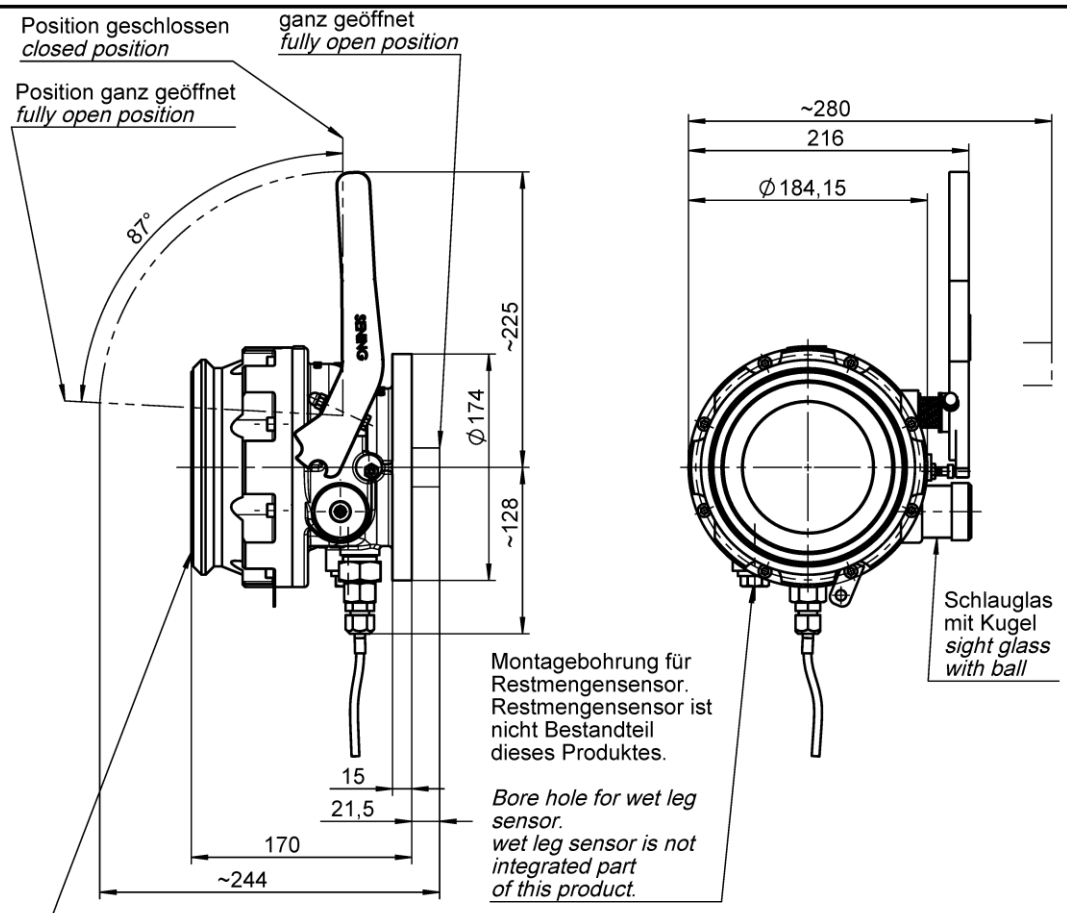
Method 1 | Method 3

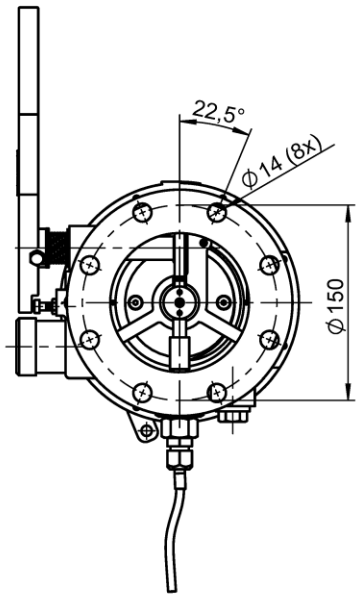
	Date / Datum	Name
Drawn	07.07.2009	Larsen
Checked		

Item name / Benennung
Bodenventil / Pneumatic operated footvalve BO100-SPD
made for / zugehörig zu
mit SPD-Druckschalter / with SPD position switch

Scale / Maßst.	1:3	Item-No. / Teile-Nr.	Drawing No. / Zeichnungs-Nr.	Rev.	Sheet / Blatt 1
Size / Format	ISO - A4	BO100-SPD	252401_51	00A.00	of / von 1
Weight / Gewicht	6,2 kg				

"Schutzvermerk nach DIN 34 beachten"





Temperaturbereich: -20° C bis +60° C

Material:

- Aluminium
- FKM / NBR (Dichtungen)
- korrosionsbeständiger Stahl / verzinkter Stahl
- Kunststoff

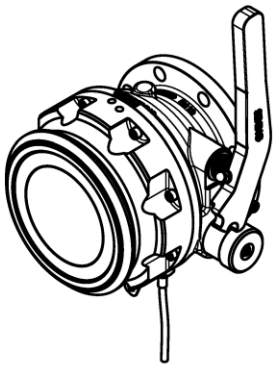
Nach EN 13083

Temperatur range: -20° C to +60° C

Material:

- *aluminium*
- *FKM / NBR (sealings)*
- *stainless steal / zinc coated steal*
- *synthetic material*

According to EN 13083



ALL TOLERANCED DIMENSIONS ARE FOR INSTALLATION ONLY.
ALL OTHER DIMENSIONS ARE FOR REFERENCE ONLY.

FMC Technologies
F.A. Sening GmbH, Regentstr. 1, 25474 Ellerbek, Germany

	Date / Datum	Name
Drawn	09.05.2007	Steffen
Checked	--	--

Method 1 | Method 3 (crossed out)

Item name / Benennung
API-Kupplung / API-Coupling
made for / zugehörig zu
mit Stellungsueberwachung / with proximity switch

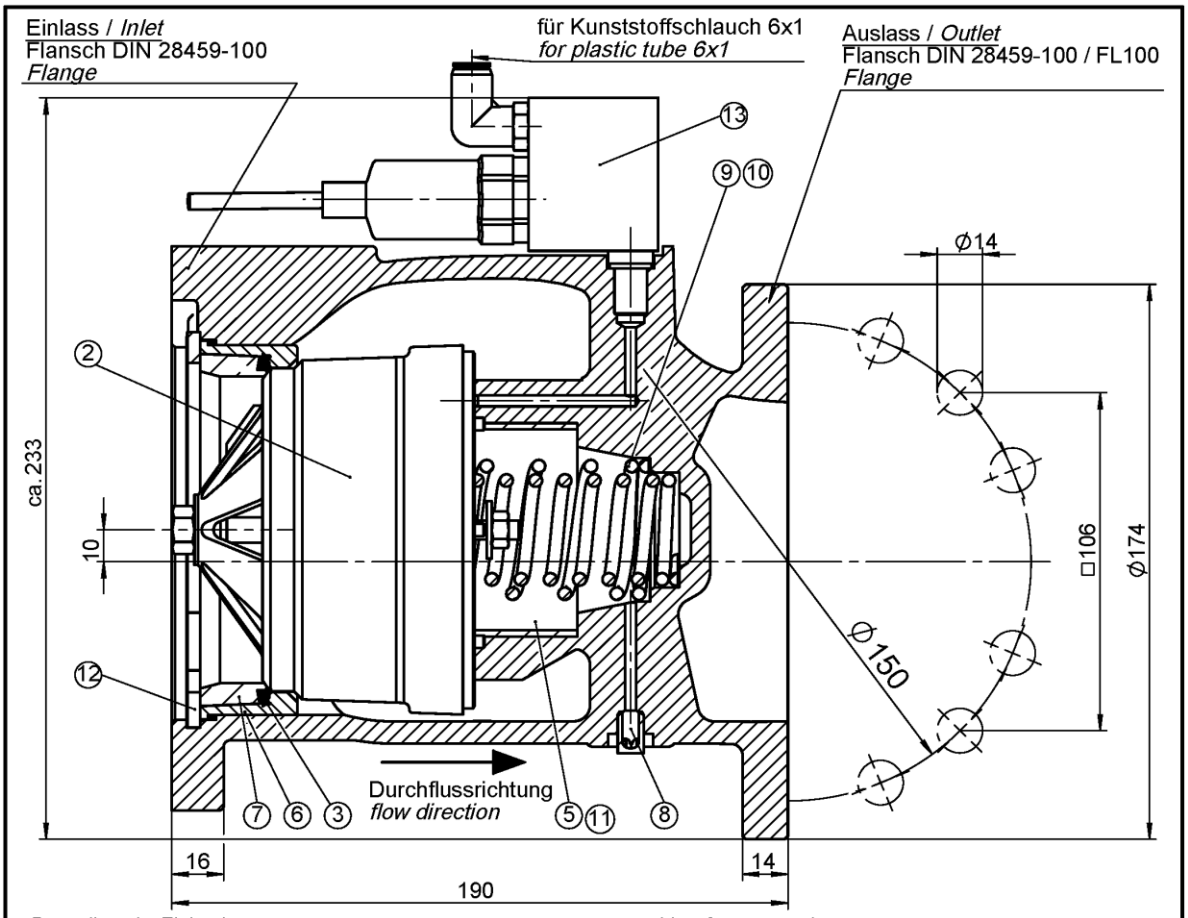
Scale / Maßst.	1:5
Size / Format	ISO-A4
Weight / Gewicht	5,2 kg

Item-No. / Teile-Nr.: VKV1M-I

Drawing No. / Zeichnungs-Nr.: 251945_51

Rev.: 000.01

Sheet / Blatt 1 of / von 1



Darstellung ist Einbaulage
Die Entlüftung muss nach unten zeigen

Vent for pneumatic actuator preferred mounting orientation

Betätigungsdruck:
von 250 bis 750 kPA

Temperaturbereich:
-20°C bis +60°C

Werkstoffe:
- Aluminiumgehäuse
- NBR / FKM (Dichtungen)
- korrosionsbeständiger Stahl, verzinkter Stahl
- Messing
- POM

PN 10

Operation air pressure:
from 250 to 750 kPA

Temperatur range:
-20°C to +60 °C

Material:
- *Housing made of aluminium*
- *NBR / FKM (sealing)*
- *Stainless steel, zinc coated steel*
- *Brass*
- *POM*

PN 10

Pos./ Item	Teile-Nr./ Part-No.	Stück/ Quant.	Benennung	*Description*
13	351165	1	Druckschalter f. Bodenventil DN100	*Pressure-switch*
12	4300104	1	Sicherungsring DIN 472 120x4 Fed.St.	*Lock ring 120x4*
11	6000200	1	O-Ring 65 x 2,5	*O-Ring 65 x 2,5*
10	20221	1	Druckfeder D-329	*Compression spring D-329*
9	12765 B	1	Druckfeder D-319	*Compression spring D-319*
8	16504	1	Buchse	*Vent bushing*
7	252096	1	Sitzbuchse	*Seat bushing*
6	252095	1	Zwischenbuchse	*Adapter bushing*
5	17883 B	1	Führungsbuchse	*Guide bushing*
4	6000100	1	O-Ring 110x2 NBR	*O-Ring 100x2*
3	15232 D	1	Dichtring	*Seal ring*
2	252097	1	Ventileinsatz	*Valve insert*

Durchgangsventil, mit Druckschalter
Line-Valve, with SPD Pressure-switch
DN100 / PN10

FMC Technologies
F.A. Sening GmbH
D-25474 Ellerbek, Germany

Weight:	Date:	Name:
4,8 kg	14.05.2009	Cromme

Part-No. DV100-4D

Changed: ECN No.	Date	Name
21169	20.10.10	RL

Drawing No.: 51.252376

Rev.: A

"Protective note according to DIN ISO 16016"

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