FMC Technologies

Electronic Register

Sening® MultiFlow

Operating and Installation Manual

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Disclaimer

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Contents

1 General Remarks

1.1 How to Use this Manual

This manual contains a great deal of information. In order to help you find the information you need, we have created some orientation help.

Pictograms

The information in this manual ranges from intended use, formal instructions, concrete operating steps and feed-back to good advice. For easy reference the information is marked with a special pictogram in the left marginal column.

In this manual you will find the following symbols:

Danger! In this case: Danger of explosion.

Environment protection; recycling

Action that may damage the equipment

§ Action that may have legal consequences

☞ Work step; concrete operation

☺ Feed-back positive

☹ Feed-back negative

Advice, tip

Optional or special case

NOTE: Indicate a special Situation

IMPORTANT: To be strictly observed

1.2 Valuable Facts about Sening®

The Sening MultiFlow has been developed according to the latest state of technology, incorporating many years of experience in the application of electronic metering.

Due to standardization of electronic metering devices within the European Union and around the world development has taken place strictly to the latest regulations for the approval of meters for W & M regulated applications within the EU (OIML R117) and the United States and Canada. This guarantees that the Sening MultiFlow will fulfil the present and also future legal requirements for meters for applications subject to Weights & Measures inspection.

Apart from the display with text output, which has now become a standard, the Sening MultiFlow development includes the following features:

The electronic W&M seal (soft seal) monitors only changes to parameters which are subject to W&M protection. This information is available by printing the Seal Report after the calibration phase and at any time since then.

The MultiFlow is capable of having one 2-channel, one single channel, or two single channel pulse inputs. If using one 2-channel pulse input, the pulse transmitter output can be set (PNP, NPN or F. A. Sening two-wire THS pulse transmitter) on the MultiFlow through the software.

The printer interface (RS-232, RS-422 or RS-485) is set to the desired type of connection by software. There are no jumpers or links to be set.

All discrete outputs are electronically protected against short circuit. The affected output becomes operational again once the short circuit is removed. It is not necessary to change any fuses

An economical data interface from the vehicle to the office is provided by the use of an industry-compatible chip-card reader. The reading device conforms to IP65 class of protection and is implemented in the intrinsically safe type of explosion protection. The reader can therefore be used in Ex areas without any special protective measures.

The Sening MultiFlow has four intrinsically safe inputs for the connection of switches for use in Ex areas without special protective measures.

The Sening MultiFlow communicates to other FAS-devices via the CAN Bus system which has become a standard on motor vehicles.

The printer can be connected without a special interface.

A feature of the Sening MultiFlow is its compact design (also in the AI version) which saves costs and weight.

Switches and jumpers within the device have been eliminated in order to make the Sening MultiFlow easy to install and configure. All settings on the communication interface are configured with software. Therefore, there is the possibility of connecting various types of printer to the Sening MultiFlow printer output.

Operation is menu-guided and all output is shown in simple text.

Operation is available in a number of languages. Three languages are permanently installed as standard.

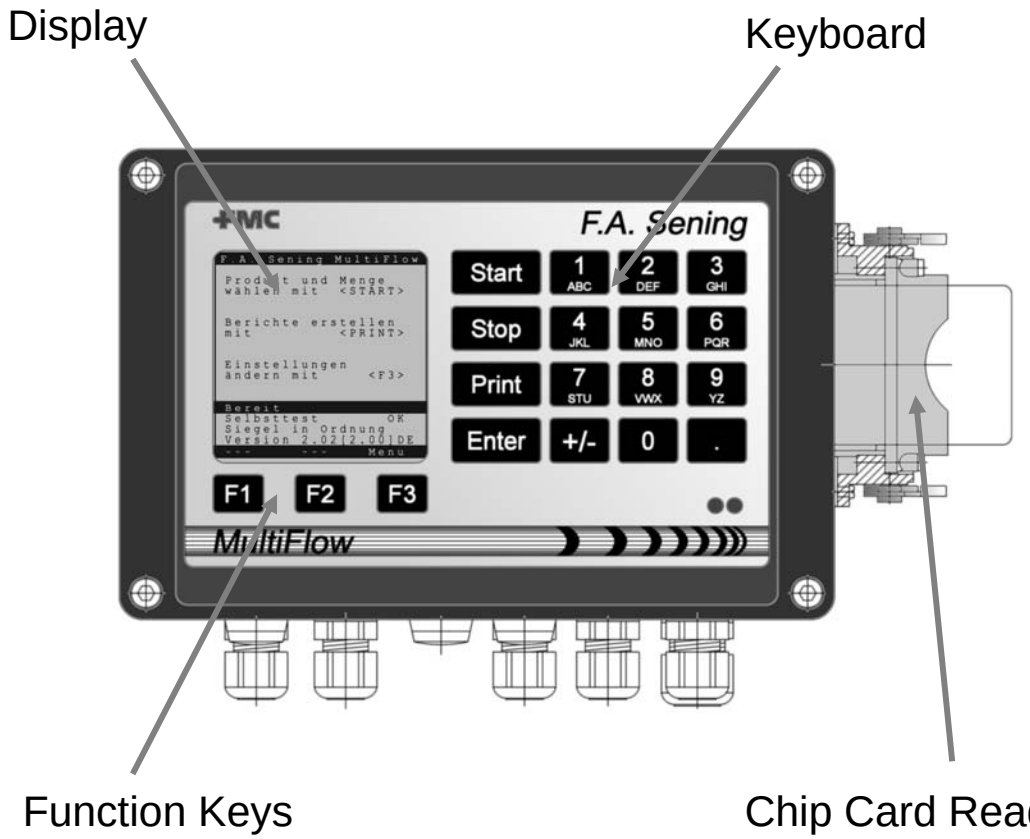
Provide facility for presetting in dollar amounts.

Pulse output to drive remote display.

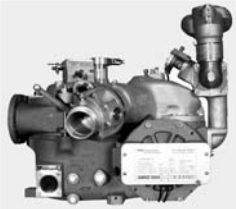
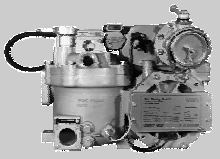
1.3 System Structure

- The Sening MultiFlow is available in the **AIII,** weatherproof, version (heating oil, diesel) or in the **AI,** explosion proof, version (petrol, kerosene).
- With the **AIII** version the complete control electronics with the operating device is accommodated in one housing.
- The supply voltage, printer connection and the sensors are connected directly in the device on plug-in connectors secured with screws.
- The connectors can be simply removed for test purposes and a test adapter can be plugged to the post terminal strip. So all device functions can be easily checked in the mounted state.
- In the **AI** version the Sening MultiFlow control electronics are mounted in an explosion proof enclosure which is supplied with voltage in an intrinsically safe manner from the operating device.
- The connection of the non-intrinsically safe inputs and outputs is made in a terminal box with increased safety features.
- Furthermore, installation is substantially simplified due to the improved access to the terminals.

1.4 Overview of Operating Elements



1.5 Quick Start up Sening MultiFlow

Steps	1.	2.	3.	4.	5.	6.	7.	8.	9.
	Date & Time	Meter Designation	Path Selection	Hose Set	Printer	Pulse Rating	Max. Error Pulses	Meter Configuration	Sensor Type
Parameter	**1.2.**	**3.1.2.**	**3.1.8.1**	**3.1.8.7**	**3.2.1**	**3.3.1.1**	**3.3.1.3**	**3.3.1.7**	**3.3.1.4**
Push **F3** for Menu, then the numbers. For one step back push the **Stop** button.									
 **GMVZ 1004**	Set date and time before sealing!	You'll find the meter number on the name plate	Choose No. **1** for one stage valve or No. **2** for two stage valve (Hi-Low Flow)	Defines the hose path that are used in the measuring system (**B**=Bypass / **G**=Dry hose gravity / **P**= Pumped dry hose / **U**= Unmetered / **W**= Wet hose	Choose No. **2** for DR-295 or No. **3** for DR-298	5.528	11	Choose No. 1 for one meter dual input , No. 2 for one single meter pulse input, and No. 3 for two single meter pulse inputs.	Choose the pulse input type according to your meter configuration.
 **GMVT 805**						8.415	17		
 **T 11- J**						15.1	30		
 **T 20- J**						8.415	17		
 **T 40- J**						5.528	11		

☞ After setting these 9 parameters the system is ready for calibration.
Set the calculated meter factor for **each** product under parameter **3.5.1.X.7.5.1**.
The placeholder **X** stands for the product number. (1= Heating Oil / 2 = Diesel etc.)

☍ For details and further information please use the chapter 0 / page 5.

2 General Installation Instructions

Apart from the points outlined in the following, all the local regulations (i.e. VDE 0165) must be observed during installation, operation and maintenance. If the instructions below are followed, long and trouble-free operation can be ensured.

2.1 Preventive Measures

2.1.1 To Avoid Accidents (Due to Gas Explosion)

The Sening MultiFlow has been designed for the flow measurement of flammable liquids in Classes AI (gasoline) and AIII (fuel oils) on tank trucks.
That means especially danger of explosions caused by flammable gases.
Be aware of the regulations for the EX protection.

If PG glands on AI terminal boxes must be changed, only Ex approved glands must be used.

It is strongly recommended not to mount the printer outside the driver's cabin, because the printer is not designed for this use, particularly with regard to its protection against humidity, contamination, temperature (ink ribbon freezes at low temperatures) and also on account of the Ex protection.

2.1.2 To Correspond to Norms

Wiring must be carried out according to the supplied wiring diagrams. All colors are selected according to DIN 47100. Please absolutely comply with the given color selections.

The electrical installation must be carried out according to EN60079-10 / VDE 0165.

It is not permissible to fit additional components into the Sening MultiFlow housing or in the terminal box (e.g. additional terminals), since this would void the device approval.

2.1.3 To Ensure Trouble-Free Operation

During welding work on the vehicle, the power supply must be disconnected.

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 Sening 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 (i.e. from the tires).

All cables must be routed such that they are not damaged or kinked.

After connecting the wire ends, the screw-secured plug-in connectors on the Sening MultiFlow must be pressed firmly onto the connector strip to prevent them from becoming unintentionally disconnected.

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 supplied screwdriver should be used for connection to the screw-secured plug-in connectors. When cutting the wire ends it is essential to make

sure that no wire clippings drop into the open device. Otherwise, this may cause short circuits on the circuit board.

After fitting the wire ends the connector should be plugged onto the matching connector strip on the board and pressed in firmly. For shielded leads the shield must be fitted with a 6.3 mm (0.25 inch) flat connector and plugged onto the flat connector strip for the screen connection. Similarly, the solenoid valves must be plugged at one end onto the flat connector strip provided (0V strip) using a 6.3 mm (0.25 inch) flat connector.

A connection between the housing/shield and the 0V strip must never be made.
If this advice is not followed, problems with the functioning of the device may occur.

The solenoid valves must be mounted upright, i.e. the solenoid coil must point upwards.

The printer must always be mounted in the driver's cabin to ensure protection against contamination and humidity.

Before a new program version (update) is installed, it is essential to print out all remaining reports and receipts, since any data saved may be lost due to the change of program.

2.1.4 To Make Work Easier for Future Users

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.

2.1.5 Also to Be Noted

If the TMC is linked to the Sening MultiFlow, electronic hose selection is used or monitoring of the overfill probe is activated, then the according wiring diagrams (see appendix) have to be followed.

In sealed state the seal password (**Parameter 3.1.3**), which enables access to the electronic calibration seal, is no longer displayed.

The user who makes a change to the password must ensure that this new password is appropriately documented. Same may, for example, be saved in a closed envelope.

2.2 Printer Connection

The printer (DR-295 / DR-298) or Epson 295 is directly supplied with a 24V voltage (see wiring diagram in section XVII for details.)

☞ The data leads are connected as usual to the Sening MultiFlow or, with the AI version, to the TXD, RXD and 0V terminals in the terminal box.

☞ If a DR-570 printer with RS-485 connection is used, the connection must be made according to the supplied circuit diagrams.

☞ If an Epson 295 printer with RS-232 connection is used, the connection must be made according to the supplied circuit diagrams or by purchasing the printer installation cable.

2.4 Routing the Cables in the Vehicle

The Sening MultiFlow is a measurement device which has been designed for vehicle use.

- To ensure trouble-free operation, a few guidelines, described in the previous sections, must be followed during installation.
- If these guidelines are not followed, faults in operation may occur.
- § Where the guidelines have evidently not been followed or the installation has not been properly carried out (contravention of applicable regulations), we accept no responsibility when faults occur nor any consequential claims arising from them.

- Lay an extra supply lead as voltage supply for the Sening MultiFlow.
  Use a cable with 1 mm² (0.04 inch^2) cross-section.
- The cable for voltage supply does not need to be shielded.

In vehicles with **AI** equipment, the relevant Ex installation regulations must be taken into account.

- Tap off the voltage of +24V or +12V directly from the battery positive pole (Terminal 30) via a fused line using a lead fitted with a separate switch.
  Protect the Sening MultiFlow with the appropriate fuse per installation drawings.
  Tap the 0V line as close as possible to the battery ground connection.
  The printer and the MultiFlow must be powered from the same power source. Connect the printer via the 24v DC output supplied by the MultiFlow.
- Never supply the printer with external voltage.
- If the system is switched off via a switch, the switch must be placed in the +24V or +12V supply line only.
- The 0V line must not be switched.
- If the Sening MultiFlow is mounted on a trailer, only the trailer cable obtainable from FMC technologies should be used for the voltage supply and the communication line.

2.5 Maintenance

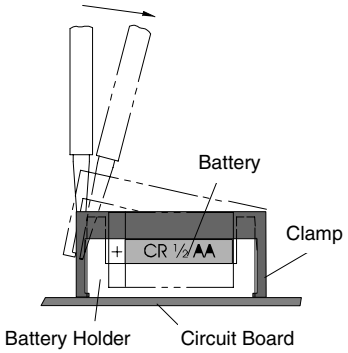
The Sening MultiFlow requires no maintenance. No mechanical or electronical change on the device itself is permitted. If the device becomes dirty, the membrane keypad can be wiped with a mild cleaning agent.

- When carrying out cleaning using a steam jet or pressurised water, the device (AI and AIII versions) must be protected from the water jet. Never point a steam jet directly at the device!
- § If water has been found to have penetrated into the device due to improper cleaning, a guarantee claim will be rejected.

2.5.1 Batteries

The clock integrated into the Sening MultiFlow is supplied from a lithium battery when the Sening MultiFlow is switched off. In normal operation the battery has a service life of at least seven years. However, the expected life also depends on the operating conditions such as temperature and turn-on duration of the device, so it is only a theoretical value. To replace the battery, the Sening MultiFlow must be opened and the battery removed as shown in the sketch.

Pic.1: Loosening the Clamp with a Screwdriver



☞ To loosen the clamp, insert the supplied screwdriver into the side slot of the battery compartment.

Press the lugs of the clamp outwards with the screwdriver.

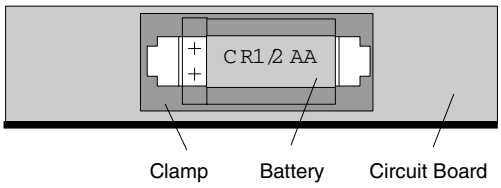
☺ The side lugs of the clamp are thus pressed out of the latched position.

☞ After one side has been loosened, treat the other side in the same way.

Then you can lift the clamp.

☞ When inserting the new battery, it is essential to ensure correct polarity. A battery of type Varta CR1/2AA 3V/950mAh should be used.

Plan View of the Battery Holder



☞ The time, date and all parameter settings must be reset after replacing the battery (see Chip Card Reader, chapter 4.). Furthermore the device has to be approved by the W & M office.

The date must be adjusted before the W & M seal is set, because it is subject to W & M protection.

3 General User Instructions

3.1 Key Character Assignment

1 ABC	Letter group **A; B; C; 1** or **a; b; c; 1** Upper and lowercase selection with F1
2 DEF	Letter group **D; E; F; 2** or **d; e; f; 2** Upper and lowercase selection with F1
3 GHI	Letter group **G; H; I; 3** or **g; h; i; 3** Upper and lowercase selection with F1
4 JKL	Letter group **J; K; L; 4** or **j; k; l; 4** Upper and lowercase selection with F1
5 MNO	Letter group **M; N; O; 5** or **m; n; o; 5** Upper and lowercase selection with F1
6 PQR	Letter group **P; Q; R; 6;** or **p; q; r; 6** Upper and lowercase selection with F1
7 STU	Letter group **S; T; U; 7** or **s; t; u; 7** Upper and lowercase selection with F1
8 VWX	Letter group **V; W; X; 8** or **v; w; x; 8** Upper and lowercase selection with F1
9 YZ	Letter group **Y; Z; 9;** <**Space character**> or **y; z; 9;** <**Space character**> Upper and lowercase selection with F1
F1	Function key <**F1**>, assignment depends on program, defined via SW
F2	Function key <**F2**>, assignment depends on program, defined via SW
F3	Function key <**F3**>, assignment depends on program, defined via SW
+/-	Character group **# ° • $ £ % & - +**
0	Special characters **Ö; Ä; Ü; ä; ö; ü; ß;0** The special characters depend on the selected language.
.	Character group **: , ; / ! ? = . ( )**
Start	Start of discharge, acceptance of packed products on the invoice or the delivery receipt
Stop	Stops discharge, goes back one menu point
Print	Triggers printout, confirmation of entered values for some entries
Enter	Acceptance of entered values, confirmation of values

3.1.1 Key Character Assignment

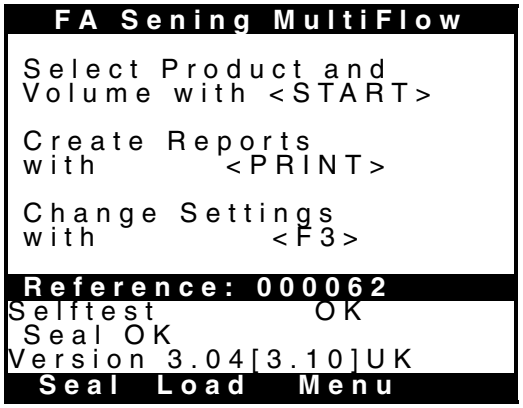
Along with the entry of numbers, the keys can also be used for the entry of letters or special characters. All the characters used can be printed out. The letters and special characters assigned to the keys are listed in the table in chapter 0.

3.1.1.1 Entry of Text

- ✍ To enter text, locate the required character below the number.
- ☞ Press this key briefly and repeatedly until the required character appears in the text field.
- ☺ The characters and numbers on the key are automatically carried one step forward with each touch of the key.
- ✍ If you discontinue pressing the key for a longer time, the character shown in the display is accepted and the cursor moves automatically one step further waiting for the next character to be entered.
- ☞ You can use function key <**F2**> to delete the last letter entered.

3.2 Menu Structure

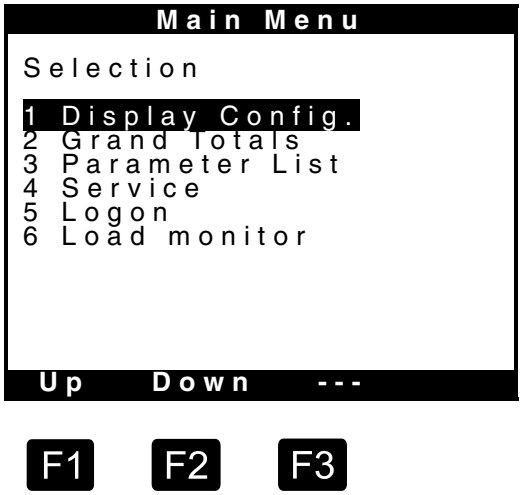
Apart from starting the discharge, two menu trees are accessible from the Start screen:



Start screen

3.2.1 Main Menu (Function Key <F3>)

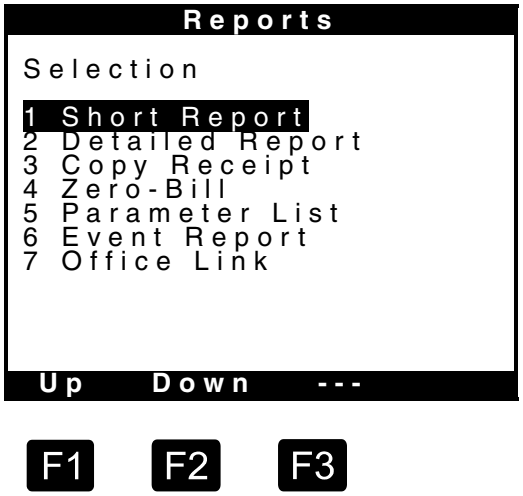
The main menu is reached via function key <**F3**> in the start screen and enables configuration of the Sening MultiFlow. It contains the product parameters and settings for the display, printer and the sensors.



Selection Menu on Pressing the Key <**F3**>

3.2.2 Report Printouts (Key <Print>)

Each delivery is saved by the Sening MultiFlow and can be printed out later as a report. This means that a complete shift or tour, with all deliveries occurred, can be documented on a tour or Trip Report.



<Print> Menu

In order to activate the print menu the <**Print**> key is pressed in the Start screen on the Sening MultiFlow. The report menu will be displayed; all the required reports can then be selected and printed.

4 Initial Operation

☞ Before you apply power to the system for the first time, check the wiring to make sure that the connections are correct and firmly seated.

Then switch on the voltage.

Test the function of the solenoid valves in the service menu (Parameter 4.3.1).

Test the functions of the temperature sensor (if used) and the pulse inputs in the service menu.

Check that the correct pulse transmitter parameter has been set (Parameter 3.3.1.4).

✍ A pulse transmitter with a PNP switching output is the default.

☞ Test the printer connection by printing a zero receipt.

☺ Once all these tests have been run successfully, you can start parameter setting of the Sening MultiFlow.

The Sening MultiFlow has an access check for sensitive parameter areas. The following **passwords** are set by the manufacturer:

Password	Designation
99 99 99	Driver ID
65 43 21	Password
12 34 56	Seal password

✍ The input of parameters and a description of the menu structure is described in chapter 8.

To prevent abuse, the passwords set at the factory, especially the seal password should be changed during the initial operation. File them in the measurement system certificate.

4.1 Version Numbers

Version numbers, which are printed on the parameter lists and W & M receipts, are used to identify the current software version. These numbers can be called up in Menu 4.1.1.

The version number has the format:

W & M Version	Service Version	Language Code
2.02	[2.00]	UK
3.33	[3.33]	NA

The W & M version indicates which W & M version subject to W & M restrictions is used in the Sening MultiFlow. This is the W & M version number.

The service version indicates the version of the program section which is not subject to W & M restrictions. Since this section of the program is not subject to these restrictions, it does not require recalibration itself. However, for the time being, it may only be updated in connection with the part of the program requiring W & M recalibration (W & M version).

The version numbers can occur in different combinations since, for example, the W & M version 2.00 may operate together with the service version 2.0 or even 1.05 (downward compatibility).

4.2 Reading in New Program Versions (Update)

After reading in a new program version a loss of log book entries and parameter settings may occur.

All reports that have not yet been produced must be printed out before the system is updated to the new program version. This also applies to saving delivery data on a chip card where this form of data interchange is used.

The current device settings should always be saved on a parameter chip card before a new program version is loaded. See section “Saving of Parameters on Chip Card” for details.

⌧ If the parameters from another device or from an older card are to be accepted, the steps below steps must be followed:

☞ Restore the valid receipt counter reading. To do this, set the **Parameter 3.1.9** to the next receipt number to be used.

In addition, check and correct the following parameters if necessary:

Parameter	Designation	Explanation
3.1.1	Device number	See Sening MultiFlow name plate
3.1.2	Meter designation	See name-plate of measuring system
3.3.2.1	(Temperature) offset	**With the same electronics** see old parameter list, otherwise refer to the preliminary test certificate for the Sening MultiFlow
3.5.nn.7.5	Meter factors	**With the same measuring system** see old parameter list, otherwise recalibration is required
3.6	Driver list	If divergent lists are used, see old driver list

4.3 Chip Card Reader

The chip card reader is integrated into the upper part of the Sening MultiFlow. Only the chip cards supplied by F. A. Sening should be used.

🛠 If chip cards from other suppliers are used, then faults in operation may occur.

The slot for the chip card is located behind the plastic flap on the side of the device where it is protected from contamination. In the latched state, the chip card reader conforms to IP65 class of protection.

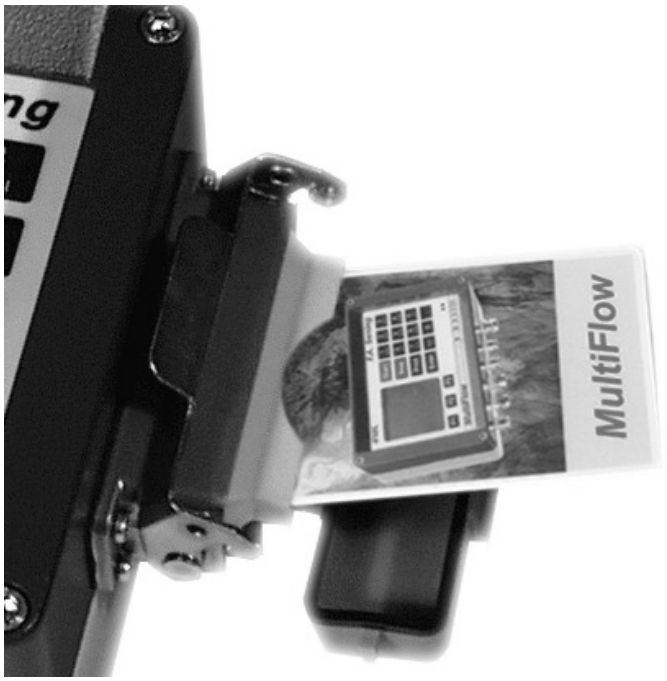
☞ To open, pull the latching lever forward and fold back the plastic flap.

☺ Now the slot for the chip card is visible.

☞ Insert the chip card with the contact pads face down (not visible on insertion).

Close and latch the flap.

🛠 It is only when secured in this way that no dampness can enter the device.



The plastic flap which protects the chip card reader must always be kept closed and latched. You should never drive the truck with an open or unlatched flap. The vehicle should never be left outdoors overnight with the flap unlatched.

In conjunction with a chip card the chip card reader is used to save the parameter list, and for data interchange with the data processing system (PC or similar) in the office. The backup copy of the parameter list can be used, for example, to reload the parameter list and the delivery receipt definitions into the Sening MultiFlow after a program update.

The chip card can also be used to simplify the office work and to automate the processing of the customer data. The customer receives deliveries in the usual manner.

After the end of the shift the delivery data is no longer output as a daily report on the printer, but is instead written to the chip card. The chip card is read out in the office and the data can be processed with suitable software. A printout of the daily report on the vehicle is therefore no longer required.

4.4 Diagnosis

Although during the Sening MultiFlow development consideration has been given to ensure a low degree of effort in installation, faults may still occur during initial operation.

When a fault occurs, the Sening MultiFlow supports error analysis with diagnostic functions and thus increases easy installation of the device.

The diagnostic functions mainly involve peripheral devices:

Temperature sensor, pulse input(s), digital inputs and outputs

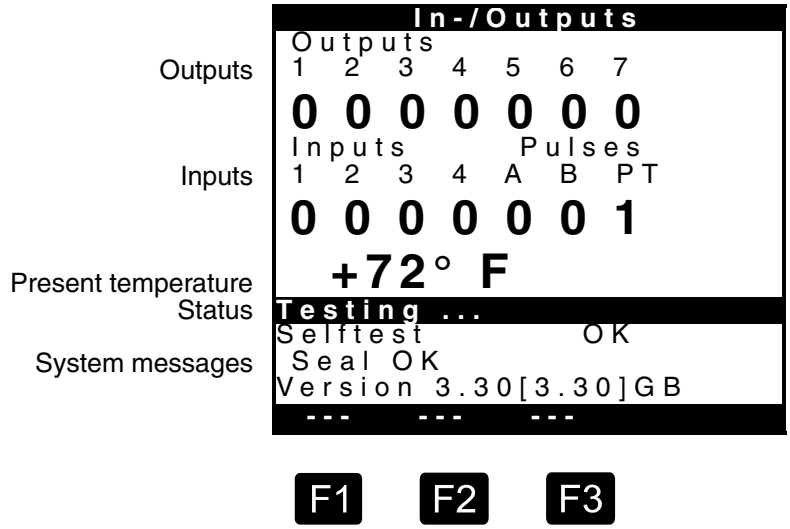
Printer

CAN Bus

Remote control

4.4.1 Inputs and Outputs

In **Menu 4.3.1** the diagnostic functions for the inputs and outputs, including temperature and pulse sensors are summarized.



Diagnosis Menu 4.3.1

If the system us set up for 1 dual channel or 2 single channel the status of the **pulse inputs A** and **B** must continually change between ‘0’ and ‘1’ when the pulse transmitter rotates. In contrast, the input **PT** must always be at ‘1’ because ‘0’ indicates a fault (no sensor connected). Respectively, if only 1 single channel meter is used, the appropriate ‘0’ and ‘1’ change will occur on the input that the meter is wired to (either A or B).

The **temperature display** continually indicates the currently measured temperature. It can be used for checking the temperature recording device.

A temperature display outside the ±200°C range points to a cable fracture, short circuit or missing sensor. Please check the wiring of the sensor.

The seven **outputs** can be switched (provided the Sening MultiFlow has not been sealed) by pressing the corresponding number (1-7). That way a functional test of the connected device (solenoid valve) is possible.

For safety reasons all outputs are set to '0' (inactive) on calling and on leaving the diagnostic screen.

The assignment of the outputs to functions depends on the selection of the valve control, please refer to **Parameter 3.1.8.1** and the respective circuit diagrams.

The current status of the valves must be observed without fail.

When a vehicle is operational actuation of the valves can lead to the release of the product!

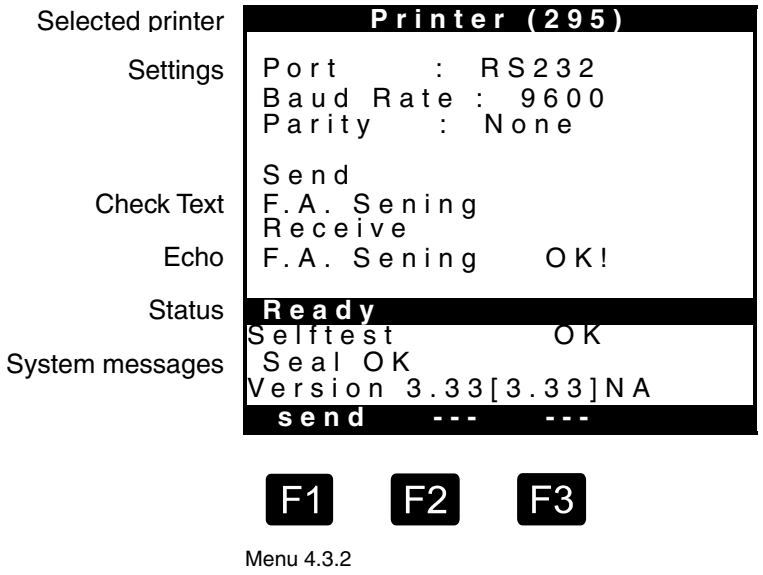
The following assignments are standard (further options in Section 0):

	1 Basic Control	2 Flow Control	3 Fully Electronic Control	4 Expanded Electronic Control	5 With blow down	6 Exp. Electron. BE	7 Control Turbine
Output 1	Control air	LOW Flow	Wet hose	Wet hose LOW flow	Wet hose LOW flow	Wet hose LOW flow	Control air
Output 2	Interlock	HIGH Flow	Dry hose	Dry hose LOW flow	Dry hose LOW flow	Dry hose LOW flow	START / STOP
Output 3	ADD pump	Release control switch	ADD pump	Wet hose HIGH flow	Wet hose HIGH flow	Wet hose HIGH flow	Regulation 1
Output 4	--------	ADD pump	Bypass	Dry hose HIGH flow	Dry hose HIGH flow	Dry hose HIGH flow	Regulation 2
Output 5	--------	LOW Flow 2nd Out	Position 1 Dual hose outlet nozzle	Position 1 Dual hose outlet nozzle	ADD pump	Position 1 Dual hose outlet nozzle	--------
Output 6	--------	HIGH Flow 2nd Out	Position 2 Dual hose outlet nozzle	Position 2 Dual hose outlet nozzle	--------	Position 2 Dual hose outlet nozzle	--------
Output 7	Pulse Output	Pulse Output	Unmeasured	Unmeasured	Blow down	ADD pump	--------
Output 8	--------	--------	--------	--------	--------	--------	--------
Output 9	--------	--------	--------	--------	--------	--------	--------
Output 10	--------	--------	--------	--------	--------	--------	--------
Output 11	--------	--------	--------	--------	--------	--------	--------
Input 1	ADD pump rest position	ADD pump rest position	ADD pump rest position	--------	ADD pump rest position	ADD pump rest position	--------
Input 2	ADD pump end position	ADD pump end position	ADD pump end position	--------	ADD pump end position	ADD pump end position	--------
Input 3	ADD pump filling level	ADD pump filling level	ADD pump filling level	--------	ADD pump filling level	ADD pump filling level	--------
Input 4	Overfill prevention amplifier	Overfill prevention amplifier	Overfill prevention amplifier	Overfill prevention amplifier	Product Transfer & Self Loading	Overfill prevention amplifier	--------
Input 5	--------	--------	--------	--------	--------	--------	
Input 6	--------	--------	--------	--------	--------	--------	
Input 7	--------	--------	--------	--------	--------	--------	
Input 8	--------	--------	--------	--------	--------	--------	

Output 1..7: MultiFlow Input 1..4: MultiFlow
Output 8..11: MFIO-E Input 5..8: MFIO-E

4.4.2 Printer

The diagnostic functions for the printer are shown in **Menu 4.3.2**.



Menu 4.3.2

The display shown above gives a quick summary of the printer settings currently selected:

- Selected printer (in the header)
- Type of interface (RS-232 or RS-485)
- Transmission speed (baud rate)
- Parity monitoring (even, odd or none)

When printer faults occur, the Sening MultiFlow offers the possibility of executing a so-called “loop-back test”. This test enables the printer connection to be tested for lead breakage (see Chapter 0).

4.4.2.1 Loop-Back Test

A “loop-back test” is available to check the wiring. This test can be executed with any printer linked.

☞ Remove the data cable from the printer and bridge the communications lines.

Bridge the following pins :

RS-232 (Printers DR-295, DR-298 & DR-570)	
Pin	
2	TX
3	RX

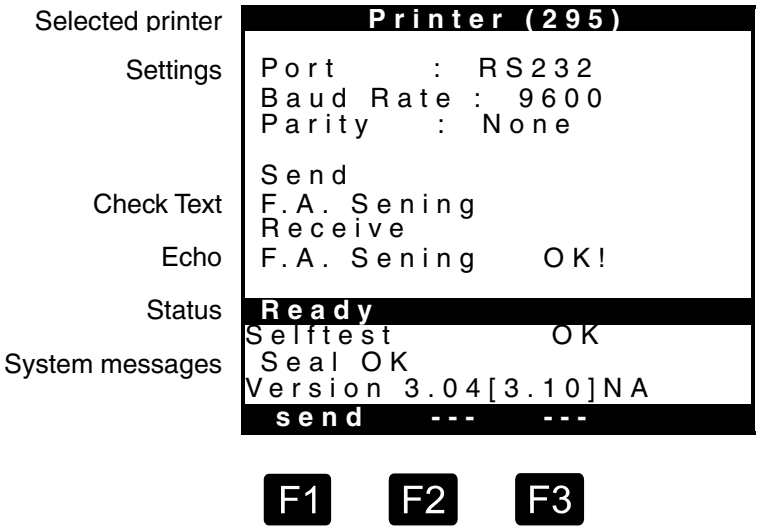
RS-485 (Printer DR-570)	
Pin	
9	TX-
16	RX-
10	TX+
18	RX+

☞ Press the <F1> key to execute the “loop-back test”.

☺ During the line test the text in the status line changes from “Ready” to “Test running ...”.

It is important to set the jumpers in the plug on the end of the data cable, because the complete wiring is then tested.

To localise a possible fault, the test section can be shortened (terminals).



Menu 4.3.2

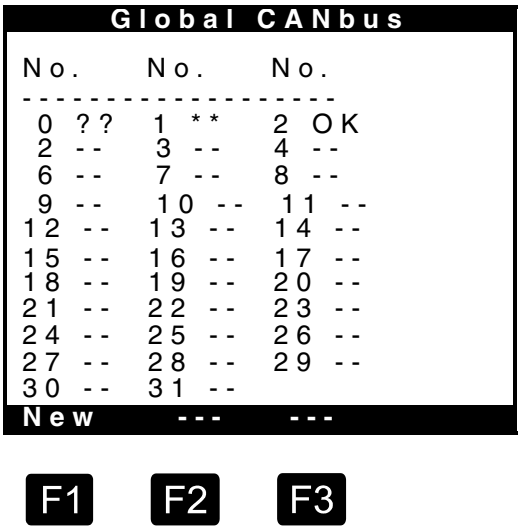
As shown in the illustration above, the check text and the echo must be identical. If this is not the case, then a fault has occurred. Normally, the fault is caused by missing wiring or a line breakage.

If the test is positive (line OK) but the **printer still does not print**, then crossed wiring may be the problem with the Send (TX) and Receive (RX) lines crossed.

4.4.3 CAN Bus

The diagnostic functions for the CAN Bus are shown in **Menu 4.3.3**.

Communication status of linked devices



Menu 4.3.3

The display shown above gives a quick summary of the actual status of the CAN Bus links.
The following conditions are possible:

Display	Condition
--	Status unknown
OK	Link in order
??	Link interference, no communication possible
**	Node reference of operating device

4.4.3.1 Testing Links

By pressing key <**F1**> a general request (broadcast) will be sent to all nodes (devices). This request is to be answered within a few seconds. Thus with this test function the linking status can be brought up to date.

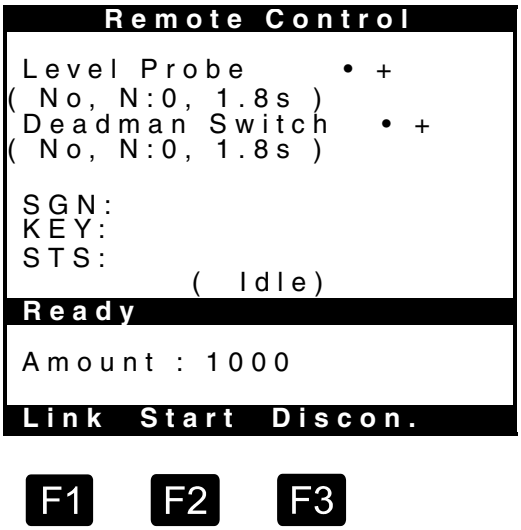
While testing the links internal timeouts will occur, so the display will need up to 10 sec. for complete updating.

Please do not activate this function twice within this time frame (10 sec).

4.4.4 Remote Control

The diagnostic functions for remote control are located in **menu 4.3.4**. In the event of faults occurring, however, a check should also be made in the CAN bus diagnostics (see above) as to whether the base station is recognized.

The remote control diagnostics screen first shows the following image:



Status of the overfill prevention

Status of the dead man's switch

Last incoming telegrams of the various types

Pre-set amount for test of The remote control

Menu 4.3.4, ready

The details in brackets concerning the functions "Level probe" and "Dead man switch" have the following meaning (see also Section 0, **parameters 3.1.6.n** and **3.1.8.8**):

"Yes" The function is activated. If the function is not being used the entry reads "No".

"N:0" Defines the node number (address) of the base station that is providing the function in question.

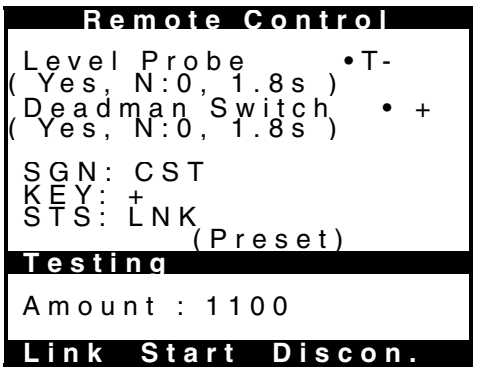
"1.8s" Defines the interval at which the base station must cyclically provide a status value (heartbeat), or else the Sening MultiFlow changes to an error status.

The functions "Level Probe", "Dead man switch", and the remote operation of the Sening MultiFlow can be implemented via various base stations. As a rule, however, only one base station is used, and this has the node number "0".

4.4.4.1 Check function

The “Idle” comment in brackets indicates that the readiness mode of the Sening MultiFlow is just activated. To check the functions of the remote control, a connection must first be made with the one or more base stations. This is achieved by pressing the key <**F1**>.

After the connection to the base station has been made, the display in the handheld remote control changes, as well as the status display of the overfill prevention and the dead man switch.



Status of the overfill prevention

Status of the dead man switch

Last incoming telegrams Of the various types

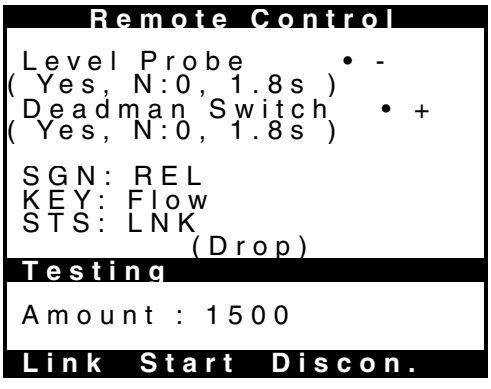
Preset amount for test of the remote control

Menu 4.3.4, connected

In the first instance a small rectangle is displayed, that jumps repeatedly from left to right. This symbolizes the “heartbeat” of the sensor. The changeover takes place approximately twice per second. However, should the interval become larger than the set maximum value, a connection fault has occurred and a “T” (for time out) appears behind the rectangle. In addition the sensor status changes from “+” (for OK) to “-” (for fault).

When the connection has been activated the Sening MultiFlow simulates the “preset” operating state. This enables the setting of a preset value via the remote control. The alteration of the preset value is displayed in the lower third of the display.

By pressing <**F2**> the Sening MultiFlow changes to the “drop” operating state. This can similarly be checked on the remote operation display.



Status of the overfill prevention

Status of the dead man’s switch

Last incoming telegrams Of the various types

Pre-set amount for test of The remote control

Menu 4.3.4, drop

The connection is broken using <**F3**> and the Sening MultiFlow is in the state described at the beginning (idle).

4.4.4.2 Message Meanings

KEY	Meaning
Start	Start / resumption of a drop
Stop	End of a drop
Volume	Change to a volume display during a drop
Flow	Change to a flow display during a drop
+	Increase pre-set value by 100
-	Reduce pre-set value by 100
++	Increase pre-set value by 1000 (SHIFT +)
--	Reduce pre-set value by 1000 (SHIFT -)
SHIFT	Shift key has been actuated
PULSE	Dead man key has been actuated
&PULSE	Shift key and dead man key have been actuated simultaneously
&NOTSTOP	Shift key and emergency off key have been actuated simultaneously
&Start	Shift key and start key have been actuated simultaneously (motor start)
&Stop	Shift key and stop key have been actuated simultaneously (motor stop)
&Vol	Shift key and volume key have been actuated simultaneously
&Flow	Shift key and flow key have been actuated simultaneously

SGN	Meaning
NCN	Overfill sensor not connected
HEA	Overfill sensor heated
CHK	Overfill sensor checked
REL	Overfill sensor released
SHR	Overfill sensor short circuit
COV	Overfill sensor covered, tank full
CST	Overfill sensor disconnected, no connection to the unit
DeadMan+	Dead man switch released
DeadMan-	Dead man switch blocking, i.e. time has run out or no connection

STS	Meaning
LNK	Link with base station made
NOLNK	Link with base station could not be made, possibly occupied by another unit

5 Discharge

Prior to operating the Sening MultiFlow the volume units must be selected using the “System Units” parameter 3.1.5.7. The selections for this parameter are Liters (0), or Gallons (1). The default initialized value is Gallons. This parameter must be set prior to use as all transaction memory is erased when this parameter is changed.

The units selected by the parameter are shown in the following table:

Property	**Liters – System Units**	**Gallons – System Units**
Flowing product	Liters	Gallons
Temperature	Degrees Celsius	Degrees Farenheit
Mass	Kilogram	Pounds
Density	Kg/M^3	API
Injected product	Milliliter	Ounces

Usually the discharging of product is as follows:

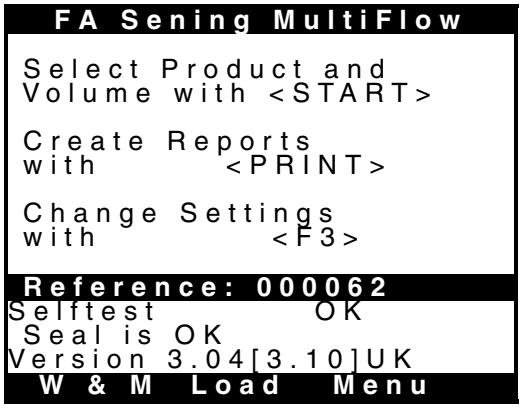
1. Switch on the Sening MultiFlow
2. Start discharging
3. Select product (or accept preset)
4. Select discharge path
5. Discharge
6. Terminate discharge (and/or deliver additive)
7. Print delivery note or bill

Single steps can be enabled / disabled by changing the setup.

- **Optional**; in versions lower than 3.10 the discharge path is selected prior to the product, in versions lower than 2.0 selection of the discharge path is not included.

5.1 Carrying Out a Discharge (Part 1)

After being switched on, the Sening MultiFlow runs a self-test after which it is ready for discharge.

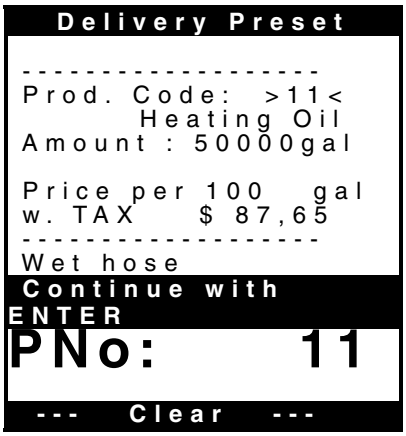


Start screen

☞ **Step 1:** Press the <**Start**> key

5.2 Carrying Out a Discharge (Part 2)

☺ Now the delivery preset screen appears.



Preset screen

The preset screen displays the last selected product. If a different product than the displayed product is required, you now must enter the desired product code (see Chapter 5.2.1).

☹ If the displayed values are not correct, or if different product than the displayed product is required, advance to Chapter 5.2.1 “Selecting a new product”.

☺ If all displayed data is correct, continue with Part 3 of the discharging operation (Chapter 5.3).

5.2.1 Selecting a New Product

Specifying the product to be discharged	To choose a new product you can enter the product code. The product will then be displayed automatically. If you enter an invalid product code, you can choose the desired product from the product pages.

☞ Enter the desired product code.

☹ If the product code is not correct, an invalid product code (e.g. “99” or “00”) can be entered.

☺ A selection list of all products then appears automatically.

☞ Select a product page.

☺ A suggestion list with all products is displayed.

☞ Select the desired product.

☍ The selection can either be accepted into the discharge settings with the function keys <**F1**> or <**F2**> (Cursor Up / Down) and then <**Enter**> or by pressing the number in front of the product.

Enter

Once the desired code is entered, the preset discharge quantity and default price are displayed marked by pointed brackets (> XX <). By pressing the <**Enter**>-key you can confirm these settings. For verification the input value is displayed in double size characters at the bottom of the display area (underneath the status line). With the numerical keys you can change these entries. The <**Enter**>-key confirms the input and switches to the next input field.

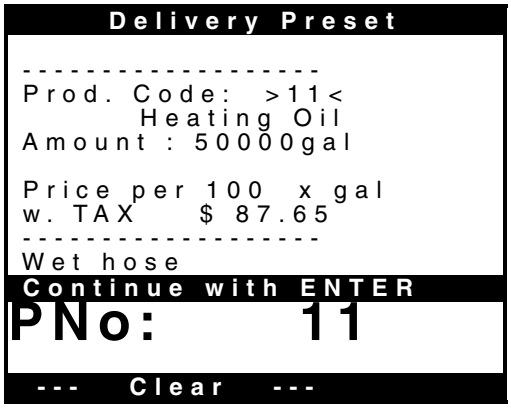
Now you have selected the desired product. Continue with Part 3 of the discharging operation (Chapter 0).

5.2.2 Preset by Dollar Amount

Parameter 3.1.4.5.0

Main Menu > Parameter List > Device Settings > Operation Options > Queries > Present by Price > Disable, Enable

Presetting by Dollar Amount allows the operator to specify the amount to deliver in monetary value. This entry shall only be available for products which have a default price defined. The current entry for the present volume will remain. If the volume preset amount is changed by the user, the dollar amount will be updated based on the default price. If the dollar amount is updated by the user, the volume amount will be updated based on the default price. When the preset screen is first displayed, the volume preset will be 99999 and the monetary preset will be 0.00. As seen below, the amount can be entered but as soon as the dollar amount is entered, the volume will adjust accordingly.



Preset screen

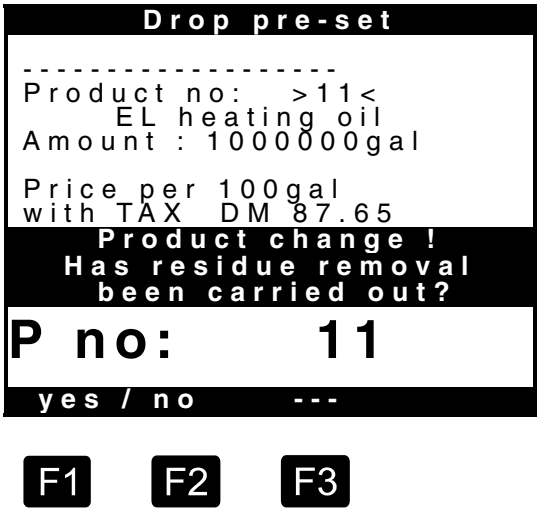
5.3 Measuring system residue removal (optional)

☞ **Step 2:** Press the <**Start**> key.

When using the “device for emptying and refilling the measuring system” according to Authorization 5.162 / 01.01 the operator is asked during a product change whether the necessary emptying/refilling has been carried out. If this is answered with “YES” a corresponding entry is written into the logbook and the delivery dialog – start of delivery is continued. If answered with “NO” then a message appears with the request to carry out the residue removal / refilling and a corresponding entry is made in the logbook.
The measuring system residue removal message can be switched on and off with Parameter 31851. In addition Parameter 31852 has already been implemented which in a future version will activate the printing out of a document concerning successful residue removal.

If parameter 31851 (residue removal control) is set to 1, this causes the following new operating sequence:

1. After entering all the preset values and pressing the **<START>** key again, the Sening MultiFlow checks whether a product change has taken place between diesel and heating oil / heating oil with additives. If this has happened a corresponding message is shown about the necessary residue removal:



2. If residue removal has not been carried out the driver must press the **>F2<** key. A corresponding entry is then made in the logbook and the display shows the following information:

The Sening MultiFlow remains in this operating state until it is switched off, i.e. it will not react to key entries (e.g. **>START<** , **>STOP<** etc.).

3. After carrying out the residue removal operation (for this period the Sening MultiFlow is switched off by the residue removal controller) the Sening MultiFlow starts up again and the driver must

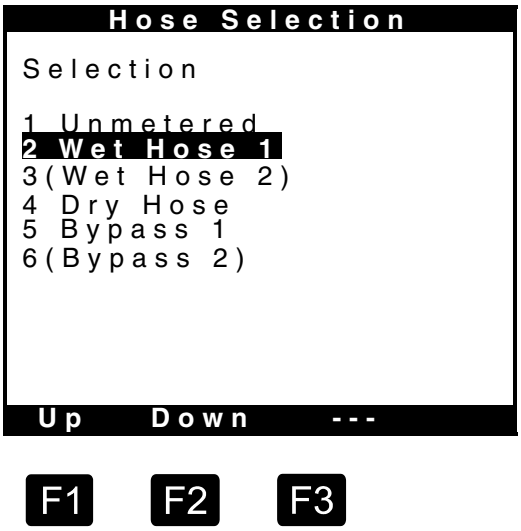
repeat the drop pre-set entries. The query as to whether residue removal has been carried out is this time confirmed by pressing the **>F1<** key. The confirmation is saved in the logbook.

After carrying out residue removal you should continue with the 4th part of the discharge procedure (Section 0).

5.4 Electronic hose selection (optional)

- ⊠ The automatic hose selection is an option, only included in SW version 2.0 or higher. This option must be configured in parameter 3.1.8.1 (see chapter 0).
- ⊠ In software versions lower than 3.10 the electronic hose selection will be carried out before product selection.
- ⊠ For devices with manual path selection you can skip this chapter.

Default: last selection



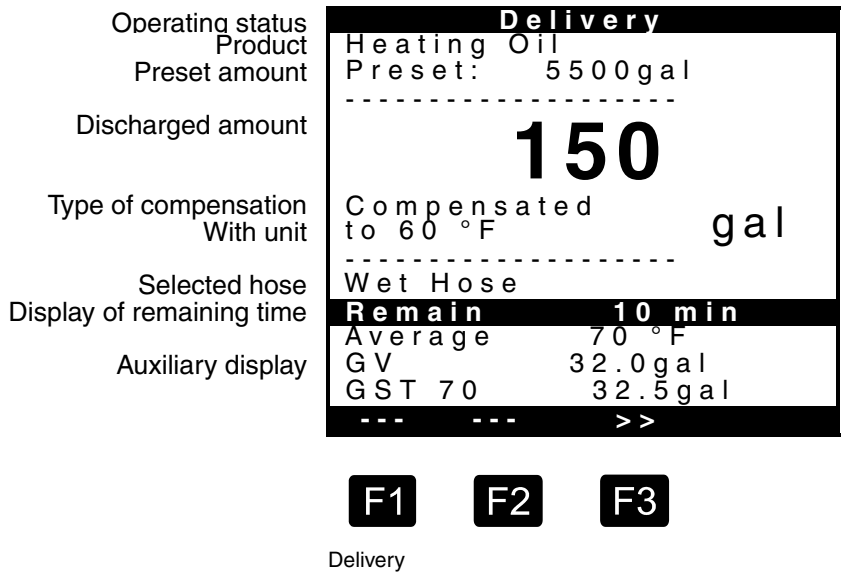
Hose selection

- ✍ The automatic hose selection replaces manually operated pneumatic switches. You are thereby able not only to select product and preset volume but also the discharge path at the Sening MultiFlow.
- ☺ After you have pressed the **<Start>** key, the defined / allowed discharge paths will be displayed first:
- ☞ Select the discharge path by pressing <**F1**> or <**F2**> and press the <**Enter**> key to confirm your selection.
- ✍ You can also select the discharge path by entering the corresponding number.
- ⊠ If only a single position is transferred, this is automatically selected with no intervention by the operator required (from program version 3.00)

5.5 Carrying Out a Discharge (Part 3)

☞ **Step 3:** Press the <**Start**> key.

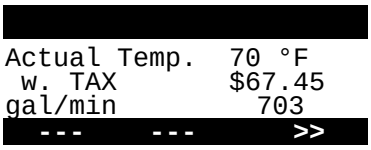
☺ The discharging operation is started.
The delivery screen is displayed.

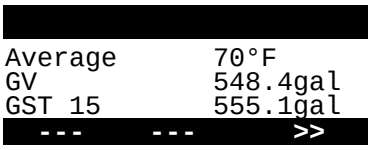


Delivery

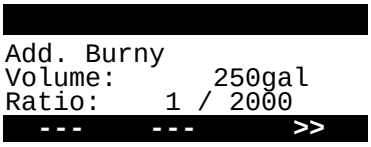
☺ Delivery is started.

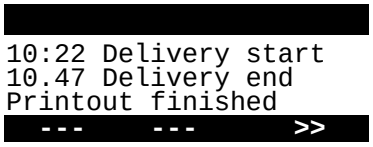
F3 The preset quantity, compensation mode, product and discharged amount (in double size characters) are displayed on the screen.
By pressing the <**F3**> key you can switch between different displays.
The following displays are available:





The third page shows the values for the additive dispensing. The display includes the name of the additive used, the discharged amount and the mixing ratio.





A fourth page provides general information about the last three actions carried out.

Stop
or
preset amount
reached

You can interrupt the discharge with <**Stop**>.
To continue the discharge press the <**Start**> key,
or press the <**Stop**> key a second time to irrevocably terminate the discharge.

However, if the preset amount has been reached, then the Sening MultiFlow automatically interrupts discharge and “Resume discharge?” appears in the display.

F1

If the discharge is to be continued (press <**F1**> for **“Yes”**), then the additional amount to be discharged must be entered.

The discharge is continued with <**Start**> after entering the amount. The entered amount is added to the amount already discharged, the total is now displayed as preset amount.

F2

If you want to discontinue discharging, press the function key <**F2**> for **“No”**.

Stop

When the preset amount has been reached or the discharge terminated with <**Stop**>, other products (in Germany no metered products) can be added to the delivery after pressing <**Stop**> again.

☞ **Step 3:** Press the <**Stop**> key.

F1

The query “More products?” is answered with the function key **<F1>** for **“Yes”**. (Parameter 31455 must be set to 1 (Yes)

Then the entry screen with the product code and the price is displayed.

Enter the amount. You can also change to a packed good (additive), and the price can be changed.

Stop

With the key <**Start**> the product is accepted in the Sening MultiFlow as delivered, similar to the liquid discharge.

F2

The entry is terminated with the function key **<F2>** for **“No”** = no further products.

☞ **Step 4:** Press the <**F2**> key.

☺ Discharge is terminated.

5.6 Printing Delivery Notes and Invoices

Now you can print a delivery note or a complete invoice.

☞ Select **Invoice** (<**F1**>) or **Delivery Note** (<**F2**>)

✍ An invoice will be printed by default but depending on the setting of parameter 3.1.4.0.1 printing of an invoice can be locked out.
In this case a delivery note is printed automatically.

⌧ When “Invoice” (<**F1**>) is selected, you have the option between private customers “Domestic” (including Tax) and commercial customers “None Domestic” (excluding Tax).

☞ Confirm your entry with <**Enter**>.

☺ One after the other the delivered products are now displayed, so that you can either confirm or correct the product prices attributed.

☞ Confirm each correction with <**Enter**>.

☺ Then the next possible input is selected (e.g. Customer No.) and marked by pointed brackets (>...<).

☹ If you have made an input mistake you can overwrite the faulty value by entering a new value, or you can delete the character to the left of the cursor by pressing <**F2**> (‘Clear’).

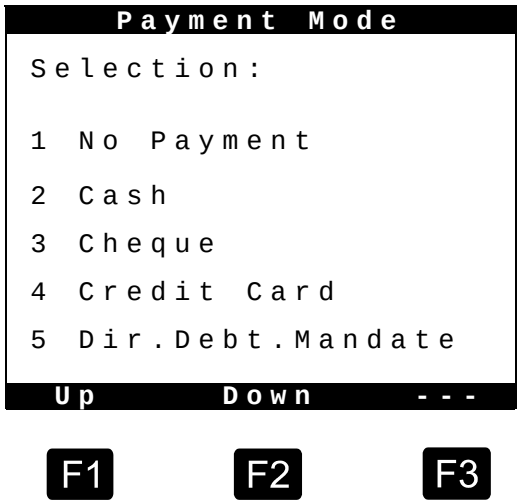
☺ When all entries are correct,

☞ Press the <**Print**> key.

☺ Then the next product (if registered) is displayed for confirmation. After confirming the last product and pressing the <**Print**> key an invoice is printed out.

⌧ According to the settings of Parameter 3.1.4.5.6, after the invoice has been printed a query about the customer’s method of payment is displayed.

After printing the note and entering the payment method the Sening MultiFlow is ready for the next discharge.



✍ All delivery data as well as the payment method is entered to the logbook.

☺ Now the discharge is completed.

✍ Depending on the setting of Parameter 3.1.4.1, the display of the latest amount or product delivered turns off immediately or after a time preset in minutes. At factory this

parameter is set to a default of 15 min. When this time has elapsed the Start screen is again displayed.

5.6.1 Using the Printer

As standard the Sening MultiFlow comes equipped with the Epson TM-U295 printer. If a different printer is used, please use the respective operating manual.

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

☺ 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.

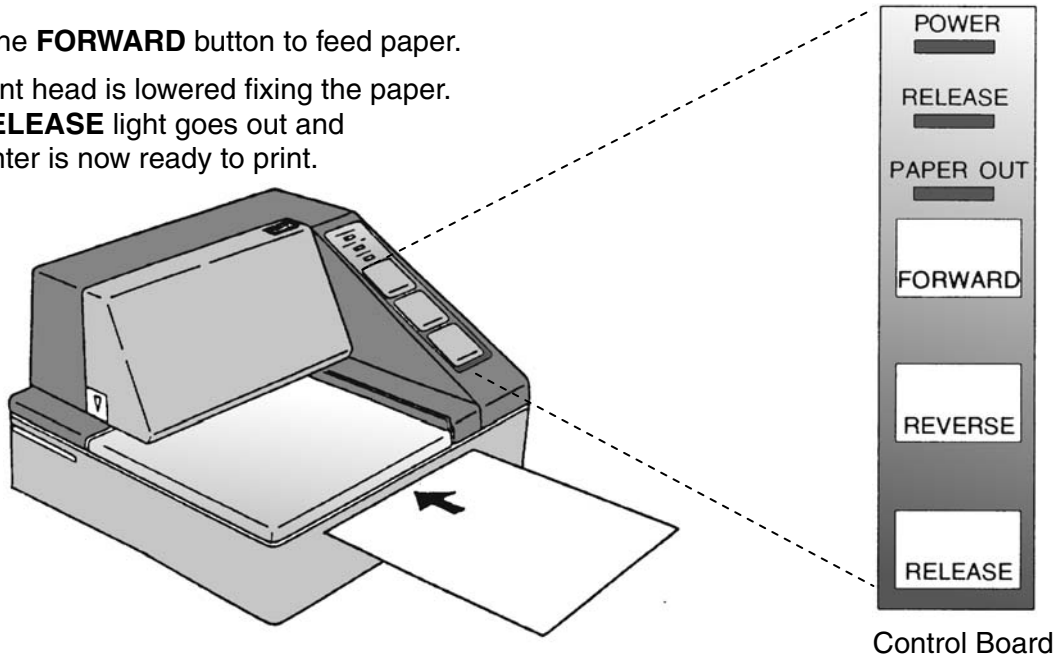
☺ The **RELEASE** light then indicates that the paper has been released from the print head, and may now be inserted or removed.

☞ Insert the paper from the front (see illustration 3.4.1.2) 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 to feed paper.

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



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.

If parameter 327 is set to Auto Feed, wait 5 seconds for the printer to feed the paper, otherwise press the **FORWARD** button to feed the paper.

5.6.2 Replacing the Ribbon

☞ Open the printer cover.

☍ The cover has ridges on the top right corner and an arrow mark on the bottom left corner. By slightly pressing the ridges on the top right and pulling the cover forward you can easily lift off the cover.

- Behind the cover there is a cassette with the ribbon.
- The ribbon cassette is easily released when the printer is in the **RELEASE** and **PAPER OUT** modes.
- The **RELEASE** status is indicated by the **RELEASE** light.

☞ If the **RELEASE** light is not on, press the RELEASE button.

To take up any slack in the ribbon, turn the feed knob on the left side of the cassette in the direction of the arrow shown on the cassette.

Remove the ribbon cassette by grasping the handle and pulling straight out, until it is noticeably released.

Pull the cassette carefully towards you to release the ribbon from the pressure rollers.

☺ Now you can insert the new ribbon cassette in the printer.

☞ Take care that the ribbon goes below the pressure rollers.

Push the cassette firmly until the pins in the back snap in.

To take up any slack in the new ribbon, turn the feed knob.

Close the cover.

5.7 Drop operated remotely

The Multi-Control package includes a handheld controller with which the Sening MultiFlow can be remotely controlled.

Operation of the Sening MultiFlow remains unaltered even when this remote operation option is used. In addition there is however the opportunity after the start of a drop (see Sections 0 and 0, Step 1) to carry out the following operation steps remotely.

Correction of the pre-set volume in step widths of 100 or 1000 with simultaneous display on the handheld controller

Motor Start/Stop

Start of the drop

Display of drop volume or flow on the handheld controller

Control of motor speed during the drop

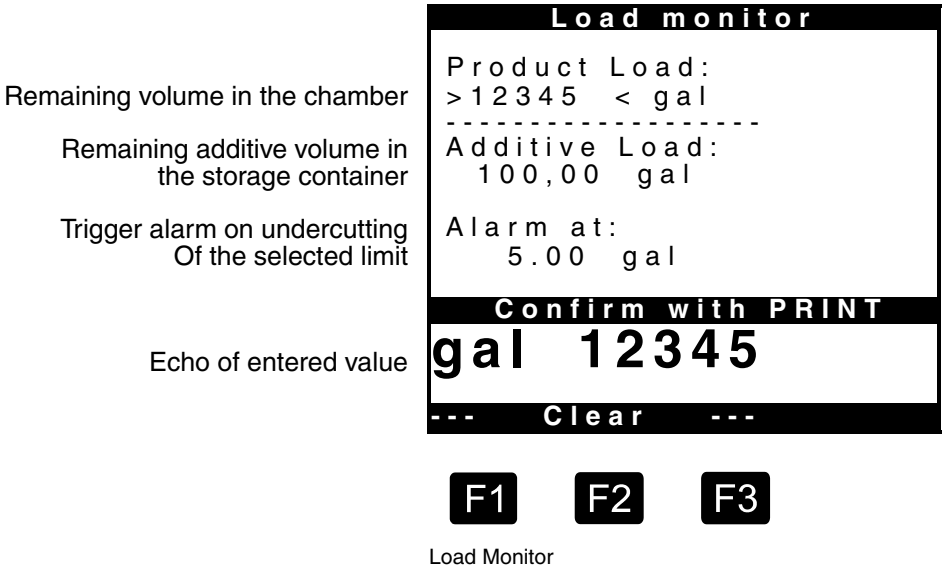
Interruption and resumption of the drop

Termination of the drop

Emergency Cut-off

5.8 Monitoring the Load

The Load screen is intended for those users who only deliver one product (e.g. heating oil) with their vehicle. The Load management can be found in the main menu under Item 6 (**Menu 6**) and contains the following information.



Load Monitor

The entry field **"Product Load"** signifies the current remaining volume in the vehicle compartments.

- ☞ Set the initial value just once after loading.
- ☺ Then after each discharge the *uncompensated discharge volume* is subtracted automatically.
- ☞ You then obtain a quick overview of the current loading state, enabling you to decide whether you can carry on with another delivery or whether you must refill the truck.

The remaining Load of additive is displayed in the central section of the display. The additive is intended for an additive pump controlled by the Sening MultiFlow.

The field **"Warning at:"** enables you to define a minimum Load.

- ☞ Here, you set the minimum value.

The additive Load is compared with the minimum volume before each discharge. If the level falls below the limit, a warning is displayed:

"WARNING Additive Load is almost completely used!"

This alarm is given to prevent the system from running empty, which would involve a refilling procedure.

You can deactivate the alarm by setting the minimum volume to zero.

5.9 Product Transfer / Self Loading

Since version 3.15 the Sening MultiFlow offers the option of recording and logging product transfer resp. self loading to compartments of a tank truck. Doing this, the path selection (parameter 3.1.8.1, see chapter 0) has to be set to control type no. 5.

Product Transfer or Self Loading is indicated to the Sening MultiFlow by activating the Sening MultiFlow input S4 **before** entering a preset for the discharge. Usually, the Input S4 is connected to an interlock of the filling couplings.

To distinguish Product Transfer and Self Loading, the selected hose is considered:

State of S4	Selected Hose	Operating Mode
OFF	Wet Hose	Normal delivery via wet hose
OFF	Dry Hose	Normal delivery via dry hose
ON	Wet Hose	Product Transfer via wet hose
ON	Dry Hose	Self loading via dry hose

The following points have to be taken under consideration for Product Transfer / Self Loading:

- It is impossible to select and deliver additivated products.
- After carrying out a Product Transfer / Self Loading, no further products can be added to the batch; the receipt will be printed immediately.
- If form element No. 20 is used, receipts will automatically have a corresponding head line (see chapter 0).
- Receipts for Product Transfer / Self Loading may include an additional text which states that this receipt is only for internal use and may not be used for trading:

  Only for internal use,
  Not Authorized for Trade Use!

  This text is stored in the new form element No. 31 (see chapter 0).

☞ **Product Transfer** means a product is pumped from one compartment of a tank truck into another of the same truck. Possible applications are:

- Combine the remaining volumes of two compartments containing the same product
- Draining of the system (pump, meter, valves, hose, etc.) into a slop tank while filling the system with a different product.

☞ To carry out a **Self Loading**, the suction side (inlet) of the pump has to be connected to the depot (additional trailer, storage tank, etc.) while the outlet of the meter has to be connected to the filling coupling of the tank truck compartment via the dry hose.

6 Product Definition

The factory settings already include a number of predefined products. They are located in the product register under the position stated in the following table as (**No.**).

No.	PTB-Code	Name	Unit	Density	Price	
					$	Factor
11	1	Heating Oil	gal	846	0.00	100
12	2	Diesel	gal	836	0.00	100
13	3	Unleaded	gal	741	0.00	100
14	5	Super-Unleaded (98)	gal	749	0.00	100
15	6	4-Star	gal	753	0.00	100
16	7	Kerosene	gal	807	0.00	100
17	8	Jet Fuel	gal	801	0.00	100
18	9	Bio Fuel Oil	gal	831	0.00	100
19	12	Heating Oil +	gal	846	0.00	100

Remark: Programmed calculation for final cost:•[$}

$$Cost[\$] = \frac{DeliveredAmount[\mathrm{Gal}] * \mathrm{Price}[\$]}{\mathrm{Factor}[\mathrm{Gal}]}$$

6.1 Define a New Product

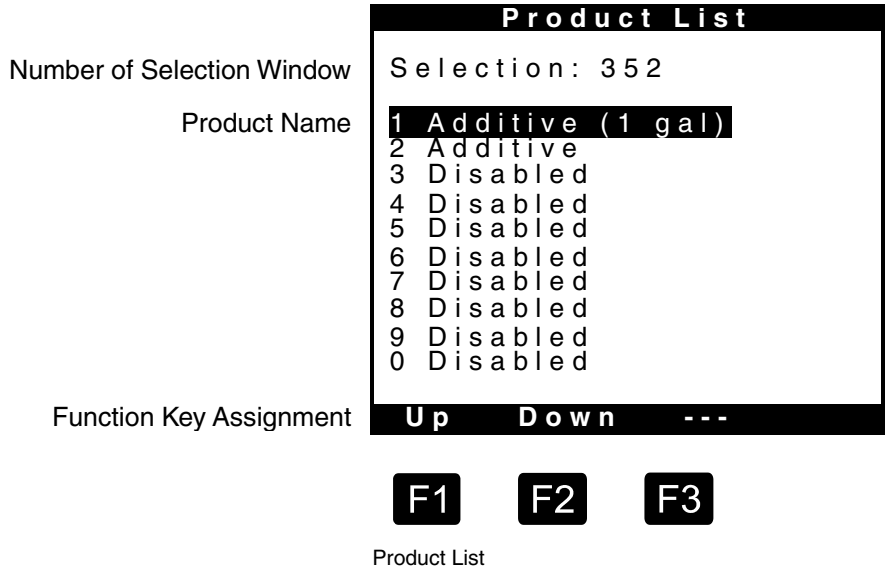
☞ Press function key <**F3**> to call the configuration menu.

3 GHI 5 MNO To define a new product, select Product Page 3.5. Here you can define 10 products within each of the 3 product pages. The allocation of the products is selectable. Packed products and liquid products or surcharges or services can be defined on the same product page.

Example: A packed product with the name “Burny”, container size 1gal, is to be defined with a price of $25.00 on Product Page 2.

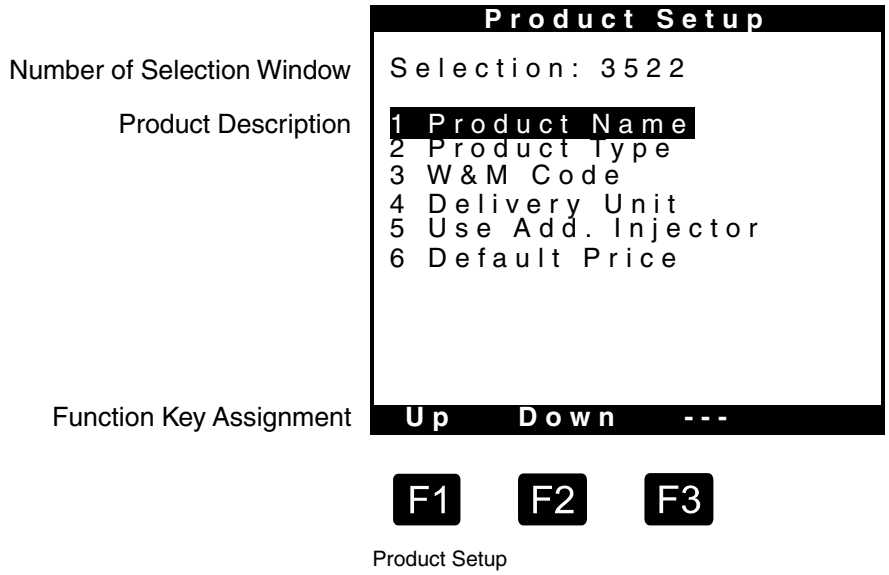
2 DEF Product Page 2 is selected with key <**2**>.

A product name which is not assigned and labelled “Disabled” is selected by pressing the corresponding key
or by using the keys <**F1**> **“Up”** or <**F2**> **“Down”**.



Product List

1 ABC First, you define the product name by pressing key <**1**>.



Product Setup

F1 Press key <**F1**> **“Change”.** Now you can enter the text, in this example “Burny” using the keypad.

1 ABC Press key <**1**> twice. The letter “B” appears.

F1 Press function key <**F1**> to set the entry of the letter to **lowercase**.

6 PQR .... 7 STU — Press key <**7**> **3 times**. Then a lowercase **"u"** appears after the letter B in the text window.
Continue the procedure until the complete product name has been entered.

Print — Confirm the entered name by pressing <**PRINT**>.

2 DEF + 4 JKL — Next you define the **product type**. A packed product is involved here.
With key <**4**> you select "Packed Product", after which the display automatically returns to the start menu.

3 GHI — With key <**3**> you select the **W&M code.** Since a container is involved here, "0"(zero) **must** be entered.

6 PQR + 1 ABC — The next step is to define the **default price**. The net price is entered with key <**6**> followed by key <**1**>.

Print — Confirm the entered price by pressing <**PRINT**>.

2 DEF — The **price factor** indicates the quantity factor. In this example the price refers to one piece so a price factor of "1" is entered.

Print — Confirm the entered price factor by pressing <**PRINT**>.

3 GHI — Finally, you define the **tax rate**.
see Section 8.3.1.4

Print — Confirm the entered tax rate by pressing <**PRINT**>.

You can disregard Point 7 **"Temp. compensation"**. This point is only active for liquid products discharged through the flow meter.

6.2 Additive Dispensing

6.2.1 Selecting a New Product

When using an additive pump, the injection point of the additive into the product flow is an important factor.

If additive dispensing takes place *before* the measuring system, the *product including the additive* is measured. In this case the additive is not indicated on the receipts. The difference to a product without additive is shown by a *changed name* (and price).

In contrast, with additive dispensing *after* the measuring system, the additive is shown in addition to the main product (e.g. heating oil). However, in this case it is necessary to have the additive pump accepted by the W & M office. This is not required when injection takes place before the measuring system.

☞ Call the configuration menu with function key <**F3**>.
Select menu 3.3.3 by pressing key <**3**> three times.

☺ This gives you access to the options for the additive dispensing device.

Frequency of the Strokes The Sening additive pump is a piston pump which regularly discharges full strokes into the product flow. The frequency of the strokes is given by the desired mixing ratio, product flow rate and the capacity of the piston pump.

☞ Press key <**1**>.

☺ The parameter “Piston capacity” is called.

✍ The capacity of the Sening additive pump is approx. 50 m•.

☞ Confirm the capacity value with <**Enter**>.
Define the meter factor of the additive pump with key <**2**>.

✍ This factor is mandatory only when the additive dispensing is subject to W & M inspection (see next parameter).

Meter Factor The piston capacity is determined during the preliminary testing of the pump and is included with the device. However, since the volume can only be quoted as an integer, the meter factor is required for fine adjustment.

The meter factor is calculated from the division of the volume V_{Std} (Parameter 3.3.3.1, “Piston capacity”) by V_{PC} (preliminary certificate). The default (neutral value) is 1.0.

☞ Confirm the value with <**Enter**>.

☞ Press key <**3**>.

☺ The injection point at which the additive is discharged into the product flow is now defined:

Injection point selection:
0: No additive dispensing.
1: Additive dispensing before the measuring system.
2: Additive dispensing after the measuring system.

☞ Define the hose volume with key <**4**>.

✍ This volume states how much product is taken up by the measuring system and the wet hose.

Hose Volume This volume is required to terminate the additive dispensing before the preselected amount is reached.
Thus the hose is flushed with pure product at the end and no additive remains in the system.

☞ Confirm the value with <**Enter**>.

5 MNO The parameter “External filling level” is not currently supported.

☞ Call the parameter “Pump cycle time” with key <**6**>.

✍ This time period specifies the maximum time which the additive pump needs for going through a pump cycle.

Pump Cycle If the cycle is not terminated in the stated time, then the discharge stops and an error message is produced.
The default figure is 6000 msec.

7 STU, 8 VWX The parameters “Piston initial position” and “Piston end position” state the time for which the piston is to dwell at the corresponding positions so that the suction and discharge functions are ensured.
The default value is 80 msec.

6.2.2 Defining the Additive / Product Containing Additive

When defining the required products, consideration should be given to the fact that the set types of product are defined in the product registers through the device sealing procedure. This prevents a product subject to W & M inspection from being converted into one that is not subject to W & M inspection after calibration.

This means that at least the main information about the products must be defined before calibration.

For calibration this means that even when injection takes place before the measuring system (not subject to W & M inspection), a register of the type “Additive (pump)” must be created to enable additive dispensing at a later point.

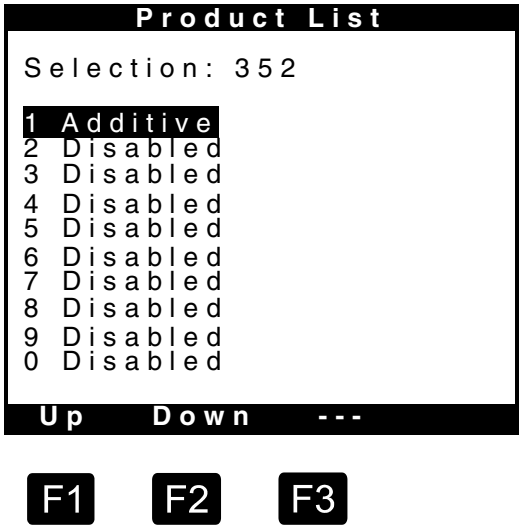
☞ The configuration menu is called with the function key <**F3**>.
To define a new product select Product Page 3.5.

Here ten products can be defined within each of the three product pages. The allocation of the products is selectable. Packed products and liquid products or even surcharges or services can be defined on the same product page.

Example: An additive with the name “Burny”, a mixing ratio of 1:2000 and a price of $25.00 per liter is to be defined on Product Page 2.

The price of the additive is only used if injection takes place ***after*** the measuring system or if a container is involved.

2 DEF Product Page 2 is selected with the key <**2**>.

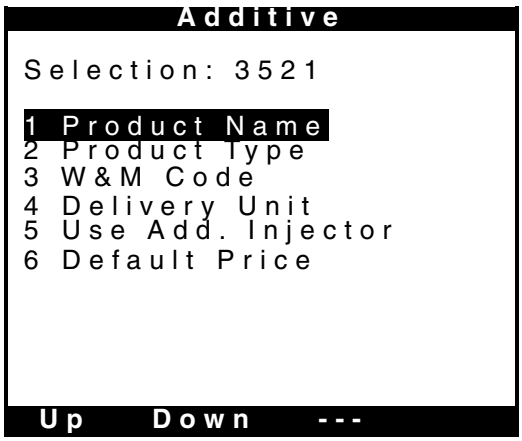


Number of Selection Window

Product Name

Function Key Assignment

“Disabled” A product name not yet assigned is identified by “Disabled”. You can select same by pressing the corresponding key or by using the key <**F1**> **“Up”** or <**F2**> **“Down”**.



Number of Selection Window

Product Description

Function Key Assignment

F1 F2 F3

1 ABC — First, define the product name by pressing key <**1**>.

F1 — Press key <**F1**> **Change** and then enter the text, in this case “Burny”, using the keypad.

For operation in a multilingual environment the name can be defined in three languages (key <**F3**>).

1 ABC — Press key <**1**> **2 times**. The letter B appears in the text window.

F1 — With function key <**F1**> the letter entry is set to **“lowercase”**.

6 PQR ..... 7 STU — Press key <**7**> **3 times**. Then a small “**u**” appears after the letter B in the text window. Continue the procedure until the complete product name has been entered.

Print — The name is accepted into the Sening MultiFlow with key <**PRINT**>.

2 DEF + 3 GHI — Next, the **product type** (key <**2**>) must be defined. This product is an additive which is to be dispensed through the pump.

Select “Additive” with key <**3**>.
Operation then automatically returns to the start menu.

3 GHI — The **W&M code** can be selected with key <**3**>. Since an additive is involved here, **20** is entered.
(Entry only required for additive dispensing ***after*** the measuring system).

Enter — The selected unit is accepted with <**Enter**>.

The entry of litres (•) is also possible as an alternative.

5 MNO — With key <**5**> you call the additive dispensing parameters.

3 GHI — Under point <**3**> you enter the mixing ratio.

Example: For additive dispensing of 1:2000, “2000” must be entered.

Enter — The selected mixing ratio is accepted with <**Enter**>.

Stop — The additive options are left with <**Stop**>.

6 PQR + 1 ABC — The next step is to define the **default price**. With key <**6**> and the key <**1**> you enter the price.

Print — The price is accepted into the Sening MultiFlow with <**Print**>.

Take note of Parameter 3.1.4.0 for differentiating between net and gross!

The additive price is only used if injection takes place ***after*** the measuring system.

2 DEF — The **price factor** indicates the quantity factor. In our case the price refers to 1000 m•, so 1000 is entered as the price factor.

Print — The price factor is accepted into the Sening MultiFlow with <**Print**>.

3 GHI — Finally, the **tax rate** must be defined.
see Section 8.3.1.4

Print — The tax rate is accepted into the Sening MultiFlow with <**Print**>.

Point 7 **Temperature compensation** not considered. This point is active only for liquid products discharged through the flow meter.

6.2.3 Defining the Additive Use

In addition to the additive definition, the use of the additive must be entered for the measured product.

3 GHI + 5 MNO To select the product, go to Product Page 3.5 again.

Example: The product “Heating oil” is to be dispensed. The general parameters have already been defined as the ninth entry on the first product page.

1 ABC Select Product Page 1 with key <**1**>.

9 YZ Select “Heating oil +” by pressing the corresponding key (<**9**>) or by using key <**F1**> **“Up”** or <**F2**> **“Down”** and <**Enter**>.

5 MNO Call the additive dispensing parameters with key <**5**>.

1 ABC Here, the additive dispensing can be activated under point <**1**>.
Set this entry to <**1**> **“Yes”**.

2 DEF Call the additive selection with key <**2**>. Here the product register number for the desired additive is inserted.

Example: “Burny” on Product Page 2 at position 2 gives the register number 22.
When discharging “Heating oil +”, the additive “Burny” will now be automatically mixed at a ratio of 1/2000.

Stop The additive options are left with <**Stop**>.

6 PQR + 1 ABC The next step is to define the **default price**. You enter the price by pressing keys <**6**> and <**1**>.

Print The price is accepted into the Sening MultiFlow with <**Print**>.

Take note of Parameter 3.1.4.0 for differentiating between net and gross!
The price of the product including additive (for injection ***before*** the measuring system) must include the additive price.

2 DEF The **price factor** indicates the quantity factor.

With liquid products the price normally refers to 100 litres, so the unit “litres” and the factor “100” must be selected.

Print The price factor is accepted into the Sening MultiFlow with <**Print**>.

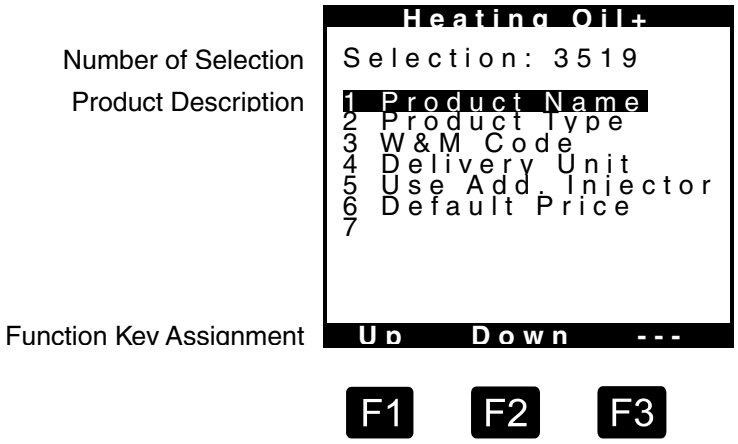
3 GHI Finally, the **tax rate** must be defined.
see Section 8.3.1.4

Print The tax rate is accepted into the Sening MultiFlow with <**Print**>.

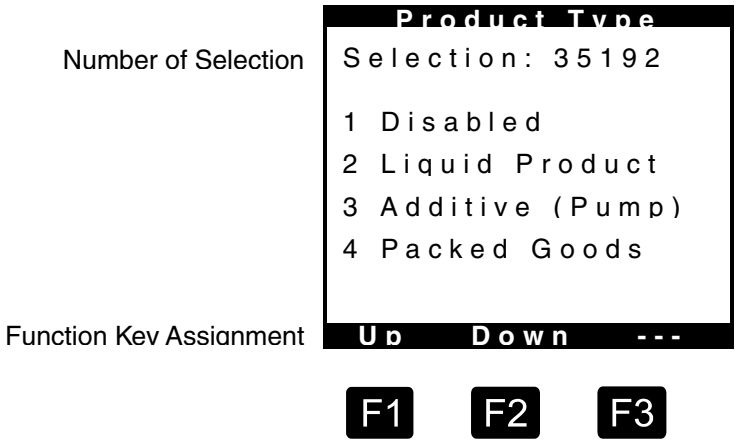
6.3 Product Deactivation

Since metering equipment is usually specific to certain product groups, some of the products installed in the factory settings must be deactivated (see Section 6).

Deactivated products do not appear on a print-out of the parameter list and also cannot be selected by the operator for a drop. No calibration of these products is therefore required!



2 DEF In order to deactivate the product heating oil+ first select the parameter index 3.5.1.9. By pressing the key <**2**> access to the type of product is obtained.



1 ABC Actuate key <**1**> to deactivate the selected product.

NOTE

Only after closing the parameter menu and recalling the product register (3.5.1) is the product presented as “Not active”.

6 W&M Calibration

7.1 Calibrating the measuring system

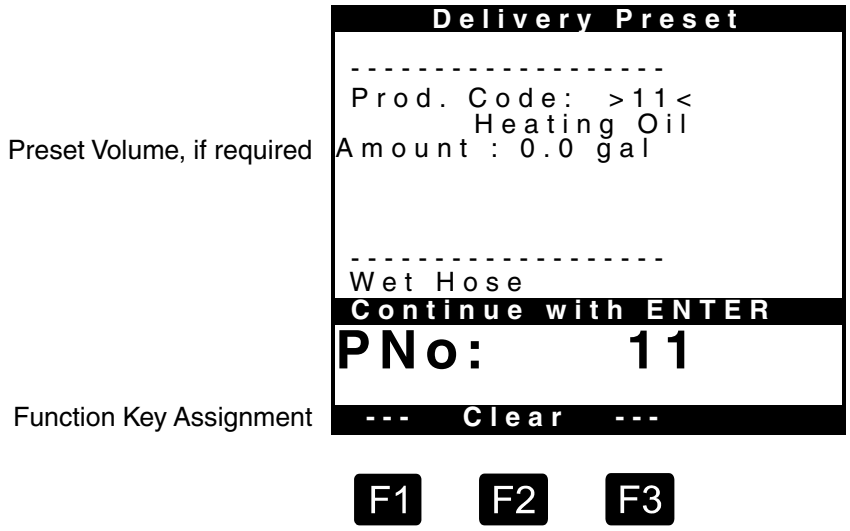
The Sening MultiFlow supports the calibration of the measuring system using a special routine (service menu). Before calibration you must define the basic parameters of the product (see Chapter 6):

- W&M code, Parameter **3.5.n.n.3**
- Product name, Parameter **3.5.n.n.1**
- Product type, Parameter **3.5.n.n.2** (2 = liquid product)
- Date and time, Parameter **1.2** (for the log)

☞ The marker **n.n** determines the product or register number of the product that is to be calibrated.

After the calibration function has been selected (in the SERVICE menu 4.2 “Calibration”), the calibration accuracy is automatically selected (ten times the resolution for standard delivery).

☺ The normal delivery screen appears (see below) in which the product to be calibrated is selected.



☞ Normally, entry of the preset volume is not used.

☞ In this case the discharge is terminated with the <**Stop**> key when the calibration vessel is full.

During discharge in the calibration mode, no volume correction is carried out. Any meter factors already defined and the temperature compensation are disabled

☞ Once the discharge is finished, you can read the actual discharged volume on the calibration vessel.

Enter this volume into the Sening MultiFlow as the target volume.

☺ Sening MultiFlow automatically calculates the meter factor and places the two volumes ("Target" and "Actual") in the display below for comparison.

Volume Established by Sening MultiFlow
Volume established by Calibration Vessel
Calculated Meter Factor

Correction Table

Volume based on **Old** Meter Factor

```
Calibrate
    Is:  1001.7 gal
Target:  1012.4 gal
Factor:  1.010682
    at:  593 gal/min
  Temp:  60 °F
--------------------
    Factor    Rate
(1) 0.987654   200
(2) 0.991234   400
(3) 1.010682  >600<
(4) 1.000000   0
--------------------
    GV:  1001.7 gal
GST15:   1001.7 gal
 ---   Clear   ---
```

F1 F2 F3

The actual volume displayed on the Sening MultiFlow is always a ***raw volume***. This means that it is not affected by meter factors nor by temperature compensation.

Check the meter factor used by verifying the volume figure in the lower section of the display, because this value is based on the meter factors ***defined before the discharge***.

✍ You can bring the meter slightly to the positive or negative by slightly varying the target value (volume measured by the calibration vessel) upon entry.
The following example explains this procedure.

Check Meter Factor Curves

The meter factor curve must be entered with the flow rates in ascending order to operate correctly. A check will be added to verify the rates are correctly entered.

Example:

The Sening MultiFlow display shows exactly 1000.0 •, and a volume of 1000.0 • was measured by the calibration vessel. Due to measurements already taken, the figure displayed by the Sening MultiFlow is to be moved slightly to the **positive**. To do this, you do not enter the "Actual" volume to define he target volume (measurement from the calibration vessel), but a slightly higher value instead.

If, for example, 1010.0 • (see table) is entered, then a meter factor of about 1.01 (positive offset) is produced, i.e. with this meter factor a volume larger by a factor 1.01 is displayed at the next discharge of the same volume.

In the reverse case, i.e. the counter is to be offset slightly to the **negative**, a target value of 990.0 • must be entered, respectively. At the next discharge, the actual measured volume is displayed reduced by the factor 0.99.

Examples for positive and negative offsets:

MultiFlow (ACTUAL)	MultiFlow (TARGET)	Meter Factor
1000.0	1010.0	1.010000
1000.0	1000.0	1.000000
1000.0	990.0	0.990000

Normally, only the target figure can be changed when making entries. The actual value is always found by the Sening MultiFlow. The same applies to the other values, e.g. the mean flow.

The meter factor is computed in the Sening MultiFlow according to the following formula:

$$\textbf{Meter Factor} = \frac{V_{target}}{V_{actual}}$$

You can now insert the correction value into the correction table using the displayed mean flow rate.

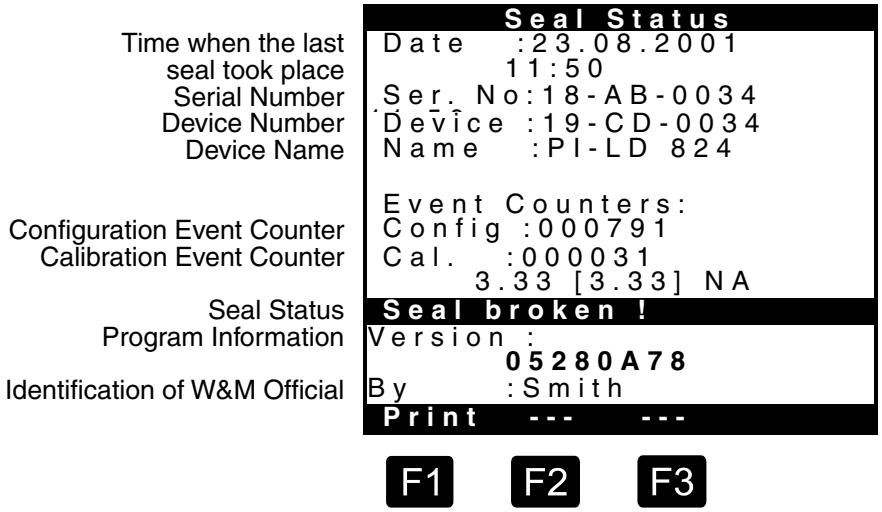
Where compensation is *dependent on the flow*, you enter the different flow rates at which the meter factor has been found, into the correction table together with the respective meter factor.

If *only one meter factor* is to be used over the complete flow range (which is the normal case), then the **maximum** flow rate of the meter must be entered as the flow rate. Correspondingly, the meter factor found must be entered under “Factor”. All other flow rates must be set to zero.

After you have terminated the calibration by pressing the key <**PRINT**>, the original settings (compensation) are activated again, and the new correction table is saved in the product register. In addition, the Sening MultiFlow offers a printout of a calibration log consisting of an expanded delivery note and an extract from the parameter list (i.e. the relevant product register).

7.2 Electronic W & M seal (soft seal)

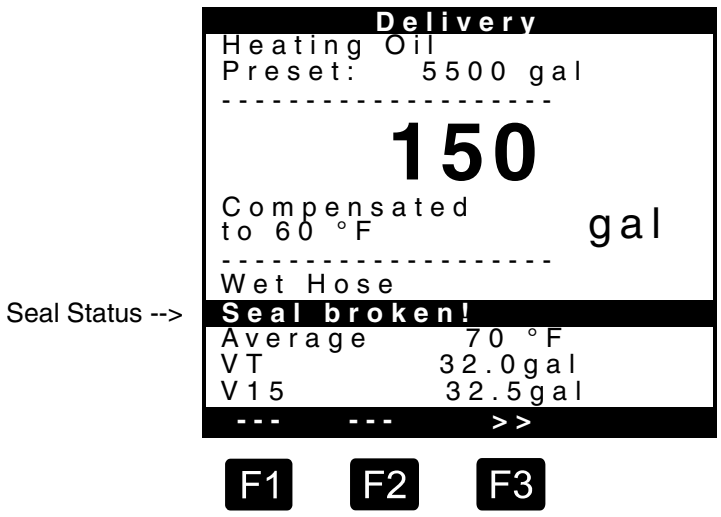
- The electronic W & M seal is used for monitoring the calibration status of the Sening MultiFlow.
- On calling the seal status (Menu 4.1.1), the device checks the checksum over the protected program sections and the status of the non-resettable event counter (Reference).
- The values found as well as the version number and the date of the last calibration are displayed (‘Display seal’) or printed out (‘Print seal’).
- The value of the event counter is displayed as “Reference”.



If the displayed data does not match those in the W & M documentation, then the W & M seal has been broken. A check of the parameters and setting of the W & M seal by an authorized person is required.

When at least one change is made to any of the meter factors, the Calibration Event Counter will be incremented. When at least one change is made to any other W&M controlled parameter, the Configuration Event Counter will be incremented.

Delivery operations are not possible while the seal is broken.



Parameters which are subject to W & M protection can only be changed after breaking the physical and electronic W & M seal

The housing (of the operator unit) must be opened and a plug-in jumper must be adjusted (c.f. Section 0) to break the electronic seal.

This operation gives access to all parameters, however the electronic seal will be automatically broken.

For calibration or recalibration the function ‘Restore seal’ (Menu 4.1.4) is called. Here the event counter(s) are incremented if necessary and the current date and the version number found. Then the new checksum is formed. All these data are saved in the electronic seal, displayed and printed out.

The entry of an additional password (**Parameter 3.1.3**) is required to protect the electronic W & M seal.

An erroneous entry of the password leads to a record in the log book. Each time the password is entered incorrectly, the waiting period is extended (1, 15, 60 min) before a new entry becomes possible.

Restoration of the electronic W & M seal must only be carried out under the supervision of a W & M inspector or an approved maintenance person!

To prevent abuse, the passwords set at the factory, especially the seal password should be changed during the initial operation. Write them in the measurement system certificate.

The new data (printout) is finally accepted into the W & M documentation. The device is now ‘calibrated’ again.

In order to change the system date and time the W&M seal has to be broken! Therefore, it is **essential** to set the date before concluding the calibration.

An example of a printout of the W & M seal is given in the Chapter 0.

7.2.1 Setting of the plug-in jumper

In some cases parameters under W&M control have to be changed. The W & M seal must be broken manually. Therefore, a jumper has been installed in the operating device of the Sening MultiFlow. The Jumper is located inside the operating device at the backside of the keypad and display board. This means it can be easily reached even with AI installations (area subject to explosion hazards).

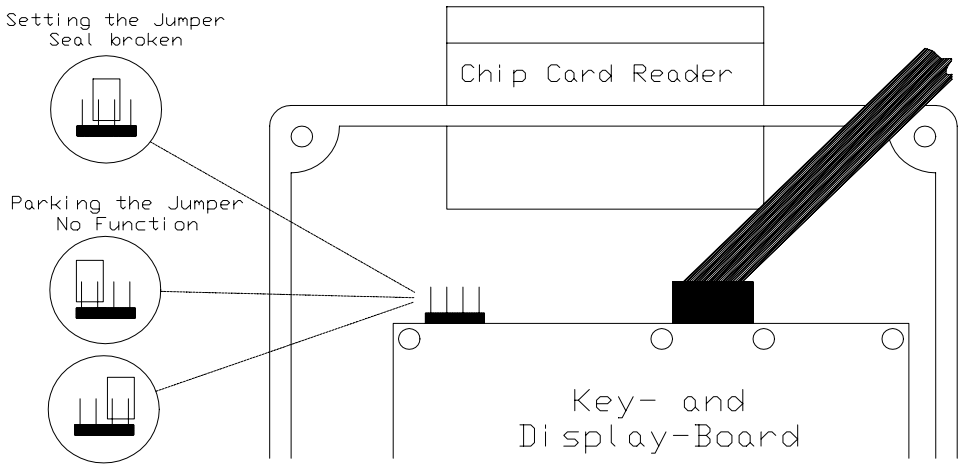
First switch off the unit and set the plug-in bridge into the central position. Then switch the unit on again.

Before opening the housing and moving the jumper the lead seal must be removed. With AI installations, the jumper is placed in intrinsically save circuits. Thereby you may open the housing even when the device is operational.

☞ To obtain access to sealed parameters the plug-in contact (jumper) must be inserted in the middle position.

If the jumper is inserted in one of the outer positions, the jumper has no function (park position).

The Sening MultiFlow protective mechanisms are rendered inoperative by setting the jumper. The operator obtains access to all parameters. It will be automatically detected that the soft seal has been broken (Warning displayed).



The electronic seal has been permanently broken and has to be renewed.

It is not possible to reset the electronic seal without first removing the jumper. If this is attempted, the operator is requested to remove the “Seal switch”.

7.3 Print-out of electronic W & M seal (example – Original Form DOK-386E)

W&M Seal

```
Serial Number   :  16DF0086
Device Number   :  52523737
Meter Name      :  Truck-5
Personnel ID    :  999999

Report Date     :  20.07.2005  15:19
-------------------------------------
Seal Status

*Seal Date      :  21.06.2005  15:15
*Version        :  3.31[3.30]NA
                   049C1806
Event Counters
Config          :  000015
Cal.            :  000002
Sealed by       :  SMITH
Sealed by       :*M-044-C*
-------------------------------------
The seal is approved!
-------------------------------------
```

Electronic Weights & Measures Seal

as Appendix to
Measurement System Certificate

Internal state type approval

5.602
97.10
MultiFlow

The seal was produced by:

Signature and identification of official:

It is essential to observe the following instructions when checking the seal status:

The seal is not violated by the inspection.

The Seal Report shown at left can be printed with either of the following key sequences:

- Power-Up Screen•<F1>(W&M)•<F1>(Print)
- Power-Up Screen•Menu•4(Service)•1(Soft Seal)•2(Print Seal)

The code number in the 'Seal status' area on the copy and on the original must match (double-sized printing).

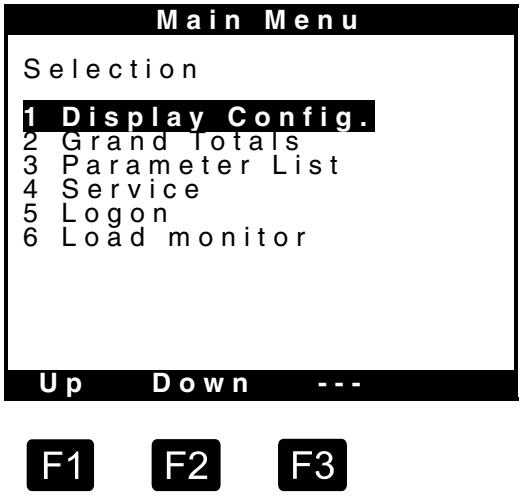
The text under the code number must read:
The seal is approved!
If the details do not match, the seal has been broken. Appropriate action must be initiated.

IMPORTANT:

Illegal modification of the W & M data or the W & M seal is a punishable offense!

7 Configuration of the Sening MultiFlow (Function key <F3>)

The main menu is reached via function key <**F3**> in the start screen, and enables the configuration of the Sening MultiFlow. It contains the product parameters as well as settings for the display, printer and the sensors.



Selection Menu on Pressing the Key <**F3**>

All entries in the menu can be *viewed* almost without any restriction. Changes, however, are only possible with restrictions, as in particular for the parameter list various access rights have been defined, such as 'Driver', 'Master' or 'Calibrate'.

Only settings in the 'Driver' group can be changed at any time. A security query is made with all the others.

Parameters in the groups 'Master' and 'Calibrate' require master access, i.e. the operator must identify himself as a master by entering a password.

With erroneous entry of the password (master code), an entry is made in the log book. Each time the password is entered incorrectly, the waiting period is extended (1, 15, 60 min) before a new entry becomes possible. In case of emergency the device can be opened and a jumper plugged onto the center contact visible beneath the plug. The entry of the passwords can be bypassed in this way.

When parameters in the 'Calibrate' group are changed, the non-resettable Calibration Event counter is automatically incremented. Please also refer to Chapter 7.2, **Electronic W & M seal (soft seal)**.

8.1 Display Configuration

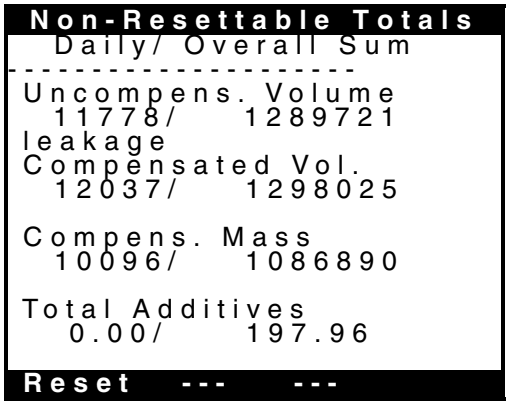
No.	Name	Seal	K	Factory Setting	Meaning
1.1	Contrast	D	x	-	Display contrast setting
1.2	Date and Time	M/ Cal	0/x	-	Sets internal clock **IMPORTANT:** Date is subject to W & M restrictions!
1.3	User's Language	D	x	-	Display language for menus, alarms and reports
1.4	Customer's Lang.	D	x	-	Display language for deliveries and receipts

8.2 Operating Data

No.	Name	Seal	K	Factory Setting	Meaning
2	Grand Totals	D	0/x	–	Display of grand totals Long-term and shift counters: • Sum of compensated volume in gal/liters (V_0) • Sum of uncompensated volume in gal/liters (V_T) • Sum of masses in pounds/kg • Sum of measured additive in gal/liters **NOTE:** The day / shift counter can be reset with function key **F1**.

8.2.1 Grand Totals

The day and overall total readings are displayed with the function **Grand totals**. The day total can be reset with the function key <**F1**>, but the overall total readings cannot be reset.



Display of Grand Totals

8.3 Parameter List

The parameter menu contains several topics:

Device No., Operation Options, W&M Restrictions
Transfer rate, FDW-Protocol
Pulse Inputs, Temp. Sensor, Additive Pump

Units, Price, Meter Factors

Parameter List: Menu 3

For additional information on the tables refer to Chapters 0 through 0.

The column designated **"No."** gives the key combination with which the parameter designated in the column **"Name"** is selected. If this number is entered in the main menu via the keypad, the corresponding parameter is called and displayed automatically.

The column **"Seal"** gives the access rights and the function is described in more detail in the column **"Meaning"**.

There are five different **categories** of parameters:

K	Priority	Meaning
0	Cal., EPROM	Highest security level; device settings which are *not* saved on the parameter chip
1	Cal.	High security level due to additional checksum; parameter transfer *from* the chip card only possible when *seal is broken* !
2	Master	High security level due to additional checksum; parameter transfer *from* the chip card only possible when *seal is broken* !
3	Master	Medium security level
x	Driver	Lowest security level; parameters which are *not* saved on the chip card

Example: After you have opened the main menu via key **<F3>** you select the parameter **"Billing"** (see chapter 0) with the key sequence **<3> <1> <4> <0>.**
To change the setting master access is required (see indication **M**).

An example of a parameter list is given in Chapter 12.3.

8.3.1 Device Settings

8.3.1.1 Device Number

8.3.1.2 Meter Designation

8.3.1.3 Seal Password

No.	Name	Seal	K	Factory Setting	Meaning
3.1.1	Device Number	Cal.	1	-	This parameter should be assigned the device ID (name-plate, see housing of operating device).
3.1.2	Meter Designation	Cal.	1	-	This parameter is used for identifying the measuring system. The designation is printed on all delivery notes and reports. **Recommendation:** Use the serial number of the measuring chamber (name-plate).
3.1.3	Seal Password	Cal.	1	123456	Password protection for electronic W & M seal.

8.3.1.4 Operating options

No.	Name	Seal	K	Factory Setting	Meaning
3.1.4	**Operating Options**		**3**		**See details 0 / Page 61**
3.1.4.1	Operating Mode	M	3	0 (Standard)	Selection of operating mode: 1 Standard, support of single and multiple metering systems
3.1.4.2	Save display	M	3	15	The discharged volume is saved in the display for the selected time in minutes. Thereafter, the ready screen is displayed again.
3.1.4.3	**Currency Options**		**3**		**See details 0 / Page 62**
3.1.4.3.1	Applicable Currency	M	3	0 (Currency A)	Selection of *applicable* currency (A or B). All preset prices, billing and driver input data are computed in this currency. Reference to the second can only be made additionally at the end of the receipt/bill (see EURO).
3.1.4.3 2	Exchange Rate	M	3	1.92573	Exchange rate between currencies A+B
3.1.4.3.3	Curr. Symbol Position	M	3	0 (after)	Determines the position of the currency symbol in printouts, i.e. before or after the amount
3.1.4.3.4	Currency Symbol A	M	3	£	Symbol used for currency A
3.1.4.3.5	Curr. Resolution A	M	3	2	Number of post-decimal places for curr. A
3.1.4.3.6	Currency Symbol B	M	3	EUR	Symbol used for currency B
3.1.4.3.7	Curr. Resolution B	M	3	2	Number of post-decimal places for curr. B
3.1.4.3.8	Resolution product price	M	3	5	Number of post-decimal places for product prices

No.	Name	Seal	K	Factory Setting	Meaning
3.1.4.5	**Queries**				**See details 0 / Page 63**
3.1.4.5.1	Driver ID Query	M	3	0 (no)	Activates the autom. driver logon (password query) after switch-on.
3.1.4.5.2	Language Query	M	3	0 (no)	Activates the autom. query for the customer's language before discharge.
3.1.4.5.3	Customer ID Query	M	3	0 (no)	Activates the customer's ID query for deliveries.
3.1.4.5.4	Customer Type Query	M	3	1 (yes)	Activates the customer type query (business or private) which determines whether prices are net or gross. When deactivated, the value of parameter 3.1.4.0.1 is considered automatically.
3.1.4.5.5	Other Products	M	3	1 (yes)	Activates the option to add several products to a delivery (e.g. bulk goods). When deactivated, only one product can be delivered on one receipt.
3.1.4.5.6	Payment Mode	M	3	0 (no)	Activates the payment mode query after printing of invoices.
3.1.4.7	Customer ID Query	M	3	0 (no)	Activates the customer's ID query for a delivery.
3.1.4.8	Add Surcharge	M	3	0 (no)	Activates special surcharge on the receipt.
3.1.4.9	Default Surcharge	M	3	31	Product code for special surcharge (e.g. transport duty). Default can be changed by the user on site.
3.1.4.0	**Billing**				**See details 0 / Page 65**
3.1.4.0.1	Billing	M	3	1 (gross)	Activates/deactivates the billing option (c.f. also 3.1.4.5.4): 0: no bill 1: bill based on gross prices (with tax incl.) 2: bill based on net prices (without tax)
3.1.4.0.2	tax rate				see Section below (8.3.1.4)
3.1.4.0.3	Volume limit	M	3		Only for the English version of the program. Activates volume limit.

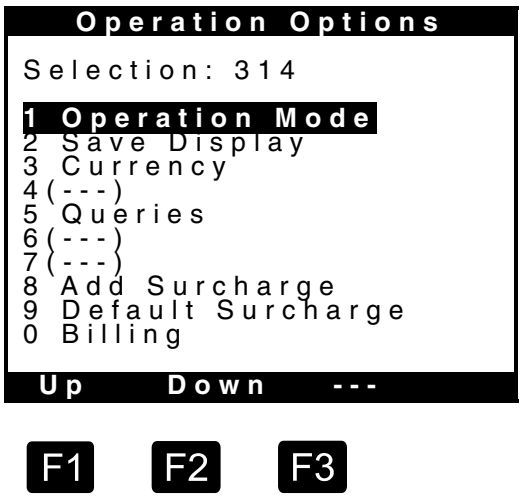
8.3.1.4.0.1 Parameter Setting for Billing (NA and UK only)

Under the condition that billing is enabled (Parameter 3.1.4.0.1) the MultiFlow has to check if heating oil has been delivered. In this case and if the given volume limit (Parameter 3.1.4.0.3) has been exceeded the MultiFlow prompts the user to enter the customer type (see Chapter 11.2.1).

Only if "none domestic" is selected by the user MultiFlow will select the alternative tax (Parameter 3.1.4.0.2) for presentation on the invoice.

8.3.1.4.1 Customization (Control Options)

Customer and country-specific settings can be carried out in the menu point ‘Control Options’.



Options for Customisation

The parameter **‘Operation Mode’** is used to set up the MultiFlow for communication with an TMC (Truck-Management-Computer) or OBC (On-Bord-Computer). The operation mode is set to ‘Std’ (Standard) by default. If no TMC or OBC is connected to the Sening MultiFlow, ensure the standard operation mode is selected.

Under the option **‘Save display’** you can define the length of time during which the discharged amount is to remain in the display after termination of the discharge. The minimum display period after which the screen is to be cleared is one minute and the maximum settable time is 99 minutes.

The parameter **‘Currency’** opens a submenu explained more in detail in Chapter 0.

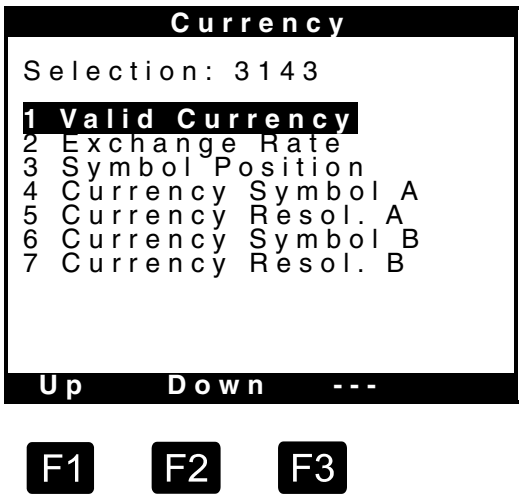
The parameter **‘Queries’** opens a submenu explained more in detail in Chapter 0.

For some products a surcharge is applicable, e.g. transport duty. In order not to forget this amount, it is automatically inserted into the invoice if **‘Add surcharge’** is set to **1**. Since the surcharge is treated as a product, a product code must be defined for the duty. This product code is entered under **‘Default surcharge’**.

The parameter **Billing** opens a submenu explained more in detail in Chapter 0.

8.3.1.4.2 Notes on the Second Currency

A new **Parameter menu 3.1.4.3** (‘Currency’) has been set up for the management of a second currency (e.g. the EURO). The **Parameter 3.1.4.4** (“Currency resolution”) has also been placed in this list.



Menu 3.1.4.3

See also Section 0, sum blocks.

8.3.1.4.2.1 Valid Currency

In **Parameter menu 3.1.4.3** two currencies (A and B) can be described. The relevant currency (A or B), in which all prices are saved internally (product register, log book, intermediate sums, operator entries, etc.), is determined via the **Parameter 3.1.4.3.1**. The conversion is made according to the exchange rate saved under **Parameter 3.1.4.3.2**.

8.3.1.4.2.2 Conversion Factor

The **Parameter 3.1.4.3.2** (“Exchange rate”) has been introduced to enable conversion between the currencies “A” and “B”.

Either: **B = A / K** (A is the valid currency)

or **A = B * K** (B is the valid currency)

A: Currency A

B: Currency B

K: Exchange rate

Example: A = $

B = EUR

K = A / B = 0.7856

8.3.1.4.2.3 Currency Symbol Before Amount

In some countries the currency symbol is placed after the amount (e.g. Germany and countries using Euro). This can be set via the **Parameter 3.1.4.3.3** (“Position symbol”).

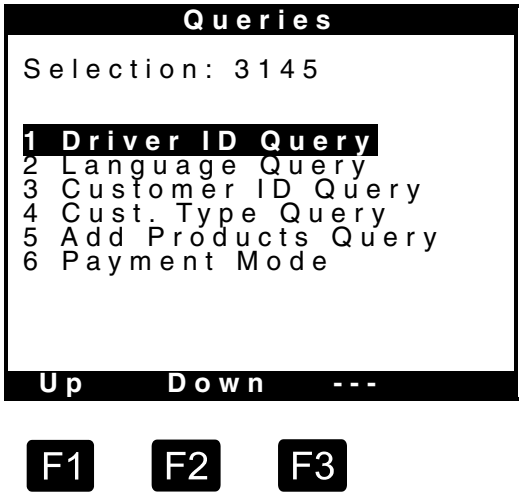
8.3.1.4.2.4 Currency Resolution / Rounding Rules

Some currencies do not have sub-units such as “pfennigs” in Germany. With these currencies, (e.g. Italian lira) no decimal places occur in the amounts.

The Parameter “Currency resolution” enables these facts to be taken into account when configuring the Sening MultiFlow. The parameter states how many decimal places are to be taken into account in representing the amounts.

8.3.1.4.3 Notes on Query Options

The Sening MultiFlow supports a range of optional queries which enable the operator to adapt the program sequence to his daily routine.



Menu 3.1.4.5

If the driver number is to be always queried after switching on the Sening MultiFlow, then the parameter **Driver no. query** must be set to **1**. Querying the driver number is practicable if different drivers drive a vehicle. The driver number is then used, for example, to control the printout of the name on the ticket and an unambiguous assignment of the deliveries can be made to each driver.

In some countries various languages are spoken depending on the area. To output the ticket in a language different from the operating language, the parameter **Language query** must be set to 1. Before each printout a query is made of which language is to be used for the printout.

For some applications it is useful to always give the customer number on the ticket so that later unambiguous assignment of the delivery to a customer can be guaranteed. If **Customer no. query** is set to 1, then a customer number must always be entered.

The enabling of the query for **further products** enables a number of products to be summarized on one delivery note

If the **parameter 3.1.5.2** (number of drops) stands at “1”, only one metered product can be recorded per delivery note.

If an invoice is printed out after discharge a query can then be displayed after the invoice print-out in which an entry can be made whether and how the invoice has been paid. For this purpose set the **payment mode** to 1.

8.3.1.4.4 Customer Type Query

The query of the **Customer type** gives the operator the option of deciding between two customer groups (assuming this has been activated with **Parameter 3.1.4.5.4**):

- “Domestic” Private customers (billing is based on gross prices).
- “Non Domestic” Commercial customers (billing is based on net prices).

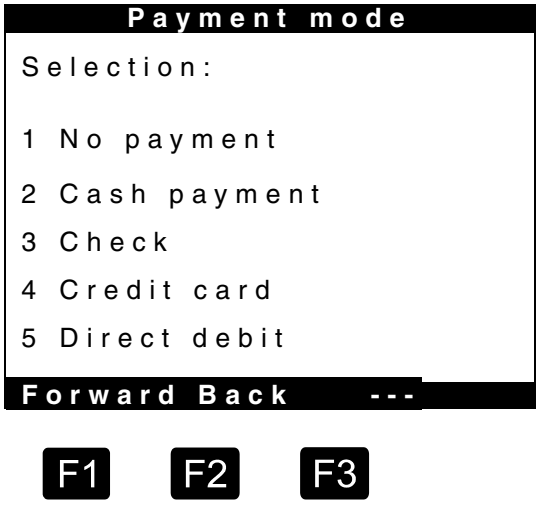
If the query of the customer type has not been activated (**Parameter 3.1.4.5.4**), the setting of **Parameter 3.1.4.0.1** (billing) occurs automatically.

The enabling of the query of **Other products** enables the operator to combine a number of products on one delivery note.

If the **Parameter 3.1.5.2** (No. of discharges) is set to “1”, only one measured product can be recorded per delivery note.

8.3.1.4.5 Payment mode query

The payment mode query is activated by Parameter 3.1.4.5.6 and takes place after the invoice print-out. The following selection is displayed here:



The selection made by the operator is saved in the internal logbook together with the discharge information and appears in the print-out of the detailed trip report (see Section 0). Information on the payment is also included if the trip data is saved on the chip card.

8.3.1.4.6 Notes on Billing

If there is the opportunity to present a bill in addition to the delivery note, the **billing** parameter is set at 1 (for a gross statement) or 2 (for a net statement).

With the setting 0 only delivery notes are printed. The query re the desired type of documentation that is otherwise made before printout of a document, is absent in this case.

The **parameter 3.1.4.5.4** “customer type query” enables after each drop a switch between “gross statement” (private customers) and “net statement” (business customers) (see Section 0).

In Great Britain there are different rates of tax when invoicing business customers for heating oil. Since these regulations are not applicable in Germany the **parameters 3.1.4.0.2 and 3.1.4.0.3** only have a function in the **NA and UK** program version.

8.3.1.4.6.1 Expand the Tax Facility

In the table below, the Product Parameter type is the directory the user is able to include which taxes are included with each product. The System Parameter is the directory that the user defines up to a maximum of 4 taxes.

The current tax facilities will be augmented to include excise tax capability (tax per unit). This pertains to the following parameters:

Parameter Number	Parameter Type	Description
3.5.X.X.6.3.1 3.5.X.X.6.3.2 3.5.X.X.6.3.3 3.5.X.X.6.3.4	Product	Selects taxes to apply. Currently allows a percentage only.
3.1.4.0.4.1	System	Tax #1 percentage
3.1.4.0.4.2	System	Tax #1 per unit
3.1.4.0.4.3	System	Tax #1 label
3.1.4.0.5.1	System	Tax #2 percentage
3.1.4.0.5.2	System	Tax #2 per unit
3.1.4.0.5.3	System	Tax #2 label
3.1.4.0.6.1	System	Tax #3 percentage
3.1.4.0.7.2	System	Tax #3 per unit
3.1.4.0.7.3	System	Tax #3 label
3.1.4.0.8.1	System	Tax #4 percentage
3.1.4.0.8.2	System	Tax #4 per unit
3.1.4.0.8.3	System	Tax #4 label

Again, this will allow for up to 4 taxes to be defined. Either the percentage OR the per unit amount would be non-zero. In the cases where both are non-zero, the percentage would be made available to be printed on the ticket.

8.3.1.4.7 Parameter Settings for Billing (NA and UK only)

Under the condition that billing is enabled (**Parameter 3.1.4.0.1**) the Sening MultiFlow has to check if heating oil has been delivered. In this case and if the given volume limit (**Parameter 3.1.4.0.3**) has been exceeded the Sening MultiFlow prompts the user to enter the customer type (see chapter 11.2.1).

Only if “none domestic” is selected by the user the Sening MultiFlow will select the alternative tax (**Parameter 3.1.4.0.2**) for presentation on the invoice.

8.3.1.5 W & M Restrictions

No.	Name	Seal	K	Factory Settings	Meaning
3.1.5	**W & M Restriction**				
3.1.5.1	Volume Resolution	Cal.	1	0	Volume division: Number of post-decimal places on volume display.
3.1.5.2	No. of Discharges	Cal.	1	1	Maximum number of discharges per receipt.
3.1.5.3	Minimum Preset	Cal.	1	200 (Litres)	Minimum default volume for discharge (200 times volume division)
3.1.5.4	Minimum Layout	Cal.	1	2,3,(11:12) ,25	Minimum requirement from W&M for bill / delivery receipt
3.1.5.5	Price Correction	Cal.	1	1 (yes)	Determines whether the *retrospective* modification of prices is permitted with products acquired by measurement.
3.1.5.6	Decimal Separator	Cal.	1	1 (‘,’)	Separator for decimal places: ‘.’ or ‘,’
3.1.5.7	System Units	Cal.	1	1(gal)	Selects metric or US units for volume, temperature, mass, and density .
3.1.5.8	Flushing Volume	Cal.	1	0 (Litres)	Minimum default amount after a change of product (due to product contamination) in litres). Gives receipt according to W & M regulations.
3.1.5.9	Force Delivery Stop	Cal.	1	0 (inactive)	Determines the time after which a delivery is automatically terminated when no flow is recognized. 0 Function inactive 1-99 Time limit in minutes
3.1.5.10	MFAC Check	Cal.	1	0 (No)	Enables check of difference between meter factors as defined by Canadian W&M

8.3.1.6 CAN-Bus (global)

No.	Name	Seal	K	Factory Setting	Meaning
3.1.6	**Global CAN Bus**				Changes on CAN Bus parameters effect only after restart.
3.1.6.1	Global Node No.	M	2	0	Node number (address) of the Sening MultiFlow when several devices are linked to one external CAN Bus. 0 No CAN communication 1 Node no. of the first Sening MultiFlow. Controls the printer (standard mode). 2-31 Node no. of the subordinate devices
3.1.6.2	CAN-Termination	M	2	1 (yes)	Controls the electronic termination of the CAN Bus. Must be activated for the first or last device at the CAN-bus, e.g. TMC or second Sening MultiFlow.

No.	Name	Seal	K	Factory Setting	Meaning
3.1.6.3	OBC node	M	2	0	Node number of the TMC or on-board computer, if this has been activated under 3.1.4.1 “operating mode”.
3.1.6.4	**Remote operation**				
3.1.6.4.1	Use remote operation	M	2	0 (no)	Activation of the remote operation option
3.1.6.4.2	Remote operation node	M	2	0	Node number of the base station of the remote operation, if this has been activated.
3.1.6.5	**Overfill prevention at the service station**				
3.1.6.5.1	Transmission interval	M	2	18 (sec/10)	Repeat rate of the overfill prevention signal. If the signal fails the drop is terminated with an OP error.
3.1.6.5.2	OP node	M	2	0	Node number of the base station of the overfill prevention if this has been activated under 3.1.8.8.
3.1.6.6	**Dead man’s switch**				
3.1.6.6.1	Use dead man	M	2	0 (no)	Activation of the optional driver attention monitoring device.
3.1.6.6.2	Transmission interval	M	2	18 (sec/10)	Repeat rate of the attention signal. If the signal fails the drop is terminated with a dead man error.
3.1.6.6.3	Dead man node	M	2	0	Node number of the base station of the monitoring device, if the latter has been activated.

8.3.1.7 CAN-Bus (local)

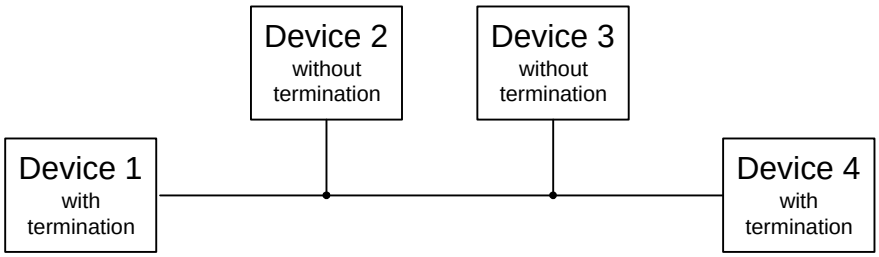
No.	Name	Seal	K	Factory Setting	Meaning
3.1.7	**Local CAN Bus**				**ATTENTION:** The settings for a local (internal) CAN Bus cannot be altered until further notice.
3.1.7.1	Internal Node No.	M	2	0	Node number of the main board on the internal CAN Bus.
3.1.7.2	Display No. 1	M	2	1	Node number of the first display on the internal CAN Bus.
3.1.7.3	Display No. 2	M	2	0 (inactive)	Node number of the second display on the internal CAN Bus.

Changes on the CAN Bus parameters will take effect after restarting the system.

8.3.1.7.1 Notes on the CAN Bus Connection

- The CAN Bus enables the connection of additional devices (e.g. other Sening MultiFlows or a TMC truck management computer) to the devices using the CAN Bus for communicating between one another.

In order to ensure trouble-free communications on the CAN Bus, the CAN Bus must be “terminated”. This means that termination resistances must be set electronically at both ends of the line.



Termination CAN-Bus

The **Parameter 3.1.6.2** “CAN termination” tells a Sening MultiFlow whether the termination is to be activated (1 = “Yes”) or not (0 = “No”). I.E. the Sening MultiFlow is informed whether the device is the first or last on the CAN Bus (termination has to be activated!).

8.3.1.7.1.1 Dual Measuring System

With the use of dual or multiple measuring systems several Sening MultiFlows can share one printer. It must be ensured internally that only one Sening MultiFlow has access to the printer at any one time.

To fulfil this requirement, one of the Sening MultiFlows must grant printing rights to the other devices. This “Master Sening MultiFlow” is always attributed the node number “1” (**Parameter 3.1.6.1**). All other Sening MultiFlows should be numbered in increasing sequence.

If the node number “0” is used, no CAN functions are activated. Communication with the device is *not* possible.

8.3.1.7.1.2 TMC / OBC operation

With the use of a TMC or OBC gateway the CAN Bus is used for communication between the Sening MultiFlow and the selected device. To activate the CAN Bus a value greater than “0” must be entered in parameter 3.1.6.1 (global node number). Normally the measurement units receive node numbers in a increasing sequence, beginning with “1”.

To differentiate between the various ways of working the desired operating mode is selected in parameter 3.1.4.1:

0 Sening MultiFlow without OBC or TMC (also multiple measurement system)
1 TMC operation
2 OBC operation

When using a TMC/OBC the Sening MultiFlow with the node number “1” automatically transfers the printer administration to the TMC or OBC gateway.

The OBC gateway works in accordance with the EMIS specification (European Multiple Interface System) from Sening, and is therefore designated as an EMIS gateway. Documentation is available on request.

In the OBC and TMC operating mode a particular format is used for the form: a drop that has been carried out is recorded as a single original documentation line.

In the **TMC operating mode** the configuration of the original documentation line is explicitly prescribed by the program. No particular definition of the form is required.

In the **OBC operating mode** the record line is defined using the form layout functions available. These provide opportunities for individual adjustment. The more stringent requirements for presentation of information that result are satisfied by the offer of additional form modules (see Section 0).

When a TMC is combined with one or more measurement systems the TMC is always the first unit on the CAN Bus (thus it is the unit with the CAN termination). A CAN termination must similarly be set for the last Sening MultiFlow in the chain only.

None of the other terminations must be activated!

8.3.1.7.1.3 Setting up a RF base station (remote operation)

The Multi-Control package from FMC Technologies comprises the following components - base station, handheld controller with display, start/stop function and dead man's key, and also the limit value sensor for overfill protection.

The three basic Multi-Control functions are, in addition to motor start/stop:

Remote control of the Sening MultiFlow with pre-set volume or flow display, drop start/stop, etc **parameter 3.1.6.4**

Overfill prevention, **parameter 3.1.6.5**

Dead man's switch, **parameter 3.1.6.6**

These functions can be activated independently of each other and allocated to separate base stations. Each parameter group thus has the option of **activation** of any particular function and setting of the CAN Bus **node number**. Usually, however, the functions are dealt with via a single base station with the node number "0".

RF activation of **overfill prevention** does not take place in menu 3.1.6.5, but under **parameter 3.1.8.8**, see Section 0. / Page 72

The **"transmission interval"** parameter for the dead man and overfill prevention settings defines the interval at which the base station must cyclically provide a status value ("heartbeat"), failing to do so, the Sening MultiFlow changes to a 'fault' state.

8.3.1.8 Valve Control

No.	Name	Seal	K	Factory Setting	Meaning
3.1.8	**Valve control**				
3.1.8.1	Path Selection	Cal.		Basic control	Defines the structure of the measuring system used: 1. Basic control: Basic version with manual operation of a control block and product release. 2. High/Low Flow: as above, but with reduction of the flow at the start and end of the discharge. 3. Fully electronic: Control switch substituted by electronic valve controller. (not supported in actual version) 4. Expanded electronical control: as 3., but combined with flow control (however, no additive dosing possible). 5. With blow down (GB): special control for GB, with flow control, additive pump, blow down of the dry hose after the drop and product transfer / self loading. 6. Expanded electronical control: as 3., with flow control & additive dosing (no unmetered discharge)
3.1.8.2	Turn-on Delay	M	2	3 (sec)	Delay on activating the control valve before the release valve.
3.1.8.3	Turn-off Delay	M	2	3 (sec)	Delay on closing the release valve before the control valve.
3.1.8.4	**Flow Control**				
3.1.8.4.1	High Flow Rate ON	M	2	5.0 (Litre)	Threshold for switchover from a reduced to a higher flow rate: Positive value: Amount in liters or gallons Negative values: Flow rate in liters/min. or gal/min
3.1.8.4.2	High Flow Rate OFF	M	2	20.0 (Litre)	Remaining volume at which the switchover to reduced flow rate takes place.
3.1.8.4.3	Wet Hose OFF	M	2	0.5 (Litre)	Remaining volume at which the flow is stopped. Used for all Hoses, except for Dry Hose (G) or (P)
3.1.8.4.4	Dry Hose (G) OFF	M	2	0.5 (Litre)	Remaining volume at which the flow is stopped. Only applicable for Dry Hose and Gravity drop.
3.1.8.4.5	Dry Hose (P) OFF	M	2	1.5 (Litre)	Remaining volume at which the flow is stopped. Only applicable for Dry Hose and pumped drop.
3.1.8.4.6	Enable Adjustment	M	2	1 (yes)	Enables the automatic adjustment of parameters 3.1.8.4.3 … 3.1.8.4.5

No.	Name	Seal	K	Factory Setting	Meaning
3.1.8.4.7	**Turbine Control**				
3.1.8.4.7.1	System Volume	M	2	20.0 (liter)	Volume of the entire discharge system, i.e. from bottom valve to outlet
3.1.8.4.7.2	Draining	Cal.	2	1 (yes)	Activates/deactivates the unmetered discharge of the retained product. Is added to the metered volume at the end of the discharge.
3.1.8.4.7.3	Draining time	Cal.	2	20 (sec.)	Time set for draining retained product
3.1.8.5	**Draining**				
3.1.8.5.1	Drain control	M	2	0 (no)	Activation of a message if product is changed.
3.1.8.5.2	Receipt draining	M	2	0 (no)	Parameter not currently used
3.1.8.6	---				No longer applicable from version 2.1; see 3.1.8.4.3
3.1.8.7	Hose Set	Cal.	1	UVLB	Defines the hose paths that are used in the measuring system for later selection. B Bypass D (L) Dry hose (Leerschlauch) G (S) Dry hose with Gravity drop (Schwerkraft) P Pumped dry hose drop U Unmetered W (V) Wet hose (Vollschlauch) Note: Each abbreviation may be used only twice at the most.
3.1.8.8	Overfill prevention	Cal.	0	No	The actuator function is transferred from the overfill prevention to the Sening MultiFlow. No: No monitoring, Sening MultiFlow is not an element of the delivery safety system. Frequency Input: A level sensor with frequency output is used. Switch Input: A level sensor with switch output is used. RF overfill prevention: OP signal is transmit ted via RF and base station to the MultiFlow
3.1.8.9	Valve Compilation	M	2	0	Select Valve Compilation (also see chapter 0) 0 General configuration 1 GVLx-xM, dry hose operation is modified
3.1.8.0	Blow Down	Cal.	1	8 (sec)	**Applicable only for NA and UK version:** Blow down of dry hose (duration)

8.3.1.8.1 Notes on the manual control of the hoses

Without full electronic valve control the outputs must be connected to following valves (functions):

Name	Basic Control	Flow Control
Flow Release A	1	1 (low flow)
Flow Release B	-	2 (high flow)
Control Switch Release	2	3

View following drawings in the appendix:
E51.351287 (Page 151); E51.351098 (Page 163); E51.351190 (Page 162)

During flow control the low flow opening remains active even during high flow.

8.3.1.8.2 Notes on the full electronic control of the hoses

The full electronic valve control (i.e. hose selection) is controlled by parameter 3.1.8.1. It replaces the pneumatic control switch and gives the opportunity to handle the meter without utilization of hand operated valves.

In order to take over these control functions, Sening MultiFlow requires the activation of the electronic control (see above) as well as a description of the implemented hoses (discharge passes). This is done at **Parameter 3.1.8.7**, where all hoses that are supported by the metering system are to be listed.

Discharge passes are described by the codes listed in the following table:

Code	Meaning
B	**Bypass**: Discharge bypassing the overfill prevention system, but limiting the maximum flow rate to 53 gal/min (199 • /min) (reduced mechanically)
D (L)	**Dry Hose**: Hose is emptied completely after discharge
P	Dry hose drop with **pump operation**
S (G)	Dry hose drop using **gravity**
G (S)	Dry hose at **Gravity** discharge, may be used instead of “D”
P	**Pumped** dry hose discharge, may be used instead of “D”
U	**Unmetered**: Discharge bypassing the meter, no volume is recorded
W (V)	**Wet Hose** Discharge through a nozzle, the hose remains filled with product at any time

At **Parameter 3.1.8.7** you enter the required codes reflecting the actual meter set-up. All codes may only be used twice. Also no more than ten paths may be defined.

Please observe the following rules:

The abbreviations U, L, S and P may only be used once each.

The abbreviations V and B may be used twice (always in sequence).

The abbreviations S and / or P can be used as *substitutes* for L, but *never together* with L (e.g. UVPS or UVL, but not UVLPS).

No more than ten drop paths can be defined.

Example: UWWDBB

Meaning: The meter offers the following discharge paths (see also chapter 0):

1. Unmetered
2. Wet hose 1
3. Wet hose 2
4. Dry hose
5. Bypass 1
6. Bypass 2

The sequence of codes also determines the sequence of the passes presented to the user in the selection list.

The full electronic valve control uses the following output to valve assignment:

	1 Basic Control	2 Flow Control	3 Fully Elec. Control	4 Expanded Elec. Control	5 With blow down	6 Exp. electron. BE	7 Control Turbine
Output 1	Control air	LOW Flow	Wet hose	Wet hose LOW flow	Wet hose LOW flow	Wet hose LOW flow	Control air
Output 2	Interlock	HIGH Flow	Dry hose	Dry hose LOW flow	Dry hose LOW flow	Dry hose LOW flow	START / STOP
Output 3	ADD pump	Release control switch	ADD pump	Wet hose HIGH flow	Wet hose HIGH flow	Wet hose HIGH flow	Regulation 1
Output 4	--------	ADD pump	Bypass	Dry hose HIGH flow	Dry hose HIGH flow	Dry hose HIGH flow	Regulation 2
Output 5	--------	LOW Flow (AUX)	Position 1 Dual hose outlet nozzle	Position 1 Dual hose outlet nozzle	ADD pump	Position 1 Dual hose outlet nozzle	--------
Output 6	--------	HIGH Flow (AUX)	Position 2 Dual hose outlet nozzle	Position 2 Dual hose outlet nozzle	--------	Position 2 Dual hose outlet nozzle	--------
Output 7	Pulse Output	Pulse Output	Unmeasured	Unmeasured	Blow down	ADD pump	--------
Output 8	--------	--------	--------	--------	--------	--------	--------
Output 9	--------	--------	--------	--------	--------	--------	--------
Output 10	--------	--------	--------	--------	--------	--------	--------
Output 11	--------	--------	--------	--------	--------	--------	--------
Input 1	ADD pump rest position	ADD pump rest position	ADD pump rest position	--------	ADD pump rest position	ADD pump rest position	--------
Input 2	ADD pump end position	ADD pump end position	ADD pump end position	--------	ADD pump end position	ADD pump end position	--------
Input 3	ADD pump filling level	ADD pump filling level	ADD pump filling level	--------	ADD pump filling level	ADD pump filling level	--------
Input 4	Overfill prevention amplifier	Overfill prevention amplifier	Overfill prevention amplifier	Overfill prevention amplifier	Product Transfer & Self Loading	Overfill prevention amplifier	--------
Input 5	--------	--------	--------	--------	--------	--------	
Input 6	--------	--------	--------	--------	--------	--------	
Input 7	--------	--------	--------	--------	--------	--------	
Input 8	--------	--------	--------	--------	--------	--------	

Output 1…7: Sening MultiFlow Output 8..11: MFIO-E	Input 1..4: Sening MultiFlow Input 5..8: MFIO-E

View following drawings in the appendix:

Description	No.	Page
Wiring Diagram (Version A3)	E51.350956	148
Wiring diagram pneum. control switch with flow control and dosage pump	E51.351287	151
Wiring diagram electronic control + dosage pump + overfill prevention amplifier	E51.351125	152
Wiring diagram electronic control + flow control	E51.351127	153
Wiring diagram electronic control, dosage pump and blow down	E51.351286	154
Wiring diagram electronic control with flow control and dosage pump	E51.351691	155
Wiring Diagram (Version A1)	E51.350958	161
Wiring diagram pneum. control switch + dosage pump	E51.351190	162
Wiring diagram pneum. control switch with flow control + dosage pump + overfill prevention amplifier	E51.351098	163
Wiring diagram electronic control + dosage pump + overfill prevention amplifier	E51.351189	164
Wiring diagram electronic control + flow control	E51.351126	165
Wiring diagram electronic control, dosage pump and blow down	E51.351285	166
Wiring diagram electronic control with flow control and dosage pump	E51.351692	167

8.3.1.8.3 Notes on overfill prevention.

Taking control of the servo component is sensible only during simultaneous use of the automatic hose selection (see parameter 3.1.8.1).

8.3.1.8.4 Notes on blow down

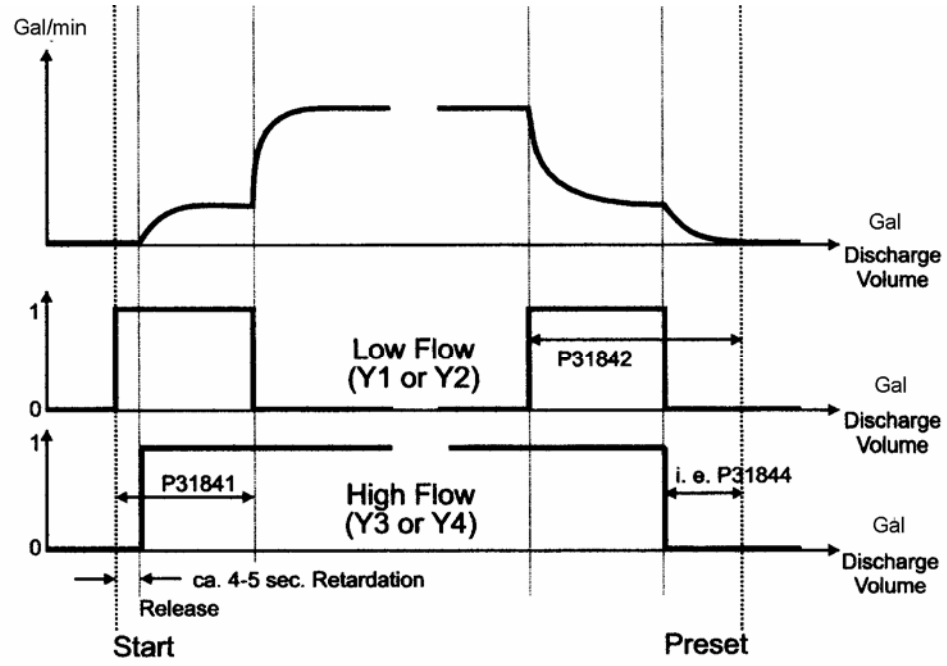
Blow down of the dry hose is a function that is required only by the British authorities. At the end of a drop high pressure air is supplied to the dry hose for a set time to evacuate the latter completely.

Because the controller differs, only *special full electronic hose selection* (parameter 3.1.8.1 = 5) can be used. With manual hose selection the Sening MultiFlow would be unable to decide whether a dry hose was in use and therefore whether blow down was to be activated.

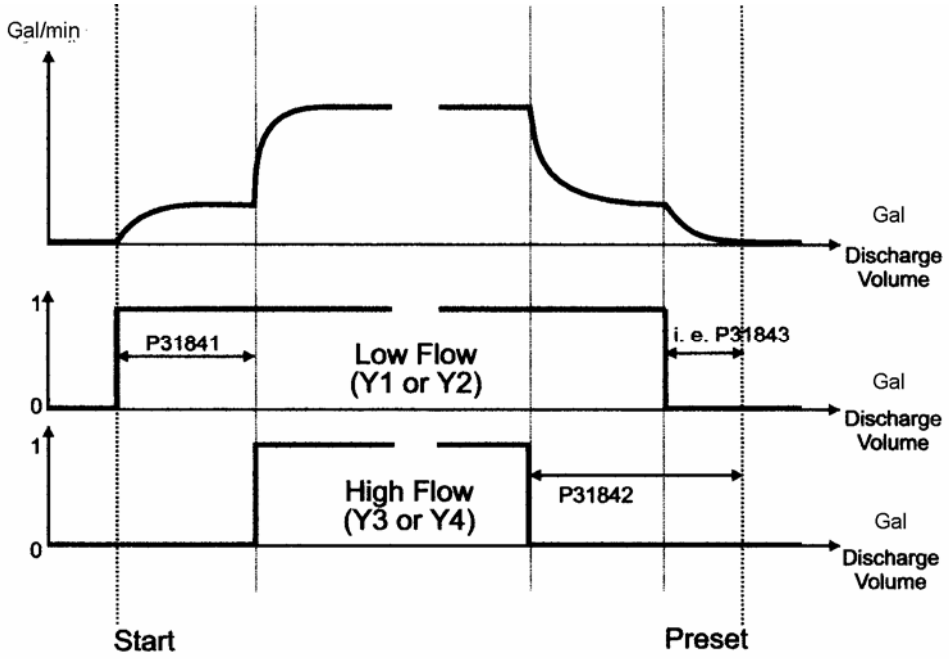
8.3.1.8.5 Notes on Flow Control

The flow control offers the user a precise preset of the discharge volume. The exact discharge will thereby achieved by a two stage shutdown.

Flow control at general valve compilation:



Flow control utilizing the GVLx-xM valve compilation (only dry hose):



The shutoff point shown in the above diagrams will vary, depending on the selected hose. See notes on parameters 3.1.8.4.x for more information (Chapter 0).

Parameter 3.1.8.4.1 controls the switchover from low to high flow:

+: Interpretation of the value entered as volume (e.g. +14 = 14 gallons): Switching over to high flow takes place after the set quantity has passed through (in this example after 14 gallons). During stationary (flow = 0 gallons/min.) the system switches back to low flow.

-: Interpretation of the value entered as a flow rate (e.g. –100 = 100 gallons/min.). Switching over to high flow takes place as soon as the set flow rate has been exceeded. Switching back to low flow takes place if the flow is less than 50% of the value set in Parameter 3.1.8.4.1.

The flow control is self-adjusting, i.e. when the drop is complete a comparison is made between the pre-set volume and the drop volume achieved. If the values deviate from each other, there is an automatic correction of the predetermined shut off (**parameters 3.1.8.4.3 - 3.1.8.4.5**), so that at the next drop the pre-set amount is maintained precisely.

The adjustment increment never exceeds 0.05 gallons (0.2 liters).

The pre-sets for the **parameters 3.1.8.4.3 - 3.1.8.4.5** are automatically overwritten without, however, damaging the electronic seal.

Self-adjustment of the preset switch-off point can be deactivated with Parameter 3.1.8.4.6.

8.3.2 Printer Settings

No.	Name	Seal	K	Factory Setting	Meaning
3.2	Printer	M	3		
3.2.1	Printer Selection	M	3	1 (DR-295)	Selects the printer 1: DR-570 (FDW) 2: DR-295 (FDW) 3: DR-298 (FDW) 4: FX (FDW) 5: ASCII
3.2.2	Interface Type	M	3	0 (RS232)	Selection between RS232 or RS485.
3.2.3	Transfer Rate	M	3	0 (9600 baud)	Data transmission speed.
3.2.4	Parity Check	M	3	0 (none)	Activation / deactivation of the parity check. 0: No parity 1: Even Parity 2: Odd parity
3.2.5	Lines per Page	M	3	57	Number of lines on a page.
3.2.6	**FDW protocol**				
3.2.6.1	Protocol	Cal.	1	0 (No)	Activation / deactivation of the FDW protocol for data subject to W & M restrictions.
3.2.6.2	FDW timeout	M	3	5 (sec)	Max. waiting period for FDW status interrogation.
3.2.6.3	Resends	M	3	2	Number of repeated transmissions when erroneous transmissions occur.
3.2.6.4	Max. error count	Cal.	1	99	Sets the number of erroneous printouts (unsuccessful attempts to print a receipt correctly) which are allowed before the device blocks any further discharges. **NOTE:** Function currently not supported
3.2.7	Paper feed	M	3	1 (autom.)	Activates the automatic paper feed when using the DR-295.
3.2.8	Reverse ejection	M	3	0 (No)	Enables the reversal of the paper ejection direction for DR-295- and DR-298 printers. 0 no, ejection opposite to printing direction (i.e. “forwards”) 1 yes, ejection in the printing direction (i.e. “backwards”)

8.3.2.1 Notes on the parity check

Only applies when using the ‘transparent’ operating mode (no data subject to W & M restrictions, no FDW[1] protocol active).

[1] FDW means Long Distance Transfer

8.3.3 Sensors

8.3.3.1 Pulse inputs

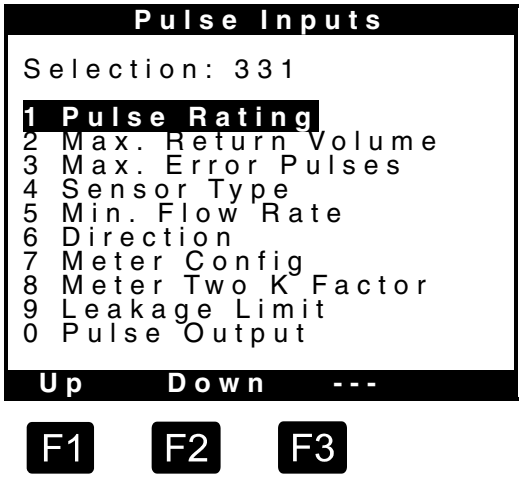
No.	Name	Seal	K	Factory Setting	Meaning
3.3.1	**Pulse counter**				
3.3.1.1	Pulse Rating	Cal.	1	1	Number of pulses per gallon or liter (see preliminary certificate and measuring system name-plate).
3.3.1.2	Max. Return Volume	Cal.	1	8 (Liter)	Permissible return volume up to which no error is displayed, in gallons or liters.
3.3.1.3	Max. Error Pulses	Cal.	1	2	No of permissible error pulses. **PTB-Recommendation:** The set value should correspond to double the pulse rating (i.e. in this case 0.5 gallons or 2 liters) **See also Chapter 0!**
3.3.1.4	Sensor Type	Cal	1	2 (PNP)	Selection of the pulse transmitter type. 1: NPN 2: PNP (default) 3: THS (Sening GMVT 704/805/1004) **IMPORTANT:** The type coding is offset by one place from the program version 1.01!
3.3.1.5	Min. Flow Rate	Cal.	1	5 gal/min or 20 (L/Min.)	Minimum flow rate during drop. Flow rates below this limit will switch off pulse error detection. The drop will be interrupted after 30 seconds. A value of 0 liters/minute will switch off this function.

8.3.3.1.1 Notes on the pulse transmitter

☞ Enter the **pulse rating** for the pulse transmitter which is stamped on the identification plate of the flow meter.

Enter the max. **return flow** next.

☍ The return flow states the amount of product which the Sening MultiFlow may count in the reverse direction before an error message is output. A normal value is two gallons or eight liters.



Pulse Counter Menu

- The maximum **error pulses** state the number of pulses, which are regarded as erroneous. If this number is exceeded, then a pulse error is output and the discharge terminated.

- Define the connected pulse sensor by entering the **sensor type**.

- An NPN, PNP or THS sensor can be connected. You can determine the correct type of sensor from the identification-plate on the flow meter.

- Error pulses are not evaluated if the actual flow is below ½ of the **min. flow rate**. Additionally, the delivery will be interrupted after 30 seconds with an corresponding warning.

- If the **min. flow rate** is set to 0, error pulses are evaluated in all cases, deliveries will **not** be interrupted on min. flow.

8.3.3.1.6 Direction

Will be set to determine the direction of the meter. This will allow for A and B pulses to be set corresponding to which pulse is leading or lagging based on the direction of flow through the meter.

8.3.3.1.7 Meter Configuration

Main Menu > Parameter List > Sensors > Pulse Inputs > Meter Config > One Dual, One Single, Two Single

The meter configuration refers to the number of meter (one or two) followed by the number of pulse inputs from the meter. There are a maximum of two pulse inputs per MultiFlow, thus leaving either a single meter with dual pulses, or two meters with single pulse inputs (or one meter with a single pulse input, leaving one input with no connection.)

Parameter 3317 selects one of three meter configuration options. These option are “One Dual”, “One Single”, and “Two Single”. When configured for one dual or one single channel meter the MultiFlow will operate as it did in previous revisions. The difference between single and dial channel metering modes will be as follows:

The meter pulse wiring will be different.

The detection of pulse errors will not be done in single channel mode.

Direction detection will not function in single channel mode.

Parameter 3317 is a sealed parameter. When configured for single channel input, the meter pulses shall be connected to terminal one on the I/O board. When configured for single channel input, direction of flow cannot be detected so parameter, 3312 (Max. Return volume), parameter 3313 (Max. Error pulses), and parameter 3315 (Min. Flow rate) will have no affect on the operation of the MultiFlow.

When the MultiFlow is configured for two single channel meter inputs, the MultiFlow user interface will be changed as follows.

A screen will be displayed during the preset process which will allow the user to select one or both of the single meters to totalize. This will be the first screen displayed in the preset sequence. Parameter (3318) sets the K factor for the second meter. A screen is available in the Service > Calibrate selection which will allow the user to select the meter to be calibrated.

Additionally, the trip report is modified to differentiate the throughput of each meter, the output to the chip card and the storage of the transaction is augmented with information identifying the meter used.

The product total block on the delivery ticket is modified to print the total for each meter. Two lines on the reports will display the meter name and the volume through the meter for the delivery.

The MultiFlow writes delivery data to the chip card under user control. The information written to the chip cad is in the form of a header followed by delivery records. The delivery records will include GV and GST non-resettable totals for the meter in use to each record.

8.3.3.1.9 Leakage Limit

Can be set to however many pulses will be accumulated before a leakage alarm is present.

8.3.3.1.0 Pulse Output

Main Menu > Parameter List > Sensors > Pulse Inputs > Pulse Outputs > 1) Disabled, 2) Standard 1X, 3) Standard 10X, 4) Tara 1X, 5) Tara 10X

A pulse output function for a discrete output will be defined. The output will produce pulses representing the units delivered only for products configured as “flow products”. If the product being delivered has temperature compensation enabled, the pulse output will be GST volume otherwise it will be gross volume.

The pulses will be 5msec in duration with a maximum of 100 pulses per second. The pulse resolution produced for each volume type will be:

Delivery Units	Resolution	Maximum rate per minute
Litres	XXXX.X	600 litres
Gal-US	XXXX.X	150 gallons

A standard discrete output which is driven to 12 VDC (500 mA max.) when asserted and 0 VDC when not asserted will be used for this function. This function will be entered in the Operation Options menu by setting parameter 3.3.1.0 Pulse Output Enable. The pulse output function will only be available in modes 1, 2, and 5. In addition, a discrete output will be made available to act as the reset signal to the counter. Each time the MultiFlow preset sequence is started, the reset output shall be toggled to reset the counter to zero.

8.3.3.2 Temperature Sensor

No.	Name	Seal	K	Factory Setting	Meaning
3.3.2	**Temperature Sensor**				
3.3.2.1	Temp. Offset	Cal.	1	Preliminary certificate	Figure for temperature offset according to W&M certificate.
0	Offset 0/32 °C/°F	-	0	Device size	Setting for temperature offset. **IMPORTANT:** The parameter is set during the preliminary test and cannot be changed.
0	Offset 100/212 °C/°F	-	0	Device size	Setting for temperature offset. **IMPORTANT:** The parameter is set during the preliminary test and cannot be changed.
3.3.2.2	Disable sensor	Cal.	1	0 (No)	(De)activates the Sening MultiFlow temperature measurement. **IMPORTANT:** With an inactive sensor no compensation and no mass computation can be carried out! **IMPORTANT:** If no sensor is connected, the temperature inputs must be fitted with a jumper.

8.3.3.2.1 Temperature Sensor (PT 100)

A **temperature offset** must be defined to compensate for component tolerances. This temperature offset is determined during the preliminary test with a number of reference temperatures. The values found are included in the preliminary certificate and must not be changed.

If during a **recalibration** it is found that the temperature measured by the Sening MultiFlow is no longer within the calibration limits, then the **Parameter 3.3.2.1** must be changed appropriately.

8.3.3.2.2 Working Without a Temperature Sensor

If the temperature sensor is disabled (**applicable from Version 2.0 only**) no compensated volumes or weight information (calculation is always based on compensated volumes!) may be displayed.

These values will not appear in reports (on paper or on chip card), or they will be set to “0” or “–”. The same applies to the corresponding totalizers.

8.3.3.3 Additive Pump (also called “dosage pump” or “Injection pump”)

No.	Name	Seal	K	Factory Setting	Meaning
3.3.3	**Additive Pump**				
3.3.3.1	Piston Capacity	Cal.	1	50 (m•)	Additive volume per stroke in m• .
3.3.3.2	Meter Factor	Cal.	1	1.0	Correction factor of additive pump. **IMPORTANT:** Follow Chapter 8 in setting this parameter.
3.3.3.3	Pump Position	Cal.	1	1	Injection point of additive pump: 0: No function 1: Before measuring system 2: After measuring system (subject to W & M inspection!)
3.3.3.4	Hose Volume	Cal.	1	50 (Litre)	Volume of measuring system for wet-hose discharge (measuring system + hose drum) in liters.
3.3.3.5	Ext. Prod. Sensor	M	2	0 (inactive)	Activates monitoring of the filling level on the external storage tank. **IMPORTANT:** The function is currently not supported.
3.3.3.6	Pump Cycle Time	M	2	6000 (msec)	Maximum time for a pump cycle in msec.
3.3.3.7	Start Interval	Cal.	1	80 (msec)	Minimum dwell time of the piston in the initial position in msec.
3.3.3.8	End Interval	Cal.	1	80 (msec)	Minimum dwell time of the piston in the end position in msec.

Also consider the option of monitoring the Load (Chapter 0 / Page 36) to prevent the additive pump from running dry.

8.3.3.3.1 Notes on the pump position

- If an additive pump is **not** connected to the Sening MultiFlow, the Parameter 3.3.3.3. must be set to 0. Activation of the additive operation in the product registers (Parameter 3.5.n.n.5.1) leads in this case to a parameter error.
- If dosing of the additive takes place in the product flow **before** the measuring instrument, Parameter 3.3.3.3. must be set to 1. In this case the measuring instrument records the volume of the **product plus additive**. As a result the additive is not noted separately on the documents (delivery receipt, invoice, trip report).
- In the event of dosing of the additive in the product flow **after** the measuring instrument, Parameter 3.3.3.3. must be set to the value 2. In this case the measuring instrument only records the volume of the product without additive, whilst the additive quantity is provided by the number of pump strokes and the (calibrated) volume of one pump stroke. In this case separate details of the additive (description, quantity, price per unit, total price) are given in the documents.

  Dosing the additives after the measuring instrument is not possible in all software versions.

§ Depending on the relevant regulations in the respective country it is possible that technical calibration approval may be required for the additive pump in the case of dosing after the measuring instrument.

8.3.4 Form Description

No.	Name	Seal	K	Factory setting	Meaning
3.4	**Form description**				
3.4.1	Spacing	M	3	1 (characters)	Entry of spacing for the printout in mm or in characters. Characters is the standard.
3.4.2	Columns Offset	M	3	0	Number of columns before the printout in mm or in characters. Characters is standard.
3.4.3	Lines Offset	M	3	0	Number of lines before the printout in mm or in characters. Characters is standard.
3.4.4	Receipt Layout	M	2	-	Delivery receipt definition, form dialogue.
3.4.5	Print Form	M			Test printout of the delivery receipt.
3.4.6	Form Elements List	M			Printout of defined elements for describing the delivery receipt.

See also Section 0.

8.3.5 Product Definition

No.	Name	Seal	K	Factory Setting	Meaning
3.5	**Product Definition**				
3.5.1	Product Page 1				Product Registers 1.1 - 1.0
3.5.2	Product Page 2				Product Registers 2.1 - 2.0
3.5.3	Product Page 3				Product Registers 3.1 - 3.0
3.5.nn.7.3[2]	Product group	Cal.	1		Determination of the compensation algorithm in dependence of the product group: 1 Packed Goods 2 Crude Oil per: **(API-Table)** 3 Refined Oil per: **(API-Table)** 4 Special Product per: **(API-Table)** for liquid gas & bitumen

See also Section 0.

[2] Parameter 3.5.nn.7.3: This parameter is included in all product definitions.
"nn" replaces the actual product register number (10 – 39).

8.3.6 Driver List

No.	Name	Seal	K	Factory Setting	Meaning
3.6	**Driver list**				
3.6.1	Driver 1	M			Driver Register 1 (entry of the driver's ID and name and of the master code)
3.6.2	Driver 2	M			Driver Register 2 (entry of the driver's ID and name and of the master code)
3.6.3	Driver 3	M			Driver Register 3 (entry of the driver's ID and name and of the master code)
3.6.3	Driver 4	M			Driver Register 4 (entry of the driver's ID and name and of the master code)
3.6.5	Driver 5	M			Driver Register 5, factory definition of master, can be changed.

8.3.6.1 Driver Register (36n.)

No.	Name	Seal	K	Factory Setting	Meaning
3.6.n.1	Driver ID	M	3		Personnel number of the driver
3.6.n.2	Driver Name	M	3		Name of the user, can be printed on receipts.
3.6.n.3	Master code	M	3		If not set to "0", then master code for increased access.

"36n" is the driver's register number, with "n" varying from 1 to 6. For unequivocal identification of a parameter the driver's register number is extended by the parameter number.

Example: Driver's name in the third driver register

Driver Register	Parameter
36 **3**	**2**

8.3.6.2 Defining the Driver's Name

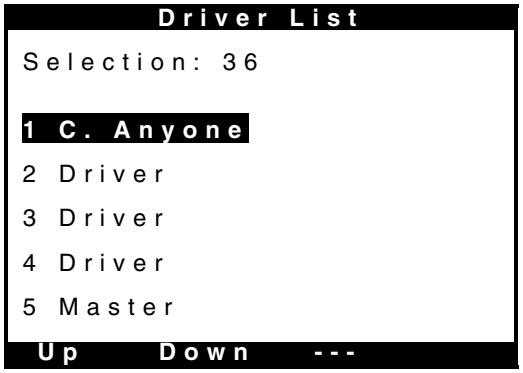
If several drivers are to drive a vehicle, it may be more practicable to issue a personnel number for each driver. It is then, for example, possible to print the driver's name on the delivery receipt to obtain a clear assignment of deliveries to the drivers.

The number is limited to five drivers. You define the drivers in **Menu 3.6**. A list of the currently entered drivers is displayed.

☞ In order to be able to make changes to the driver list, the personnel number of the system manager (master) must be entered, followed by the master password.

☞ This prevents unauthorised persons from changing the driver list.

The personnel number **999999** and master password **654321** are issued by default. This personnel number is defined as the fifth driver with the name "Master".



Display of driver list

☞ To make changes to the settings, a driver is selected from the list of the five drivers using <**Enter**>.

After selecting a driver, you can re-issue the driver ID, the driver's name and the master code.

If zero is entered as the master code, then the driver has no master rights.

Take care that at least **one master** is defined, otherwise no changes are possible to the parameters which are subject to the master code.

8.4 Service Menu

No.	Name	Seal	K	Factory Setting	Meaning
4.1	**Electronic seal**				
4.1.1	Display Seal	D			Display status of electronic W & M seal.
4.1.2	Print Seal	D			Print status of electronic W & M seal.
4.1.3	------	----			
4.1.4	Restore Seal	M/ Cal.			Saves modified W & M information. **IMPORTANT:** To be executed in the presence of a W & M inspector or service person only!
4.2	**Calibration**	Cal.			Procedure for measuring the meter factors at various flow rates.
4.3	**Diagnosis**	**M**			
4.3.1	In- / Outputs	M/Cal.			Tests the inputs and outputs. **IMPORTANT:** The setting of the outputs is subject to W & M restrictions!
4.3.2	Printer	M			Loop-back test for testing the printer line with a special printer connector.
4.3.3	Global CAN Bus	M			Display link status of all CAN Bus devices.
4.4	**Initialise**	M/Cal.			Resets the device parameters (restores the factory settings).
4.5	**Chip card**				
4.5.1	Write Parameters	M/Cal.			Loads all parameters and delivery receipt definition from the chip card.
4.5.2	Read Parameters	M/Cal.			Reads out all the parameters and the delivery definition.
4.5.3	Format Chip	Cal.			Erases all data from a chip card.
4.6	**Program update**				See Section 4.2
4.6.1	Activated	M			Program update activated
4.6.2	Blocked	M			Program update barred

8.5 Logon

8.6 Load Monitor

No.	Name	Seal	K	Factory Setting	Meaning
5	**Logon**	D			Entry of the driver code for a change of drivers (logon).
6	**Load Monitor**	M			Displays the actual load status and gives the option to set the warning level for “additive load undercut”

8.7 Units

The Sening MultiFlow can be configured for US or metric operation by setting the System Volume Units parameter (3.1.5.7) to gallons or liters respectively. The table below shows the units displayed by the Sening MultiFlow based upon the setting of the System Volume Units. The values entered in the parameter list are also affected by the units selection. For example, the K-Factor will be pulses/gallon or pulses/liter and all flow rates entered for valve control or meter factor curve will be in GPM or LPM.

The following units are defined:

System Volume Units (3.1.5.7)	Gallons	Liters
Flow product totals	Gallons	Liters
Additive product totals	Ounces	ml
Grand Total flow product	Gallons	Liters
Grand Total additive	Gallons	Liters
Temperatures	Fahrenheit	Celsius
Density	API	Kg/M^3
Mass	Pounds	Kg
Flow rates	GPM	LPM

8.8 Product Registers (35nn..)

The placeholder ‘nn’ in the product register corresponds to the product register number where ‘nn’ varies from 11 to 30. The product register number is extended by the parameter number to give unambiguous identification of a parameter in a product register.

Example: Mean density on the first product page in the third product register. The placeholder **nn** is in this case substituted by page **1** and register **3** (nn = 13).

Product register			Parameter
	Page	Register	
35	**1**	**3**	**73**

No.	Name	Seal	K	Factory Setting	Meaning
3.5.n	**Product pages**				
3.5.nn.1	Product name	Cal.	1		Product name
3.5.nn.2	Product type	M/ Cal.	1/3		Product category (1: Disabled, 2: Liquid Products, 3: Additive, 4: Packed products) **IMPORTANT:** Liquid products can only be activated by breaking the W & M seal!
3.5.nn.3	W&M code	Cal.	1		W&M article code
3.5.nn.5	**Use add. pump**				
3.5.nn.5.1	Use add. pump	M	2	0 (no)	This parameter activates the additive dispensing for the selected product register.
3.5.nn.5.2	Additive number	M	2	0	Reference to the register number of the additive to be used. **IMPORTANT:** The parameter is only active when Parameter 3.5.n.n.5.1 is set to 1 (yes) and 3.3.3.3 not to zero (inoperable).
3.5.nn.5.3	Mixing ratio	M	2	2000	Mixing ratio for the additive. **IMPORTANT:** The parameter is only active for products of type 2 (additive).
3.5.nn.6	**Default price**				
3.5.nn.6.1	Default price	M	3		Standard price for the product.
3.5.nn.6.2	Price factor	M	3		The standard price applies to 1, 10, 100 units, etc. Price factor “0” defines fix price which is not dependent on quantity (packed good only).
3.5.nn.6.3	Tax rate	M	3		Entry of rate for value added tax (percent).

No.	Name	Seal	K	Factory Setting	Meaning
3.5.nn.7	**Temperature compensation**				
3.5.nn.7.1	Compensation	Cal.	1	0 (no)	Activation of compensation
3.5.nn.7.2	Comp. temperature	Cal.	1	60°F/15°C	Selection of compensation temperature
3.5.nn.7.3	Product group	Cal.	1		Determination of the compensation algorithm in dependence of the product group: 1 Packed good 2 Crude oil (**API Table 5A,53A)** 3 Refined product (**API Table 5B, 53B)** 4 Special Product **(API Table 53X)** for liquid gas & bitumen
3.5.nn.7.4	Mean density	Cal.	1		Physical constant specified by W&M.
3.5.nn.7.5	**Meter Factors**				
3.5.nn.7.5.1	Meter Factor 1	Cal.	1		See 'Calibration'
3.5.nn.7.5.2	Meter Factor 2	Cal.	1		See 'Calibration'
3.5.nn.7.5.3	Meter Factor 3	Cal.	1		See 'Calibration'
3.5.nn.7.5.4	Meter Factor 4	Cal.	1		See 'Calibration'
3.5.nn.7.5.5	Flow Rate 1	Cal.	1		Upper limit of validity range for Meter Factor 1
3.5.nn.7.5.6	Flow Rate 2	Cal.	1		Upper limit of validity range for Meter Factor 2
3.5.nn.7.5.7	Flow Rate 3	Cal.	1		Upper limit of validity range for Meter Factor 3
3.5.nn.7.5.8	Flow Rate 4	Cal.	1		Upper limit of validity range for Meter Factor 4
3.5.nn.7.5.9	Copying from ...	Cal.	1		Copies the calibration data (see above) from a different product register.
3.5.nn.8	Hose set	M	2	WP	Allowed hoses for this product, see parameter 3.1.8.1 & chapter 0 for details
3.5.nn.9	**Control Turbine**				
3.5.nn.9.1	Max. Flow Rate	M	2	product dependent	Max. Flow Rate during the discharge
3.5.nn.9.2	Remaining volume	Cal.	1	10 (liter)	Volume of the unmetered residue.

Comparison must be made with Section 6!

Flow rates 3.55.nn.7.5.6 through 3.5.nn.7.5.9 must be entered in ascending order.

Check meter factor curves

The meter factor curve must be entered with the flow rates in ascending order to operate correctly. A check will be added to verify the rates are correctly entered.

8.1.1 Notes on the hose set

When using electronic selection of the hose set, to increase the operating safety and to minimize the mixtures every product can be assigned to one (or more) defined hose set(s) .

The codes to be entered are identical with those for the entry of the hose set which are *available* on the vehicle in Parameter 3187 (Section 0).

The addition of a digit after a code serves as the selection between several alternatives.

Example: UV1LB1

Meaning: The meter offers the following discharge passes (see also chapter 0)

1. Unmetered
2. Wet hose 1
3. Dry hose
4. Bypass 1

8.10 Notes on Parameter Checks

Parameter checking has been designed to be more operator-friendly. If errors are found during parameter checking, then an alarm message appears on the screen which enables the operator to print a parameter report.

The parameter report summarises all the settings which conflict with the defined boundary conditions.

A parameter report may appear as follows:

Parameter Report

Report date :18.08.1998 14.45
Version :2.02[2.00]UK
Meter desig. :PHME 97

_____

Recalibration Error
3161 Global node no. 32

(35.11.) Heating oil EL

_____

Parameter Conflict
3322 + Sensor inactive Yes
.71 + Compensation Yes
-End of printout-

Explanation:

Parameter 3.1.6.1: The global node number must not be greater than “31”.

Parameter 3.3.2.2,
Parameter (35.11).71: Compensation cannot be provided with an inactive temperature sensor.

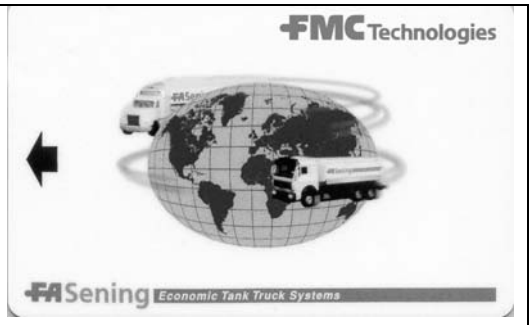
8.10 Saving Parameters on the Chip Card

You can save all Sening MultiFlow parameter settings to a chip card using the integral chip-card reader. Please keep this card for the purposes of data back-up.

- If the device settings become corrupted by an operational fault, you can restore the original state by reading in the chip card.
- In addition, with a fleet of the same type of vehicles, you can use the parameter chip for universal configuration of the measurement systems without having to manually enter these settings each time. You only need to carry out the settings once on one vehicle and they can then be transferred to the other vehicles by the chip card.

Some parameters which are specific to the measurement systems, such as correction factors and device designations, must be adapted in each case.

Two different versions of the chip card are available:

Picture on card		
Part No.	CS-CC-64	CS-CC-512
Supplied	Until 01 / 2004	From 02 / 2004
Up to Version 3.20[3.23]	1 card for parameters	1 card for parameters
From version 3.30[3.30]	2 cards for parameters	1 card for parameters

8.10.1 Saving the Parameters

☞ You save the parameters in Menu 4.5.2.

☺ A security query follows after checking the access rights (master):
"Transfer data from MultiFlow to chip card?"

✍ The procedure can be cancelled with <**F2**> ("No") and the chip card remains unchanged.

☞ You confirm with <**F1**> ("Yes").

☹ If the chip card has never been used or used for other purposes before, another warning is given:
"Chip card error! Incorrect format. Continue?"

✍ The procedure can be cancelled with <**F2**> ("No") and the chip card remains unchanged.

☞ You confirm with <**F1**> ("Yes").

☺ During the transfer which takes about 90 seconds, the following information appears:
"Transfer running... Please wait"

☺ Starting with Sening MultiFlow software version 3.30[3.30] two cards of type CS-CC-64 are required; therefore after about. 60 seconds the following message is displayed:
"Please insert next Chip Card!"

☞ You confirm the change of the chip card with <**F1**> ("OK").

☺ When the data transfer is completed the following message is displayed:
"Data transfer complete!"

☞ You acknowledge this message with <**F1>** (“OK”).

☺ The parameters are now transferred.

☹ If an error occurs, an appropriate error message is given and you must repeat the transfer.

8.10.2 Loading the Parameters from the Chip Card

Data is read from a parameter chip analogous to the saving procedure in Menu 4.5.1.

Only deviating memory ranges are transferred.

However, here particular attention should given to the fact that in the sealed state the Sening MultiFlow only accepts parameters which are **not subject to W & M regulations**.

☹ If the parameters subject to calibration regulations deviate from the present settings, the following instruction is given:

“Break the electr. seal before processing this parameter!”

☞ You acknowledge this message with <**F1**> (“OK”).

☹ Then the following message appears:

“Data transfer unsuccessful!”

The error message only applies to the transfer of the parameters **subject to calibration regulations**. All others will have already been transferred.

☺ Starting with Sening MultiFlow software version 3.30[3.30] two cards of type CS-CC-64 are required; therefore after about. 60 seconds the following message is displayed:

“Please insert next Chip Card! ”

☞ You confirm the change of the chip card with <**F1>** (“OK”).

☺ When all parameters have been successfully compared, the following message appears:

“Data transfer complete!”

☞ You acknowledge this message with <**F1**> (“OK”).

☺ The procedure is now terminated.

From software version 3.30[3.30] 1 x 16K or 2 x 8K chip cards.

9 Form Description

The operation of a flow computer demands a range of forms. In particular, the invoice form is subject to individual user requirements and must therefore be capable of flexible arrangement.

A form is described by a string of form elements. A form element is composed of the following fields:

Field	Meaning
ID	Element type
X, Y	Position in the form in mm or columns and lines.
Attributes	Display features
Options	Conditions for application
Format	Multi-purpose field, formatting information

The choice of whether the position details are to be defined in millimetres or in columns and lines, is specified via **Parameter 3.2.5** (Units X/Y).

9.1 Defining a Receipt (Delivery Receipt or Invoice)

The main problem when defining a delivery receipt is usually the positioning of text in fields which are already printed on the receipt. Furthermore, the printout should also be able to be arranged in a variable manner with regard to the character layout, for example, to highlight certain text and so to layout the printout with regard to size and width, etc. Apart from ready-defined text modules, there should also be the possibility of defining one's own text.

To fulfil all these requirements the definition of the form element positions can be made in **characters** or in **mm**. For the normal receipt the definition of the positions in characters is completely adequate with the **spacing** (Parameter 3.2.5) being set to 1.

The definition of the spacing in mm is only practicably applicable with a DIN A4 printer. It is then possible to print text in the intended fields with an accuracy of 1 mm, e.g. the date in the date field, the delivery receipt number in the delivery receipt field, etc.

To define the character layout, attributes are introduced with which the font size and width can be set individually. In addition, the conditions under which the text is to be printed can also be defined. The printout "COPY" should not, for example, appear on the original receipt. Correspondingly, the option 'K' is provided for the text field "COPY".

The application for the various attributes are described using an example.

9.1.1 W & M Requirements

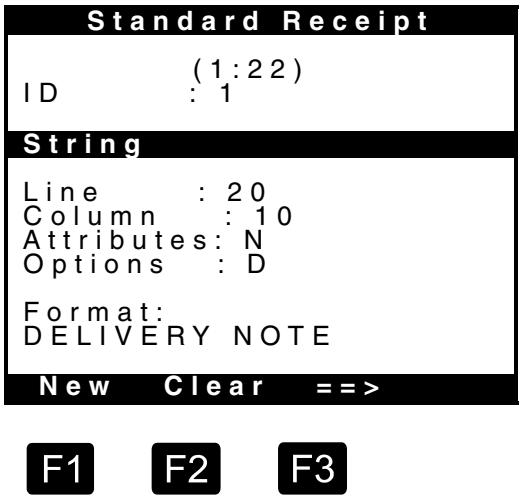
The definition of the delivery note is divided in two sections: the section subject to W & M regulations, and the one not subject to W & M regulations.

During calibration a minimum layout requirement is defined in **Parameter 3.1.3.4**, enabling the changing of the delivery note after calibration. Printing of the required text elements is **mandatory** on any delivery note and any invoice (W & M requirement).

After any change made in the delivery note definition the Sening MultiFlow checks whether these mandatory text elements are available. In case a text element is found missing, an error message appears on the screen. Only when all required text elements are available in the delivery note definition, the delivery note can be changed and adapted. This procedure ensures that no parameter required by W & M regulations is omitted in the delivery note definition. **Additional amendments to the delivery note definition** can thus be made without breaking the W & M seal.

9.1.2 Entry Dialogue

The form entry dialogue enables the user to change, delete and insert into the list of elements which describe a form.

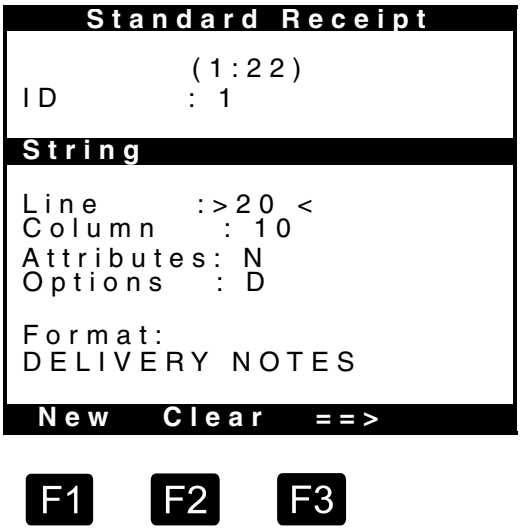


The following keys are used to control the list:

F1	Create and insert a new element
F2	Delete displayed element
F3	Display next element
Enter	Edit element
Stop	Terminate editing of form, cancel all changes after confirmation by the user
Print	Terminate editing of form

The field to be edited is identified in pointed brackets > <:

Active Entry Field



F1 F2 F3

The following key assignment applies when editing:

F1	Shift between upper and lower case characters
F2	Deletes the character to the left of the cursor.
F3	When active: Selects the language with multilingual text.
Enter	Save entry, continue with the next entry field.
Stop	Cancel dialogue, restore old values, close mask.
Print	Close dialogue, save all entries.

The defined receipt layout can be printed and checked in the reports menu (PRINT).

9.1.2.1 Positioning on the Receipt

To position the texts on the receipt the X and Y positions must be defined first. This position is then used as the reference point for all other definitions.

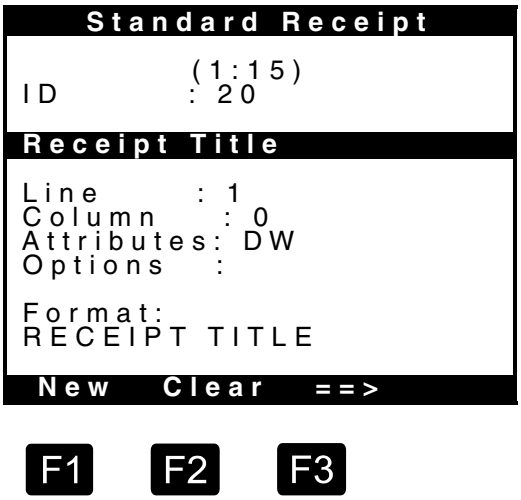
3 GHI 4 JKL 1 ABC	As the first step, check the setting for the **spacing**. For a standard delivery receipt definition the spacing should always be set to 1 character.
Print	The entry is confirmed with <**Print**>.
2 DEF	Next, the columns for the actual printout are defined. This specifies how much space is to be maintained at the left margin of the page.
3 GHI	The figure for the **lines before printout** gives the distance to the upper page margin. No text is printed in this section.

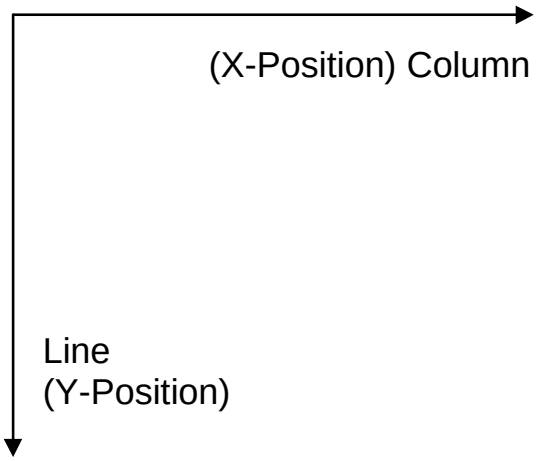
☍ See also Chapter 0.

When the menu 3.4.4 “Receipt Layout” is selected, the receipt header coded “0” appears. In future you will be able to define various receipts, currently only the standard receipt is defined. You cannot change this setting.

☞ Use the <**F3**> key “= = >” to display the first defined form element.

The various form elements are displayed in the same order as they are printed on the receipt.





The text "**Receipt Title**" in above mask serves as a placeholder for the receipt title, the ID of which is '20'. You define the print position on the receipt by entering line and column.

☞ Add a new receipt definition with <**F1**> **"NEW".**

✍ ID 1 "string of characters" is always pre-set.
From the summary of text elements (modules) (see Chapter 9), you can now choose a pre-defined text module (form element), or you can enter the required text to the form display.

☞ Press the <**Enter**> key to start processing the text element.

☺ With the blinking cursor you are asked to enter the "ID".

☞ Enter the ID of the required text element and press <**Enter**>.

☺ Now definition of the **"Line"** is required.

☞ Enter the required line position at which the text is to be printed.
Enter the **"Column".**

☺ Now the positioning of the text on the receipt is completed.

☞ With "Attributes" and "Options" you can define the form and possible options for the printout.

9.1.2.2 Form modification After Sealing

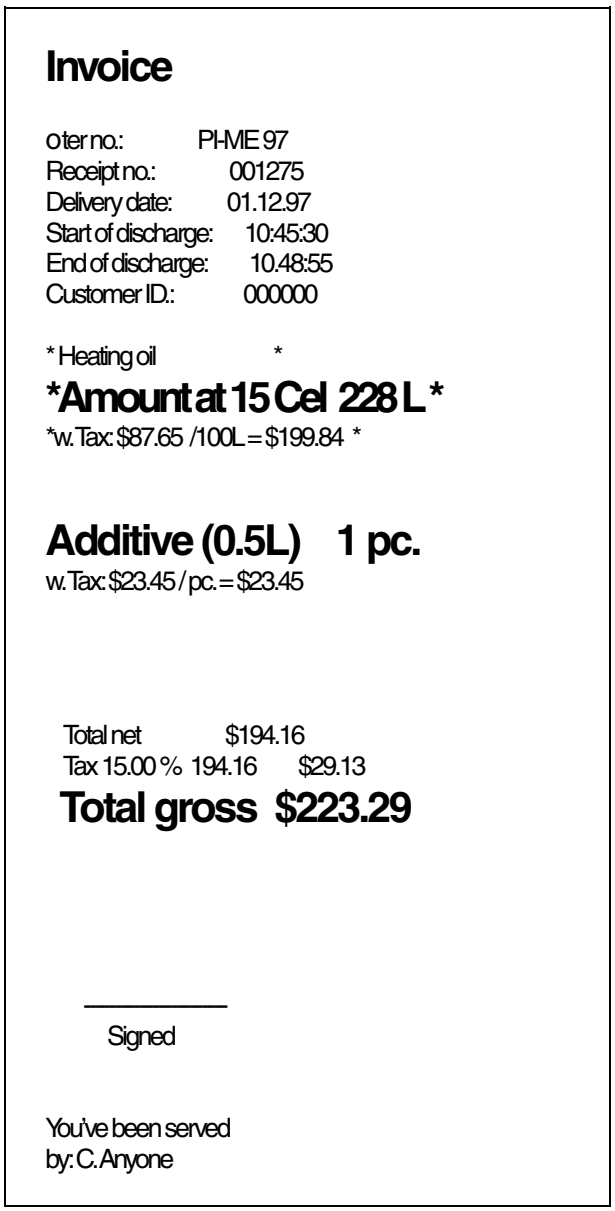
After the Sening MultiFlow has been sealed the parts of the form description relevant for calibration are secured against manipulation. This means that those form elements listed in the minimum requirements (**Parameter 3.1.5.4**) are monitored.

The Sening MultiFlow prevents the formatting or the options for these elements from being changed. The position and attributes of these elements however remain variable.

See also Chapter 0.

9.1.2.3 Example of a Receipt

The receipt illustrated below shows how the receipt definition must be carried out.



Invoice

oter no.: PI-ME 97
Receipt no.: 001275
Delivery date: 01.12.97
Start of discharge: 10:45:30
End of discharge: 10.48:55
Customer ID.: 000000

* Heating oil *
***Amount at 15 Cel 228 L ***
*w. Tax: $87.65 /100L = $199.84 *

Additive (0.5L) 1 pc.
w. Tax: $23.45 / pc. = $23.45

Total net $194.16
Tax 15.00 % 194.16 $29.13
Total gross $223.29

_____
Signed

You've been served
by: C. Anyone

9.1.3 Summary of Text Modules

In order to obtain an overview of which elements (modules) are available for the definition of the receipt, a summary can be printed with the function **"Form elements"** (Menu 3.4.6). The attributes supported by the connected printer are also shown in the printout.

The example shown below was produced by a DR-295 printer. From the table it can also be seen that not all the attributes are supported by the DR-295.

Example of a Printout of the Text Modules:

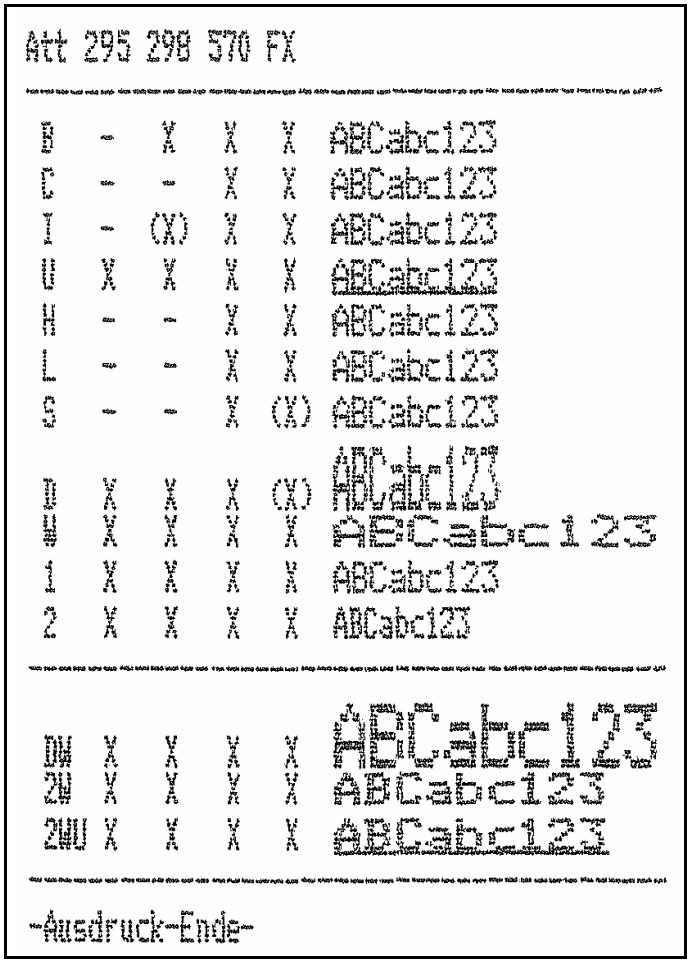
```
 Form Element List     Attr  Opt
 ------------------------------

 0 Header
 1 Litral
 2 Meter ID    :#20#
 3 Receipt ID  :#20#
 4 Customer ID :#20#
 5 Driver ID   :#20#
 6 Date        :#20#
 7 Time        :#20#
 8 Deliv. Date :#20#
 9 Deliv. Start :#20#
 10 Deliv. End  :#20#
 11 PRODUCT BLOCK 1      D
 12 PRODUCT BLOCK 2
 13 PRODUCT BLOCK 3
 14 SUM BLOCK 1          D    R
 15 SUM BLOCK 2          D    R
 16 SUM BLOCK 3          D    R
 17 Compact, SUM BLOCK
 18 Driver's name: #1#
 19 Meter before start:  D
 20 RECEIPT TITLE       DW
 21 INVOICE             DW   R
 22 DELIVERY NOTE       DW   L
 23 ZERO RECEIPT        DW   L
 24 W & M RECEIPT       DW   L
 25 (COPY)              B    K
 26 W&M-REMARK          2
 27 SEAL-ALERT          2    X
 28 UNDEFINED
 29 UNDEFINED
 30 PRODUCT BLOCK 4      D
 31 Transfer-Remark      B   PS
 32 Selected Hose :#18#
 33 Average Flow  :#18#

 50 Drop line start
 51 Drop line end
 54 Product name
 55 Drop volume
 56 Measurement unit
 57 Average temperature
 58 Average density
 59 Drop mode (short)
 60 Drop mode (long)
```

```
61 Total Start VT
62 Total Start V0
63 Total Start Masse
64 Total Start Add
65 Total End VT
66 Total End V0
67 Total End Mass
68 Total end Add ————————————
Minimum Layout2,3,(11:12),25
————————————
```

Attributes Marked with an ‘X’ are Supported:



9.1.3.1 Description of Text Modules

ID	Printed text	Name	Remarks
0		Form header	This element is contained in each form; it acts as 'anchor' for all user-defined elements. This element does not appear on the receipt.
1	<Any text>	String, Literal, Text	Text element, defined by operator
2*	Meter no.: 123456	Device no.	Device Identification
3*	Receipt no.: 123456	Receipt no.	
4	Customer ID.: 123456	Customer ID	
5	Driver ID.: 123456	Driver ID	
6	Date: dd.mm.(YY)yy	Date	Current date
7	Time: ss:mm(:ss)	Time	Current time
8	Delivery date: dd.mm.(YY)yy	Delivery date	Date at start of discharge
9	Start of discharge: ss:mm(:ss)	Discharge start time	
10	End of discharge: ss:mm(:ss)	Discharge end time	
1*	Product name Volume at nn Cel XXXXXXX L w. Tax: $12.34 /100L = $YYYYY.YY Product name At discharge temperature XXXXXXX L w. Tax: $12.34 /100L = $YYYYY.YY Product name XXXXXXX Pc. w. Tax: $12.34 /100pc = $YYYYY.YY	Product block #1	Contains product name and code, discharge volume and type, gross and net prices only on invoice. Figures on compensation may vary!
12*	Product name Volume at nn Cel XXXXXXX L At discharge temperature XXXXXXX L w. Tax: $12.34 /100L = $YYYYY.YY	Product block #2	Both volumes GRS and GST are printed.
13*	(see ID # 11)	Product block #3	Price line also on delivery note
14	Total net $12345.67 Tax 12.34% 1234.56 $12345.67 Total gross $12345.67	Sum block #1	Contains net sum, taxes, gross sum
15	Total net $12345.67 Tax 12.34% 1234.56 $12345.67 Total gross $12345.67 At exchange rate 1.23456 Total gross xxxxxxx EUR	Sum block #2	Same as sum block #1, however stating both currencies.
16	Total net $12345.67 Tax 12.34% 1234.56 $12345.67 Total gross $12345.67 Total gross xxxxxxx EUR	Sum block #3	Same as sum block #2, but without stating the exchange rate.

ID	Printed text	Name	Remarks
17	Product Name Volume at nn C/F XXXXXXX Gal @$ X.XXX/gal= $ XXX.XX Net Amount $ XXXX.XX Tax X.X% XX.XX $ XXXX.XX **Total Amount $XXXXX.XX**	Compact Sum Block	Similar to Product Block #1 with the Sum Block #1.
18	Driver's name: xxxxxxxxxxxxxxxxxxxx	Driver's name	Driver's name from driver table.
19	Meter before start: 0 L	Meter reading	Meter reading before the discharge (appears on zero receipt).
20	RECEIPT TITLE	Receipt title	Combines the fields 21-24 and 28 - 29; differentiated positioning is not possible.
21	INVOICE	Text: Invoice	Predefined text element (only appears on invoices).
22	DELIVERY NOTE	Text: Delivery note	Predefined text element (only appears on delivery notes).
23	ZERO RECEIPT	Text: Zero receipt	Predefined text element (only appears on zero receipts).
24	W & M RECEIPT	Text: Calibration	Predefined text element (only appears on calibration receipts).
25*	COPY	Text: Copy	Predefined text element (only appears on copies).
26	Data from calibrated parts of the device are enclosed by *.	Cal. Remark	Standard text for printouts made on forms not bearing the compulsory remark.
27	Seal broken! No responsibility accepted for any values measured.	Seal Alarm	Standard text used whenever the seal is broken.
28**	PRODUCT TRANSFER	Text: Prod. Transf.	Predefined text element (only appears on transfer forms).
29**	SELF LOADING	Text: Self Loading	Predefined text element (only appears on selfloading forms).
30*	(see ID # 11)	Product block 4	(see ID # 11); the positions of "Discharge type" and "Product name" are exchanged.
31**	Only for internal use, Not Authorised for Trade Use !	Transfer Remark	Predefined text element (only appears on selfloading and product transfer forms).
50		Drop line start	Identifies the beginning of a record line
51		Drop line end	Identifies the end of a record line
52		Free	
53		Free	
54		Product name	
55	nnnnnnn (.mm)	Drop volume	Formatting dependent on equipment setting and regulations

ID	Printed text	Name	Remarks
56		Unit of measurement	
57	+nn(.m °C)	Average temperature	
58	nnn(.m kg/m3)	Average density	
59	xx	Drop mode (short)	“CRS” or reference temperature in °C
60	At the drop temperature *or, if compensated* volume at nn ºC	Drop mode (long)	
61	nnnnnnnn L	Total Start VT	Totalizer Reading for VT before start of the first discharge
62	nnnnnnnn L	Total Start V0	Totalizer Reading for V0 before start of the first discharge
63	nnnnnnnn Kg	Total Start Mass	Totalizer Reading for Mass before start of the first discharge
64	nnnnnnnn L	Total Start Add	Totalizer Reading for Additive before start of the first discharge
65	nnnnnnnn L	Total Ende VT	Totalizer Reading for VT after the last discharge
66	nnnnnnnn L	Total Ende V0	Totalizer Reading for V0 after the last discharge
67	nnnnnnnn Kg	Total Ende Masse	Totalizer Reading for Mass after the last discharge
68	nnnnnnnn L	Total Ende Add	Totalizer Reading for Additive after the last discharge

- Elements marked by an ***** are subject to W & M regulations. When saving the layout and before each delivery a test is made of whether the necessary elements are contained in the form (see parameter 3.1.5.4, minimal layout).
- Elements marked with ¨ are only used with certain software features.
- If forms are used which have the required text printed in you may do without the element “26”.

9.1.3.2 Placeholders

Placeholders are provided for values which are only produced during the printout (e.g. time, date, discharged amount). The placeholders are set between '#' characters and the figure indicates the number of characters reserved for formatting.

For example, six characters (#**6**#) are provided for the meter number. The delivery date can be regarded as a special case. Eight characters are sufficient for the short form without the century figure. However, if the century is to be printed, then a placeholder for minimum 10 characters must be provided.

The length of the placeholder always determines the **minimum** space to be reserved. If the output requires more space, the setting is ignored.

The actual value is always placed right aligned in the reserved area.

9.1.3.3 Options

One character or a number of characters also indicate the option of when the text is to be printed. The text is only printed when the selected conditions are also fulfilled after the printing job is triggered.

The following abbreviated designations are defined:

L/D	Delivery note
R/I	Invoice
K/C	Copy
N/Z	Zero receipt
V	Electronic seal Verified
X	Electronic seal (soft seal) broken
P	Product transfer between single compartments of a truck
S	Self loading

Example: 'LK': The text with this option is only printed on delivery notes when a copy is involved.
'X': A text with this option only printed when the electronic seal is broken.

9.1.3.4 Attributes

A range of attributes are made available to the user for individual receipt layout. The selection of the available attributes is limited here by the possibilities offered by the printer used. The Sening MultiFlow supports both the DR-295 (FDW) and the DR-570 (FDW).

The effect of the various attributes can be seen in the summary (Chapter 0) or in a sample receipt (Chapter 0).

A character string represents the attributes used (max. combination of 3):

Attribute	Explanation	DR-295	DR-298	DR-570	**Epson 295**
B	Bold	-	yes	yes	yes
C	Condensed	-		yes	
I	Italic	-	(yes)*	yes	
U	Underlined	yes	yes	yes	yes
H	Superscript	-	-	yes	
L	Subscript	-	-	yes	
S	Small	-	-	yes	
D	Double Height	yes	yes	yes	yes
W	Double Width	yes	yes	yes	yes
1	10 CPI (Font size 1)	yes	yes	yes	yes
2	12 CPI (Font size 2)	yes	yes	yes	yes

* Printing is inverted instead of italic

Example: ‘DWU’. The text is printed in double height, double width and underlined.

9.1.3.5 Sum Blocks

With the introduction of the sum blocks #2 and #3 the changing from one currency (e.g. £) to another (e.g. EURO) has become easier.

In the interim the sum block #2 can be used to print two currencies on the receipts. Internally all prices are computed in the respective “applicable” currency (**Parameter 3.1.4.3.1**). However, on the invoice an additional amount (in the alternative currency) as well as the respective exchange rate may be printed.

After the introduction of the EURO the £ will become the ***alternative*** currency. All prices which had been defined in the national currency before, will have to converted. Especially for the prices of liquid product it is **absolutely advisable** to use a price factor in order to keep the conversion loss small.

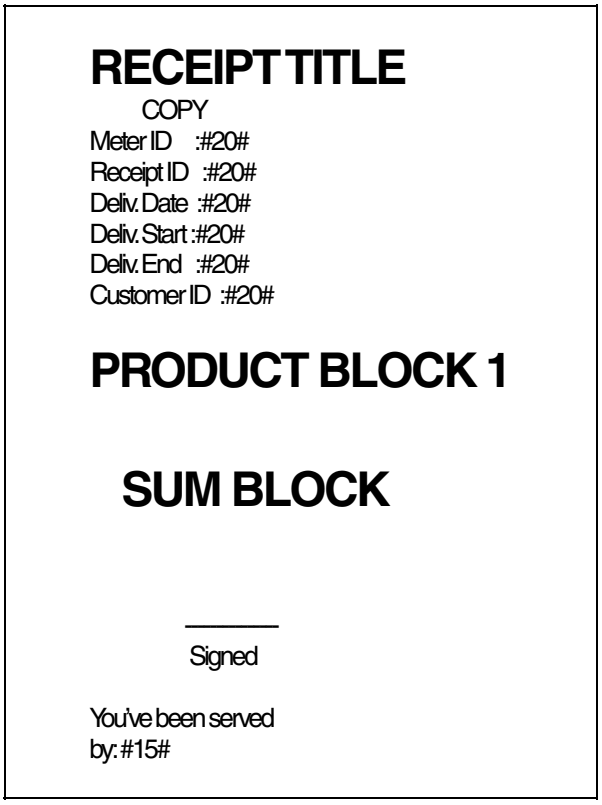
Example: In Belgium prices are normally defined by factor “1”, i.e. the price per liter. At the same time the exchange rate EURO to BEF is about 40. In order to keep pricing continuously precise, the price factor “100” (price per 100 liters) should be introduced.

9.1.4 Control Printout

The layout of the receipt can be printed for test purposes to check the created receipt definition in Menu 3.4.5 **“Print form”**. Here, placeholders are printed for the text which is to be printed later, e.g. “Sum block” or also “Receipt title”. The line and column positioning however does not differ from the

actual printout.

Sample printout with placeholders:



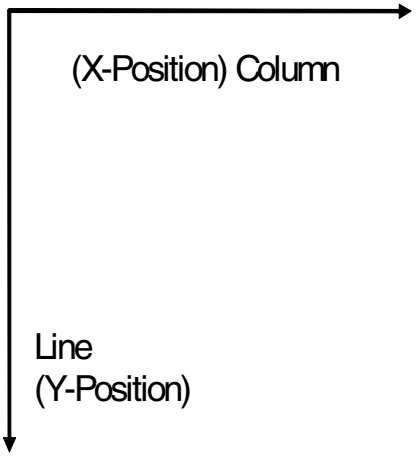
Secondly the receipt is printed out in **descriptive form**.

The Y position specifies the line position in **lines before printing** (Parameter 3.4.3) and the X position gives the column position in **columns before printing** (Parameter 3.4.2).

Receipt printout in descriptive form:

```
(341) Spacing            : Characters
(342) Columns before printing : 0
(343) Lines before printing   : 0

(344) Form descr.      Y  X Attr Opt
————————————————
Standard receipt   ( 0) 0  0
RECEIPT TITLE      (20) 0  0  DW
COPY               (25) 2  8  B    K
Meter ID     :#20# ( 2) 3  0
Receipt ID   :#20# ( 3) 4  0
Deliv. Date  :#20# ( 8) 5  0
Deliv. Start :#20# ( 9) 6  0
Deliv. End   :#20# (10) 7  0
Customer ID  :#20# ( 4) 8  0
PRODUCT BLOCK 1    (11) 10 0  D
TOTAL BLOCK        (14) 14 5  D    R
————————( 1) 25 8
Signature          ( 1) 26 11
You've been served ( 1) 30 0
by: #15#           (18) 31 0
```



The descriptive text and the code (in brackets) state the text modules used (see Chapter 0).

Special formatting, e.g. double height, bold, underlining, etc. are specified under **Attr** (refer to Chapter 0). See also the effect of the attributes on the printout of the receipt summary.

If nothing is specified under **Opt**, then the defined text appears on the invoice and on the delivery note (refer to Chapter 0).If **'D'** is entered as the option, then a printout only occurs on the delivery note, whereas for option **'I'** the printout correspondingly only occurs on the invoice. The option **'C'** only applies to copies, i.e. the text is only printed out for a copy.

In the module summary (see Chapter 0) the standard attributes and options for the printout are already specified. For the text, **"Invoice"**, for example, is specified with double height, double width and as **option 'I'** so that the printout only occurs on an invoice.

9.2 Definition of an original delivery note (OBC operation)

Since the OBC is not included in the calibration, the measurement system must independently (i.e. without intervention from the OBC) print a drop record (the so-called original delivery note).

This original delivery note is then placed at the beginning of the actual delivery documentation (bill / delivery note). The positions are printed at the same time as the transfer of the measurement results to the OBC.

Example of the layout of a delivery form:

Original Delivery Note

Counter no.	Del. note	Date	Product	Discharge type	Volume
*FMC-001	004711 (K)	09.02.2000	EL heating oil	Compensated for 15°C	2374 L *

Customer address/order (short) — Signature of customer

Supplier address / logo

Customer address — Date / Time / Bill no.

Items supplied

Credit period — Sub-total / Tax / Total

Supplier data, manager, telephone / fax nos., bank details etc.

Payment transfer form — Customer's stub (and / or) direct debit authority

The OBC is initially only required to print a header, to position the printing head, and possibly to make desirable adjustments to the attributes (when not controlled by the measuring system).

When the discharge has been completed and the record of the measurements has been printed, the OBC can add customer information to the original delivery note so that it can easily be assigned at a later stage.

The purpose of the original delivery note is to obtain a confirmation of delivery (a signature) from the end customer on the “calibrated” delivery note. The driver brings this back to the office for use in accounting and the calculation of government duty. The rest of the form is retained by the customer.

9.2.1 Format

In contrast to the TMC operating mode the original delivery note when the measurement system(s) are connected to an OBC (i.e. via an EMIS gateway) is variable. I.e. the original delivery note can be matched to the different requirements of the tanker operator.

To define the original delivery note the form editor already described is used. However form modules other than those included in the standard documentation are sometimes used.

The lines of the delivery note are first fully assembled and then transmitted to the printer in the FDW protocol.

The whole line is enclosed by asterisks (*).

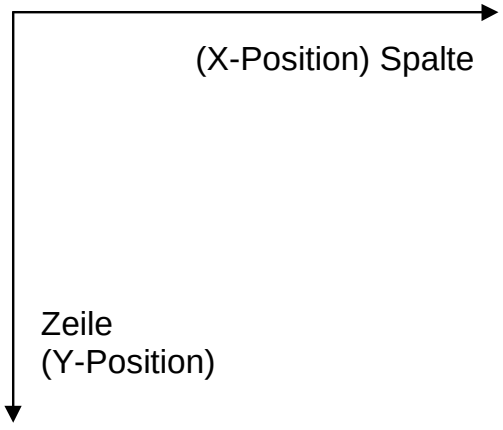
The special format of the form layout makes necessary an altered compilation for the minimal layout (**Parameter 3.1.5.4**):

Minimal layout : 2,3,8,25,54,
55,56,(59:60)

For the above example the receipt definition is as follows:

```
(341) Step-length    : Character
(342) Columns before print : 0
(343) Lines before print : 0

(344) Form descr.   Y  X Attr Opt
-------------------------
Standard receipt  ( 0) 0  0
          (50) 1  0  2
#1#         ( 2) 2  0
#6#         ( 3) 2 17
(K)        (25) 2 24  B    K
#10#        ( 8) 2 28
#1#        (54) 2 40
#21#        (60) 2 60
#7.0#       (55) 2 81
#3#        (56) 2 90
          (51) 3  0
```



9.2.2 Header

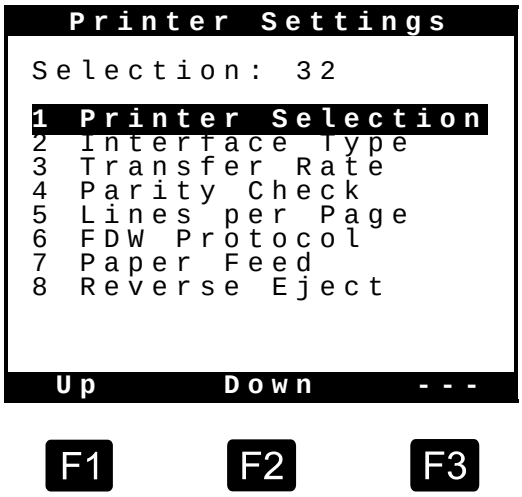
The TMC controller provides a header over the lines of the original delivery note, describing the structure of the original delivery note. At present this is also added by ***the measuring system*** to the original delivery note in accordance with instructions from the TMC. It is omitted from the second position, since the structure is always the same.

In the new scheme, this header (when necessary) will be printed by the OBC before it transmits the discharge orders to the measuring system(s). This considerably lightens the control load. The contents of the original delivery note lines (as described above) are adapted by the form editor to the requirements of the OBC.

9.3 Printer Settings

To adapt the Sening MultiFlow to different printers, the connected printer must be parameterised.

The connected printer can be selected in Menu 3.2.1 **"Printer selection"**.



Menu for Printer Settings

- After selecting the menu point, you can select the desired printer.
- To select the physical interface, you can define in the menu point 3.2.2 **"Type of interface"** a connection of **RS232** type with '0' and of **RS485** type with '1'.
- The connector assignment for the types of interface is different and the printer interface must be wired according to the enclosed wiring diagram.
- You can select one of the **data rates** 9600 baud or 19200 baud. The Epson-295 printer is normally operated with 9600 baud and the DR-570 printer with 19200.
- With the setting for the **parity check** you define whether no check ('0'), or even ('1') or odd parity ('2') is to be checked.
- The figure for **lines per page** defines after how many lines a new page is to begin. With a DIN A4 sheet of paper up to 66 lines can be printed. This figure is however restricted by the various paper transport mechanisms, so that with a line number of 57 no writing over the edge of the page normally occurs.
- For a secure data transfer, you can switch on (1) or off (0) the **FDW[3]-Protocol** under selection point 6. This parameter is only available if the seal is broken.
  If the FDW-Protocoll is switched off and printing is required, the display will show:
  "Is Printer prepared?"
  Answering with "Yes" **<F1>** will start the printing.
  Answering with "No" **<F2>** will display the message: "Please copy..."
- Furthermore, you can define an **FDW timeout**. If the printer does not respond after this timeout has expired, then a **Resend** is started. With the entry under this parameter you define how often attempts should be made to output data to the printer.

☹ If the resends are not successful within the defined number of attempts, then an error message is printed. You must then write the receipt manually.

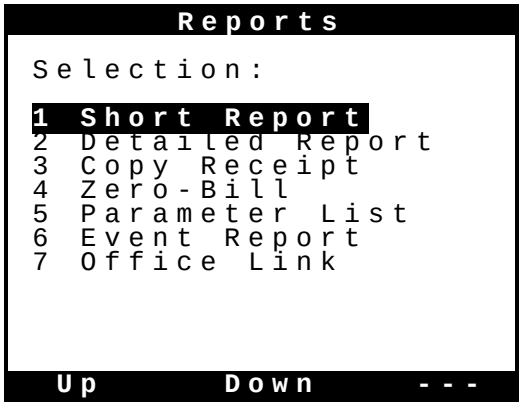
With the Epson-295 or DR-295 FDW the **paper feed** can alternatively occur automatically or manually using the operating panel. To achieve exact positioning of the receipt information, it is recommended to activate automatic feed (Parameter 3.2.7).

10 Printing out Reports (Key <Print>)

Each delivery is saved by the Sening MultiFlow and can be printed out later as a report. Thus a complete shift or tour can be documented with all the events occurring on a tour or Trip Report.

☞ In order to activate the print menu press the <**Print**> key in the ready menu on the Sening MultiFlow.

☺ With the reports menu which is then displayed you can select and print all the required reports.



<Print>Menu

The following reports can be called with the <**Print**> key:

No.	Name	Sea	Meaning
1	Short report	D	Short report over the selected reporting period. Selection possible according to time or receipt no.
2	Detailed report	D	Detailed overview over the selected reporting period. Selection possible according to time or receipt no.
3	Copy receipt	D	Reproduction of receipts according to selected receipt numbers
4	ZERO receipt	D	Receipt as proof that counter is at ZERO
5	**Parameter list**	**D**	
5.1	W & M settings	D	Only prints settings relevant to W&M requirements
5.2	All settings	D	Prints all settings.
5.3	Driver list	M	Output list of all registered drivers **NOTE:** The passwords for the master access are printed as well.
5.4	Form elements	D	Listing of defined form elements
5.5	Receipt layout	D	Test printout of defined receipt layout
6	Event report	M	Print extract from the log book according to selected time period
7	Office link	F	Save a Trip Report on the chip card (see Chapter 12.1.3.1)

10.0.1 Time and Date in AM / PM Format

Parameter 1.5.X

Main Menu > Display Configuration > Date/Time Format > 0=Military, 1=AM/PM

This parameter will be available for viewing through the Contrast screen on the MultiFlow, on printed reports, and in the chip card data.

The time and date input screen in the Display Configuration Menu includes an input field which allows the user to select AM, PM, or military. If military format time is selected, the operation of the MultiFlow will be unchanged with the hours formatted as 0-24 and the date formatted as DD.MM.YYYY. If AM or PM is selected, the time will be formatted as 0-12 hours and either an “a” or “p” appended to the time to indicate AM or PM (HH:MMp or HH:MMa). The date shall be formatted as MM.DD.YYYY.

10.1 Trip Report

You can now select the desired receipt printouts from the menu Detailed report. The data that has been printed is not deleted afterwards.

The receipt memory is organised as a ring-buffer memory with a memory of 200 records. When the memory is full, the oldest records are overwritten with the new data. It is possible to reconstruct older procedures even after printing out (provided they have not already been overwritten by new data).

To support this function, the type of printout is requested after initiating a print function. A differentiation is made between report according to time and report according to receipt.

For a report according to time

☞ You enter the time period which the report is to cover. Therefore the report start time (date and time) and the report end time (also date and time) are required.

☺ All data occurring in this period is then printed out.

With a report according to receipt

☞ You enter the start receipt number first, followed by the receipt number where the printout is to finish.

☺ Thus it is possible to again document individual receipts. The tedious searching for the date and time as the print criterion is not needed.

10.1.1 Trip Reports on the Chip Card

An important task in the daily routine in the oil business is the checking of the supplied deliveries with the billing department. Normally, use is made of duplicates of the delivery papers and of Trip Reports.

The Sening MultiFlow in its current version also supports a data interface for office EDP which is not dependent on the installation of electronics in the tank truck.

In comparison to the Truck Management Computer (TMC) this is a low cost solution which is based on the well-known chip card technology also used for saving the Sening MultiFlow parameter settings.

All data contained in the detailed report (see Chapter 0) are written to a chip card.

Do not use the *parameter chip card* for the Trip Report because then all parameter data on the chip will be deleted.

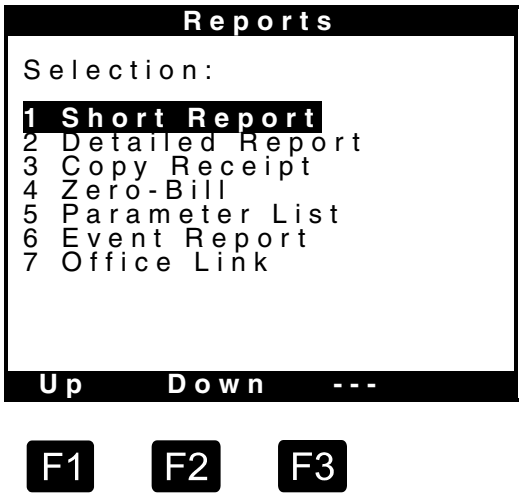
The trip data contained on the chip card can be processed by a number of commercially available data processing systems. We would be pleased to send you appropriate information material on request.

10.1.1.1 Saving the Trip Report

As with all other reports, the saving of the Trip Report is offered in the report menu.

☞ Activate the report menu with the <**Print**> key.

☺ Now the report menu is displayed.



☞ Select menu point 7 “Office link”.

☺ Now you have the choice of restricting the extent of the report by stating the receipt number range or the time period.

See Chapter 0 / Page 115 and 0 / Page 118

☺ Once the data has been transferred, the message **“Data transfer successful!”** appears.

The last event in the report time-period is saved by the Sening MultiFlow and is used during the next data transfer for determining the default setting for the required extent of the report.

☞ Now you can take the chip card out of the Sening MultiFlow and the data can be processed by a suitable EDP system.

☺ Manual data acquisition with its attendant transfer errors is no longer needed.

10.1.1.2 Large Quantities of Data

If the gathered report data exceeds the capacity of one chip card, the remaining data can be transferred to a second card, and so on. In this case the following message appears after the data transfer:

"Chip card full! Please insert next chip card"

☞ Change the chip card.
Then acknowledge the message with <**F1**> **"OK"**

☺ The transfer is continued.

To avoid data losses, it is ***essential*** to change the chip card ***before*** acknowledging the message!

10.2 Short Report

The reports made available differ in the length of the printout and thus in their information content. With the short report only the most important data in compressed form is printed out.

Example for a Short Report:

Trip Report

Report date : 20.02.2003 10:30
Meter no. : PI-ME 97
Personnel no. : 4150 (C. Anyone)
Tour start : 19.02.2003 14.39
Tour end : 20.02.2003 10:25

Receipt	Time	D.	Pr	GST	Temp.	Vo
19.02.2003:						
000091	14:39	4	11 (1001)	+19,9		997
000092	16:15	7	11 (1745)	+25,9		1729
000092	16.15	0	21 (1)	-		-
20.02.2003:						
000093	10.25	10	12 2525	+25,3		(2502)

	Total	Meter	Tour
Heating oil	11 2746		2726
Diesel	12 2525		2502
Additive (0.5L)	21 1		-
Liquids	VT L	6472	5270
	Vo L	6419	5227
Additive	L	0.00	0.00

-End of List-

Block 1
Block 2
Block 3

The trip report shows three information blocks beneath the report heading:

☞ **Block 1** shows details of each delivered product:

- Receipt Document number
- Time Point of time when the delivery started
- D. Duration of the delivery in minutes
- Pr Product register
- GRS Uncompensated volume in litres
- Temp. Average product temperature during delevery in °C
- GST Compensated volume in °C

☺ The volume, which is relevant to the respective discharge (GST for temperature-compensated measurement of the delivered volume, GRS for uncompensated measurement), is shown in brackets. In the case of bulk goods the delivered quantity is in column GST.

☞ **Block 2** forms the cumulative block. Here the sums of all the products delivered in the time covered by the report are listed.

☞ **Block 3** shows the cumulative statuses of the measuring system (daily and total sums).

10.3 Detailed Report

If more information is required, then a complete Trip Report can be printed out. Here, all the information is listed in detail. The detailed report is shown below as a comparison to the short report.

The trip report shows three information blocks beneath the report heading:

Trip Report

Report date : 20.02.2005 10:30
Meter no. : PI-ME 97
Personnel no. : 4150 (C. Anyone)
Tour start : 19.02.2005 14.39
Tour end : 20.02.2005 10:25

No. Time Product Name Unit GST
Client Dura. Code Temp. Unit GRS
Gross Rec. Pay. Dens. Mass

19.02.2003:
91 14:39 Heating oil L 1001
000000 4 11 +19,9 L 997+
- 0 0 845,00 kg 842

92 16:15 Heating oil L 1745
000000 7 11 +25,9 L 1729+
$1515,47 1 2 845,00 kg 1461

92 16:15 Additive (0,5L) pcs 1+
000000 0 21 - pcs -
$23,45 1 2 kg -

20.02.2003:
93 10:25 Diesel L 2525+
000000 10 12 +25,7 L 2502
- 0 0 835,00 kg 2089

Total Heating oil L 2746
11 11 L 2726
$1515,47 845,00 kg 2303

Total Diesel L 2525
10 12 L 2502
$0.00 835,00 kg 2089

Total Additiv (0,5L) Stk 1
0 21 Stk -
$23.45

Block 1 gives 3 lines of detailed information for each product delivered:

No.	Document number
Time	Point of time when the delivery started
Product Name	Name of delivered product in plain text
Unit	Unit of measurement for the following compensated volume
GST	Uncompensated volume in litres
Client	Client number. The client number query can be activated before starting discharge with Parameter 3.1.4.5.3.
Dura.	Duration of the delivery in minutes
Code	Product code (product register)
Temp.	Average product temperature in °C
Unit	Unit of measurement for the following uncompensated volume
GRS	Compensated volume in litres
Gross	Sales price incl. Tax
Rec.	Type of document printed: 0 Delivery receipt 1 Invoice, gross (incl. Tax) 2 Invoice, net (excl. Tax) 3 Self-loading 4 Product transfer ay. Payment upon invoice print-out 0 No payment 1 Cash 2 Cheque 3 Credit card 4 Debit procedure / direct debit authorisation 9 Undefined
Dens.	Reference density for calculation of temperature compensation
Mass	The weight of delivered product calculated from the volume and densit

☺ The relevant volume for the respective discharge (GST for temperature-compensated measurement of the delivered volume, GRS for uncompensated measurement) is marked with a plus sign (+). In the case of bulk goods the delivered quantity is in

—————————— $ 1338.10 (Net takings) $ 1538.92 (Gross takings) Final total Meter Tour —————————— Liquids VT L 6472 5270 Vo L 6419 5227 Additives L 0,00 0.00 -End of List- Block 3	column GST. **Block 2** forms the cumulative block. Here the sums of all the products delivered in the time covered by the report are listed. The cumulative statuses of the measuring system (daily and total sums) are shown in **Block 3**.

10.4 Copy Receipt

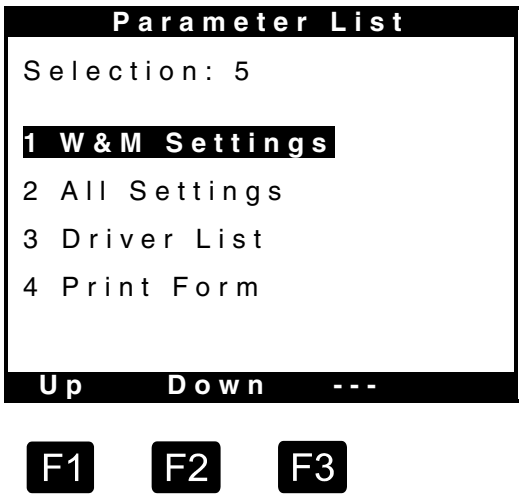
- If a receipt is lost or has become contaminated or illegible because the ink ribbon was worn, you can repeat this printout at any time with the function Copy receipt.
- The addition “Copy” is printed on the receipt to differentiate from the original.

10.5 Zero-Bill

- A blank receipt is printed out with the function Zero-Bill.
- With this receipt you prove that the Sening MultiFlow is in the standby mode and not in the discharge mode already.
- The receipt counter is not incremented.

10.6 Printout of Parameter List

The function **parameter list** is subdivided into three points:



- With the function **W & M setting** only the parameters relevant to W & M regulations are printed. It is therefore possible to obtain a quick overview of the data of interest to the W & M inspector.
- The complete set of parameters is printed out with **All settings**. This also includes those parameters not relevant to W & M regulations.
- With the function **Driver list** the list of all defined drivers with name, personnel number and master code is printed.

10.6.1 Printout of parameter list (example)

Parameter-List

Serial number	:	16TK0001
		# 00
Device number	:	18UB0001
Meter Name	:	Z-4711
Personel ID	:	000001
Version	:	3.04[3.04]DE
		ABCDEF00
Report date	:	05.08.1999 11:50
Reference	:	**000017**

The seal is approved!

Grand totals

Uncompens. Volume	217169 L
Compensated Vol.	205973 L
Compens. Weight	32098 kg
Total Additives	0.00 L
Fail volume	0.00 L

Device Settings

311 + Device Number	18UB0001
312 + Meter Name	Z-4711
313 + Seal Password	######
3141 Operating Mode	Standard
3142 Save Display	15 min
31431 Valid Currency	Currency A
31432 Exchange Rate	1,955830
31433 Position Symbol	After
31434 Currency Symbol A	$
31435 Currency Resol.A	2
31436 Currency Symbol B	EUR
31437 Currency Resol. B	2
31451 Driver ID Query	No
31452 Language Query	No
31453 Customer ID Query	No
31454 Cust Type Query	Yes
31455 Add Products Query	Yes
3148 Add Surcharge	No
3149 Default Surcharge	31

Page 1-
MultiFlow: Z-4711 (16TK0001)
Setup count: 000017
05.08.1999, 15:51

31401 Billing w. Tax

3151 + Volume Resolution	0
3152 + No. of Discharges	1
3153 + Minimum Preset	200 L
3154 + Minimum Form	2,3,(11:12),25
3155 + Price Correction	Yes
3156 + Decimal Separator	.
3157 + Show Additive	No
3158 + Flushig Volume	0 L
3159 + Auto. Abgabe-Stop	0 min
3161 Global Node No.	0
3162 CAN-Termimation	1
3163 OBC Node	0

Remote Control

31641 Enable Control	No
31642 Remote Ctrl Node	0

Level Probe

31651 Probe Timeout	18
31652 Level Probe Node	0

Deadman Switch

31661 Enable Switch	No
31662 Probe Timeout	18
31663 Deadman Sw. Node	0
3171 Internal Node No.	0
3172 Display No. 1	1
3173 Display No. 2	0

Valve Control

3181 + Path Selection	Basic Control
3182 Turn-on Delay	10 sec
3183 Turn-off Delay	10 sec

Flow Control

31841 High Flow Rate ON	5 L
31842 High Flow Rate OFF	20 L
31843 Wet Hose OFF	0,5 L
31844 Dry Hose (G) OFF	0,5 L
31845 Dry Hose (P) OFF	1,5 L

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MultiFlow: Z-4711 (16TK0001)
Setup Count: 000017
05.08.1999, 15:52

3187 + Hose Set	UVLB
3188 + Overfill Prev.	No
3189 Valve Compilation GVLx_xM:	No
319 + Receipt ID	7

Printer Setting

321 Printer Selection	DR-295
322 Interface Type	RS232
323 Transfer Rate	9600
324 Parity Check	No
325 Lines per Page	57
3261 + Protokol	Yes
3261 FDW-Timeout	5 sec
3261 Resends	3
327 Paper Feed	Yes
328 Reverse Eject	No

Units	Type	Factor
1: Litres	(L) Volume	1.000000
2: Kilogram	(kg) Mass	1.000000
3: Piece	(Pc.) Piece	1.000000
4: Tonnes	(t) Mass	0.001000
5: Gallons (US)	(gal) Volume	0.264172
6: Gallons (GB)	(gal) Volume	0.219969
7: Millilitre	(mL) Volume	1000.000000
8: Cubic Centim.	(cm3) Volume	1000.000000
9: Cubic Meter	(m3) Volume	0.001000
0: No Unit	( ) Piece	1.000000

Pulse Inputs

3311 + Pulse Rating	5,528000 1/L
3312 + Max. Return Vol.	8.00 L
3313 + Max. Error Pulses	11
3314 + Sensor-Type	THS-Type
3315 + Min. Flow Rate	80 L

Temp. Sensor

3321 + Offset	0.00 °C
3322 + Disable Sensor	No
0 + Offset 0°C	1.13 °C
0 + Offset 100°C	0.00 °C

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Additive Pump

3331 + Piston Capacity	50 mL
3332 + Meter Factor	1.000000
3333 + Pump Position	Before
3334 + Hose Volume	50 L
3335 Ext. Prod. Sensor	No
3336 Pump Cycle Time	6000 msec
3337 + Start Interval	80 msec
3338 + End Interval	80 msec

Product Setup (35.11.)

.1 + Product-Name	Heating Oil
.2 + Product Type	Liquid Product
.3 + W&M Code	1
.4 + Delivery Unit	Litres
.51 + Use Add. Injector	No
.52 + Additive Code	0
.61 Default Price	87.65
.62 Price Factor	100
.63 Tax Rate	16.00 %
.71 + Compensation	Yes
.72 + Comp. Temperature	15 °C
.73 + Product Group	Refined Oil
.74 + Average Density	846.00
.751 + Meter-Factor 1	0.991234
.752 + Meter-Factor 2	1.000000
.753 + Meter-Factor 3	1.000000
.754 + Meter-Factor 4	1.000000
.755 + Flow Rate 1	1000
.756 + Flow Rate 2	0
.757 + Flow Rate 3	0
.758 + Flow Rate 4	0

Product Setup (35.12.)

.1 + Product-Name	Diesel
.2 + Product Type	Liquid Product
.3 + W&M Code	2
.4 + Delivery Unit	Litres
.51 + Use Add. Injector	No
.52 + Additive Code	0

• Page 4 -

.61 Default Price	55.00
.62 Price Factor	100

.63 Tax Rate	16.00 %
.71 + Compensation	No
.72 + Comp. Temperature	60 °F
.73 + Product Group	Refined Oil
.74 + Average Density	835.00
.751 + Meter-Factor 1	0.991234
.752 + Meter-Factor 2	1.000000
.753 + Meter-Factor 3	1.000000
.754 + Meter-Factor 4	1.000000
.755 + Flow Rate 1	1000
.756 + Flow Rate 2	0
.757 + Flow Rate 3	0
.758 + Flow Rate 4	0

Product Setup (35.19.)

.1 + Product Name	Unleaded
.2 + Product Type	Liquid Product
.3 + W&M Code	3
.4 + Delivery Unit	Litres
.51 + Use Add. Injector	Yes
.52 + Additive Code	21
.61 Default Price	120.00
.62 Price Factor	100
.63 Tax Rate	16.00 %
.71 + Compensation	No
.72 + Comp. Temperature	60 °F
.73 + Product Group	Refined Oil
.74 + Average Density	740.00
.751 + Meter-Factor 1	1.000000
.752 + Meter-Factor 2	1.000000
.753 + Meter-Factor 3	1.000000
.754 + Meter-Factor 4	1.000000
.755 + Flow Rate 1	1000
.756 + Flow Rate 2	0
.757 + Flow Rate 3	0
.758 + Flow Rate 4	0

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MultiFlow: Z-4711 (16TK0001)
Setup Count: 000017
05.08.1999, 15:54

Product Setup (35.21.)

.1 + Product Name	Additive (1 L)
.2 + Product Type	Packed Goods
.3 + W&M Code	0
.4 + Delivery Unit	Pieces
.61 Default Price	23.45
.62 Price Factor	1
.63 Tax Rate	16.00 %

Product Setup (35.22.)

.1 + Product Name	Additive
.2 + Product Type	Additive (Pump)
.3 + W&M Code	20
.4 + Delivery Unit	Millilitres
.53 Ratio	2000
.61 Default Price	14.60
.62 Price Factor	1
.63 Tax Rate	16.00 %

Product Setup (35.31.)

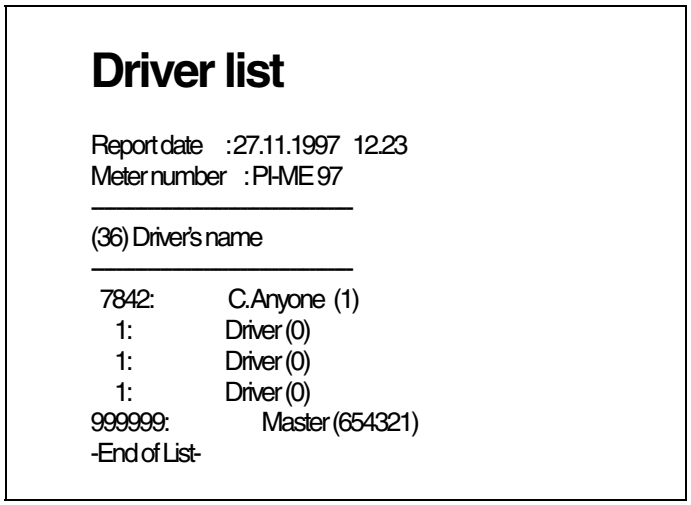
.1 + Product Name	Transport Duty
.2 + Product Type	Packed Goods
.3 + W&M Code	0
.4 + Delivery Unit	No Unit
.61 Default Price	15.00
.62 Price Factor	0
.63 Tax Rate	16.00 %

-End of List-

10.6.2 Printout “Driver list”

In the driver list shown below, under personnel number 7842 the driver C. Anyone is defined with password # 1. No other drivers are defined. Furthermore, the personnel number 999999 is defined as master with the password 654321. This factory setting is intended for the Sening MultiFlow installation and can be changed at any time.

Example Driver list:



Driver list

Report date : 27.11.1997 12.23
Meter number : PI-ME 97

(36) Driver's name

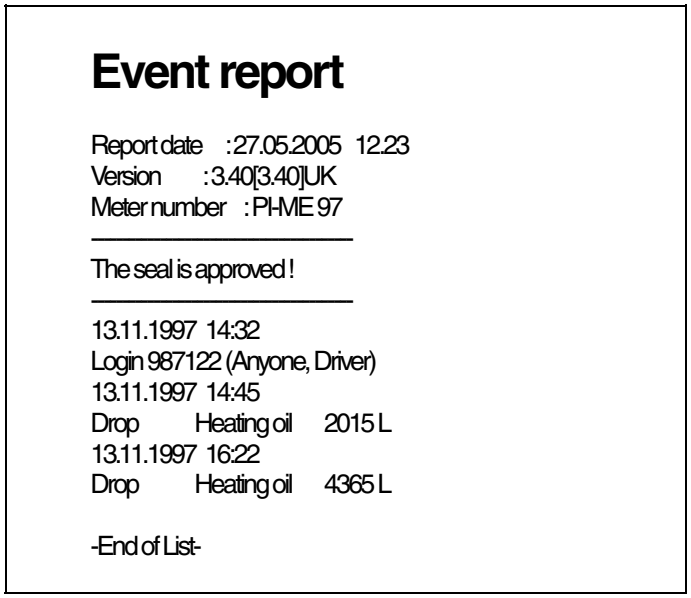
7842: C.Anyone (1)
1: Driver (0)
1: Driver (0)
1: Driver (0)
999999: Master (654321)
-End of List-

10.7 Event Report

The event report prints in chronological sequence all the events recorded in the log book.

For the printout you define a reporting period for which a log book printout is to be carried out. Mainly this printout is of interest to the service personnel, because alarms are listed here which indicate possible sources of error or faults.

Example Event report list:



Event report

Report date : 27.05.2005 12.23
Version : 3.40[3.40]UK
Meter number : PI-ME 97

The seal is approved !

13.11.1997 14:32
Login 987122 (Anyone, Driver)
13.11.1997 14:45
Drop Heating oil 2015 L
13.11.1997 16:22
Drop Heating oil 4365 L

-End of List-

10.7.1 Log Book

In the log book all activities on the device (in particular discharges) are logged. From this log the Trip Reports are generated.

The log book (list of events) is designed as a ring buffer in which only a limited number of events can be retained (approx. 100 receipts).

- For data security the event data are protected with a checksum.

The following events are retained in the log book:

Event	Description	Data
Logon	Switch on, initialization, driver logon	Time, system status, driver ID
Logoff	Switch off (power down)	Time, system status, driver ID
Alarm	Error status in hardware, software and sensors	Time, system status, driver ID
Drop	Delivery was terminated	Time, customer, product, volumes
Setup	The setup has been changed	Time, parameters, setting, access code

11 Error Messages

The Sening MultiFlow error messages are subdivided into several categories.

The errors with the lowest priority normally arise due to erroneous input by the operator. After acknowledgement of the error message (normally with <**F1**>), these are immediately rectified by correct input.

Other errors which indicate a severe malfunction in the program execution are listed below:

Message	Meaning
Parameter Alarm	Appears on conflict between parameters. Printing of a parameter report is offered (see Chapter 0).
Log book corrupted!	At least one record in the log book is corrupt, i.e. the checksum is not correct. Where possible, attempts are made to rectify the error automatically. However, ***in any case*** some information is ***lost!***
Password Penalty! No Access! Try again later!	The operator has made an error in entering a password. **NOTE:** Re-entry is possible, but with repeated erroneous entry increased time delays are experienced.
No enough memory!	The Sening MultiFlow cannot provide enough memory for a function. In normal operation this should not arise. **IMPORTANT:** **A severe fault has occurred!** It is essential to switch the device off and then on again.
Unknown CAN-Telegram received!	An unknown telegram is received at the external (global) CAN Bus. This may result from a temporary disturbance. **NOTE:** Service personnel must be consulted, if this alarm continues to appear.
ERROR! SoftSeal failed check!	This message appears when the inspection of the soft seal has failed (Checksum mismatch!). **IMPORTANT:** **A severe fault has occurred!** Service personnel must be consulted.
ERROR! Delivery interrupted Printing receipt ...	This message appears after switch-on when the device has been switched off without terminating a running delivery with a receipt. A delivery note for the open positions is automatically printed.
Temperature error!	The Sening MultiFlow has registered either a product temperature outside of the permissible range **or** an impermissible change in temperature. In both cases the delivery is interrupted and a receipt must be printed.
Pulse error!	The Sening MultiFlow has registered a pulse error (A and B pulses are different). The delivery is interrupted and a receipt must be printed.
Return-flow error!	The Sening MultiFlow has registered an impermissible return flow. The delivery is interrupted and a receipt must be printed.

Message	Meaning
Pulse sensor defective!	The Sening MultiFlow has detected a functional fault on the pulse transmitter. The delivery is interrupted and a receipt must be printed.
Additive Max. cycle time exceeded!	The additive pump (also called “dosage pump”) was not able to execute a complete pump cycle within the specified time period. The delivery is interrupted and a receipt must be printed.
ERROR Flow rate below Minimum!	During the drop the flow rate was below the Min. Flow rate for 30 seconds. The drop is interrupted and can be resumed by pressing “START” or finished with “STOP” key.
Additive Max. pump rate exceeded!	The Sening MultiFlow has determined an additive pump rate for the current product flow which the pump cannot deliver. The delivery is interrupted and a receipt must be printed.
Additive Product filling level undercut!	The internal filling level sensor on the additive pump signals “empty”. The delivery is interrupted and a receipt must be printed.
Additive Ext. filling level undercut!	The external filling level sensor on the additive pump signals “empty”. **IMPORTANT:** This information is not currently processed!
Additive Start position not detected!	The Sening MultiFlow has not detected the initial position on monitoring the pump piston. The delivery is interrupted and a receipt must be printed.
Additive Motion error! Position unknown!	The Sening MultiFlow has received impermissible information on monitoring the piston position (both positions detected simultaneously). The delivery is interrupted and a receipt must be printed.
ERROR Hose selection not permissible!	The operator has made an impermissible choice of hose (only occurs with fully electronic selection).
ERROR No flow!	The Sening MultiFlow has measured no flow over a lengthy time period. This message is released after the maximum waiting period. The discharge must be terminated (cf. Parameter 3.1.5.9)
Interruption by Product Transfer or Self Loading Sensor	**Cause 1**: During product transfer or self-loading the signal input has been deactivated (i.e. switch-over to normal discharge) **Cause 2**: During a normal discharge the signal input for product transfer / self-loading was activated. The delivery is interrupted and a receipt must be printed.

Message	Meaning
MEMORY CHECK FAILED! Restoring factory settings...	An error has occurred on monitoring the various memory ranges. The factory settings are automatically restored. **IMPORTANT:** All parameters are reset in this procedure. Further operation without consulting service personnel and without recalibration is **not permissible!**
Printer error! Incorrect response to FDW protocol	The printout of information relevant to W & M regulations on the receipts occurs in the FDW mode which ensures correct output. The error message indicates an error in the printer control. If the problem persists after repeated attempts, the receipt data must be copied manually from the display. **IMPORTANT:** Service personnel must be consulted immediately.

☞ All error messages are recorded in the log book and can be called from there using a printout (event report see chapter 0 / Page 125).

12 Technical Data

Power supply	9-30V/1.5 A max., (optionally max. 2.2 A for AI)
Pulse input channel	2-channel input, type settable via SW 1. 12V 2-channel pulse transmitter (pnp output) 2. 12V 2-channel pulse transmitter (npn output) 3. 2-wire current output for THS pulse transmitter
Pulse frequency	max. 10 kHz
Outputs	7 outputs for driving solenoid valves 12V/500mA per output Outputs protected against short circuit and overload.
Inputs	EEx ib IIB 4 intrinsically safe inputs for switching contacts
Temperature input	Pt100 according to IEC751
Measurement range	-60 to 110 °C (-76 to 230 °F)
Measurement error (-25 °C to 70 °C) (-13 °F to 158 °F)	+/- 0.2 °C
Async. communication	1 Type of communication selectable via SW switch 1. EIA232 2. RS232 3. RS422/RS485 Transmission rate 2400 to 19200 baud
Network communication (bus)	CANbus 100 kHz Termination resistors switchable via SW.
Intrinsically safe power supply	2 intrinsically safe outputs EEx ib IIB
Internal communication	Intrinsically safe CANbus EEx ib IIB
Operating temperature	-20 to 50 °C (4 to 122 °F)
Housing	IP65, die-cast aluminium
Ambient conditions:	**The following guidelines are fulfilled:** OIML R 117 A.4.4 (IEC68-2-6) Sinusoidal vibrations OIML R 117 A.4.3 (IEC 68-2-30) Damp heat OIML R117 A.4.1 (IEC68-2-2) and A.4.2 (IEC68-2-1) Dry hot and cold temperatures
Interference immunity:	**The following guidelines are fulfilled:** Conformance to OIML R 117 DIN EN 50 081-1 Interference emissions in living areas DIN EN 50 082-2 Interference immunity in industrial areas DIN 57 879-3 Radio frequency suppression on vehicles DIN 40839-1 EMC in road vehicles, conducted interference DIN 40839-3 EMC in road vehicles, induced interference DIN V ENV 50140 Interference immunity to electromagnetic fields

12.1 Sening MultiFlow Control Device

Supply	12V nominal voltage under 30 Watt, from built-in battery of corresponding vehicle, protected against overvoltage (>50V)
Data circuit	In intrinsically safe level of protection: II 2 G EEx d [ib] IIB T4 with following maximum values U_o = 7.5 V I_o = 173 mA P_o = 325 mW Characteristic: linear
or:	For connection to a certificated intrinsically safe circuit with following maximum values (current addition) U_i = 7.5 V I_i = 173 mA P_i = 325 mW Max. permissible external capacitance C_o = 260 µF Max. permissible external inductance L_o = 1.4 mH
Contact circuits	In intrinsically safe level of protection: II 2 G EEx d [ib] IIB T4 with following maximum values U_o = 15 V I_o = 44 mA P_o = 165 mW Characteristic: linear Max. permiss. external capacitance C_o = 2.4 µF Max permiss. external inductance L_o = 70 mH
Power supply circuits	In intrinsically safe level of protection: II 2 G EEx d [ib] IIB T4 with following maximum values U_o = 15 V I_o = 360 mA P_o = 1.35 W Characteristic: linear Max. permiss. external capacitance C_o = 2.4 µF Max permiss. external inductance L_o = 0.2 mH
EU type test certificate	TÜV 97 ATEX 1176

The control device containing batteries, it must only be opened outside of any area subject to explosion hazards.

12.2 Operating Device

EU test sample certificate	TÜV 97 ATEX 1175
Supply circuit I + II	In intrinsically safe level of protection: II 2 G EEx ib IIB T4 Only for connection to a certificated intrinsically safe circuit with the following maximum values: U_i = 15 V I_i = 360 mA P_i = 1.35 W The effective internal capacitance and inductance are negligibly small.
Data circuits	In intrinsically safe level of protection: II 2 G EEx ib IIB T4 Only for connection to a certificated intrinsically safe circuit with the following maximum values: U_i = 7.5 V I_i = 173 mA P_i = 0.94 W The effective internal capacitance and inductance are negligibly small.

12.3 Printer

Part designation	Epson-295 or DR-295 FDW
Printer model	7 needle-shuttle-printer
Symbols per line	42-35
Print speed	about 2.3 lines/s
Print width	65mm
Paper feed	platform for single pages min. 80 mm x 80 mm max. 182 mm x 257 mm
Interface	serial V.24 with FDW-report
voltage supply	24V DC ±10%

Copies of the relevant certificates are to be found in the appendix to this document.

13.2 Extract from the Preliminary Certificate

The preliminary test establishes whether the component conforms to the requirements of the type approval. It can be submitted for calibration in conjunction with a pre-tested measuring apparatus in a measuring system set up according to weights and measures legal requirements and operated by a weights and measures authority.

The figure (number of error pulses) found in the test step “Testing the pulse input” (Test step no. 2) is only used for testing the function of the pulse monitoring circuit. The setting of the number of permissible error pulses which is dependent on the meter and pulse transmitter must be found before calibration according to W & M instruction 5 (EA 5) and saved in System Parameter 3.3.1.3.

The number of permissible error pulses can be determined from the meter nominal values based on the following formula:

$$P_{dper} \quad 0.01 * V_{min} * P_{pul}$$

Where:

P_{dper} = max. permissible number of error pulses
P_{pul} = number of pulses per unit volume (meter name-plate)
V_{min} = lowest measurement/discharge amount (meter name-plate)

The lowest measured volume must not be less than 200 liters.

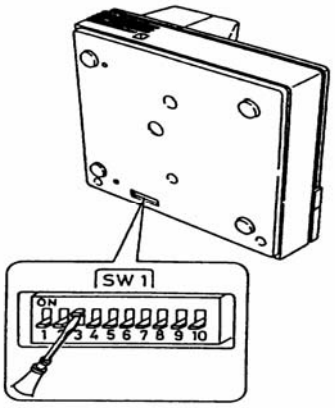
Parameter settings for a minimum measurement volume of V_{min} = 200 •

Pulse Rating Parameter 3.3.1.1	Error Pulse Limit Parameter 3.3.1.3
23.715 Pulses/•	47
11.858 Pulses/•	23
10.000 Pulses/•	20
6.568 Pulses/•	13
5.714 Pulses/•	11
5.517 Pulses/•	11

13.3 DIL Switch Positions DR-290/DR295

☞ The following factory settings are to be checked on the printer in the event of a fault:

Switch	Epson 295	DR-290 / DR-295	Function
SW-1	OFF	ON	Ignore transmission errors
SW-2	OFF	OFF	512Byte data buffer
SW-3	ON	ON	Handshake XON/XOFF
SW-4	OFF	OFF	8 Bit
SW-5	OFF	OFF	No Parity
SW-6	OFF	ON	Even Parity
SW-7	OFF	OFF	9600 Baud
SW-8	OFF	OFF	
SW-9	OFF	OFF	
SW-10	OFF	ON	Transparent mode ON



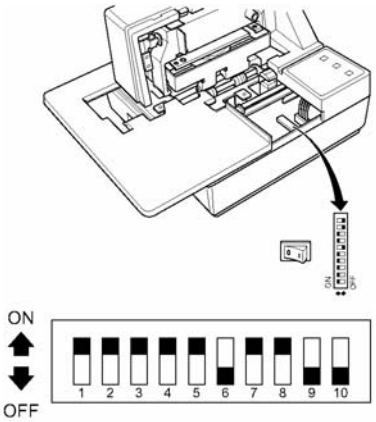
13.4 DIL –switch setting DR-298-FDW

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

☞ The following factory settings are to be checked on the printer in the event of a fault :

Switch	Position	Function
SW-1	ON	9600 Baud
SW-2	ON	
SW-3	ON	8 Bit
SW-4	ON	No Parity
SW-5	ON	
SW-6	OFF	Handshake XON/XOFF
SW-7	ON	Printer mode
SW-8	ON	
SW-9	OFF*	Pin6 Reset deactivated
SW-10	OFF*	Pin 25 Reset deactivated

* Any setting is valid



13.5 Settings on Printer Interface Card Type C82307 for DR-570

DIP Switch SW1	Setting	Remarks
1	ON	Card active
2	ON	8 Bit transmission
3	OFF	No parity
4	OFF	check
5	ON	Transmission speed (fixed)
6	ON / OFF	SW1-6 OFF: Baud rate 9,600 SW1-6 ON: Baud rate 19,200

DIP Switch SW2	Setting	Remarks
1	ON	Baud rate 3
2	ON	Baud rate 4
3	ON	Transparent mode active
4	ON	Protocol (XON / XOFF)
5	OFF	Current Loop
6	ON / OFF	ON: RS-422A / OFF: RS-232D

DIP Switch SW3	Setting	Remarks
1	OFF	Buffer mode active
2	ON	DR-570 mode
3	OFF	Buffer release at 768 Bytes
4	OFF	Flag DTR, positive polarity
5	OFF	DSR/DCD signal inactive
6	OFF	DTR Flag / XOFF, if buffer < 16 Bytes
7	OFF	Self-test inactive
8	OFF	Select self-test (loop-back)

Jumper	Setting*	Remarks
JG	OFF	Link between earth and signal ground
J4	OFF	Receive RDA on Pin No. 16
J3	ON	
J2	OFF	
J1	OFF	

(*) OFF = Jumper open ON = Jumper plugged

13.6 Printer Settings DR-570 (Front)

The two DIP switches SW1 and SW2 are hidden behind the small flap at the front of the printer.

DIP Switch SW1	Setting	Remarks
1	ON	
2	ON	Font
3	ON	PC437 (USA)
4	ON	
5	OFF	Bi-directional printing
6	OFF	Draft quick printing active
7	OFF	8 KByte input buffer
8	OFF	Skip of page perforation inactive

DIP Switch SW2	Setting	Remarks
1	ON	Page length
2	OFF	(12 inch, 305 mm)
3	ON	Automatic tear-off active
4	OFF	Automatic line feed inactive

Only the above setting ensures a proper printout under all circumstances.

At any rate, the setting “German font” must be avoided, since with this setting no OCRA lettering can be printed on the payment transfer forms.

14 Character sets available for the Sening MultiFlow

14.1 PC437 character set

This character set is used for the west European and English-speaking area.

Hex	Dec	ASCII	Hex	Dec	ASCII	Hex	Dec	ASCII	Hex	Dec	ASCII	Hex	Dec	ASCII
20	32		4D	77	M	7A	122	z	A7	167	º	D4	212	╘
21	33	!	4E	78	N	7B	123	{	A8	168	¿	D5	213	╒
22	34	"	4F	79	O	7C	124	|	A9	169	⌐	D6	214	╓
23	35	#	50	80	P	7D	125	}	AA	170	¬	D7	215	╫
24	36	$	51	81	Q	7E	126	~	AB	171	½	D8	216	╪
25	37	%	52	82	R	7F	127	⌂	AC	172	¼	D9	217	┘
26	38	&	53	83	S	80	128	Ç	AD	173	¡	DA	218	┌
27	39	'	54	84	T	81	129	ü	AE	174	«	DB	219	█
28	40	(	55	85	U	82	130	é	AF	175	»	DC	220	▄
29	41	)	56	86	V	83	131	â	B0	176	░	DD	221	▌
2A	42	*	57	87	W	84	132	ä	B1	177	▒	DE	222	▐
2B	43	+	58	88	X	85	133	à	B2	178	▓	DF	223	▀
2C	44	,	59	89	Y	86	134	å	B3	179	│	E0	224	α
2D	45	-	5A	90	Z	87	135	ç	B4	180	┤	E1	225	ß
2E	46	.	5B	91	[	88	136	ê	B5	181	╡	E2	226	Γ
2F	47	/	5C	92	\	89	137	ë	B6	182	╢	E3	227	π
30	48	0	5D	93	]	8A	138	è	B7	183	╖	E4	228	Σ
31	49	1	5E	94	^	8B	139	ï	B8	184	╕	E5	229	σ
32	50	2	5F	95	_	8C	140	î	B9	185	╣	E6	230	µ
33	51	3	60	96	`	8D	141	ì	BA	186	║	E7	231	τ
34	52	4	61	97	a	8E	142	Ä	BB	187	╗	E8	232	Φ
35	53	5	62	98	b	8F	143	Å	BC	188	╝	E9	233	Θ
36	54	6	63	99	c	90	144	É	BD	189	╜	EA	234	Ω
37	55	7	64	100	d	91	145	æ	BE	190	╛	EB	235	δ
38	56	8	65	101	e	92	146	Æ	BF	191	┐	EC	236	∞
39	57	9	66	102	f	93	147	ô	C0	192	└	ED	237	ø
3A	58	:	67	103	g	94	148	ö	C1	193	┴	EE	238	ε
3B	59	;	68	104	h	95	149	ò	C2	194	┬	EF	239	∩
3C	60	<	69	105	i	96	150	û	C3	195	├	F0	240	≡
3D	61	=	6A	106	j	97	151	ù	C4	196	─	F1	241	±
3E	62	>	6B	107	k	98	152	ÿ	C5	197	┼	F2	242	≥
3F	63	?	6C	108	l	99	153	Ö	C6	198	╞	F3	243	≤
40	64	@	6D	109	m	9A	154	Ü	C7	199	╟	F4	244	⌠
41	65	A	6E	110	n	9B	155	¢	C8	200	╚	F5	245	⌡
42	66	B	6F	111	o	9C	156	£	C9	201	╔	F6	246	÷
43	67	C	70	112	p	9D	157	¥	CA	202	╩	F7	247	≈
44	68	D	71	113	q	9E	158	₧	CB	203	╦	F8	248	°
45	69	E	72	114	r	9F	159	ƒ	CC	204	╠	F9	249	∙
46	70	F	73	115	s	A0	160	á	CD	205	═	FA	250	·
47	71	G	74	116	t	A1	161	í	CE	206	╬	FB	251	√
48	72	H	75	117	u	A2	162	ó	CF	207	╧	FC	252	ⁿ
49	73	I	76	118	v	A3	163	ú	D0	208	╨	FD	253	²
4A	74	J	77	119	w	A4	164	ñ	D1	209	╤	FE	254	■
4B	75	K	78	120	x	A5	165	Ñ	D2	210	╥	FF	255	
4C	76	L	79	121	y	A6	166	ª	D3	211	╙			

14.2 PC852 character set – Middle European and Slavonic Language Area

Hex	Dec	ASCII	Hex	Dec	ASCII	Hex	Dec	ASCII	Hex	Dec	ASCII	Hex	Dec	ASCII
20	32		4D	77	M	7A	122	z	A7	167	ž	D4	212	ď
21	33	!	4E	78	N	7B	123	{	A8	168	Ę	D5	213	Ň
22	34	"	4F	79	O	7C	124	¦	A9	169	ę	D6	214	Í
23	35	#	50	80	P	7D	125	}	AA	170		D7	215	î
24	36	$	51	81	Q	7E	126	~	AB	171	ź	D8	216	ě
25	37	%	52	82	R	7F	127	▒	AC	172	Č	D9	217	┘
26	38	&	53	83	S	80	128	Ç	AD	173	ş	DA	218	┌
27	39	'	54	84	T	81	129	ü	AE	174	«	DB	219	█
28	40	(	55	85	U	82	130	é	AF	175	»	DC	220	▄
29	41	)	56	86	V	83	131	â	B0	176	░	DD	221	Ţ
2A	42	*	57	87	W	84	132	ä	B1	177	▒	DE	222	Ů
2B	43	+	58	88	X	85	133	ů	B2	178	▓	DF	223	▀
2C	44	,	59	89	Y	86	134	ć	B3	179	│	E0	224	Ó
2D	45	-	5A	90	Z	87	135	ç	B4	180	┤	E1	225	ß
2E	46	.	5B	91	[	88	136	ł	B5	181	Á	E2	226	Ô
2F	47	/	5C	92	\	89	137	ë	B6	182	Â	E3	227	Ń
30	48	0	5D	93	]	8A	138	Ö	B7	183	ě	E4	228	ń
31	49	1	5E	94	^	8B	139	Ő	B8	184	Ş	E5	229	ň
32	50	2	5F	95	_	8C	140	î	B9	185	╣	E6	230	Š
33	51	3	60	96	`	8D	141	Ź	BA	186	║	E7	231	š
34	52	4	61	97	a	8E	142	Ä	BB	187	╗	E8	232	Ŕ
35	53	5	62	98	b	8F	143	Ć	BC	188	╝	E9	233	Ú
36	54	6	63	99	c	90	144	É	BD	189	Ż	EA	234	ŕ
37	55	7	64	100	d	91	145	Ĺ	BE	190	ż	EB	235	Ű
38	56	8	65	101	e	92	146	í	BF	191	┐	EC	236	ú
39	57	9	66	102	f	93	147	ô	C0	192	└	ED	237	Ý
3A	58	:	67	103	g	94	148	ö	C1	193	┴	EE	238	ţ
3B	59	;	68	104	h	95	149	Ľ	C2	194	┬	EF	239	´
3C	60	<	69	105	i	96	150	ľ	C3	195	├	F0	240	
3D	61	=	6A	106	j	97	151	Ś	C4	196	─	F1	241	˝
3E	62	>	6B	107	k	98	152	ś	C5	197	┼	F2	242	˛
3F	63	?	6C	108	l	99	153	Ö	C6	198	Ă	F3	243	ˇ
40	64	@	6D	109	m	9A	154	Ü	C7	199	ă	F4	244	˘
41	65	A	6E	110	n	9B	155	Ť	C8	200	╚	F5	245	§
42	66	B	6F	111	o	9C	156	ť	C9	201	╔	F6	246	÷
43	67	C	70	112	p	9D	157	Ł	CA	202	╩	F7	247	¸
44	68	D	71	113	q	9E	158	×	CB	203	╦	F8	248	°
45	69	E	72	114	r	9F	159	č	CC	204	╠	F9	249	¨
46	70	F	73	115	s	A0	160	á	CD	205	═	FA	250	˙
47	71	G	74	116	t	A1	161	Í	CE	206	╬	FB	251	ű
48	72	H	75	117	u	A2	162	ó	CF	207	¤	FC	252	Ř
49	73	I	76	118	v	A3	163	ú	D0	208	đ	FD	253	ř
4A	74	J	77	119	w	A4	164	Ą	D1	209	Đ	FE	254	▪
4B	75	K	78	120	x	A5	165	ą	D2	210	Ď	FF	255	
4C	76	L	79	121	y	A6	166	Ž	D3	211	Ë			

14.3 PC866 character set – Cyrillic Characters

Hex	Dec	ASCII	Hex	Dec	ASCII	Hex	Dec	ASCII	Hex	Dec	ASCII	Hex	Dec	ASCII
20	32		4D	77	M	7A	122	z	A7	167	з	D4	212	╘
21	33	!	4E	78	N	7B	123	{	A8	168	И	D5	213	╒
22	34	"	4F	79	O	7C	124	¦	A9	169	Й	D6	214	╓
23	35	#	50	80	P	7D	125	}	AA	170	К	D7	215	╫
24	36	$	51	81	Q	7E	126	~	AB	171	Л	D8	216	╪
25	37	%	52	82	R	7F	127	▒	AC	172	М	D9	217	┘
26	38	&	53	83	S	80	128	А	AD	173	Н	DA	218	┌
27	39	'	54	84	T	81	129	Б	AE	174	О	DB	219	█
28	40	(	55	85	U	82	130	В	AF	175	П	DC	220	▄
29	41	)	56	86	V	83	131	Г	B0	176	░	DD	221	▌
2A	42	*	57	87	W	84	132	Д	B1	177	▒	DE	222	▐
2B	43	+	58	88	X	85	133	Е	B2	178	▓	DF	223	▀
2C	44	,	59	89	Y	86	134	Ж	B3	179	│	E0	224	Р
2D	45	-	5A	90	Z	87	135	З	B4	180	┤	E1	225	С
2E	46	.	5B	91	[	88	136	И	B5	181	╡	E2	226	Т
2F	47	/	5C	92	\	89	137	Й	B6	182	╢	E3	227	У
30	48	0	5D	93	]	8A	138	К	B7	183	╖	E4	228	ф
31	49	1	5E	94	^	8B	139	Л	B8	184	╕	E5	229	Х
32	50	2	5F	95	_	8C	140	М	B9	185	╣	E6	230	Ц
33	51	3	60	96	`	8D	141	Н	BA	186	║	E7	231	Ч
34	52	4	61	97	a	8E	142	О	BB	187	╗	E8	232	Ш
35	53	5	62	98	b	8F	143	П	BC	188	╝	E9	233	Щ
36	54	6	63	99	c	90	144	Р	BD	189	╜	EA	234	ъ
37	55	7	64	100	d	91	145	С	BE	190	╛	EB	235	Ы
38	56	8	65	101	e	92	146	Т	BF	191	┐	EC	236	ь
39	57	9	66	102	f	93	147	У	C0	192	└	ED	237	э
3A	58	:	67	103	g	94	148	Ф	C1	193	┴	EE	238	Ю
3B	59	;	68	104	h	95	149	Х	C2	194	┬	EF	239	Я
3C	60	<	69	105	i	96	150	Ц	C3	195	├	F0	240	Ё
3D	61	=	6A	106	j	97	151	Ч	C4	196	─	F1	241	ё
3E	62	>	6B	107	k	98	152	Ш	C5	197	┼	F2	242	Є
3F	63	?	6C	108	l	99	153	Щ	C6	198	╞	F3	243	є
40	64	@	6D	109	m	9A	154	ъ	C7	199	╟	F4	244	Ї
41	65	A	6E	110	n	9B	155	Ы	C8	200	╚	F5	245	ї
42	66	B	6F	111	o	9C	156	ь	C9	201	╔	F6	246	Ў
43	67	C	70	112	p	9D	157	Э	CA	202	╩	F7	247	ў
44	68	D	71	113	q	9E	158	Ю	CB	203	╦	F8	248	°
45	69	E	72	114	r	9F	159	Я	CC	204	╠	F9	249	∙
46	70	F	73	115	s	A0	160	а	CD	205	═	FA	250	·
47	71	G	74	116	t	A1	161	б	CE	206	╬	FB	251	√
48	72	H	75	117	u	A2	162	в	CF	207	╧	FC	252	№
49	73	I	76	118	v	A3	163	г	D0	208	╨	FD	253	¤
4A	74	J	77	119	w	A4	164	д	D1	209	╤	FE	254	■
4B	75	K	78	120	x	A5	165	е	D2	210	╥	FF	255	
4C	76	L	79	121	y	A6	166	ж	D3	211	╙			

15 Warranty and Service

In addition to the dealer's legal warranty in the purchase agreement we give the end user a warranty for this device on the following conditions:

1. The warranty period is twelve months and starts at the time of delivery of the device by FMC Technologies.
2. The warranty includes the rectification of all device damage or defects occurring within the warranty period and which can be shown to be due to material or production faults.

The warranty does not include:

- slight deviations from the intended quality which are insignificant for the value or usefulness of the device,
- damage or defects due to connection other than as specified, improper handling or non-observance of the installation guidelines and instructions for use,
- damage from the chemical and electrochemical effects of water or other liquids, electrical or electromagnetic influences and generally from abnormal ambient conditions,
- damage due to external effects such as damage in shipment, damage due to shock or impact, the effects of the weather or other natural phenomena.

3. The right to claim under warranty becomes invalid if repairs or tampering have been carried out by persons not authorised by us for the work or if our devices have been fitted with supplementary parts or accessories which are not suitable for our devices and not released by us for that purpose.
4. The warranty service is carried out, free of charge and according to our choice, by repairing defective parts or replacing them by perfect parts. Replaced parts become our property.
5. During the first six months of the warranty period the warranty service is carried out without billing. Thereafter, travelling time, travelling cost and work time for the service staff and any transport costs occurred are billed or not reimbursed.
6. Work under warranty does not imply any lengthening of the warranty period nor does it initiate a further period of warranty. The warranty period for installed replacement parts terminates with the end of the warranty period for the complete device.
7. More far-reaching or additional claims, in particular those for compensation of losses or consequential losses outside of the device are expressly excluded, provided no liability is deemed mandatory in law.

Important Note

All explanations and technical details given in this documentation have been produced and edited by the author with care. However the possibility of errors cannot be completely eliminated. ***FMC Technologies*** would be very grateful for the notification of any errors found.

Our service department would be pleased to advise and help you.

They can be reached under:

FMC Technologies

PO Box 10428
1602 Wagner Avenue
Erie, PA 16514-0428

Telephone: 814-898-5000
FAX: 814-899-7415

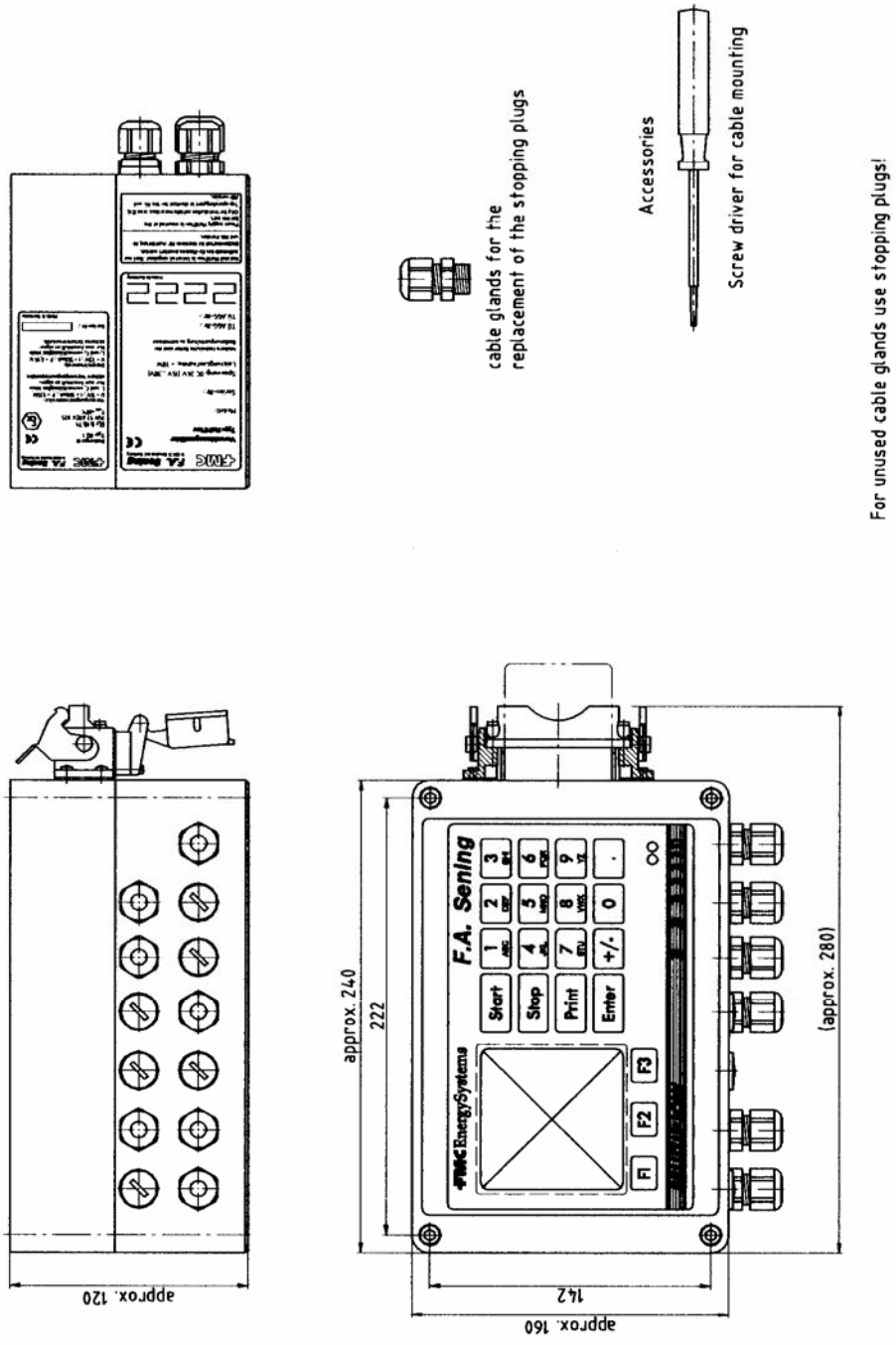
16 Keyword Index

17 Drawings and Approvals

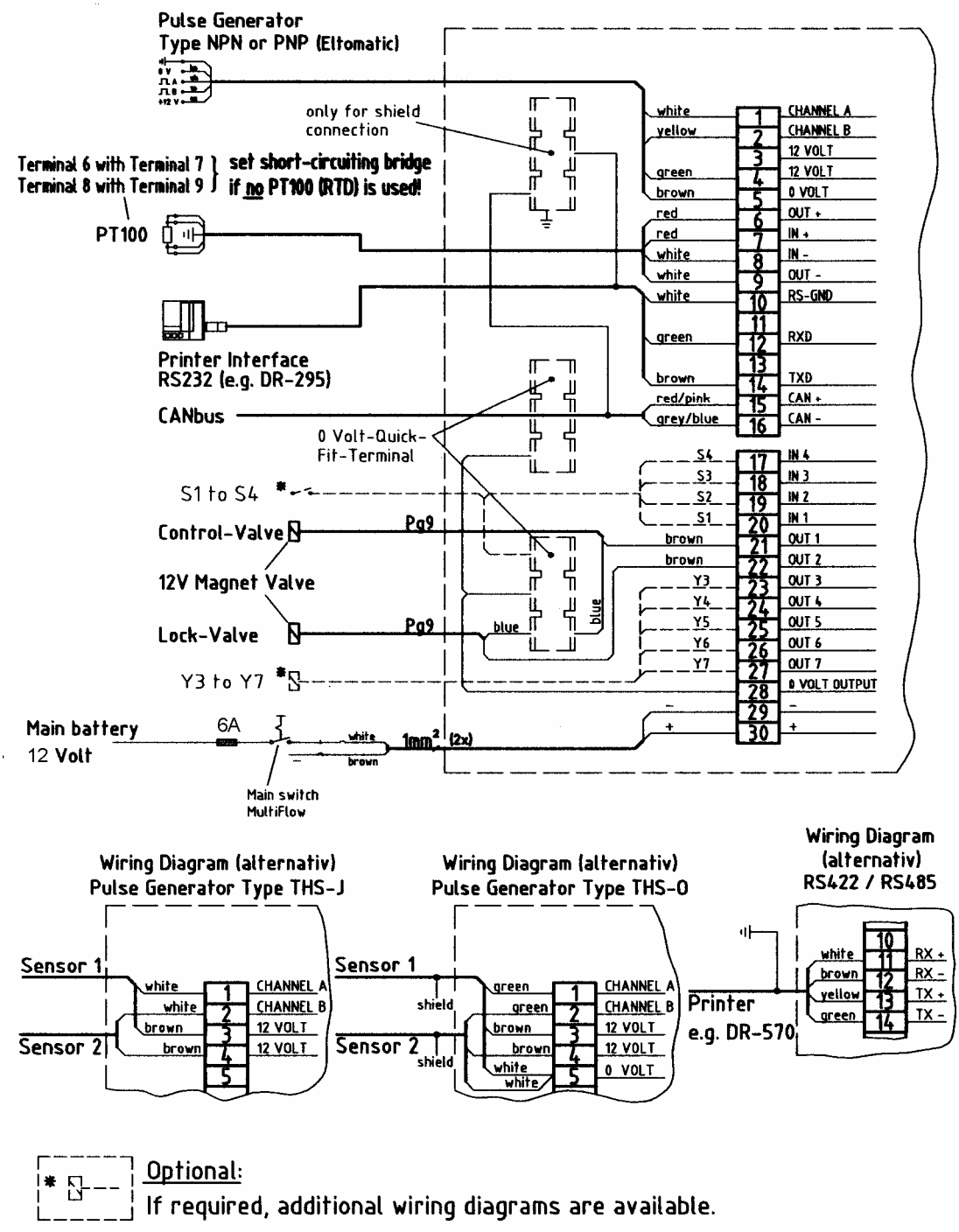
17.1 Contents of Appendix

17.2 Drawings

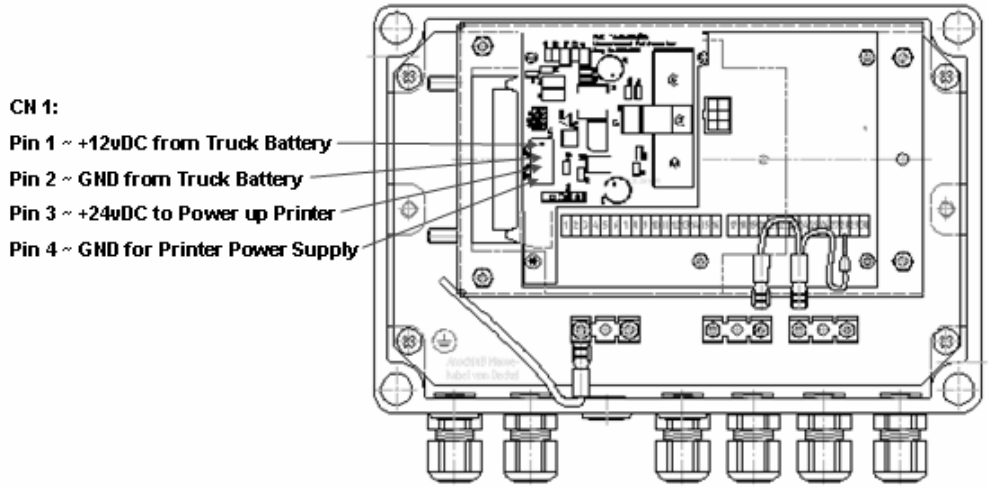
17.2.1 Weather-proof housing (Version A3)



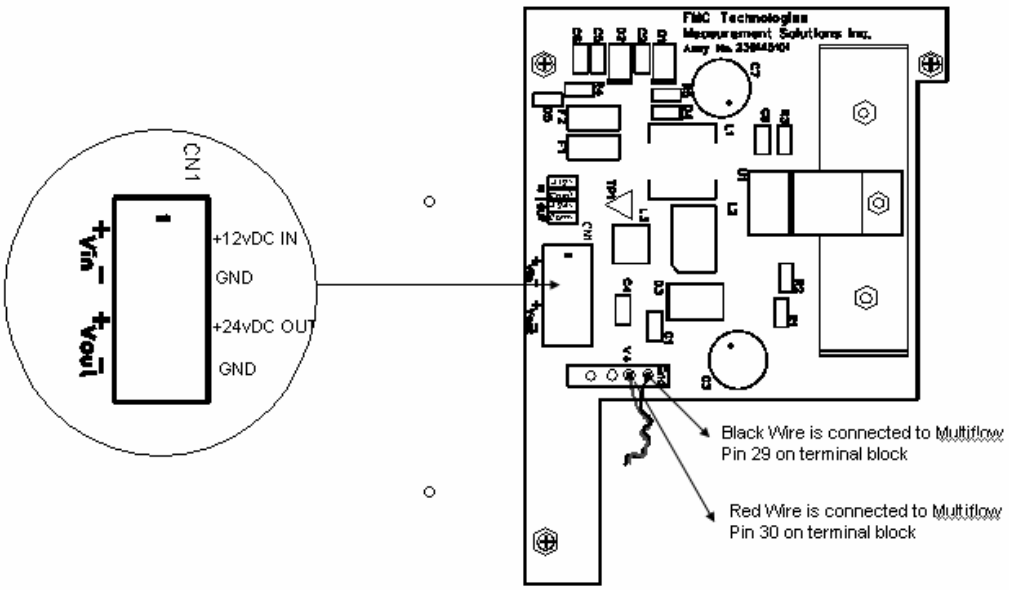
17.2.2 - Wiring Diagram (Version A3)



17.2.3 - Wiring Instructions for the Sening MultiFlow Printer Connection



On the CN 1 connector, Pin 1 is located at the top



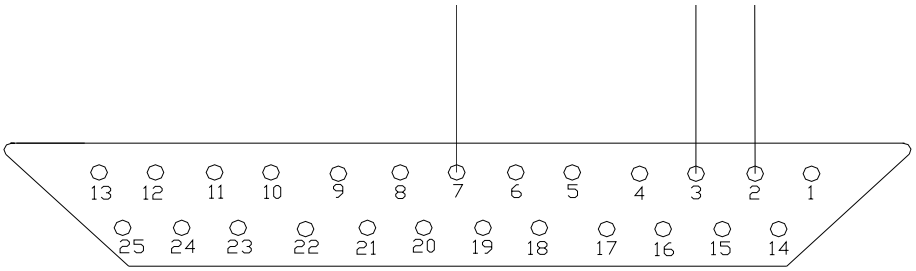
Exploded view of the MEPS board and additional wiring information

The 12vDC IN on Pin 1 CN1 and GND Pin 2 CN1 are wired to the positive and negative terminals on the truck battery. The +24vDC Pin 3 CN1 and GND Pin 4 CN1 are to be used to power up the printer.

If LTS sales has provided the printer power cord, connect the blue wire to the +24vDC Out and connect both the Red and Yellow wires to GND (Pin 4 on CN1).

Printer Connection - Communications

Pin 10 Pin 14 Pin 12



DB 25 Connector
attached to Printer

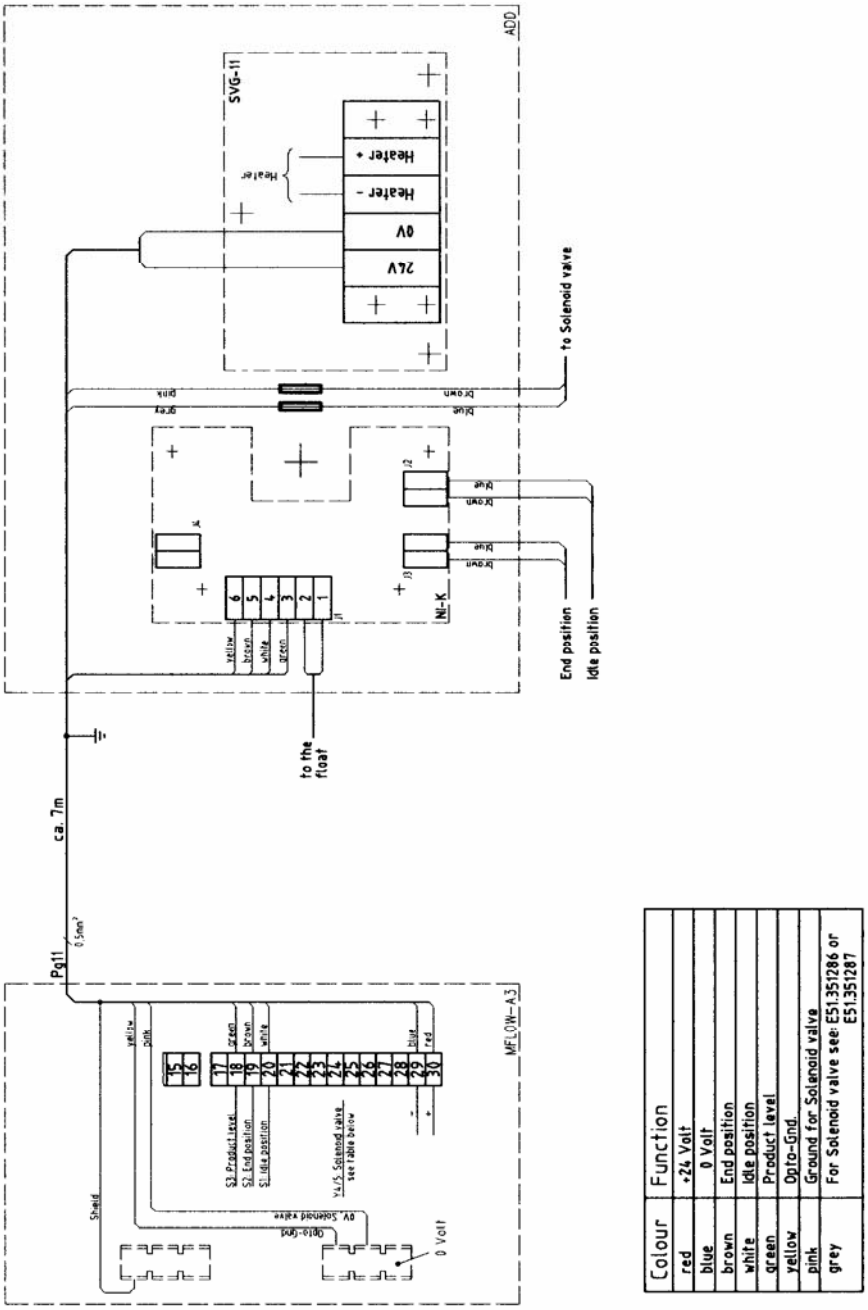
The above diagram shows how the DB 25 Pin Connector is attached from the Epson Printer to the MultiFlow. As illustrated above:

Pin 2 on the DB 25 is connected to ---------- Pin 12 on the MultiFlow

Pin 3 on the DB 25 is connected to ---------- Pin 14 on the MultiFlow

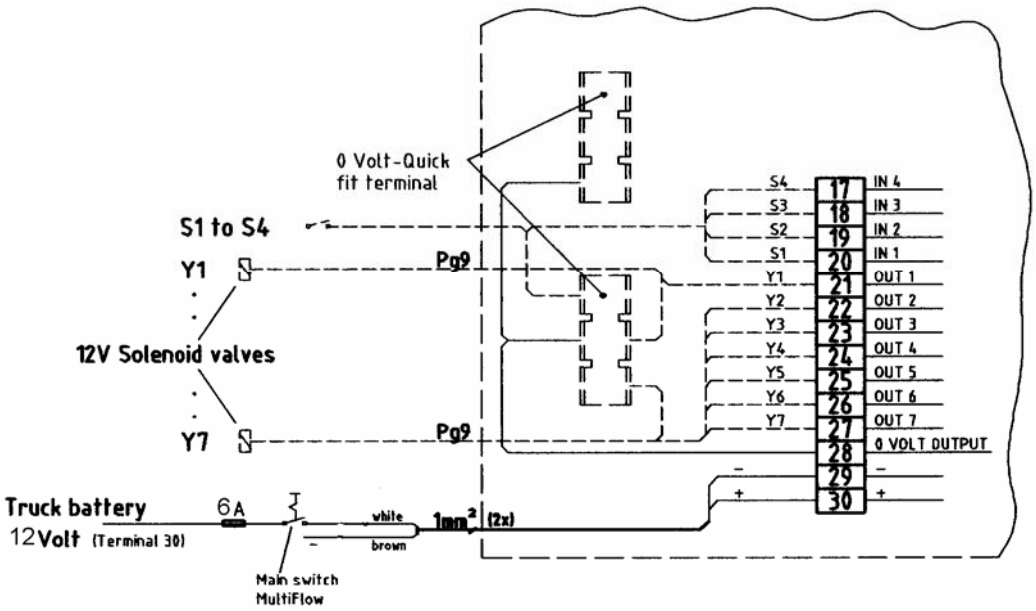
Pin 7 on the DB 25 is connected to ---------- 0VDC on the MultiFlow

17.2.4 - Wiring diagram ADD-Dosage pump (Version A3)



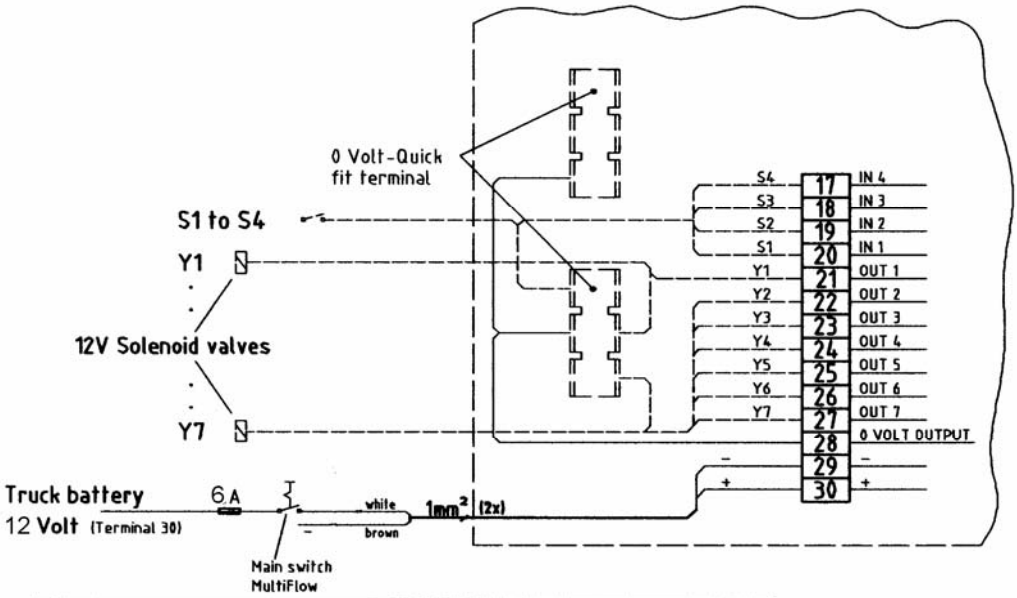
Colour	Function
red	+24 Volt
blue	0 Volt
brown	End position
white	Idle position
green	Product level
yellow	Opto-Gnd.
pink	Ground for Solenoid valve
grey	For Solenoid valve see: E51.351286 or E51.351287

17.2.5 - Wiring diagram pneum. control switch with flow control and dosage pump



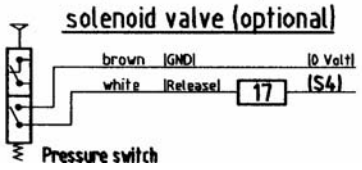
Terminal	Colour	Function	Note
17	white	S4 : Overfill prevention amplifier	optional
18	green	S3 : Product level	Dosage pump
19	brown	S2 : End position	Dosage pump
20	white	S1 : Idle position	Dosage pump
21	brown	Y1 : Release low flow (Bypass)	
22	brown	Y2 : Release high flow	
23	brown	Y3 : Release control switch	
24	brown	Y4 : Dosage pump	option
25	--	Y5	
26	--	Y6	
27	--	Y7	
0 Volt-Quick fit plug	blue	Gnd. connection for 12V solenoid valves and related potential for inputs	

17.2.6 - Wiring diagram electronic control + dosage pump + overfill prevention amplifier

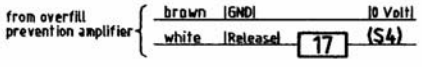


Terminal	Colour	Function	Note
17	white	S4 : Sening overfill prevention amplifier / pressure switch	optional
18	green	S3 : Product level	Dosage pump
19	brown	S2 : End position	Dosage pump
20	white	S1 : Idle position	Dosage pump
21	brown	Y1 : wet hose	
22	brown	Y2 : Dry hose	
23	grey	Y3 : Dosage pump	option,see also drawing No.61.351017
24	brown	Y4 : Bypass	
25	brown	Y5 : Hose 1	
26	brown	Y6 : Hose 2	
27	brown	Y7 : Unmetered	
0 Volt-Quick fit plug	blue	Gnd. connection for 12V solenoid valves and related potential for inputs	
	yellow+ pink	0V from Dosage pump	

overfill prevention amplifier with solenoid valve (optional)

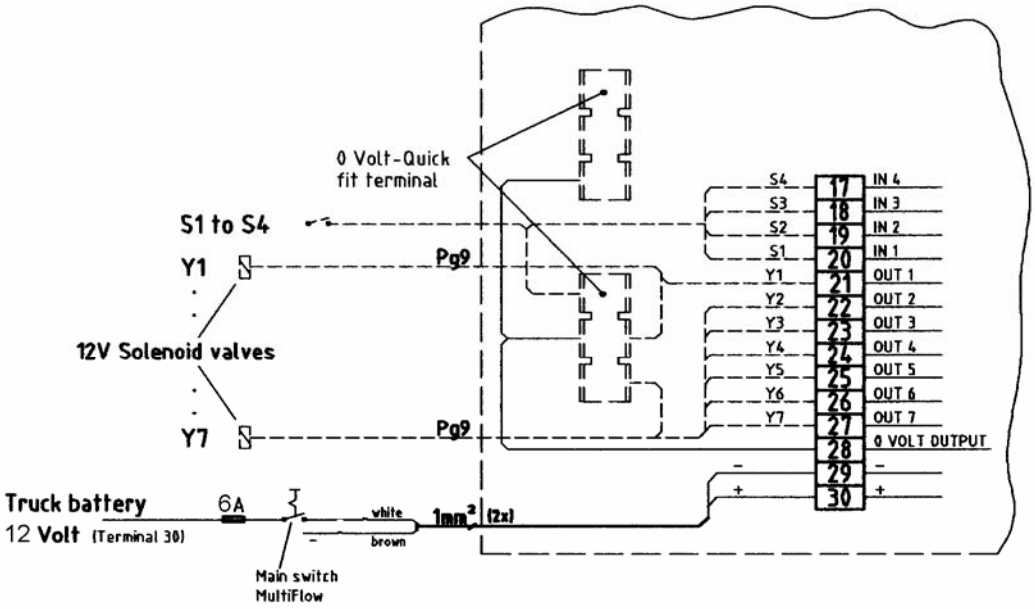


F.A. Sening overfill prevention amplifier (optional)



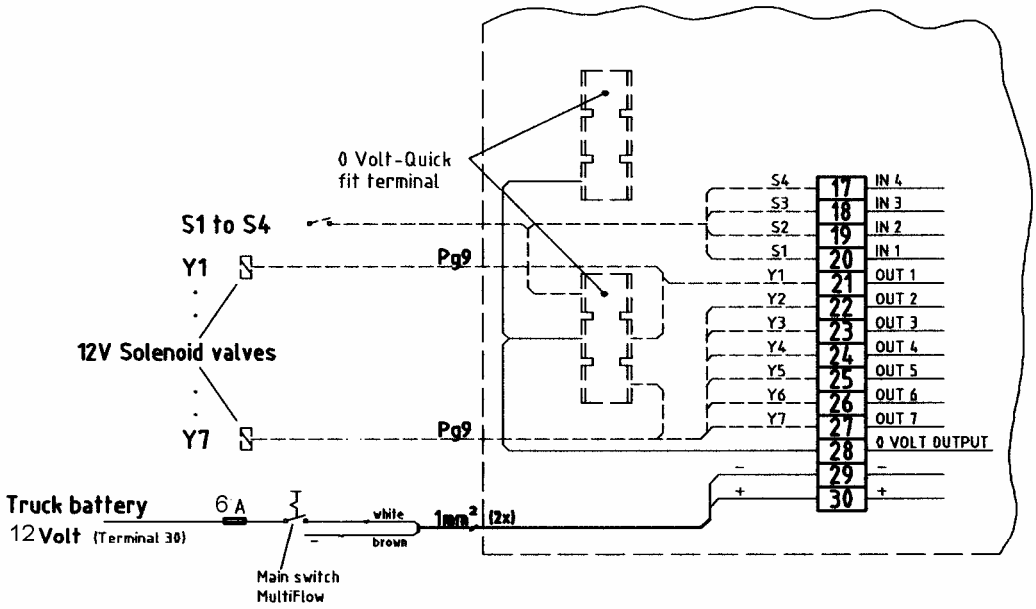
only for connection of F.A. Sening amplifier type: ASE-D-MF, ASE-E-MF or ASE-M

17.2.7 - Wiring diagram electronic control + flow control



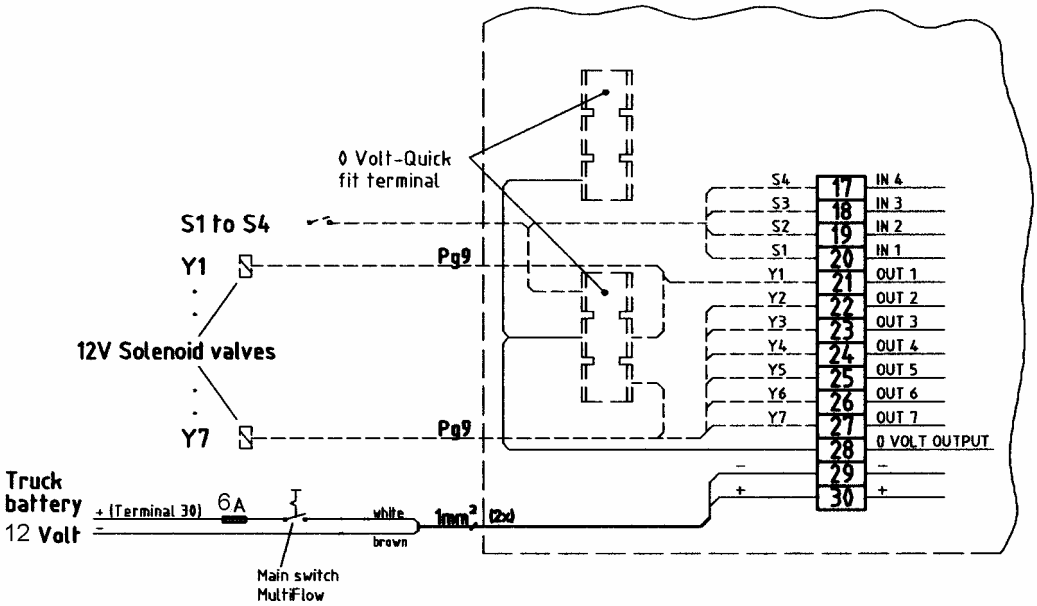
Terminal	Colour	Function
17	--	S4 : Overfill prevention amplifier
21	brown	Y1 : Wet hose low flow
22	brown	Y2 : Dry hose low flow
23	brown	Y3 : Wet hose high flow
24	brown	Y4 : Dry hose high flow
25	brown	Y5 : Wet hose 1
26	brown	Y6 : Wet hose 2
27	brown	Y7 : Unmetered
0 Volt Quick fit plug	blue	Gnd. connection for 12V solenoid valves and related potential for inputs

17.2.8 - Wiring diagram electronic control, dosage pump and blow down



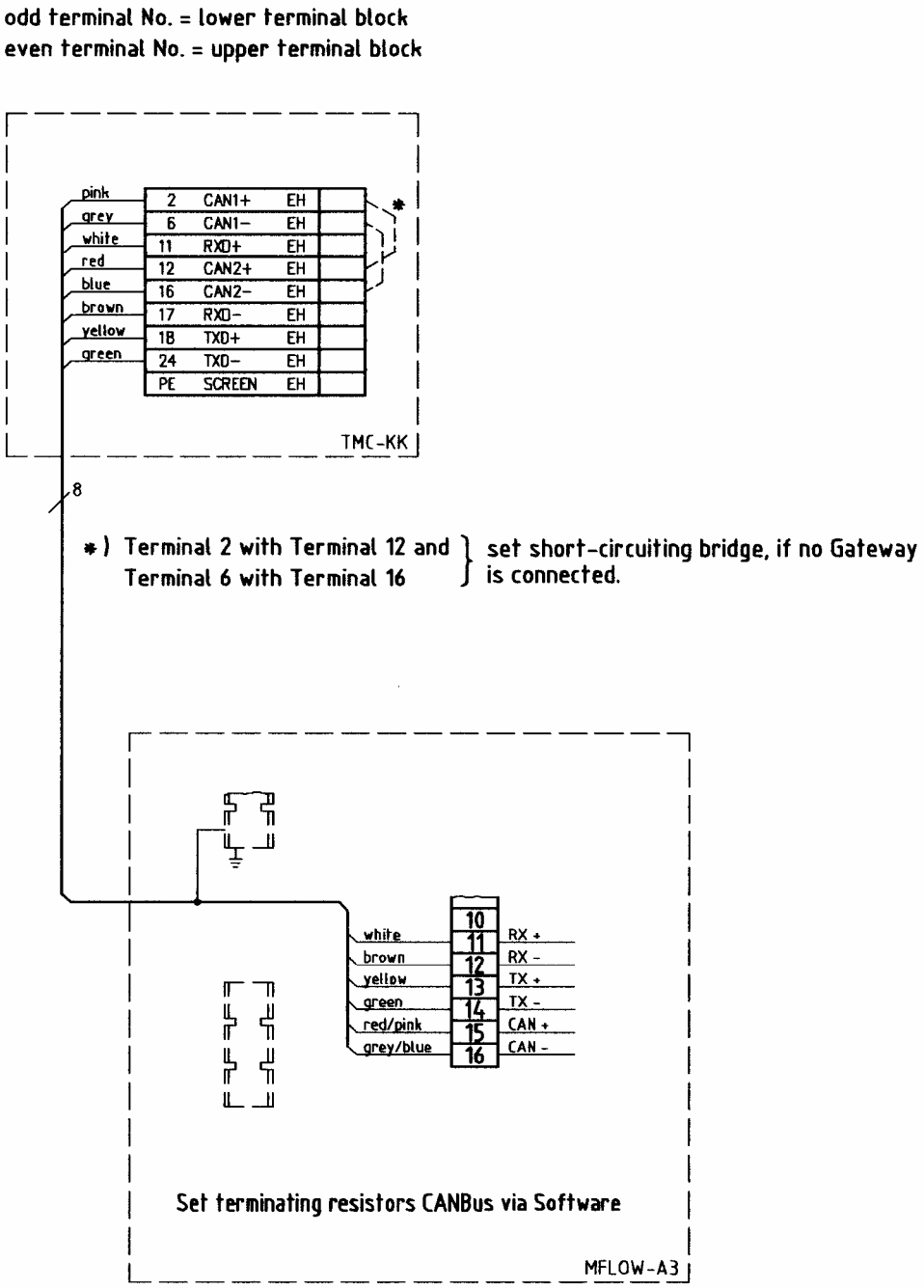
Terminal	Colour	Function	Note
17	white	S4 : Discharge interlock	Product Transfer / Self Loading
18	green	S3 : Product level	Dosage pump
19	brown	S2 : End position	Dosage pump
20	white	S1 : Idle position	Dosage pump
21	brown	Y1 : Wet hose low flow	
22	brown	Y2 : Dry hose low flow	not avaible if no GVL80-Mx (two-stage-valve) is used. In this case only Y4 is activated (single stage operation)
23	brown	Y3 : Wet hose high flow	
24	brown	Y4 : Dry hose high flow	
25	brown	Y5 : Dosage pump	
26	brown	Y6 : not used	
27	brown	Y7 : Blow down	
0 Volt-Quick fit plug	blue	Gnd. connection for 12V solenoid valves and related potential for inputs	

17.2.9 - Wiring diagram electronic control with flow control and dosage pump



Terminal	Colour	Function	Note
17	white	S4 : Overfill prevention amplifier	optional
18	green	S3 : Product level	Dosage pump
19	brown	S2 : End position	Dosage pump
20	white	S1 : Idle position	Dosage pump
21	brown	Y1 : Wet hose low flow	
22	brown	Y2 : Dry hose low flow	
23	brown	Y3 : Wet hose high flow	
24	brown	Y4 : Dry hose high flow	
25	brown	Y5 : Wet hose1	
26	brown	Y6 : Wet hose2	
27	brown	Y7 : Dosage pump	optional
0 Volt-Quick fit plug	blue	Gnd. connection for 12V solenoid valves and related potential for inputs	

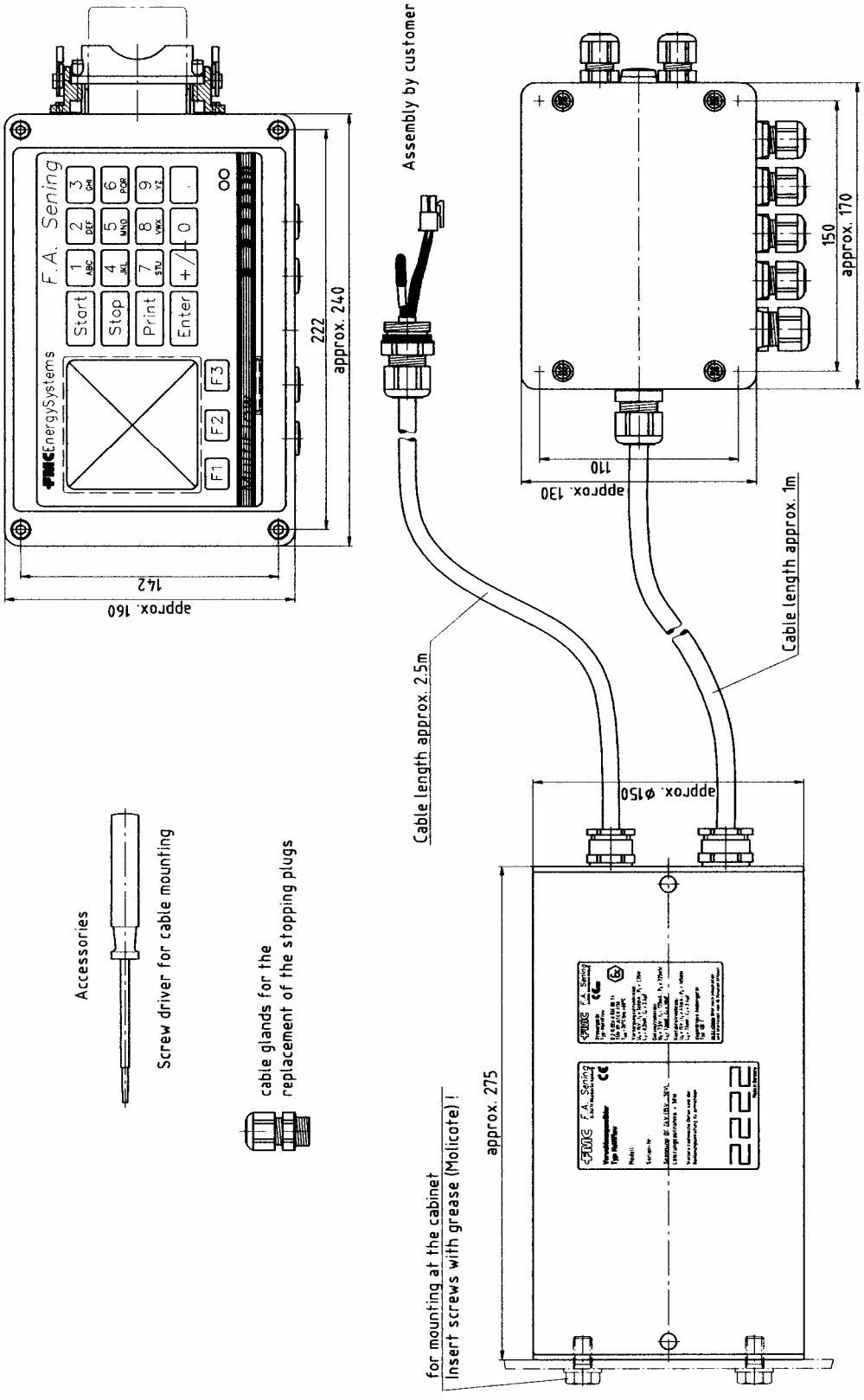
17.2.10 - Wiring diagram TMC-KK to MFLOW-A3 (Version A3)



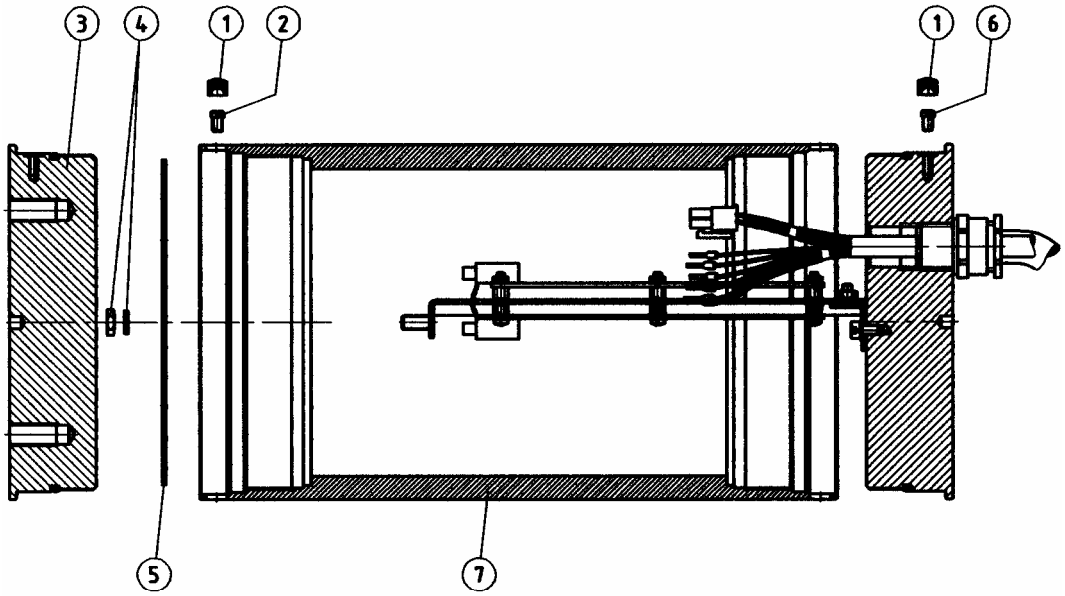
17.2.11 - Sealing Arrangement for Sening MultiFlow (Version A3) – Left Side

17.2.12 - Sealing Arrangement for Sening MultiFlow (Version A3) - Right Side

17.2.13 - Explosion-proof housing (Version A1)



17.2.14 - Disassembly of the Ex-housing

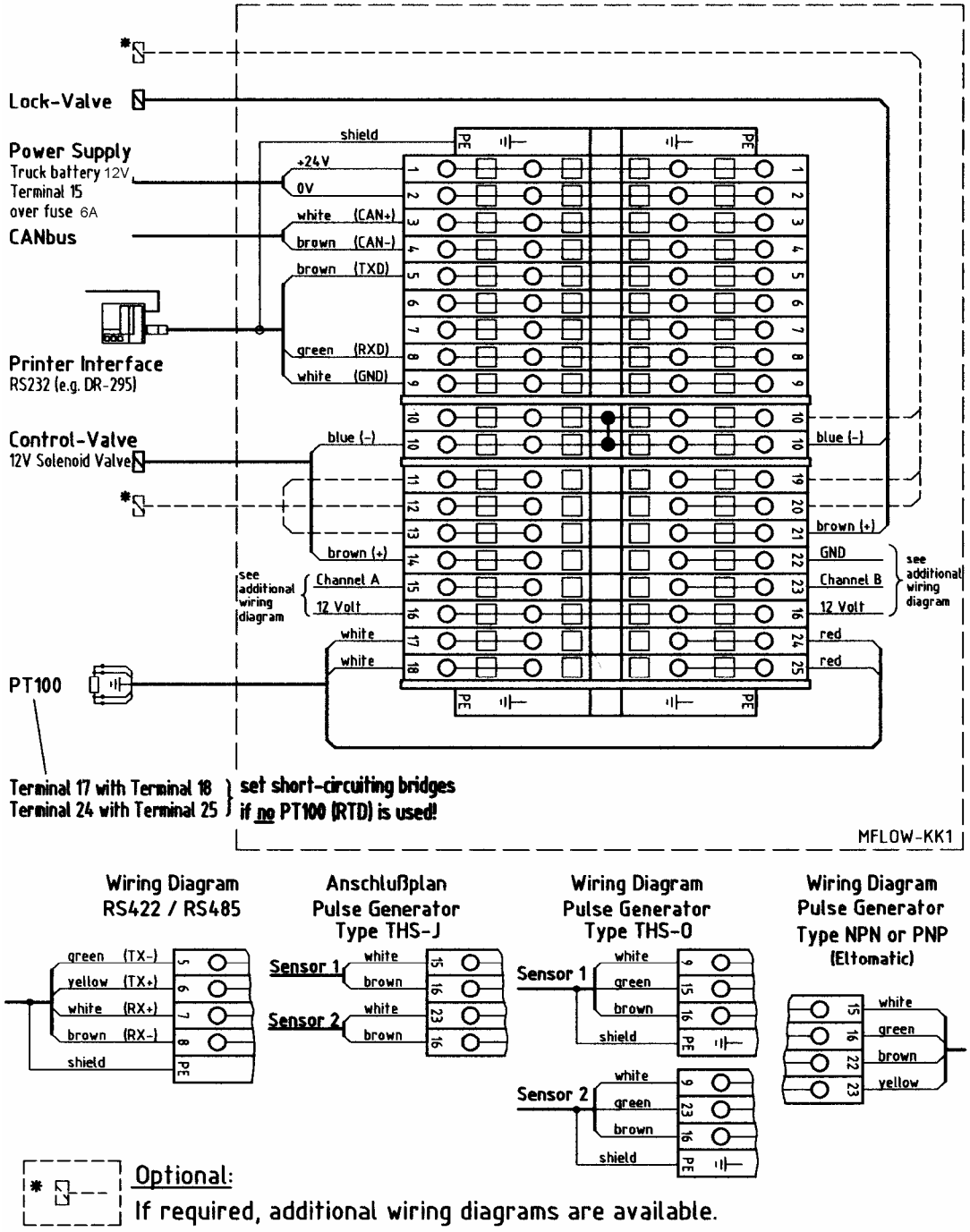


1. Remove the lead seals
2. Unscrew the "slotted pan head screw"
3. Unscrew / open the cover
4. Remove the hexagon nut (2x) and the toothed lock washer (2x)
5. Pull the disk out of the pipe (housing)
6. Unscrew the "slotted pan head screw"
7. Unscrew the pipe (housing) from the cover

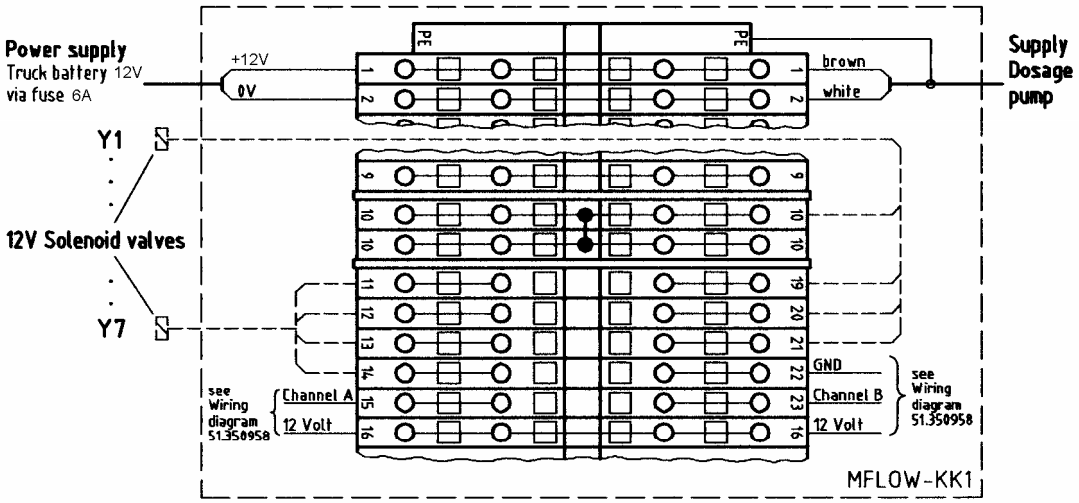
Take care:

O-Ring seals (Cover) must be greased!

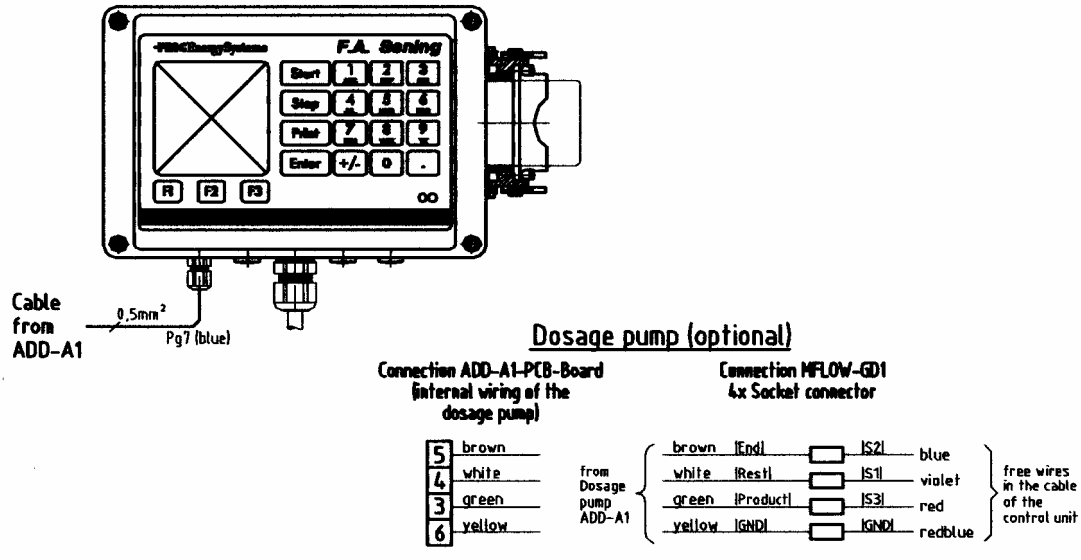
17.2.15 - Wiring Diagram (Version A1)



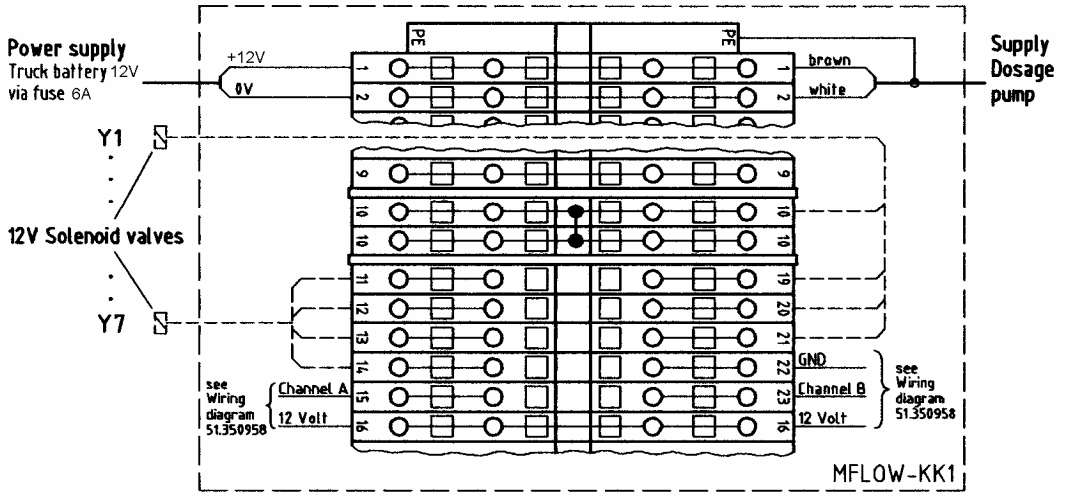
17.2.16 - Wiring diagram pneum. control switch + dosage pump



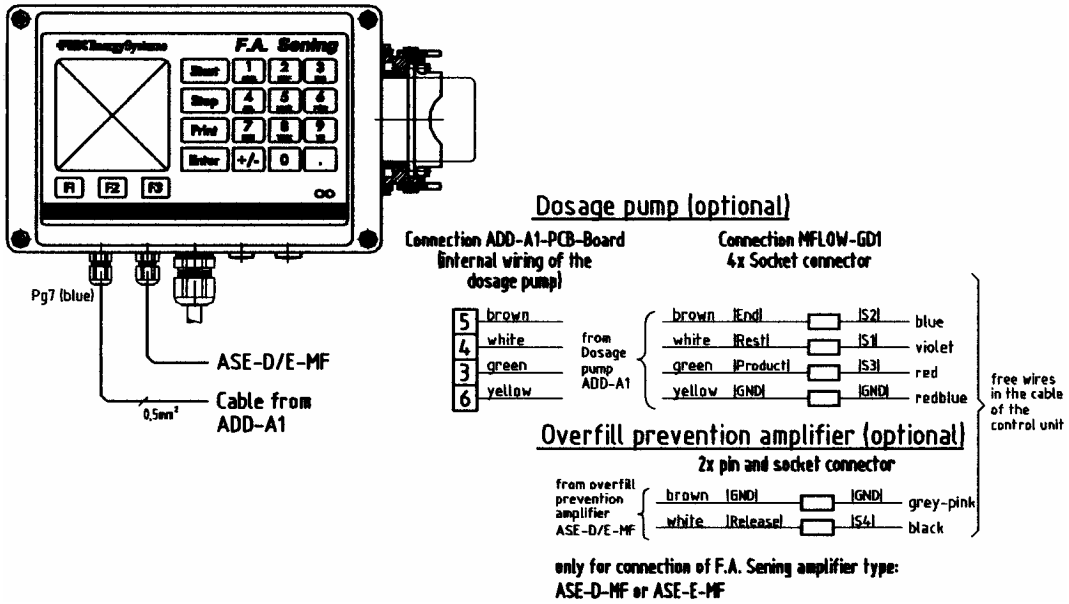
Terminal	Colour	Function	Note
14	brown	Y1 : Release hose	
21	brown	Y2 : Release control switch	
13	brown	Y3 : Dosage pump	option
20	--	Y4	
12	--	Y5	
19	--	Y6	
11	--	Y7	
10	blue	0 V Connection for solenoid valves	



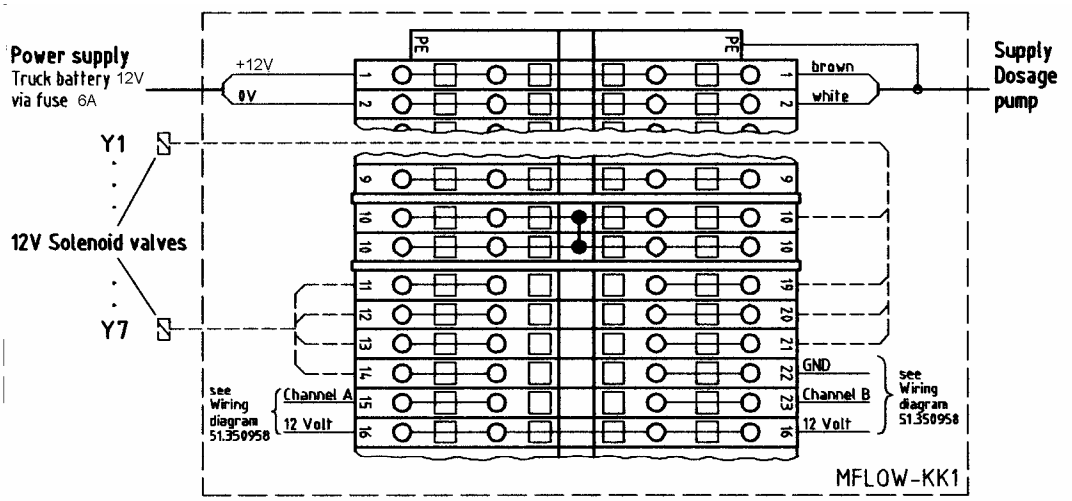
17.2.17 - Wiring diagram pneum. control switch with flow control + dosage pump + overfill prevention amplifier



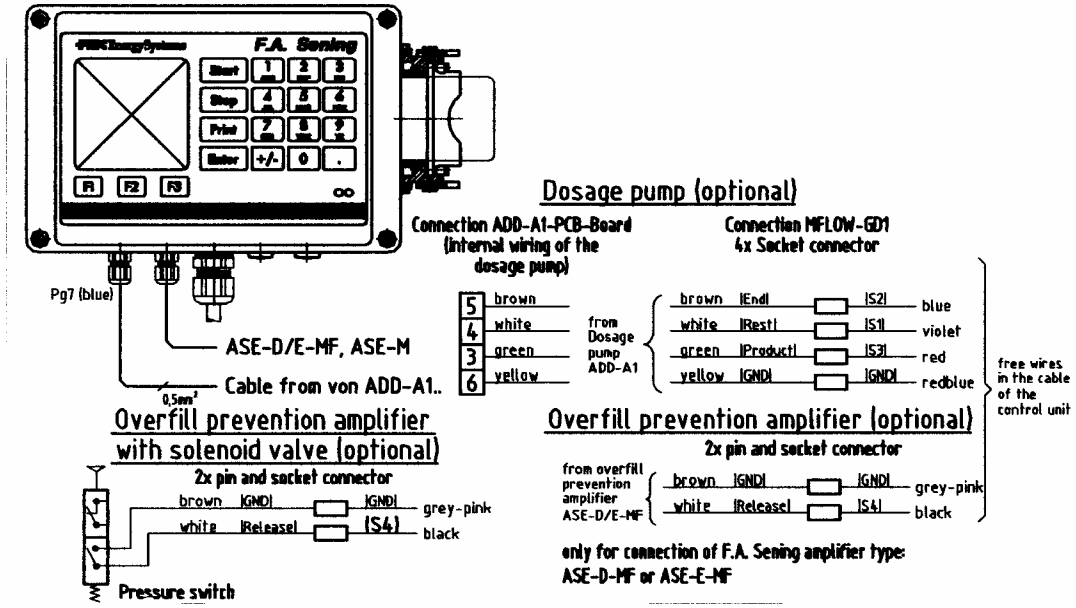
Terminal	Colour	Function	Note
14	brown	Y1 : Release low flow (Bypass)	
21	brown	Y2 : Release high flow	
13	brown	Y3 : Release control switch	
20	brown	Y4 : Dosage pump	option
12	--	Y5	
19	--	Y6	
11	--	Y7	
10	blau	0 V Connection for solenoid valves	



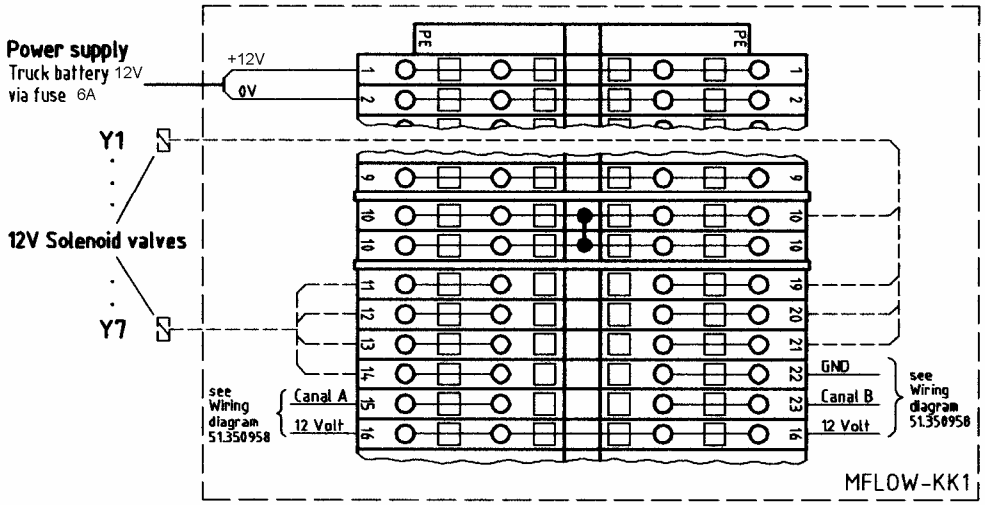
17.2.18 - Wiring diagram electronic control + dosage pump + overfill prevention amplifier



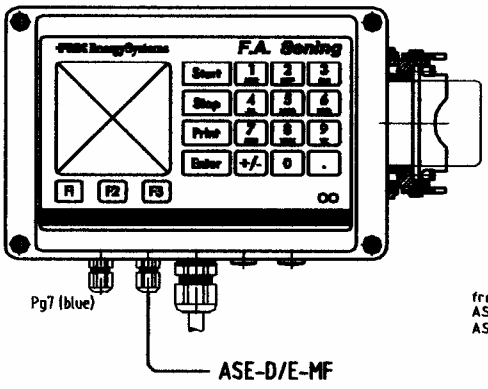
Terminal	Colour	Function	Note
14	brown	Y1 : Wet hose	
21	brown	Y2 : Dry hose	
13	brown	Y3 : Dosage pump	option
20	brown	Y4 : Bypass	
12	brown	Y5 : Hose 1	
19	brown	Y6 : Hose 2	
11	brown	Y7 : Unmetered	
10	blue	0 V Connection for solenoid valves	

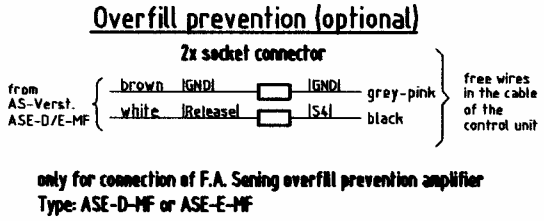


17.2.19 - Wiring diagram electronic control + flow control

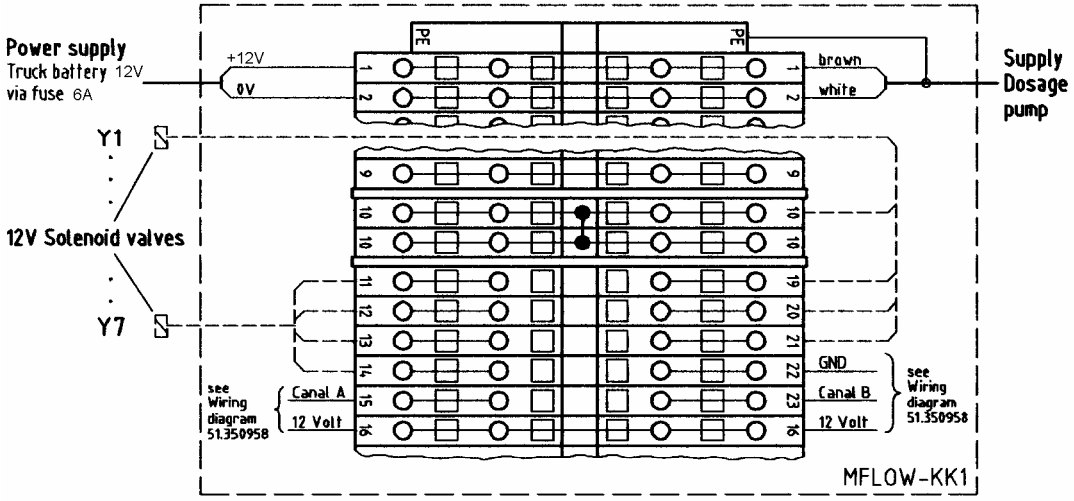


Terminal	Colour	Function
14	brown	Y1 : Wet hose low flow
21	brown	Y2 : Dry hose low flow
13	brown	Y3 : Wet hose high flow
20	brown	Y4 : Dry hose high flow
12	brown	Y5 : Wet hose 1
19	brown	Y6 : Wet hose 2
11	brown	Y7 : Unmetered
10	blue	0 V connection for solenoid valves

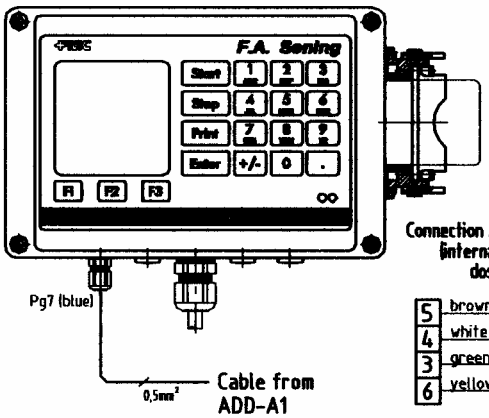


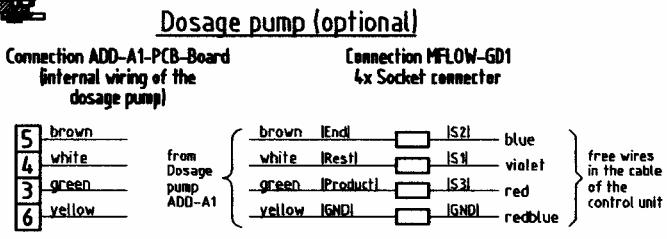


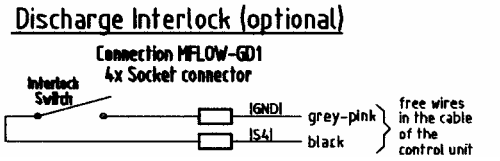
17.2.20 - Wiring diagram electronic control, dosage pump and blow down



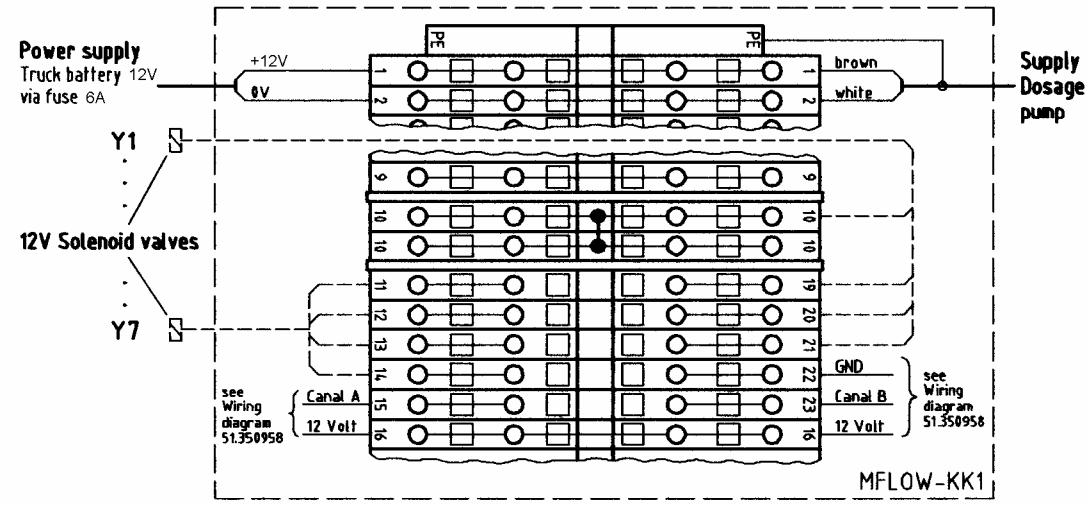
Terminal	Colour	Function	Note
14	brown	Y1 : Wet hose low flow	
21	brown	Y2 : Dry hose low flow	
13	brown	Y3 : Wet hose high flow	
20	brown	Y4 : Dry hose high flow	
12	brown	Y5 : Dosage pump	
19	brown	Y6 : not used	
11	brown	Y7 : Blow down	
10	blue	0 V Connection for solenoid valves	



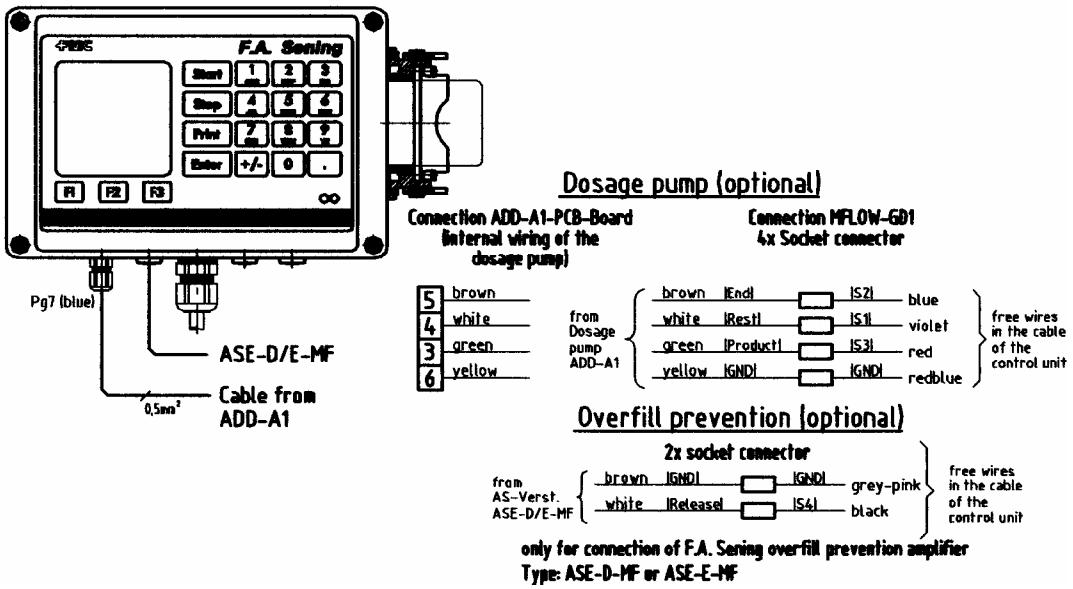




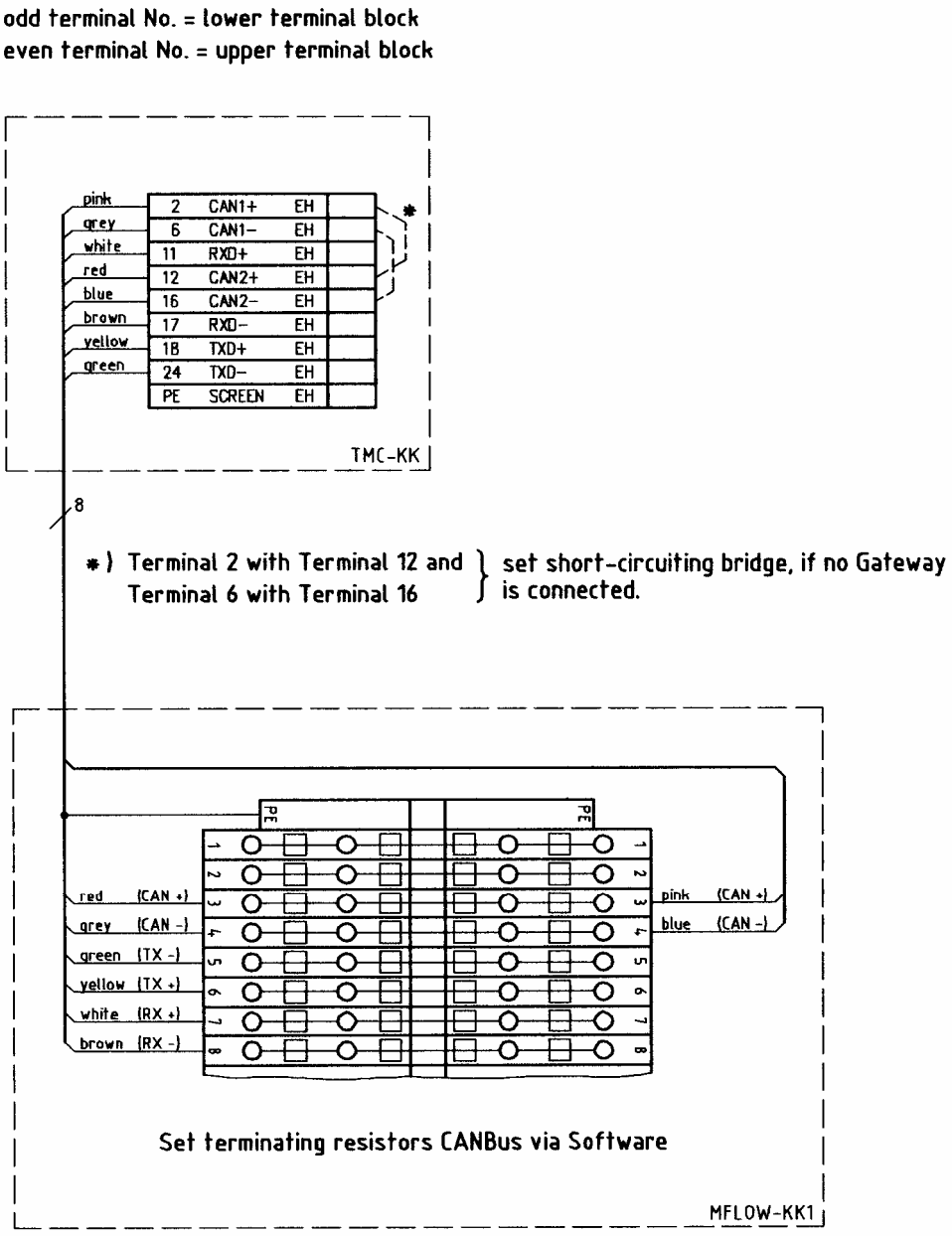
17.2.21 - Wiring diagram electronic control with flow control and dosage pump



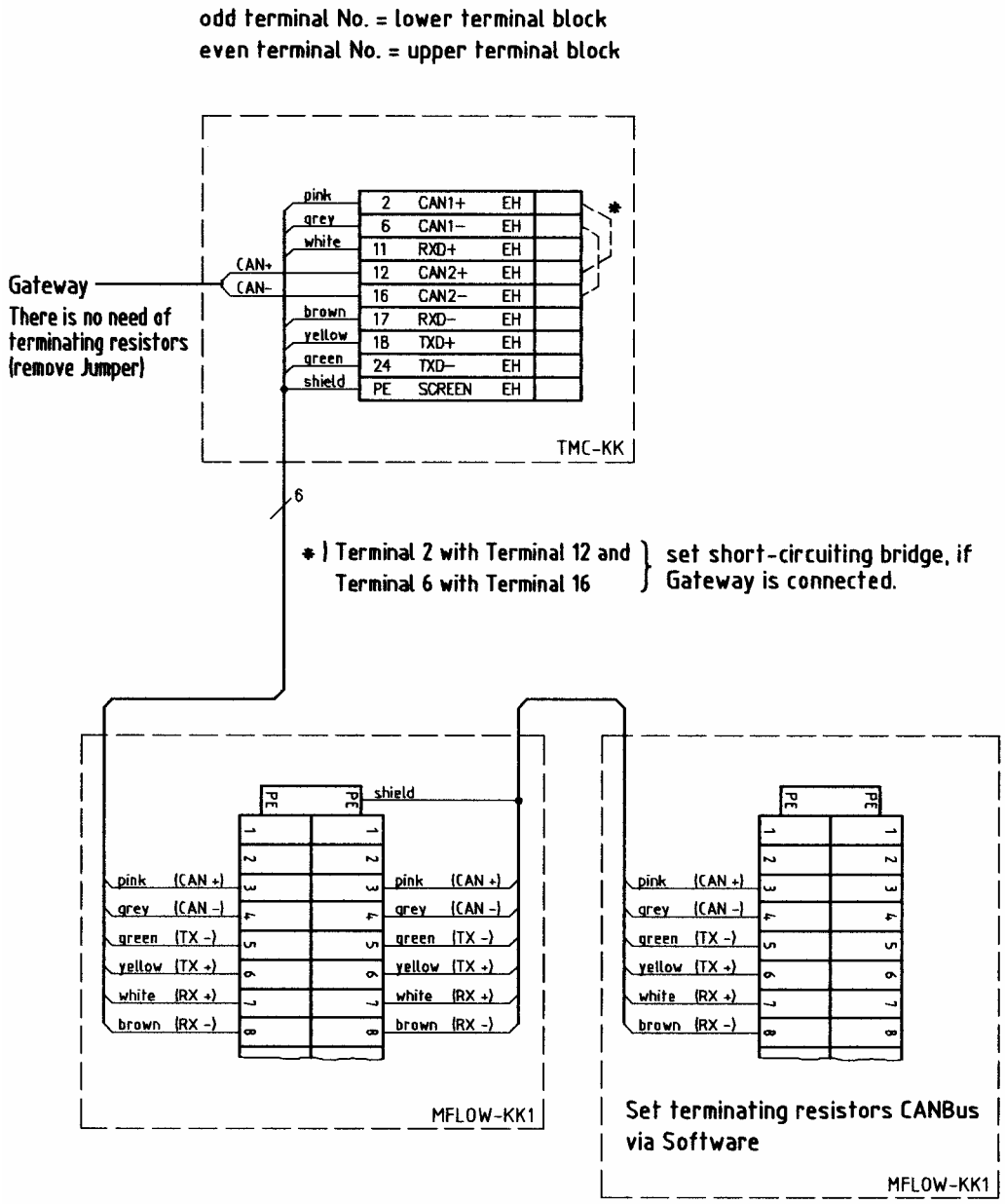
Terminal	Colour	Function	Note
14	brown	Y1 : Wet hose low flow	
21	brown	Y2 : Dry hose low flow	
13	brown	Y3 : Wet hose high flow	
20	brown	Y4 : Dry hose high flow	
12	brown	Y5 : Wet hose1	
19	brown	Y6 : Wet hose2	
11	brown	Y7 : Dosage pump	optional
10	blue	0 V Connection for solenoid valves	



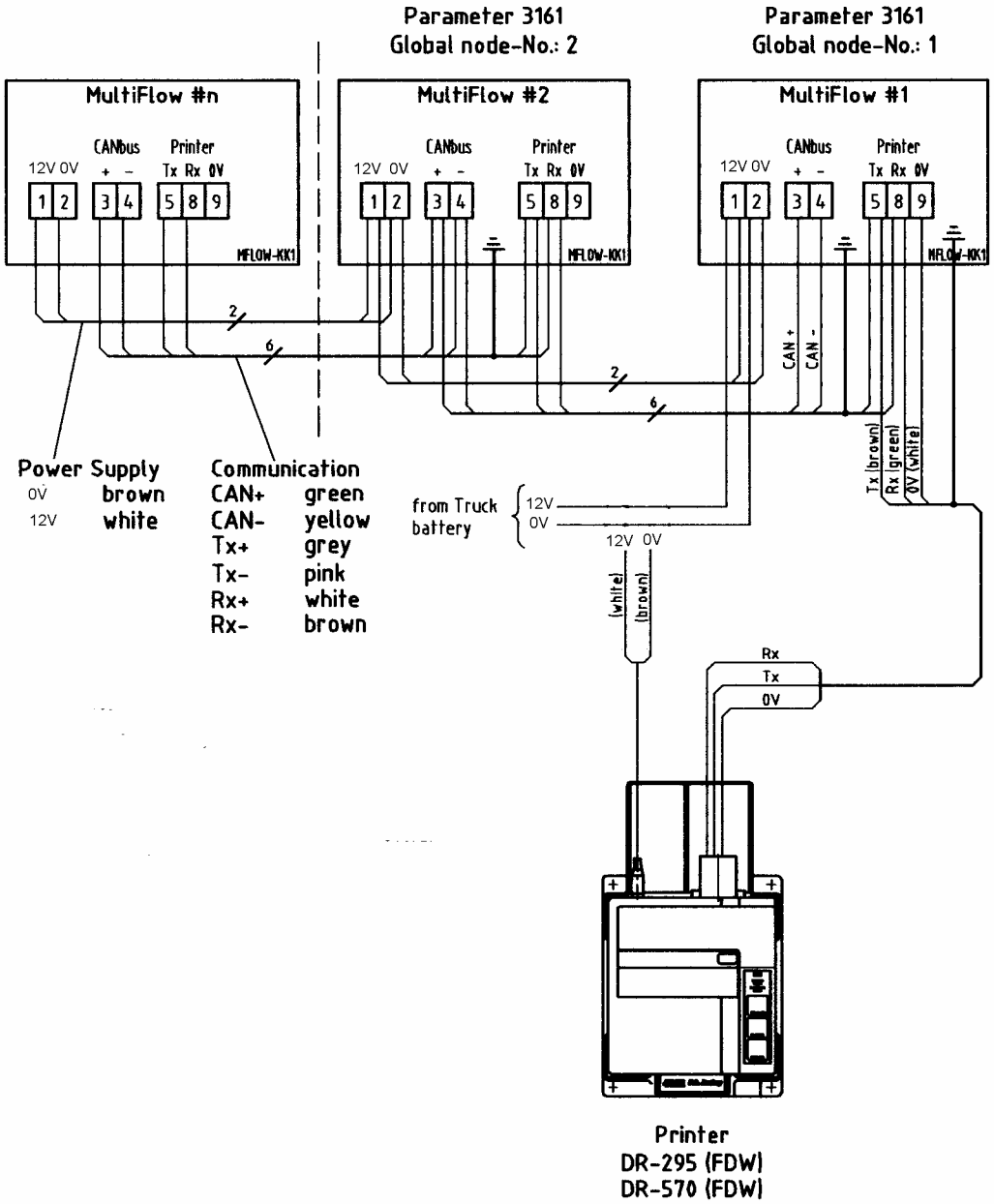
17.2.22 - Wiring diagram TMC-KK to MFLOW-KK1 (Version A1)



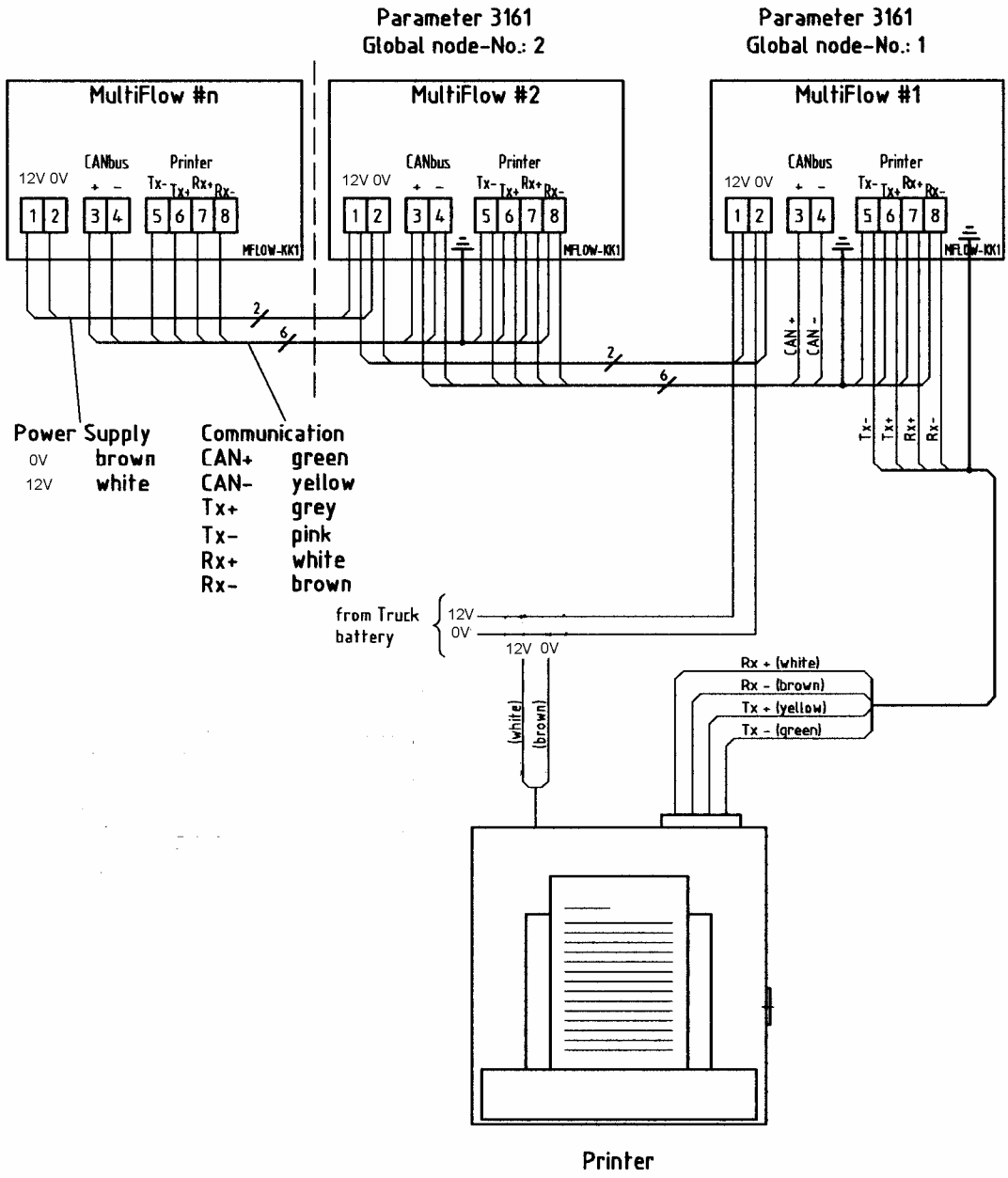
17.2.23 - Wiring diagram TMC-KK to two MFLOW-KK1 (Version A1)



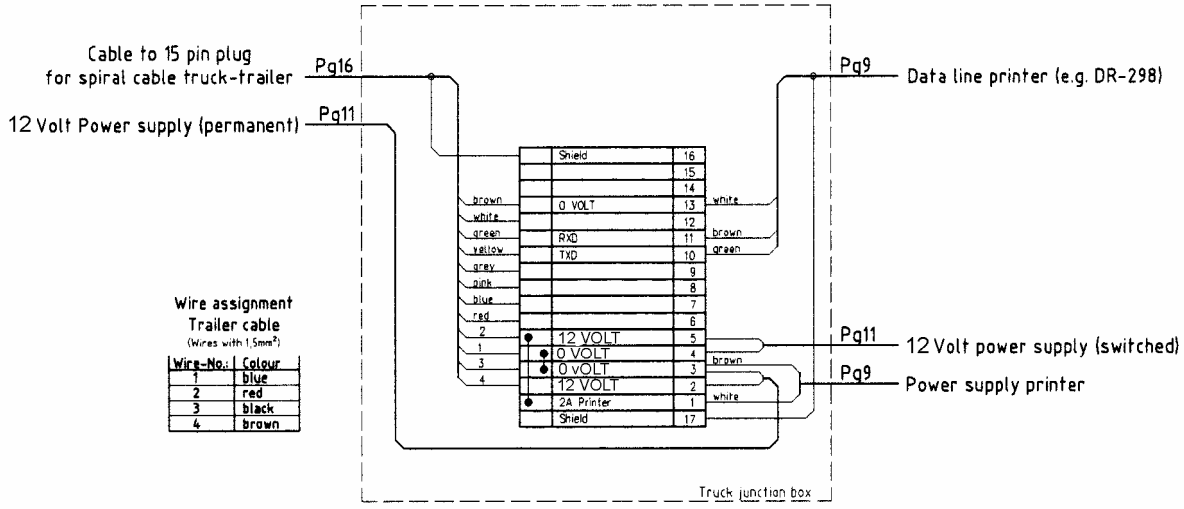
17.2.24 - Wiring diagram RS232 - Interface (Version A1) - Page 1



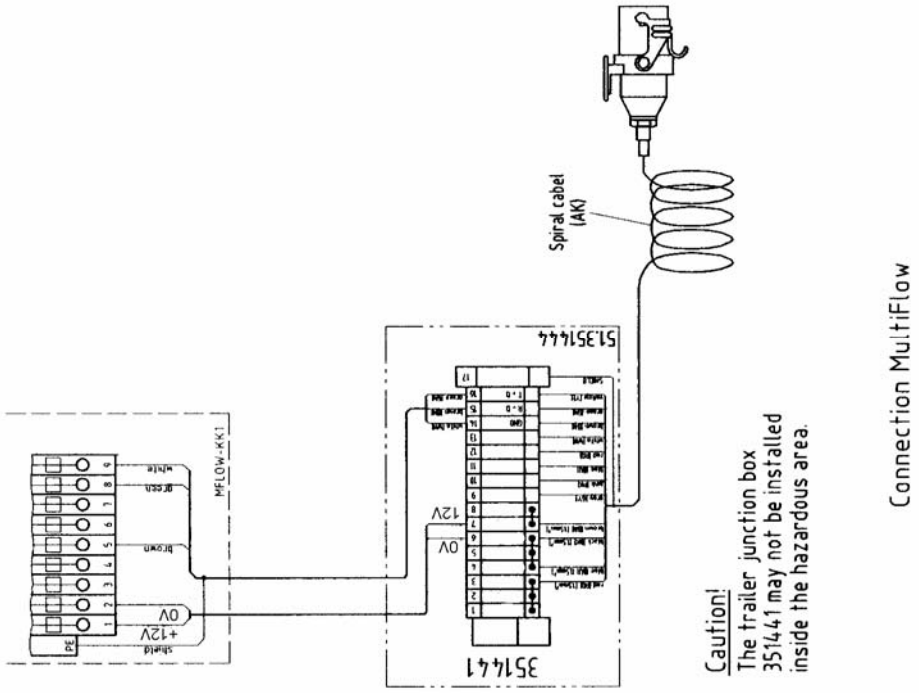
17.2.25 - Wiring diagram RS232 - Interface (Version A1) - Page 2



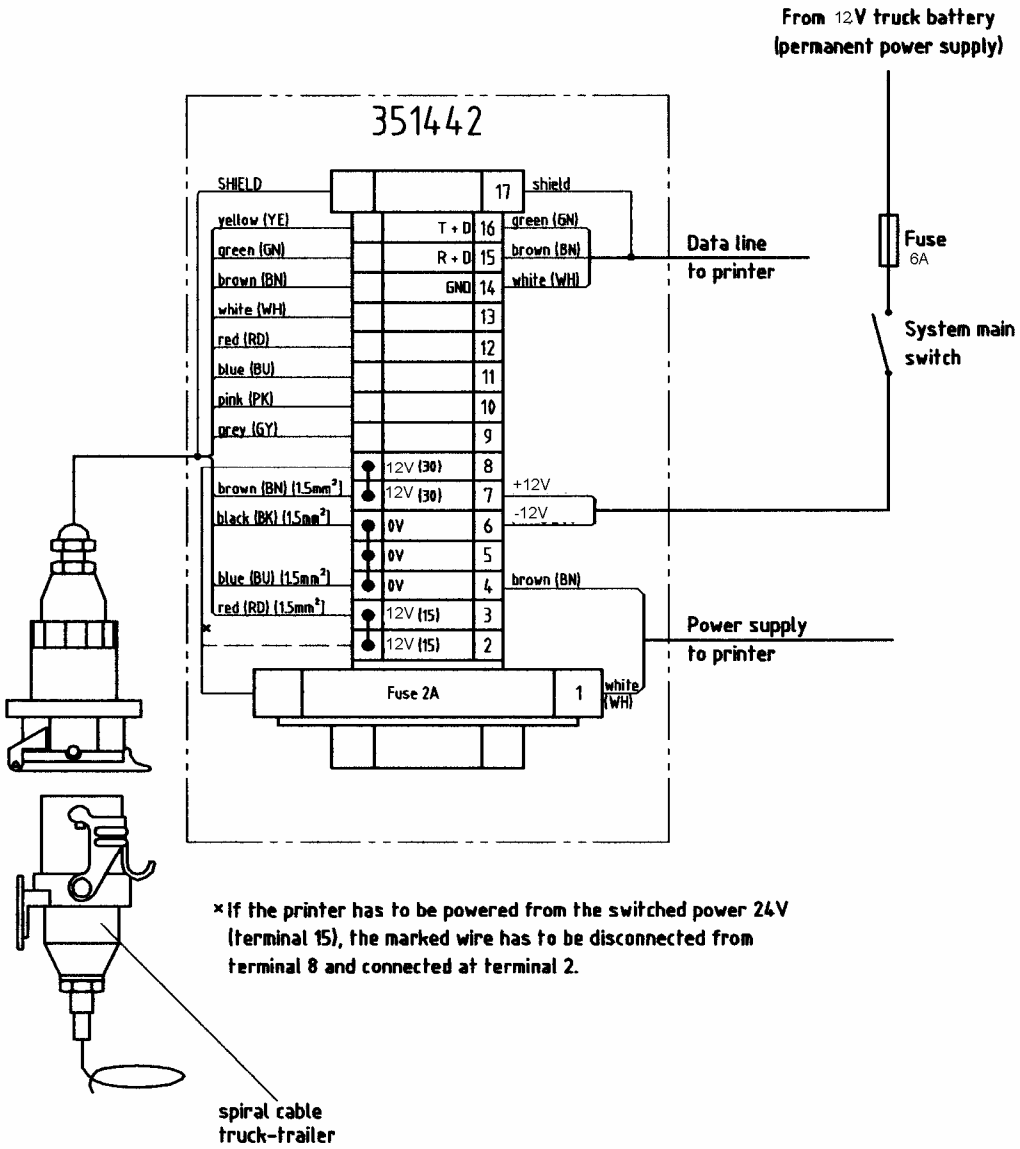
17.2.26 - Wiring diagram junction box truck to Sening MultiFlow (Version A1)



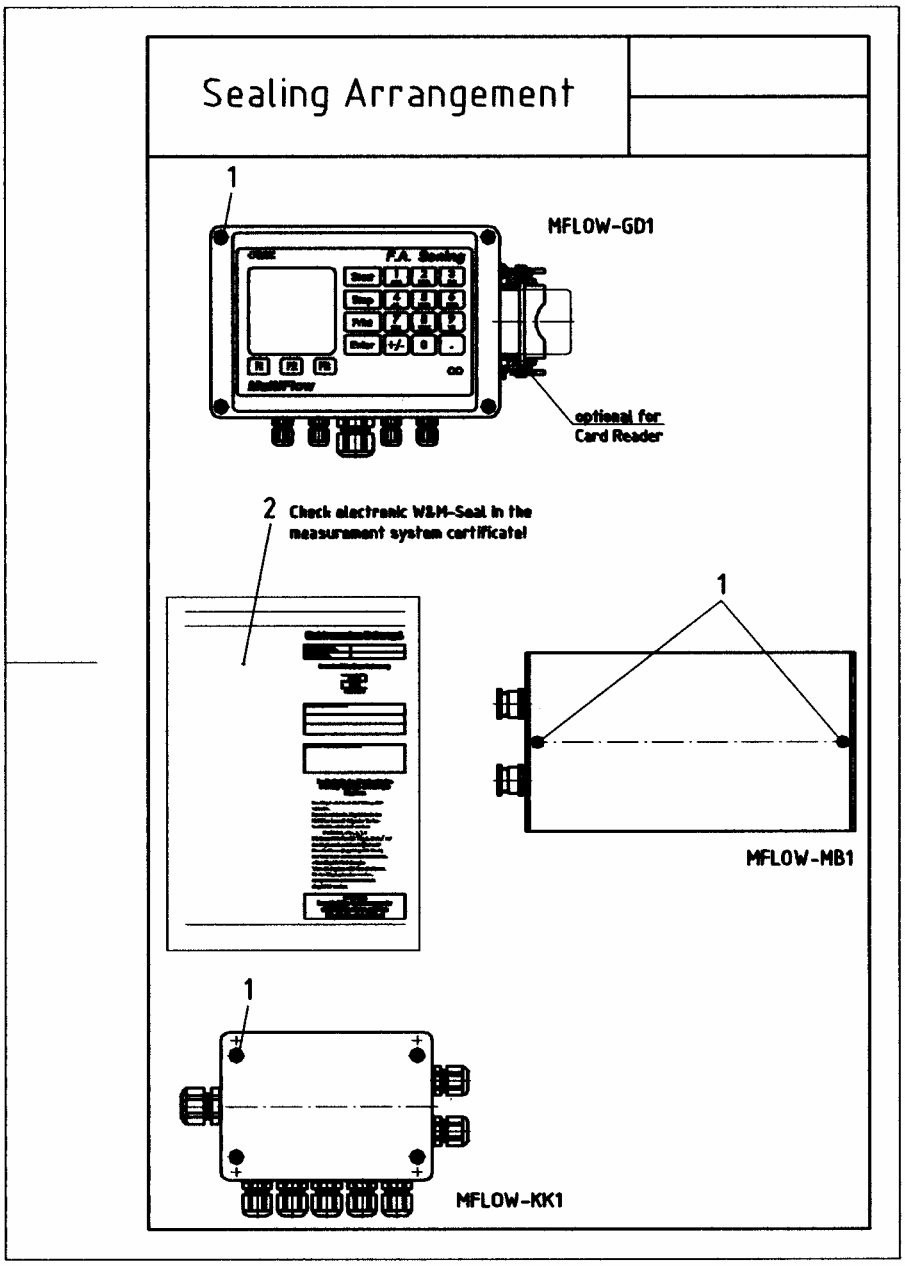
17.2.27 - Wiring diagram connection of single Sening MultiFlow to junction box CS-KK-1



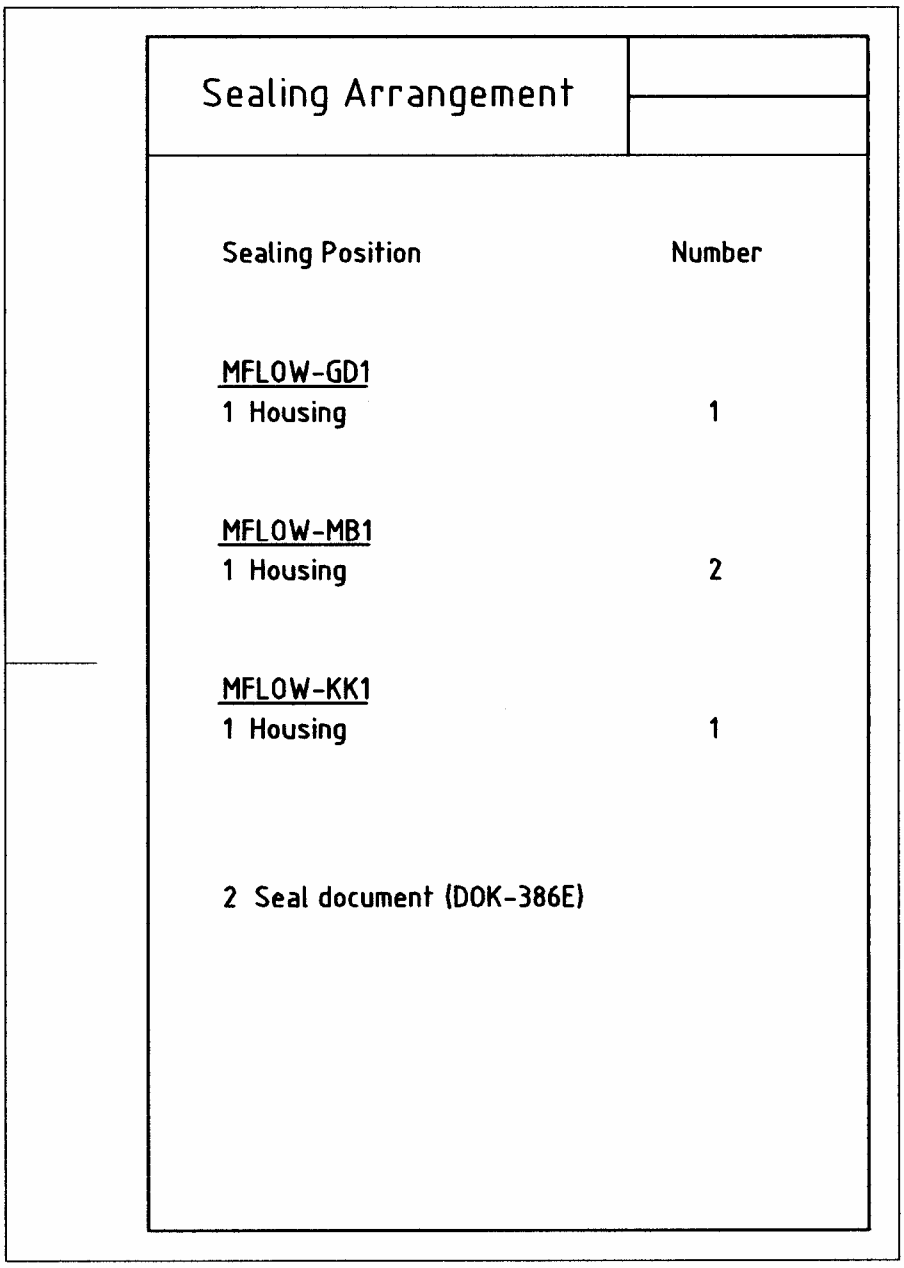
17.2.28 - Wiring diagram junction box truck, type 351442, to Sening MultiFlow (Version A1)



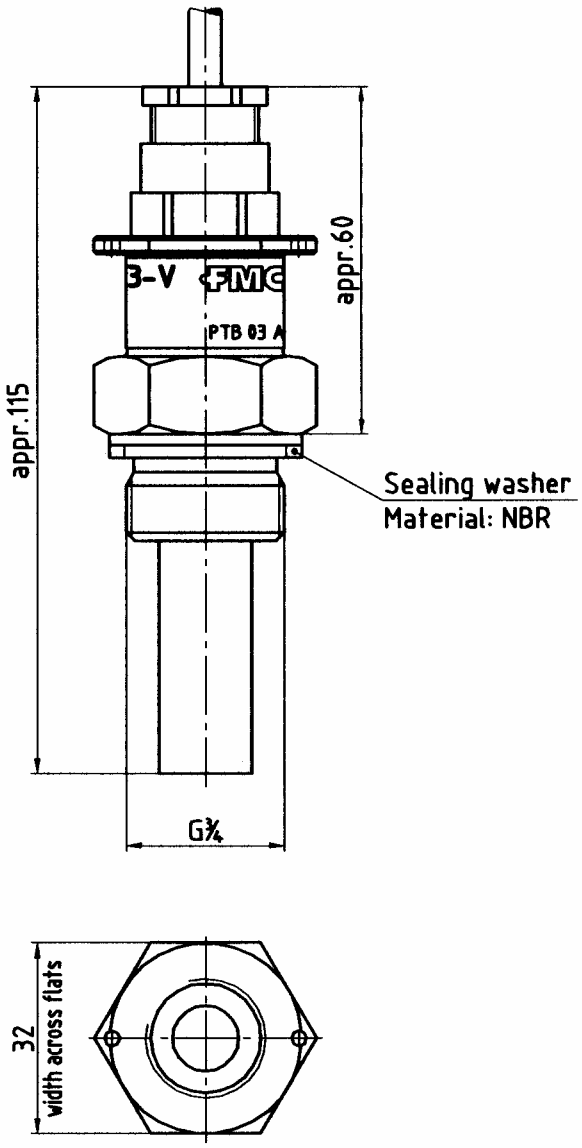
17.2.29 - Sealing Arrangement for Sening MultiFlow (Version A1) - Page 1



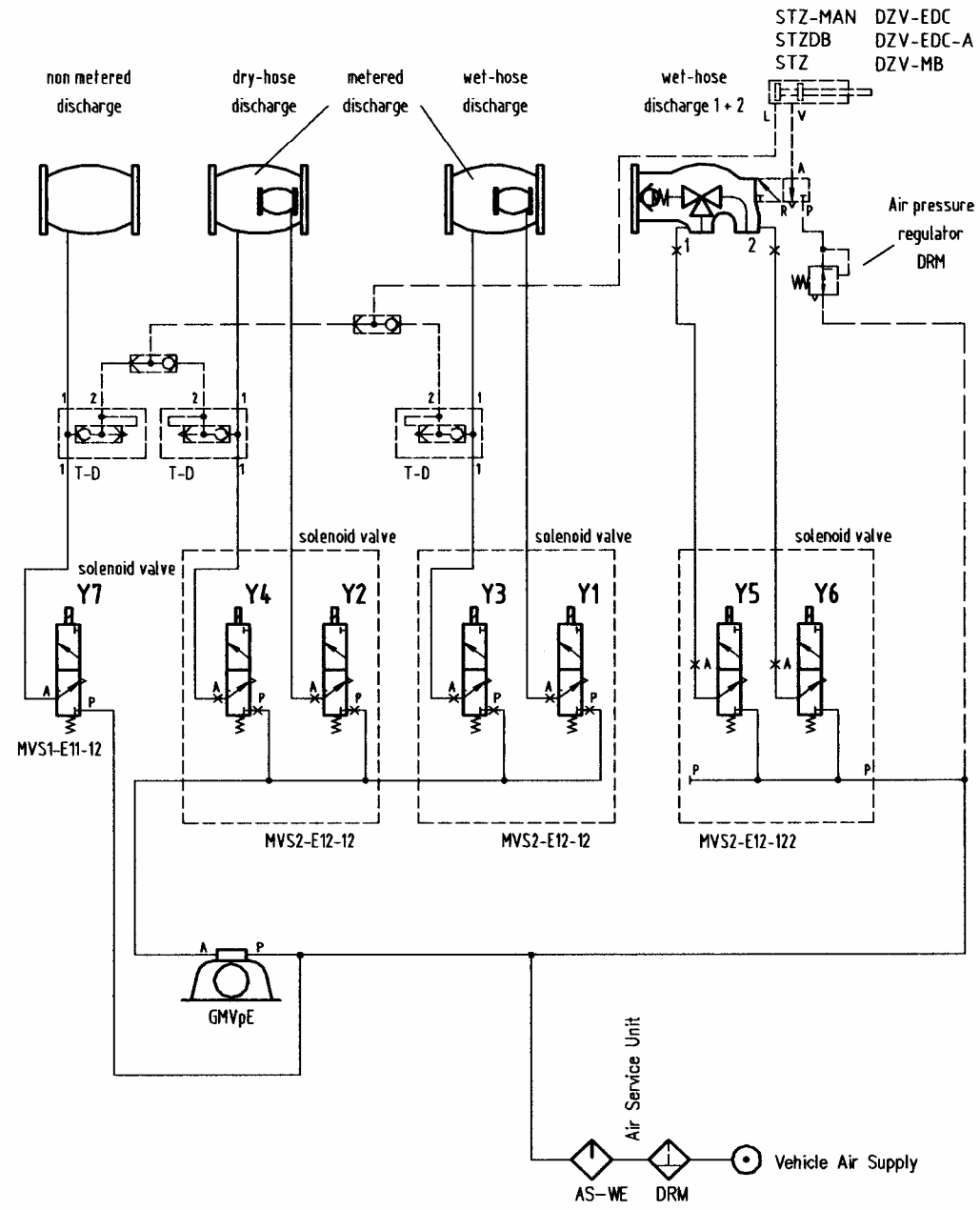
17.2.30 - Sealing Arrangement for Sening MultiFlow (Version A1) - Page 2



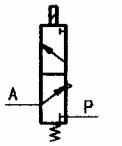
17.2.31 - Sensor, pre-approval



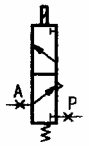
17.2.32 - Pneumatic Circuit Diagram: Meter Package with Sening MultiFlow



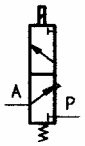
17.2.33 - Solenoid Valves Connection Diagrams & Order Codes



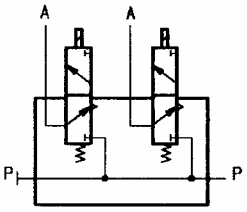
MVS1-E11-12



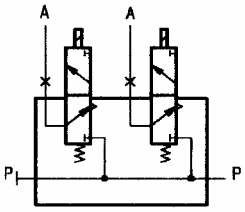
MVS1-E11-122
MVS1-E11-262



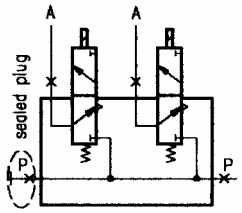
MVS1-S11-12K
MVS1-S11-24K



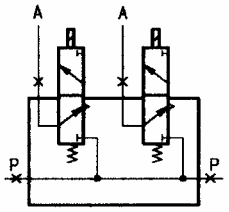
MVS2-E12-12



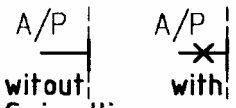
MVS2-E12-122



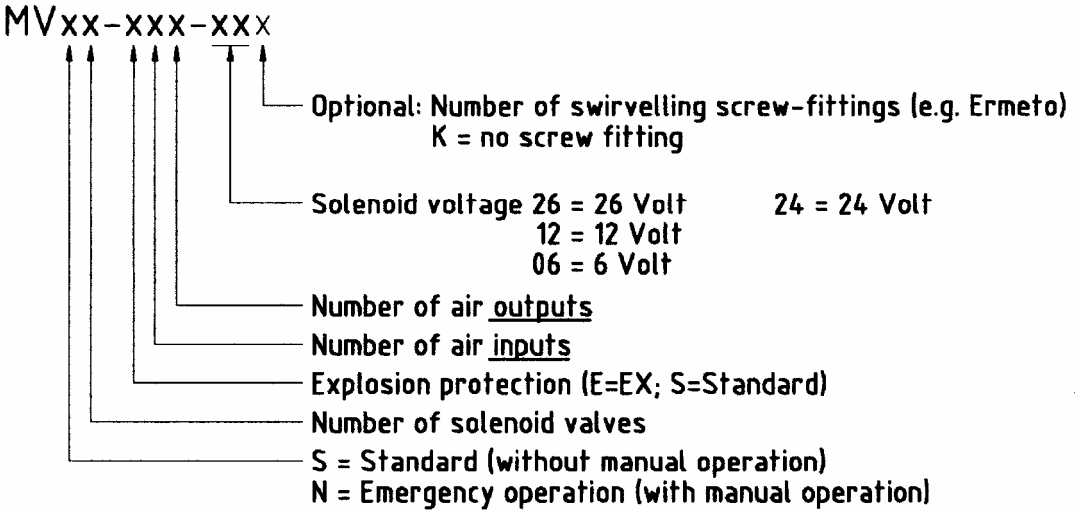
MVS2-E12-123
MVS2-E12-263



MVS2-E12-124
MVS2-E12-264



Swirvelling screw-fitting (e.g. Ermeto)



17.4 Certificates

17.4.1 W & M seal form (blank)

FMC EnergySystems
FMC Measurement Solutions

Electronic Register
MultiFlow
Seal Receipt

Rev. 2.21 AS / Date: 08.07.2003 / Part-No. DOK-383E

Electronic Weights & Measures Seal

as
appendix to measurement
system certificate

Internal state type approval

5.602
97.10
MultiFlow

The seal was produced by:

Signature and identification of official:

It is essential to observe the following instructions when checking the seal status:

- The seal is not violated by the inspection.
- The seal impression opposite for the Multiflow can be repeated with the following key combination:
  Switch On <***F1***> *(Seal Status)*
  <***F1***> *(Print)*
- The code number in the 'Seal status' area on the copy and on the original must match (double-sized printing).
- The text under the code number must read:
  `*The seal is approved!*`
- If the details do not match, the seal has been broken. Appropriate action must be initiated.

IMPORTANT:
Illegal modification of the W & M data or the W & M seal is a punishable offence!

FASening *Economic Tank Truck Systems*

Revisions included in MN06514 Issue/Rev. 0.1 (3/08):

- Updated Table of Contents
- Revised Valuable Facts About MultiFlow
- Omitted parts of the System Structure
- Added column to Quick Start up MiltiFlow
- Revised Printer Connection
- Revised Routing the Cables in the Vehicle
- Revised Inputs and Outputs
- Inserted Preset By Dollar Amount section
- Revised Carrying Out a Discharge (Part 3)
- Omitted parts of section 5.7
- Added Check Meter Factor Curves
- Added Expand the Tax Facility
- Added Parameters to 8.3.3.1.1
- Added Meter Factor Curves
- Added Time and Date in AM/PM Format

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