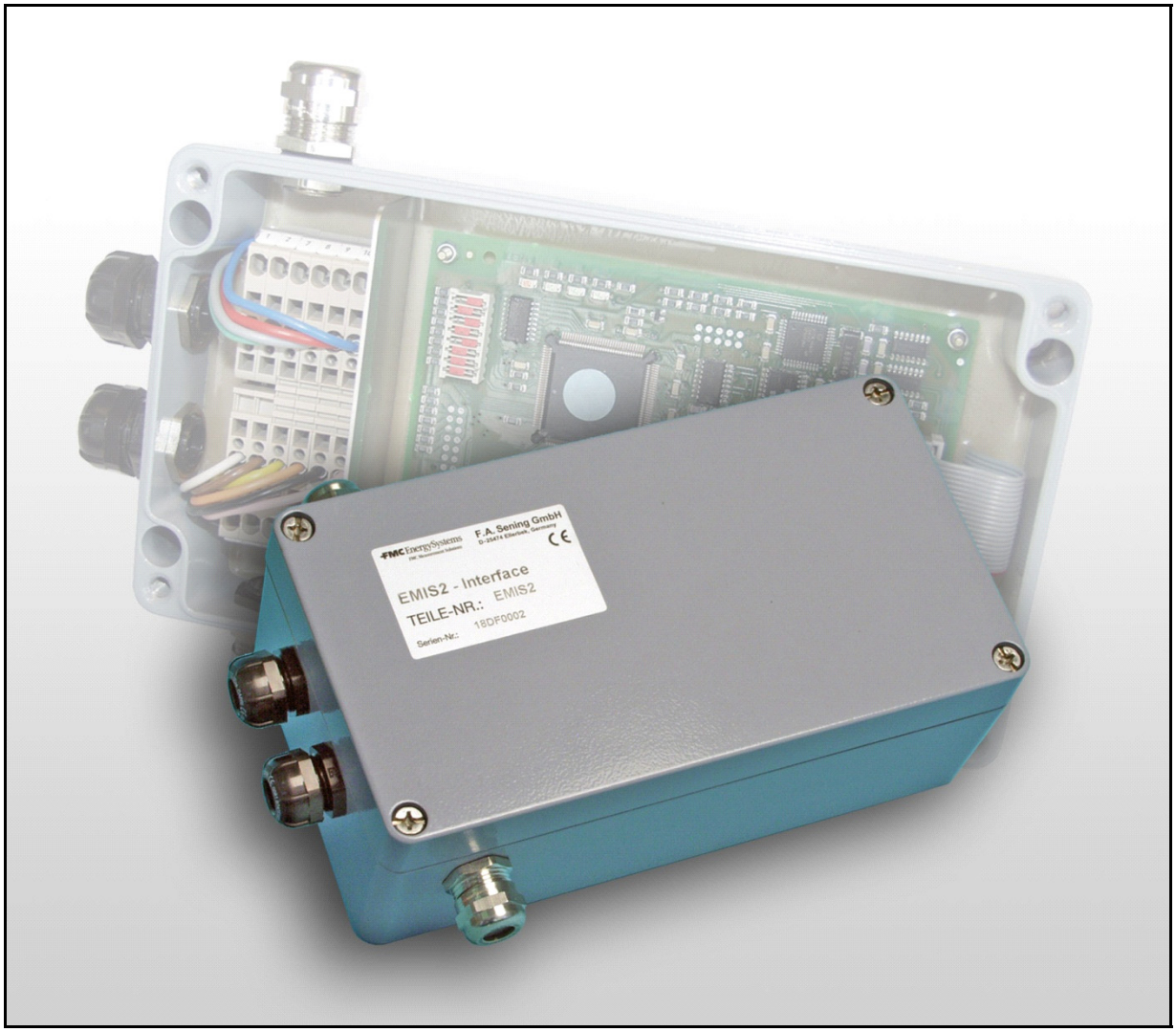
FMC Energy Systems
F.A. Sening GmbH
EMIS2 - Interface
TEILE-NR.: EMIS2
Serien-Nr.: 18DF0002

Further Dokumentation for this Product:

Description	Order No.
Workshop and Installation Manual EMIS3	DOK-493E
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Important

All information and technical specifications in this documentation have been carefully checked and compiled by the author. However, we cannot completely exclude the possibility of errors. **F.A.Sening GmbH** is always grateful to be informed of any errors.

An update service has been in for this document. If you like to receive every latest version (PDF-file, size approx. 820 kByte) by E-Mail automatically, please send an E-Mail with the subject “EMIS DOK411E Service“ to: Manfred.Boeck@intl.fmcti.com

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1 General

1.1 Orientation Aids for the manual

This manual contains a variety of information. We have produced some orientation aids so that you can easily find the required subjects.

- Pictograms

  The information in this manual extends from mandatory safety measures and default values to concrete handling steps and well-intended advice. This information is identified with suitable pictograms in the margins to enable better distinction in context.
  This will not only increase attention for „beginners“, but also help „cross-readers“ to rapidly locate the desired Information. Therefore the pictograms are symbolic of the underlying textual content.

- The following pictograms are used in this manual:

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

Risk of operating fault. Actions that damage the equipment.

Legal Notice. Actions that lead to legal consequences.

Working step. Concrete action statements, e.g. „Press the <Enter>-key“

Positive response message, e.g. „the main menu now appears “

Negative response message, e.g. „A fault message should now appear...“

Background information, Short-Tip, e.g. „See more detailed information in Chapter XX“

Option, Special Case

Function / Functional Description

NOTE: Indicates a special Situation

IMPORTANT: To be strictly observed

2 Introduction

Communication - It is not always possible to adequately maintain the dialogue between the tank truck, which is often on the road for a lengthy period and far away from the base, and the logistics center. For efficient cost calculation and optimum sequences coordination, the control centre constantly needs updated information on transaction data and system events from the tank truck. This is to enable the right tour decisions to be made and for transportation to be carried out at low cost.

The *European Multiple Interface System* (**EMIS**) acts as the interface between the components of the Sening vehicle system (QAS node → **NoMix, MultiSeal**; METER-node → **MultiFlow** and future **Sening**® components) and any On-Board Computer (OBC).

Using suitable media, this information, such as transaction data and system events, can be transfered to the control centre and edited there. Appropriate evaluation allows a logical shift course to be reconstructed - relating to both complete product information and decisive activities on the vehicle.

EMIS provides a number of variables in a tree structure permitting data to be exchanged with the connected devices. The EMIS–linked OBC has no trouble in accessing this data and comparing it with the use of higher-ranking software modules.

Communication between EMIS and the OBC is done by means of a 3-wire RS232 interface. The protocol used is documented in this interface description (**DOK-411**).

EMIS2 is a revised version of the EMIS. Irrespective of the version, this device will be referred to as EMIS for the rest of this description.

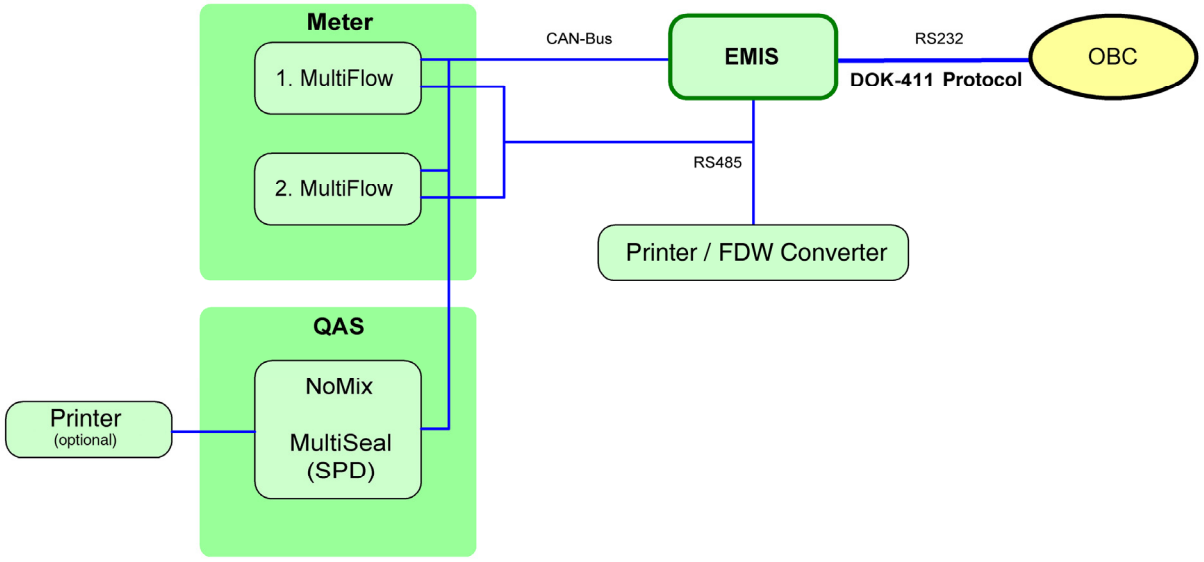

Figure 1: System Components with EMIS-Printer

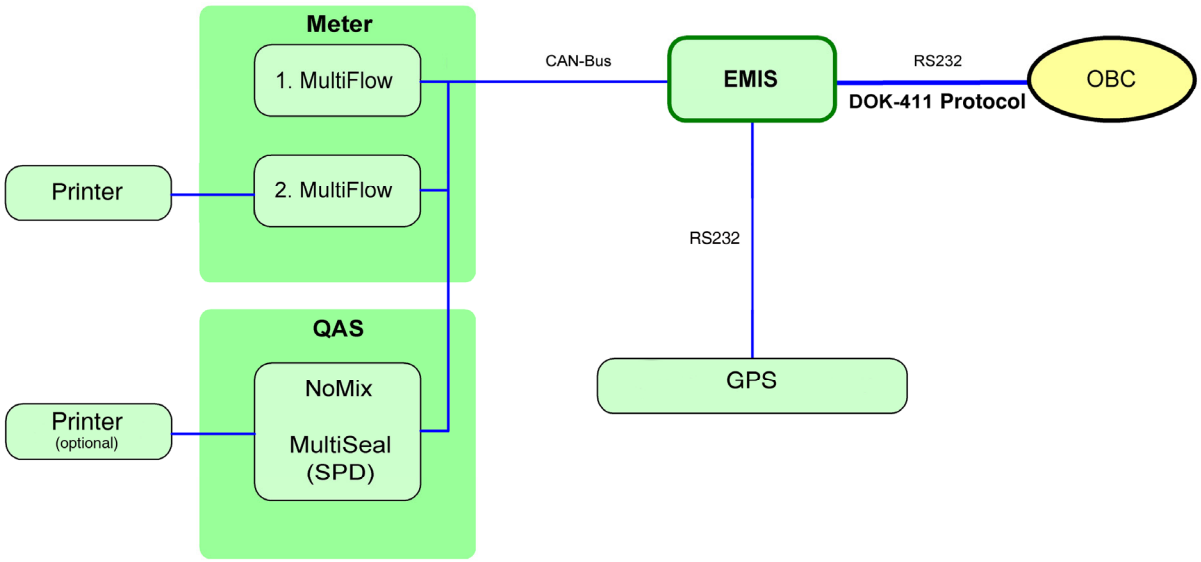

Figure 2: System Components with GPS

QAS = **Q**uality **A**ssurance **S**ystem

3 Implementation

Communication between EMIS and the OBC is based on telegrams exchanges. Each telegram consists of an **OpCode**, a **node** and possibly with one or several **sub-nodes** and from **variables** with the related **variable values**.

- The OBC requests variables through a REQUEST telegram.
- The answer comes from the EMIS as one or several REPORT telegrams.
- The OBC can set variables using a SET telegram.

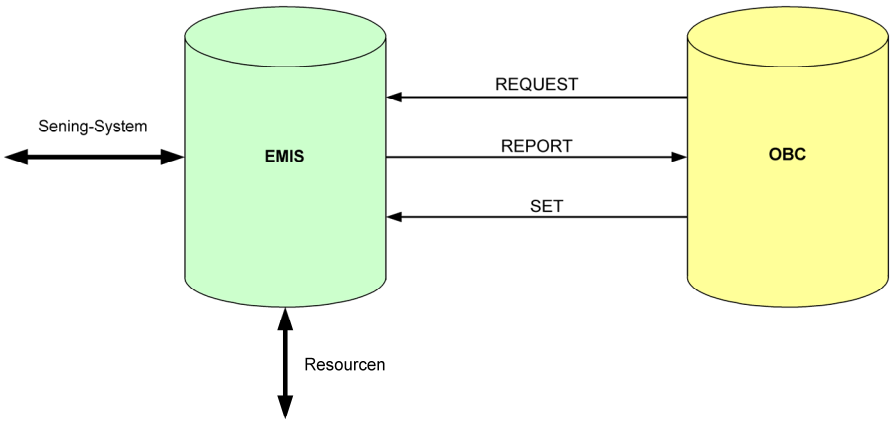

Figure 3: Data Flow

3.1 General Remarks

- Following being switched on, EMIS scans all the CAN addresses to localize connected participants. This takes approx. **20** seconds. During this time EMIS in the regular operating mode can still not be "talked to". The OBC should then send a "Ping" (SET,ADMIN,PRPTOCOL, Ping="e.g. test") as the first telegram to the EMIS to check on commuication.
- The variables for the EMIS description are organized under the ADMIN node. It is also established here as to which other nodes were implemented.
(see ADMIN,PROTOCOL,OPTION).

3.2 Communication Layers

The following simplified layer model is used to describe the EMIS interface:

Layer	Description
Data model	Telegram structures: OpCodes, Node[,Sub Node[, ..]], Variables, Variables Values
Flow control	Data flow control (handshake)
Hardware	Interface concept

The following chapters will describe the important features of the data model used by the EMIS-interface. The following specifications apply to the other layers:

Hardware: An RS-232 interface is used. The link is established through three wires (RX, TX, Gnd), ***9600 baud, 8 bits, no parity***.

Flow Control: The above hardware scheme requires a software protocol (XON / XOFF control)

3.3 Telegram Format

Transmission employs a telegram structure in which each telegram starts with the control character <STX> (start of text, 02 $_{hex}$) and is concluded by the control character <ETX> (end of text, 03 $_{hex}$) and a checksum <BCC> (2 bytes).

All telegrams have the following structure:

- <STX> <OpCode> <Node > <SubNode > <Variable> < Variable Values> <ETX> <BCC>
  - **`<STX>`** (Start of Text, 02 $_{Hex}$) Start character of a telegram
  - **`OpCode`** Telegram type (see chapter 3.3.1 / page 11)
  - **`Node`** Node selektion (see chapter 3.3.2 / page 12)
  - **`Sub Node`** Sub Node selektion (see chapter 3.3.2 / page 12)
  - **`Variable`** Variable selektion (see chapter 3.3.2 / page 12)
  - **`Variable Values`** Variable Values (see chapter 3.3.3 / page 13)
  - **`<ETX>`** (End of Text, 03 $_{Hex}$) End character of a telegram
  - **`<BCC>`** Checksum as a sequence of ASCII characters.
    Example:
    The value 1A $_{hex}$ is represented by the character string
    "1A" = (31 $_{hex}$ 41 $_{hex}$) (see chapter 3.3.4 / page 14).

Telegrams are represented in accordance with the following rules:

- All characters are represented by printable ASCII alphanumeric characters, so that numbers, for example, are not transmitted in binary form but rather as a character string. This also applies to the telegram checksums (BCC).
  Example: The value 1A hex is represented by the character string "1A" (31 hex 41 hex)
- There is at present no limit on the length of telegrams (although a max. of 500 characters between <STX> and <ETX> is recommended).
- Several REPORT telegrams need to be transmitted when transferring large data quantities (see event requests Chapter 0 / Page 19).
- Capitalization or lowercase is of no relevance in interpreting OpCode, nodes, sub-nodes and variables.
- However, a distinction is made between capitalization and lowercase for variable values.

3.3.1 OpCode

All telegrams begin with a <STX> followed by an operation code (OpCode). This is an identifier as to how the telegram data is to be interpreted.

Following OpCodes are defined:

- REQUEST Recalling one or several variables
- REPORT Answer from the EMIS to a REQUEST telegram
- SET Setting a variable

- Only REQUEST or SET telegrams may be transmitted from the OBC.
- The answer to a REQUEST telegramm is a REPORT telegram.
- Apart from a few exceptions, a feedback in the SET telegrams is only done through an ACK answer.
- The ongoing variable value can then be requested, if needed, with a REQUEST telegram.
- On setting a number of variables a REPORT telegram will also be transmitted. Its contents can be examined for assessment purposes.
- Setting a variable can impact on other variables in the EMIS or on the response of the connected devices.

3.3.2 Nodes, sub-nodes and variables

All data is organized in a tree structure. Nodes are established with definitions given, if necessary, of sub-nodes and variables for each node. These various nodes could be, for instance:

- METER nodes (MultiFlow);
- QAS nodes (NoMix, MultiSeal);
- PRN nodes (printer);
- ADMIN nodes (EMIS)

On this also refer to
Figure 1: System Components with EMIS-Printer
/ Page 8 and Figure 2 / Page 8.

Nodes, sub-nodes and variables are separated by a comma. A number of variables outputted in a telegram for a node or sub-node are to be separated by a semi-colon. The value of a variable is assigned by an equal character. The distinction made for multiple appearance of node or variable groups is done through a bracketed index. The index count always starts at "0".

Format:
Node[(n)] [,Sub-node[(n)] [,...],Variable [= [”]Varvalue[”]][; Variable = [”]Varvalue[”]]]

Example:
METER,DEVICE(1),Serial=”12XY1234”;Name=”MultiFlow”;…

String lengths:
All node, sub-node and variable designations are of a maximum 12-character length.

3.3.3 Variable values

Values, which can be accessed in a number of ways, are assigned to the variables.(see access rights 3.4.2 / page 16).

All variables are converted into character strings before transmission. If character strings contain commas, semicolons or other reserved characters, they must be enclosed within quotation marks. Otherwise the quotation marks are optional.
Quotation marks are not permitted at all within values assigned to variables.

The following reserved characters are defined:

Character	Use
,	Comma: separates OpCode from variable name and divides hierarchical variable names
;	Semicolon: separates elements in a list of identifications (only for identifications within a group)
=	Separates variable name from its value
””	Quotation marks enclose the variable value. Optional, if no reserved characters occur within the character string.
()	Brackets enclose the index in field structures, i.e. if subsidiary groups are present more than once (e.g. COMP(n)). • The index counts from 0 upwards • Stating index (0) is optional. In other words, COMP and COMP(0) have the same meaning

ATTENTION
None of the characters mentioned above can be used in the value being assigned to a variable unless the character string is enclosed within quotation marks ("...").

Variable Formats:

- The format of HWVersion and SWVersion is **"xx.xx"** + optionally up to 5 additional characters.
- Dates are always represented in the form **"dd:mm:yyyy"**. Shortening the year number (**yy**) is not permitted (to handle the millennium properly).
- Times are to be displayed in the form "**hh:mm[:ss]**". There is no provision for a resolution finer than seconds. Display of the seconds is optional **(hh:mm)**.
- The variable LastError has the format **"nnnn:Text"**, and has a maximum length of 50 characters.
- Special rules are to be observed for the transfer of QAS event lists. (see chapter 0 / page 19)
- The maximum string lengths of the variable values are determined in the tables under “Length“ chapter 4 Variablendefinition / page 25.

3.3.4 Checksum BCC

The checksum (also known as the binary check code, BCC) is generated by exclusively ORing (XOR) all the bytes contained in the telegram (including STX and ETX).

Since this algorithm will yield the same result if the sequence of bytes is altered, the positional index of each byte is added to it ***before*** the ORing process. This yields a checksum that depends on the position of the bytes.

The function in pseudo-code:

```
Byte:    unsigned character
Word:    unsigned short
Pointer: array of Byte

Byte buildBCC (Pointer DatenFeld, Word AnzahlBytes)
  {
  Word   I   = 0;
  Byte   BCC = 0;
  repeat
    {
    BCC = BCC xor (I + DatenFeld [I]);
    I   = I + 1;
    }
  until (I equal AnzahlBytes);
  return BCC;
  }
```

3.4 The Communication Structure

3.4.1 Flow Control

The data flow is regulated as follows:

- By using <XOFF> (13Hex) the counterpart is asked not to transmit any more data until the next <XON> (11Hex).
- Following an<XOFF> there is no timeout through which the interface can be reactivated.
- Even an <STX> annuls an <XOFF> previously received.
- Valid telegrams are acknowledged with <ACK> (06Hex).
- Unknown or invalid telegrams are acknowledged with <NAK> (15Hex). The error is described through the ADMIN,STATUS,LastError variable and is only transferred on request.
- Telegrams confirmed with <NAK> are not accompanied by any automatic transmission retransmission. They have to be requested again. The recommendation is firstly to request the ADMIN,STATUS,LastError variable (Exception – see Chapter 0 / Page 19. QAS – Event request.
- A telegram must at least comprise an <STX>, an <ETX> and a 2-byte long valid or invalid check sum for an <ACK> or <NAK> to be transmitted.
  Telegrams not satisying these minimum requirements will be ignored.
- No further telegram requests will be considered when a telegram is being processed.
- <CAN> (18Hex) can halt the transfer of several telegrams.
- Ein <EOT> (04Hex) signals the end of the transmission of data of seveal data sets.
- A break for a considerable time in the transmission due to extensive calculations being carried out will result in a < WaitOn > (12Hex) / < WaitOff > (14Hex) being alternatively transmitted at least every 4 seconds within this break. This is to prevent a timeout being triggered in the receiver and the transmission being stopped.

Composition of the control characters

Control character			Description	Revision
STX	02_{Hex}		Start character of a telegram	From Version 1.0
ETX	03_{Hex}		End character of a telegram ahead BCC	From Version 1.0
DC1	11_{Hex}	XON	Software handshake	From Version 1.0
DC3	13_{Hex}	XOFF	Software handshake	From Version 1.0
ACK	06_{Hex}		Telegram OK	From Version 1.0
NAK	15_{Hex}		Telegram faulty	From Version 1.0
CAN	18_{Hex}		Data transmission interrupted	From Version 1.0
EOT	04_{Hex}		End of data transmission	From Version 2.0
DC2	12_{Hex}	WaitOn	Data transmission paused	From Version 2.0
DC4	14_{Hex}	WaitOff	Continuation of data transmission (repeat any telegram that was started)	From Version 2.0

3.4.2 Access Rights

For each variable access rights are defined laying down the OBS scope of access:

- R/W Read / Write access is allowed.
  The OBC can read and change variable.
- R Read access is allowed.
  The OBC can read but not change variable.
- W Write access allowed.
  Whilst variable can be set, the value cannot be read.

- The scope for access to several variables can change as a function of the operating mode of the connected devices. There is, for instance, no access to the QAS event variables during discharging.
- The attempt to change a write-protected variable is refused (the SET telegram is answered with NAK). A corresponding error message is placed in ADMIN,STATUS,LASTERROR.
- Setting variables where only a write access is possible triggers sequences for which the variable value is of no significance or for which later access of the variable serves no purpose. A read access on these variables is answered by a blank expression (“”).
- The access rights of the variables are listed in the tables in Chapter 4 / Page 25 "Access".

3.5 Operating States

All EMIS components have the variable "STATUS,Mode". This variable can adopt the following states:

State	Components	Meaning
<leer>	All	Undefined / unknown
READY	All	Ready for operation
ALARM	All	A fault that does not prevent operation from continuing has occurred. Alarms are generally caused by devices on the system (CAN) bus.
ERROR	All	Error state; see STATUS,LastError for the error message
BUSY	All	Example: The meter is in the process of performing a function that may not be interrupted (e.g. a discharge). All variables are locked, and may not be altered from outside.
OBC, METER, QAS	PRN	Indicates the allocation status of the printer interface. Possible clients are the devices at the CAN bus: QAS, METER or the OBC. READY means that the printer inteface is free and available for a client.
SERVICE	ADMIN	Indicates the EMIS operating mode. <SERVICE> indicates that irrespective of all settings at the COM(0) an OBC interface with 9600 baud is operated (see □ ADMIN Description).
INVALID	GPS	The data of this node is invalid due, for instance, to poor reception conditions.

3.6 Examples of the Procedure

- For enhanced readability the OpCodes, nodes and sub-nodes in the following examples are shown in capitals and the names of the variables in capitals and lowercase lettering. Only for reasons of space are the line breaks inserted in the telegrams.
- Some telegrams are only reproduced in an abbreviated form.
- Control characters are marked with pointed brackets <>; comments by //.

3.6.1 REQUEST - Standard Queries

All the variables are provided by the EMIS interface, and can be accessed individually or as a structure (group).

Individual query:

Direction	Telegram
EMIS	`REQUEST,ADMIN,DEVICE,Name`
OBC	`<ACK>`
OBC	`REPORT,ADMIN,DEVICE,NAME=”F.A.Sening EMIS”`
EMIS	`<ACK>`

Structure query:

Direction	Telegram
EMIS	`REQUEST,ADMIN,DEVICE`
OBC	`<ACK>`

OBC	`REPORT,ADMIN,DEVICE,SERIAL=”191234”;`
	`NAME=”F.A.Sening EMIS”;`
	`HWVERSION=”02.00EMIS2”;`
	`SWVERSION=”03.02EMIS2”`

EMIS	`<ACK>`

3.6.2 SET / REQUEST - Variable access

SET with <ACK>:

Direction	Telegram
EMIS	SET,ADMIN,VEHICLE,Name="HH XX 123"
OBC	<ACK>
…	
EMIS	REQUEST,ADMIN,VEHICLE,Name
OBC	<ACK>
OBC	REPORT,ADMIN,VEHICLE,NAME="HH XX 123"
EMIS	<ACK>

SET with REPORT-Telegram

Direction	Telegram
EMIS	SET,ADMIN,PROTOCOL,Ping="Test Ping"
OBC	*<ACK>*
OBC	REPORT,ADMIN,PROTOCOL,PING="Test Ping"
…	
EMIS	REQUEST,ADMIN,PROTOCOL,Ping
OBC	<ACK>
OBC	REPORT,ADMIN,PROTOCOL,PING=""
EMIS	<ACK>

3.6.3 Control of Discharges

MultiFlow Product guidelines - PRESETs:

Direction	Telegram
EMIS	REQUEST,METER,SETUP,MeterCount
OBC	<ACK>
OBC	REPORT,METER,SETUP,METERCOUNT="2" // tank truck with 2 MultiFlows
EMIS	<ACK>
EMIS	REQUEST,METER,STATUS(0) // status request for 1.MutiFlow
OBC	<ACK>
OBC	REPORT,METER,STATUS(0),LASTERROR="0000:No Error";MODE="READY"…
EMIS	<ACK>
EMIS	SET,METER,ORDERS,ReInit ="123" // initiate the discharge sequence
OBC	<ACK>
EMIS	SET,METER, ORDERS,PRESET(0),PCode=1;Volume=1000;PUnit="L"
OBC	<ACK>
EMIS	SET,METER, ORDERS,PRESET(1),PCode=2;Volume=200;PUnit="L"
OBC	<ACK>
EMIS	SET,METERS,ORERS,OrderCount=2 // presets complete
OBC	<ACK>
OBC	REPORT,METERS,ORERS,ORDERCOUNT="2" // presets tranmitted
EMIS	<ACK>

Initiation of the discharge sequence begins when METERS,ORDERS,Count is *successfully* set to the count of the valid orders, it the status of the measuring system(s) is "Ready". Compare this with Chapter 3.4 / page 15.

Particular note should be taken of the fact that in the above example no particular measuring system is named when the discharge presets are transferred. The interface (gateway) is responsible for distributing the data to the available measuring systems.

This mechanism means that an OBC can communicate with the measuring system(s) even without any detailed knowledge of the device configuration.

MultiFlow Measurement - RESULTs:

Direction	Telegram
EMIS	REQUEST,METER,ORDERS,**RESULT(0)**
OBC	<ACK>
OBC	REPORT,METER,ORDERS,**RESULT(0)**,PCODE="001";VOLUME=" 998"; PUNIT="L";METERID="18DC-80363 "; … **CHECK="OK"**
EMIS	<ACK>
EMIS	REQUEST,METER,ORDERS,**RESULT(1)**
OBC	<ACK>
OBC	REPORT,METER,ORDERS,**RESULT(1)**,PCODE="002";VOLUME=" 234"; PUNIT="L";METERID="18DC-80363 "; … **CHECK="OK"**
EMIS	<ACK>

Check = "Ok" indicates a correct and complete "Result Telegram".

3.6.4 QAS – Event list query

The QAS node (**Q**uality **A**ssurance **S**ystem) accesses the NoMix- und MultiSeal data. Events are saved in an internal logbook in both devices (NoMix, MultiSeal). Several thousand saveable events in the QAS device precludes the output being undertaken in a telegram. That is why every event is transmitted in a REPORT telegram. A special structure is defined to represent the events.

Event-Struktur:

QAS			
EVENT	Type		Event-Typ
	Value1		1. Parameter for this Event-Typs
	Value2		2. Parameter for this Event-Typs
	Date		Date for this Events (DD.MM.CCYY)
	Time		Time fort this Events (hh:mm:ss)

Special features:

- In addition to the usual <ACK> and <NAK> characters for confirming receipt of correct telegrams or for refusing faulty telegrams respectively, an additional control character, <CAN>, is used, with which the transmission of further events can be halted.
- Before a further telegram is outputted, the OBC is to answer every REPORT telegram with an <ACK>, <NAK> or <CAN>.
- Should the OBC answer an “EVENT report line“ with a NAK, then this line is to be repeated for as long as NAKs are transmitted as an answer. It is up to the OBC software to decide whether the report line is to be re-requested or the tranmsission stopped by a CAN.
- From Log Version 2.0 onwards <EOT> signals the end of a data transmission.
- EMIS alternatively sends <WaitOn> and <WaitOff> when lengthy interruptions (up to 2 minutes) arise. This happens, for instance, when event information is analysed at the beginning of the query.
- In contrast to all the other variables, the EVENT structure ones cannot be individually inquired into.
- The setup parameters are always transmitted by default at the start of the event query. This can be stopped by setting the variable QAS,SETUP,NoSeP=1. The setup parameters are always outputted on the recalling of the events with date/time.
- The NoSep variable retains its value even after a power-off.
- Setting the QAS,SETUP,ReInit variable with any value etsablishes the ongoing time as the starting time for the next event query.
- Inquiring into the event without date / time has the effect of stopping SCU events (see 4.2.1.3 Event Table / Page 33) being saved in the QAS log book.
- If the OBC does not answer an “EVENT report line“ with an <ACK>, then the ouput is interrupted for as long as it takes for an <ACK> to be accepted.

Event query: Setup parameter

At the start of an event query, the setup parameters of the QAS unit are transmitted. Although not events, they are still depicted in the same struture.

Direction	Telegram
EMIS	REQUEST,QAS,EVENT
OBC	<ACK>
OBC	<WaitOn>
OBC	<WaitOff>
	…
OBC	REPORT,QAS,EVENT,TYPE="SET02";VALUE1="IO";VALUE2="2";DATE="DD.MM.CCYY"; TIME="hh:mm:ss"
EMIS	<ACK>
OBC	REPORT,QAS,EVENT,TYPE="SET04";VALUE1="TT";VALUE2="M";DATE="DD.MM.CCYY"; TIME="hh:mm:ss"
EMIS	<ACK>
OBC	REPORT,QAS,EVENT,TYPE="SET04";VALUE1="NC";VALUE2="06";DATE="DD.MM.CCYY"; TIME="hh:mm:ss"
EMIS	<ACK>
OBC	REPORT,QAS,EVENT,TYPE="SET04";VALUE1="OP";VALUE2="2";DATE="DD.MM.CCYY"; TIME="hh:mm:ss"
EMIS	<ACK>
OBC	REPORT,QAS,EVENT,TYPE="SET04";VALUE1="FB";VALUE2="Y";DATE="DD.MM.CCYY"; TIME="hh:mm:ss"
EMIS	<ACK>
OBC	REPORT,QAS,EVENT,TYPE="SET04";VALUE1="PS";VALUE2="Y";DATE="DD.MM.CCYY"; TIME="hh:mm:ss"
EMIS	<ACK>
	…
OBC	REPORT,QAS,EVENT,TYPE="SET08";VALUE1="SL";VALUE2="Y";DATE="DD.MM.CCYY"; TIME="hh:mm:ss"
EMIS	<ACK>
OBC	// … Fortsetzung mit Ausgabe der Eventdaten

The time (QAS time) of the event query is displayed as the time stamp (Date / Time).

Event query: extract from a loading procedure

The actual events are transmitted directly following on from the setup parameters.

Direction	Telegram
	…
	// … Setup-Parameter siehe Eventabfrage: Setup-Parameter
OBC	REPORT, QAS,EVENT, TYPE=”PKNG”; ... DATE=”DD.MM.CCYY”;TIME=”hh:mm:ss”
EMIS	<ACK>
OBC	REPORT, QAS,EVENT, TYPE=”VEN”; ... DATE=”DD.MM.CCYY”;TIME=”hh:mm:ss”
EMIS	<ACK>
OBC	REPORT, QAS,EVENT, TYPE=”BST”; ... DATE=”DD.MM.CCYY”;TIME=”hh:mm:ss”
EMIS	<ACK>
OBC	REPORT, QAS,EVENT, TYPE=”NSI”; ... DATE=”DD.MM.CCYY”;TIME=”hh:mm:ss”
EMIS	<ACK>
	…
	…
OBC	REPORT, QAS,EVENT, TYPE=”AST”; ... DATE=”DD.MM.CCYY”;TIME=”hh:mm:ss”
EMIS	<ACK>
OBC	<EOT>

Event query: explicit declaration of start date and time

Direction	Telegram
EMIS	REQUEST,QAS,EVENT,DATE=“12.10.2000“;TIME=“12:00“
OBC	<ACK>
OBC	<WaitOn>
OBC	<WaitOff>
OBC	<WaitOn>
OBC	<WaitOff>
	…
OBC	REPORT,QAS,EVENT,TYPE="SET02";VALUE1="IO";VALUE2="2";DATE="DD.MM.CCYY"; TIME="hh:mm:ss"
EMIS	<ACK>
	…
OBC	REPORT,QAS,EVENT,TYPE="SET08";VALUE1="SL";VALUE2="Y";DATE="DD.MM.CCYY"; TIME="hh:mm:ss"
EMIS	<ACK>
OBC	REPORT,QAS,EVENT,TYPE=”PKNG”; ... DATE=”DD.MM.CCYY”;TIME=”hh:mm:ss”
EMIS	<ACK>
	…
	…
OBC	REPORT,QAS,EVENT,TYPE=”AST”; ... DATE=”DD.MM.CCYY”;TIME=”hh:mm:ss”
EMIS	<ACK>
OBC	<EOT>

Event query: with interruption of the query by the OBC

Direction	Telegram
EMIS	REQUEST,QAS,EVENT
OBC	<ACK>
OBC	<WaitOn>
OBC	<WaitOff>
OBC	<WaitOn>
OBC	<WaitOff>
	…
OBC	REPORT,QAS,EVENT,TYPE="SET02";VALUE1="IO";VALUE2="2";DATE="DD.MM.CCYY";TIME="hh:mm:ss"
EMIS	<ACK>
	…
OBC	REPORT,QAS,EVENT,TYPE=”PKNG”; ... DATE=”DD.MM.CCYY”;TIME=”hh:mm:ss”
	…
	…
EMIS	<ACK>
OBC	REPORT,QAS,EVENT,TYPE=”AST”; ... DATE=”DD.MM.CCYY”;TIME=”hh:mm:ss”
EMIS	<CAN>

Event query: with cancellation of the query by EMIS

Direction	Telegram
EMIS	REQUEST,QAS,EVENT
OBC	<ACK>
OBC	<WaitOn>
OBC	<WaitOff>
OBC	<WaitOn>
OBC	<WaitOff>
OBC	REPORT,QAS,EVENT,TYPE="SET02";VALUE1="IO";VALUE2="2";DATE="DD.MM.CCYY";TIME="hh:mm:ss"
EMIS	<ACK>
	…
OBC	REPORT,QAS,EVENT,TYPE=”PKNG”; ... DATE=”DD.MM.CCYY”;TIME=”hh:mm:ss”
EMIS	<ACK>
OBC	REPORT,QAS,EVENT,TYPE=”AST”; ... DATE=”DD.MM.CCYY”;TIME=”hh:mm:ss”
EMIS	<ACK>
OBC	REPORT,QAS,EVENT,TYPE=”LST”; ... DATE=”DD.MM.CCYY”;TIME=”hh:mm:ss”
OBC	<CAN>

Continuous event query

- In the case of an event query without start specification (date / time), the output begins with the last non-positive acknowledged event (with, for instance, <CAN> instead of <ACK>). After the last query this can be the first of a number of new ones coming in or the final event before a <CAN> cancellation. Regular recalling ensures there are no gaps in listing all the events that have arisen without having to explicitly indicate the last query time when recalling.
- This approach also enables the event telegrams to be individually recalled. The first telegram must be answered with <ACK> and the next with <CAN>. Nevertheless, the output of the setup parameters ought to be switched off beforehand (QAS,SETUP,NoSeP=1).

4 Variablendefinition

The use of upper and lower case letters is irrelevant to the interpretation (syntax), and is used simply to clarify the hierarchy.

4.1 ADMIN – (EMIS)

ADMIN-Variables			Remarks	Access	Length
DEVICE	Serial		e.g. “18DL0001”	R	10
	Name		e.g. “EMIS2“	R	15
	HWVersion		e.g. “02.00EMIS2“	R	10
	SWVersion		e.g. “03.12EMIS2“	R	10
	Node		CAN-bus node no.of the device typisch “21“	R	2
STATUS	LastError		See table in Chapter 5 / page 51	R	50
	Mode		e.g. “Ready”: Ready for operation (see chap. 3.5 / page 16)	R	10
	Reset		Setting (SET) this variable releases a software RESET	W	15
VEHICLE	Name		e.g. license plate number “HH AB 123“	R/W	15
CLOCK	Date		Date e.g. “01.01.2005“	R/W	10
	Time		Time e.g. “01:01:10“	R/W	8
	AutoDST		(**D**aylight **S**aving **T**ime) “0” **no** automatic summer winter time daylight saving “1” automatic summer winter time daylight saving on last Sunday in March and on last Sunday in October respectively	R/W	1
	CurrentDST		“0” current time is wintertime “1” current time is summertime	R	1
PROTOCOL	Version		„2.10“, corresponds to available specification	R	15
	Ping		Setting (SET) this variable releases an autom. REPORT telegram. It serves the connection for the examination.	W	15
	OPTION	Meters	Number of max. supported meters: typical “3“	R	2
		QAS	Number of max. supported QAS: typical “1“	R	2
		OBC	Number of max. supported QBCs: typical “1“	R	2
		PRN	Number of max. supported Printer: typical “1“	R	2
		COM	Number of max. supported serial interfaces: typical "2"	R	2
		GPS	Number of max. supported GPS module: typical “1“	R	2

4.1.1 ADMIN Structure

The ADMIN structure identifies the EMIS interface in use and the available protocol options (PROTOCOL). It also offers a facility for synchronisation of the clock (CLOCK) and identifying the vehicle (VEHICLE).

- From EMIS software version 3.10, both available serial interfaces can be individually assigned via the ..SETUP,Port Variable of the PRN, OBC or GPS node; e.g. COM(0) to a GPS and COM(1) to a printer. In order to enable continued communication with the EMIS, a SET,PING,PROTOCOL,Ping="..." can be sent during the first few seconds following a reset. EMIS then remains in Service Mode until the next reset, i.e. independent of all settings, EMIS supports the OBC interface (transmission parameter: 9600:8:N:1) on COM(0).
- This mode is displayed with
  - ADMIN,STATUS,Mode = "Service".
    All other variables remain unchanged.
  - A software reset is triggered by SET,ADMIN;STATUS,Reset="...", which has the same effect as a hardware reset.

Direction	Telegram
EMIS	SET,ADMIN,PROTOCOL,Ping="Service-Mode" // contents of the Ping variables are arbitrary
OBC	<ACK>

- • Also following activation of the Service Mode, a few seconds are required before EMIS is available for communication.
- • With the variable CLOCK,AutoDST="1", automatic switching between summer and winter time is activated. This takes place on the last Sunday in March and on the last Sunday in October.

4.2 QAS – (NoMix, MultiSeal)

QAS-Variablen		Remarks	Access	Length
DEVICE	Serial	Serien-No. e.g. “123456“	R	10
	Name	e.g. “NoMix 2000“ or “MuliSeal“	R	15
	HWVersion	e.g. “02.00“	R	10
	SWVersion	e.g. “01.60“	R	10
	Node	CAN-bus node number of the device typisch “11“	R	2
STATUS	LastError	See table in Chapter 5 / page 51	R	50
	Mode	e.g. “Ready”: Ready for operation (see chap 3.5 / page 16)	R	10
SETUP	Compartments	Number of compartments e.g. “5“	R	2
	ReInit	***Is normally empty (""). By setting the variable (with any content) all the QAS,COMP(),LOAD and QAS,COMP(),DROP variables will be reset, and the memory area for the EVENT list will be cleared.*** ***The supplied content is not stored!***	W	15
	Override	“DISABLE” = Override NOT possible “ENABLE” = Override possible “HOSE” = Override the discharge hose safety system (however NOT the Cross-Over-Prevention) possible “PRODUCT“ = Override the discharge hose safety system AND the Cross-Over-Prevention possible, only if no or unknown code was recognized	R	7
	ManLoadPlan	“DISABLE“ = manual Load plan NOT possible “ENABLE“ = manual Load plan possible	R	7
	Pcorrection	“DISABLE“ = Product correction NOT possible “ENABLE“ = Product correction possible	R	7
	OPD	(Overfill Prevention Devices)	R	2
	NoSeP	No Setup Parameter ”0” = With Setup Parameter output ”1” = NO Setup Parameter output if request WITHOUT Date / Time	R/W	1
AUX	OutRelease	Output release “0” = Output NOT activated ”1” = Output activated “2“ = Output unknown	R/W	1

QAS-Variablen			Remarks		Access	Length
DATA	TOUR		TourNo	Tour Nr.	R	8
			ShiftID	Shift ID	R	8
			DepotID	Depot ID	R	8
			PStationID	Petrol station ID	R	8
	CUSTOMER		ShiftStart	DD.MM.CCYY hh:mm:ss	R	19
			ShiftEnd	DD.MM.CCYY hh:mm:ss	R	19
			DriverID	Driver ID	R	8
			Customer	Customer ID	R	8
EVENT	Type		see chap 4.2.1 / page 30		R	10
	Value1				R	16
	Value2				R	16
	Date				R	10
	Time				R	8
COMP(n) n = 0…23	STATUS	State	“EMPTY” = Empty “REST” = Remaining volume “LOADED” = Loaded “SEALED” = Sealed		R	6
		Date	DD.MM.CCYY e.g. 01.12.2005		R	10
		Time	hh:mm:ss e.g. 23:59:59		R	8
		LastOp	“LOAD” = Load “DROP” = Discharge		R	6
		ActPCode	Product code for DIN 26051-1 (P53), optional entry in QAS-System the code can be enhanced respectively changed		R	3
		PrefCode	see ActPCode		R	3
		Loads	Number of recorded loads		R	2
		Drops	Number of recorded discharges		R	2
	SENSOR	API	“LOCKED“ = API coupling closed “UNLOCKED“ = API coupling open		R	10
		Bottom	“LOW“ = no pressure for bottom valve (bottom valve CLOSED) “HIGH“ = bottom valve supplied with pressure (bottom valve OPEN)		R	10
		Dome	“LOCKED“ = dome hatch locked “UNLOCKED“ = dome hatch unlocked		R	10
		Line	“LOW“ = no pressure for line valve (valve CLOSED) “HIGH“ = line valve supplied with pressure (valve OPEN)		R	10
		WetLeg	“DRY“ = Sensor is dry “WET“ = Sensor is wet “UNDEFINED“ = Status of sensor is undefined		R	10

QAS-Variablen			Remarks	Access	Length
		Water	“PASSIVE“ = passiv “ACTIVE“ = activ (Wasser in Kammer) “DISCONNECT“ = disconnect “SHORT“ = short-circuit “INVALID“ = invalid / unknown	R	10
COMP(n) **n = 0…23**	**LOAD(m)** **m = 0…9**	Mode	“CODED”: = coded “OVERRIDE”: = bypass	R	8
		PCode	see ActPCode	R	3
		Date	Date at start time DD.MM.CCYY	R	10
		StartTime	hh:mm:ss	R	8
		StopTime	hh:mm:ss	R	8
		Check	“LAST“ = last data record “NEXT“ = further data records available “LOST“ = records between this and the next stored record are lost	R	4
	DROP(m) **m = 0…9**	Mode	“CODED” = coded “OVERRIDE” = bypass	R	8
		PCode	siehe ActPCode	R	3
		Date	Date at start time DD.MM.CCYY	R	10
		StartTime	hh:mm:ss	R	8
		StopTime	hh:mm:ss	R	8
		Check	“LAST“ = last data record “NEXT“ = further data records available “LOST“ = records between this and the next stored record are lost	R	4

4.2.1 Events

All setup parameters and events are available via QAS,EVENT. Each entry contains a date and time specification, which however are not included in the following. Since EMIS only “hands over” the values from QAS, new values may be added in new QAS software versions which are not included here.

Examples and special items for event queries are given in Chapter 3.6.4 / page 20.

4.2.1.1 Setup Parameters

In order to be able to interpret the correlation of individual events in an event query, it is often necessary to be acquainted with the basic settings of the QAS system.

- For each QAS-EVENT query, the setup parameters are therefore transmitted first by default.
- The time (QAS time) of the event query is output as the time stamp.
- These are then followed by the actual events.
- One setup parameter is transmitted per telegram.
- Each setup parameter is specified in the form
  <TYPE>=<SETn> <VALUE1>=<Identifier> <VALUE2>=<Value>.
- The “SETn” value is optional and refers to the index number in NoMix / SPD Setup Index.

SET01	**System setup**
SET02	Components
SET03	Network
SET04	Tank truck
SET05	Product
SET06	Loading
SET07	Discharge
SET08	Sensors
SET09	Events

- Only the <Identifier> and the corresponding <Value> are necessary for an unambiguous evaluation.
- The setup parameters are output by NoMix from version 1.43 and by MultiSeal from version 1.23.
- The output is supported by EMIS from software revision 2.00.

4.2.1.2 Setup Table

Setup parameter summary:

Setup description	TYPE	VALUE1	VALUE2	TDL-Kennung 800 Feldindex
Number of output drivers	SET02	**IO**	0 to 4	4
Level Gauge	SET03	**LG**	“N“ = No “Y“ = YES	5
Tank truck type	SET04	**TT**	“D“ = Direct discharge “M“ = Measuring vehicle “H“ = Hybrid vehicle	6
Number of compartments	SET04	**NC**	01 to 24	7
Number of overfill prevention devices	SET04	**OP**	0 to 4	8
Footvalve pressure balanced	SET04	**FB**	“N“ = No “Y“ = YES	9
Monitor pipeline fill level	SET04	**PS**	“N“ = No “Y“ = YES	10
Double sensors for remaining quantity	SET04	**DW**	“N“ = No “Y“ = YES	11
Separate in-line valve controller	SET04	**LV**	“N“ = No “Y“ = YES	12
Instrumentation cabinet lock	SET04	**UC**	“N“ = No “Y“ = Yes	13
Loading mode	SET06	**LM**	“T“ = Truck “C“ = Compartment	14
Turn on filling release valve	SET06	**LE**	“L“ = Loading Mode “C“ = Connected	15
Turn off filling release valve	SET06	**LD**	“C“ = Compartment-Error “L“ = Loading-Error “S“ = System-Error	16
Automatic opening:	SET06	**AO**	“Y“ = Yes “N“ = No “M“ = NOT when manually entering loading plan	17
Close compartments after filling:	SET06	**CC**	“N“ = No “Y“ = YES	18
Compartment empty test	SET06	**CE**	“N“ = No “Y“ = Yes, WITHOUT override “O“ = Yes, WITH override (Override)	19
Leave compartment open after empty test	SET06	**CO**	“N“ = No “Y“ = YES	20

Setup-Bezeichnung	TYPE	VALUE1	VALUE2	TDL-Kennung 800 Feldindex
Delivery on filling side:	SET07	**DL**	“N“ = No “Y“ = Yes	21
First sensor dome cover [1])	SET08	**SM**	“N“ = No “Y“ = Yes	22
First sensor API coupling [1])	SET08	**SA**	“N“ = No “Y“ = Yes	23
First sensor Footvalve [1])	SET08	**SF**	“N“ = No “Y“ = Yes	24
First sensor In-line valve [1])	SET08	**SL**	“N“ = No “Y“ = Yes	25
Sensors for overfill prevention	SET08	**SO**	“N“ = No “Y“ = Yes	26
Sensors for left cabinet cover	SET08	**LC**	“N“ = No “Y“ = Yes	27
Sensors for right cabinet cover	SET08	**RC**	“N“ = No “Y“ = Yes	28
Sensor for water detection	SET08	**WT**	“N“ = No “Y“ = Yes	29

[1]) The number of the sensor is entered here in the NoMix / Multiseal setup. However, only the information as to whether the sensor type is installed goes to the OBC.

Die Spalte “TDL-Kennung 800“ wird im Anhang A / Seite 73 erläutert

4.2.1.3 Event Table

See below for information on the foot notes and abbreviations used in the table.

Event / sensor	TYPE	VALUE1	VALUE2
API coupling (sensor status)	**AST**	*CoNo*	"L" = locked "U" = unlocked
TDL	42,S,V1,2,(1) (2) >> V2[..]		
ACCU-Load Communication	**ALC**	Connection to ACCU-Load "0" = interrupted "1" = connected	
TDL	825,S,*NoID*,FAS,V1 [4)]		
Footvalve (sensor status)	**BST**	*CoNo*	"L" = closed (pressure low) "H" = open (pressure high)
TDL	42,S,V1,1,(1) (2) >> V2[..]		
Footvalve left = standard (solenoid valve)	**BVL**	*CoNo*	"0" = closed "1" = open
TDL	43,S,V1,1,(1) (2) >> V2[..]		
Footvalve right (solenoid valve)	**BVR**	*CoNo*	"0" = closed "1" = open
TDL	43,S,V1,1,(1) (2) >> V2[..],2		
Cabinet flap (sensor status)	**CAB**	Instrumentation cabinet "L" = left "R" = right	Action "0" = closed "1" = open
TDL	42,S, ,7,(1) (2) >> V2[..],(1) (2) >> V1[..]		
Compartment status	**CFS**	*CoNo*	"0" = empty "1" = not empty "2" = remaining quantity (not empty) "3" = unknown "4" = Full "5" = Fault
TDL	40,S,V1, ,(0) (1) (1) () (2) ()>> V2[..]		
Overfill prevention (sensor status)	**COF**	*CoNo.* for which the overfill protection has triggered	
TDL	42,S,V1,17,1		
Seal status	**CST**	*CoNo*	"E"= empty (not sealed) "R"= remaining quantity (not empty) "S"= sealed "L" = second sealing when loading "D"= second sealing when discharging "?" = unknown

Event / sensor	TYPE	VALUE1	VALUE2
TDL	40,S,V1, , ,(2) (2) (1) (3) (3) (0) >> V2[..]		
Central unit DIP-switch	**DIP**	"n" = switch no's 1 to 8	"0" = OFF "1" = ON
TDL	47,S,2,10,V1,(0) (1) >> V2[..] 3) (10 in [3] kennzeichnet den DIP-Schwitch in der Zentraleinheit		
ANA deadman switch	**DMS**	"0" = ANA switched off "1" = ANA switched on "2" = ANA Alarm "3 = ANA emergency off	
TDL	824,S,*NoID*,FAS,V1 4)		
Dome cover (sensor status)	**DST**	*CoNo*	"L" = locked "U" = unlocked
TDL	42,S,V1,3,(1) (2) >> V2[..]		
Quality assurance (error status)	**EQS**	String "xy[:zz][xy]" Device-Code (x) "C" = Compartment: "O" = Overfill prevention "M" = Measuring system Device-No (y) "n" = Device No. "zz" = *PrCo (loaded)*	String "x:zz" Device-Code (x) "C" = Magnet product code (hall or limit indicator) "P" = Product code (TAG) "zz" = *PrCo (connected)*
TDL	823,S,*NoID*,FAS,V1,V2 4)		
GPO data (NOT up-to-date)	**GPO**	North–South data 4.4N or 4.4S 1)	East–West data 5.4E or 5.4W 2)
TDL	8,S,DIN-26051-1 O61(V2), DIN-26051-1 O60(V1), , 3		
GPS data (up-to-date)	**GPS**	North–South data 4.4N or 4.4S 1)	East–West data 5.4E or 5.4W 2)
TDL	8,S,DIN-26051-1 O61(V2), DIN-26051-1 O60(V1), , 6		
Hose conductance test (gas fluctuation and discharge hose)	**GTR**	Hose test result "0" = Fault "1" = OK	DH (discharge hose) test result String e.g. "1001" - first figure for DH1 - second figure for DH2 - etc. "0" = Fault "1" = OK Example: "0110"
TDL	42,S, ,5,(2) (1) >> V1[..], , ,V2 3)		
Magnet code API hall sensor	**HMC**	*CoNo*	"0" = NO code or Magnet code (NO PrCo !!)
TDL	45,S, ,V1, , ,1, ,V2		

Event / sensor	TYPE	VALUE1	VALUE2
Interlock release (left & right) (Solenoid valve)	**ILP**	Interlock release “0“ = NO release “1“ = Release	
TDL	43,S, ,7,(1) (2) >> V1[..]		
In-line valve (Solenoid valve)	**LMV**	*CoNo*	“0“ = closed “1“ = open
TDL	43,S,V1,11,(1) (2) >> V2[..]		
In-line valve (sensor status)	**LST**	*CoNo*	“L“ = closed (pressure low) “U“ = open (pressure high)
TDL	42,S,V1,11,(1) (2) >> V2[..]		
Manual entry of loading plan	**MLI**	*CoNo*	*PrCo*
TDL	41,S,V1,V2, , , ,8		
Sensor for remaining quantity	**NSI**	Sensor number	“0“ = dry “1“ = wet “2“ = interrupted “3“ = short-circuit
TDL	42,S,V1,13,(2) (1) (6) (5) >> V2[..]		
Magnet code Overfill prevention amplifier (level sensor)	**OMC**	*Level sensor no.*	“0“ = NO code or *Level sensor magnet code (NO PrCo !!)*
TDL	45,S, ,V1, , ,2, ,V2		
Overfill prevention Level sensor	**OPD**	*Level sensor no.*	Connection status “0“ = interrupted “1“ = connected “2“ = released “3” = NOT released “4“ = defective
TDL	42,S, ,20,(2) (1) (8) (9) (0) >> V2[..],V1, ,1 [3)] 1 in [7] bezeichnet Abfüllsicherung-Grenzwertgeber		
AS amplifier	**OPE**	Number of used AS channels “0“ = AS channels deactivated “n“ = no. of channels	
TDL	822,S,*NoID*,FAS,V1 [4)]		
Override (for discharging)	**OVR**	*CoNo*	“0“ = finish override or *OpNo* or *CoNo* if no AS installed
TDL	41,S,V1, ,0, , ,8 /		41,S,V1, ,0, , ,8,V2 [3)]

Event / sensor	TYPE	VALUE1	VALUE2
Product code correction for loading	**PCC**	*CoNo*	“0“ = end of loading or *PrCo* at start of loading
TDL	41,S,V1, ,1, , ,8	/	41,S,V1,V2,1, , ,8
Loading mode	**PKNG**	*CoNo*	“0“ = end of loading or *PrCo* at start of loading
TDL	41,S,V1, ,1	/	41,S,V1,V2,1
Power ON / OFF	**PWR**	Device „0“ = switched off „1“ = switched on	
TDL	20,S,(49) (16) >> V1[..]		
NOMIX operating mode	**SCU**	“D“ = discharge mode “L“ = loading mode “M“ = menu “R” = Remote Access “S“ = Standby “E” = Error	“ “ =empty „Q“ = Default e.g. for magnet codes „N“ = NoMix-Tag-Codes (Q and N only for discharge or loading)
TDL	47,S, , ,(0) (1) (2) (3) (4) (5) >> V1[..],() (0) (1) >> V2[..] [3)]		
Parking brake (sensor status)	**SPB**	Parking brake “0“ = released “1“ = engaged	
TDL	42,S, ,25,(8) (9) >> V1[..]		
Discharge	**TKNG**	“0“ = End of discharge *or* *CoNo.* at start of discharging	OpNo or CoNo if no AS installed
TDL	41,S, , ,0, , , ,V2	/	41,S,V1, ,0, , , ,V2 [3)]
Overfill prevention (AS) TAG (sensor status)	**TOP**	*TAG-No*	Connection status “2“ = released “3“ = NOT released “4“ = defective
TDL	42,S, ,20,(8) (9) (0) >> V2[..],V1, ,2 [3)] 2 in [7] bezeichnet Abfüllsicherung-TAG		
TAG product code	**TPC**	*TAG-No*	3 2-figure values (hexadecimal) separated by spaces: “12 34 56“ “0“ or “00 00 00“ = NO code or 1st value TAG type 2nd value TAG group 3rd value TAG quality

Event / sensor	TYPE	VALUE1	VALUE2
TDL	45,S, ,V1, , ,4 / 45,S, ,V1, , ,4, ,V2[4]V2[5], , ,V2[0]V2[1],V2[2]V2[3]		
Uncoded loading	**UCL**	*CoNo*	"0" = end of loading or *PrCo* at start of loading
TDL	41,S,V1, ,1, , , ,1 / 41,S,V1,V2,1, , , ,1 [3)] 1 in [8] bezeichnet uncodierte Beladung		
Valve driver digital input	**VDI**	"n" = Input no. "1" = External setup - key switch "2" = External ANA	"0" = passive "1" = active
TDL	820,S,*NoID*,FAS,V1,V2 [4)]		
Solenoid valve	**VEN**	Valve number	"0" = switched off (closed) "1" = switched on (open)
TDL	43,S,0,19,(1) (2) >> V2[..],V1		
Vapour recovery overpressure sensor	**VEP**	"0" = NO overpressure "1" = overpressure	
TDL	42,S, ,21,(2) (1) >> V1[..]		
Vapour recovery underpressure sensor	**VNP**	"0" = NO underpressure "1" = underpressure	
TDL	42,S, ,22,(2) (1) >> V1[..]		
Vapour recovery hose monitor	**VRC**	Vapour recovery coupling "1" = GPS-connection no. 1 "2" = GPS-connection no. 2 "3" = GPS-connection no. 3 "4" = GPS-connection no. 4 "5" = collective GPS connection	Connection status "0" = interrupted "1" = connected
TDL	42,S, ,5,(2) (1) >> V2[..],V1		
Wetleg Digital Input	**WDI**	"n" = Input no. "1" = compressed air sensor "2" = GPSÜ (vapour recovery hose overpressure)	"0" = pressure low / passive "1" = pressure high / active
TDL	821,S,*NoID*,FAS,V1,V2 [4)]		
Water detection (sensor status)	**WTR**	*CoNo*	"0" = passive "1" = active (water in compartment) "2" = not connected "3" = short-circuit "4" = invalid / unknown
TDL	826,S,*NoID*,FAS,V1,V2 [4)]		

Footnotes:

[1]) North-South specification according to NMEA 0183 $GPRMC<3> + GPRMC<4>
Example: 5343.3887N

[2]) East-West specification according to NMEA 0183 $GPRMC<5> + GPRMC<6>
Example: 01040.7877E

[3]) manufacturer-specific data field expansion, which is not specified in this way in DIN 26051

[4]) new manufacturer-specific data field identifier 91 (see appendix A …) / page 73)

Abbreviations:

KaNo	Compartment number 1 to n, where 1 is the tank compartment following the driver's cab
AsNo	Overfill prevention device number
PrCo	Product code according to DIN 26051-1 (P53); can be expanded or changed in QAS system
NoID	CAN account number of the QAS unit (typical = 11)
TAG-No	TAG No. 1 to 99

Explanation of the implementation of DOK-411 in TDL data sets:

- For "**S**" a time stamp acc. to DIN 26051-1 Table 10 in the CCYYMMDDhhmmss form is to be used.
- The values of **VALUE1** (VALUE2) are to be inserted for V1 (V2).
- For better readability, empty TDL fields have been represented by a comma plus a space. Spaces are omitted in the TDL data set.
- Some DOK-411 event data leads to different TDL data sets. These are separated by "/" .
- The implementation of some VALUEx in TDL data is effected according to the following scheme:
  - The value of VALUEx e.g. "**S**" is replaced by the value in brackets e.g. (0).
  - The order of the VALUEx values corresponds to the values inside the brackets.

Examples for TDL data records:

Event / sensor	TYPE	VALUE1	VALUE2
Compartment status	**CFS**	*CoNo*	“0“ = empty “1“ = not empty “2“ = remaining quantity (not empty) “3“ = unknown “4“ = Full “5“ = Fault
TDL	40,S,V1, ,(0) (1) (1) () (2) () >> V2[..]		
CFS,3,4	>>	40,S,3,,2	
CFS,4,3	>>	40,S,4	
Seal status	**CST**	*CoNo*	“E“= empty (not sealed) “R“= remaining quantity (not empty) “S“= sealed “L“ = second sealing when loading “D“= second sealing when discharging “?“ = unknown
TDL	40,S,V1, , ,(2) (2) (1) (3) (3) (0) >> V2[..]		
CST,5,S	>>	40,S,5,,,1	
CST,3,?	>>	40,S,3,,,0	
Loading mode	**PKNG**	*CoNo*	“0“ = end of loading or *PrCo* at start of loading
TDL	41,S,V1, ,1	/	41,S,V1,V2,1
PKNG,5,0	>>	41,S,5, ,1	Ende der Beladung KaNr 5
PKNG,5,3	>>	41,S,5,3,1	Start der Beladung KaNr 5, PrCo 3

4.3 METER – (MultiFlow)

METER-Variablen				Zugriff	Länge
DEVICE (n)	Serial		e.g. “12AB1234”	R/W [1])	10
	Name		e.g. “MultiFlow”	R/W [1])	15
	HWVersion		e.g. “01.23”	R/W [1])	10
	SWVersion		e.g. “3.45 DE”	R/W [1])	10
	Node		CAN-bus node number of the device typical “1”	R/W [1])	2
STATUS (n)	LastError		See table in Chapter 5 / page 51	R	50
	Mode		e.g. “READY”: Ready for operation (see Chapter 3.5 / page 16)	R	10
SETUP	MeterCount		Anzahl Messanlagen im Netzwerk	R/W [1])	1
	AutoScan		“1“ EMIS will automatically detect and identify connected meters. “0“ Information of the connected meter(s) have to be set once, especially the CAN-bus node number	R/W	1
DATA (n)	CurVT		uncompensated volume (in „L“)	R	8
	CurVC		compensated volume (in „L“)	R	8
	CurMass		weight / mass (in „kg“)	R	8
	TotVT		uncompensated volume total (in „L“)	R	15
	TotVC		compensated volume total (in „L“)	R	15
	TotMass		weight / mass total (in „kg“)	R	15
	TotAdditive		volume Additiv total (in „L“)	R	15
ORDERS	ReInit		Setting the variable (any content) brings about resetting the presets, customer information and the measuring system(s).	W	15
	OrderCount		Number of the transmitted presets. Is automatically answered with the appropriate REPORT when the measuring systems accept the orders. If there is an error, OrderCount=0 is returned.	R/W	2
	Customer		Customer number, match code (numeric)	R/W	8
	PRICE (m)	PCode	Product code (PTB)	R/W	3
		PriceFactor		R/W	5
		Vat	Value –added tax 19.12 >> 19.2%	R/W	5
		PRICE-SCALE(o)	From (Minimum volume for price)	R/W	8
			Price	R/W	10
	PRESET (m)	PCode	Product code (PTB)	R/W	3
		Volume	Preset quantity	R/W	8
		PUnit	Dimensional unit of the measuring system e.g. „L“, „kg“	R/W	3
	NewResults		Number of the RESULTS not yet read.	R	2
	RESULT (m)	PCode	Product code (PTB), for checking (see PRESET)	R	3

[1]) Zugriff Read-Only bei Meter,Setup,AutoScan = “1“

		Volume	Measuring system display		R	8
		PUnit	Dimensional unit of the measuring system, e.g. „L“, „kg“		R	3
		MeterID	Measuring point identification		R	15
		ReceiptID	Receipt number, generated by counter		R	10
		ModeID	Discharge type of the measring system e.g. „VT“, „V15“ (or „MASS“)		R	4
		AvTemp	Mean discharge temperature e.g. „+25,2“		R	10
		TUnit	e.g. „°C“		R	2
		Date	Discharge date in keeping with measuring system e.g. “01.12.2004“		R	8
		StartTime	Discharge start time in keeping with measuring system e.g. “16:17“		R	5
		EndTime	Discharge end time in keeping with measuring systems e.g. “16:32“		R	5
		VT	Uncompensated volume (in „L“)		R	8
		VC	Compensated volume (in „L“)		R	8
		Mass	Weight / mass (in „kg“)		R	8
		Check	“OK“ when RESULT data available ““ when no RESULT data available		R	2
		AvFlowrate	Mean flow rate in L/Min		R	5
		HoseSel	Hose selection		R	3
		TransMode	Transfer mode		R	2
		PRICE	PriceFactor	e.g. 100 (PUnit=“L“) then price per 100 litres	R	5
			Price	Price per (PUnit x PriceFactor) max. >> vvvvvv,nnn	R	10
			ExVat	0= Preis incl. Vat / 1= excl.Vat	R	1
			Vat	Value –added tax 19.12 >> 19.2%	R	5
		ADDITIVE	PCode	PTB product code for additive	R	3
			Volume	Additive volume max. >> VVVVV,nn	R	8
			PUnit	Dimensional unit for the volume e.g. „ml“, „kg“	R	3
			MixRatio	Mixing ratio 1500 >> 1:1500	R	4
			PumpPos	Position of the additive pump	R	1
			RestVolume	Remaining volume max. >> VVVVV,nn in PUnit	R	8
			PriceFactor	e.g. 1000 (PUnit=“mL“) then price per 1000 mLitre	R	5
			Price	Price per (PUnit x PriceFactor) max. >> vvvvvv,nnn	R	10
			ExVat	0= Preis incl. Vat / 1= excl.Vat	R	1

			Vat	Value –added tax 19.12 >> 19.2%	R	5
		Check	„“ no RESULT available		R	2
	MAN-RESULT (m)	Siehe RESULT (m)				

- (n) denotes the index of the METER (0 to 2)
- (m) denotes the index of the PRESETs or RESULT (0 to 9)

Comments:

- **The presets are only to be set :**
  1.) When all the measuring systems (METER,STATUS(n), Mode) are in the “READY” status.
  2.) When a discharge is not over or 3.) In instances when MultiFlow is in the menu input. A measuring system reporting the “BUSY” status means that specifications have already been transferred. In that case it is not possible to transfer new preset values. The presets in the EMIS and measuring systems can be reset with the aid of SET,METER,ORDERS,ReInit=“e.g. B.123“.
- **Presets** must always be transferred with a rising index (starting with 0). Presets with an incorrect index are ignored, and are answered with NAK.
- **Once the presets are transferred**, the OBC sets METER,ORDERS,OrderCount to the number of the transferred data sets. The interface transfers the specifications to the measuring system(s). The effect of setting METER,ORDERS,OrderCount is to simultaneously delete the entire RESULT memory.
- **The sequence is to be noted:** the specifications are passed on to the MultiFlows when METER,ORDERS,OrderCount is set, i.e. the OBC must have set the presets ***beforehand*** !
- **During processing** of the specifications (discharge up to delivery note printing), the measuring system(s) is in the “BUSY“ state. This status can be established at any time by querying the METER,STATUS(n),Mode variable.
- **When all discharges are over** from a measuring system, the appropriate status changes from “BUSY” to “READY”. The measuring results can be recalled under METER,ORDERS,RESULT(n) with valid results marked by the Check=“OK“ variable. For clear-cut assignment purposes, the results are filed in the same order (with the same index) as the presets. All presets and results remain in the EMIS interface to enable later queries to be made.
- **The presets**, customer numbers (customer match code) and the measuring system(s) itself are reset by METER,ORDERS,ReInit.
- **With METER,ORDERS,RESULT(m)**,.. only the results of the discharges initiated by a preset can be read out.
- **A non-planned delivery** - that is the discharge without a preset can be read out using METER, ORDERS,MANRESULT. The data of the last non-planned delivery is always available (one or several MultiFlows).
- **On the use of several measuring systems** the interface distributes the presets to all measuring systems. The neasuring systems search for "suitable" presets.
- **For examples** on the programming – see Chapter 6.
- **With the CurVT, CurVC und CurMass variables** (sub-node DATA(n)), volume and/or mass information can be recalled during the discharge. These variables are blank at the start or end of the discharge.
- **Die TotVT, TotVC, TotMass und TotAdditive** (DATA(n) sub-node) variables express the MultiFlow Totalizer values. They represent the total values of all discharges of a MultiFlow.
- **A group interrogation** of the DATA values lasts approx. 1500 m/sec.
- **The tot. values** are updated in the MultiFlow after the discharge, i.e. the values do not change during a discharge.

Example query:

Direction	Telegram
...	
EMIS	REQUEST,METER,DATA(0) // vor dem Start der Abgabe
OBC	<ACK>
OBC	REPORT,METER,DATA(0),CURVT="";CURVC="";CURMASS=""; TOTVT="11092";TOTVC="10572";TOTMASS="8562";TOTADDITIVE="1"
EMIS	<ACK>
...	
EMIS	REQUEST,METER,DATA(0) // während der Abgabe
OBC	<ACK>
	REPORT,METER,DATA(0),CURVT="00385,75";CURVC="00356,71";CURMASS= "00267,18";TOTVT="11092";TOTVC="10572";TOTMASS="8562";TOTADDITI VE="1"
EMIS	<ACK>
...	
EMIS	REQUEST,METER,DATA(0) // während der Abgabe
OBC	<ACK>
	REPORT,METER,DATA(0),CURVT="00771,75";CURVC="00713,61";CURMASS= "00534,49";TOTVT="11092";TOTVC="10572";TOTMASS="8562";TOTADDITI VE="1"
EMIS	<ACK>
...	
EMIS	REQUEST,METER,DATA(0) // während der Druckerausgabe
OBC	<ACK>
	REPORT,METER,DATA(0),CURVT="00771,75";CURVC="00713,61";CURMASS= "00534,49";TOTVT="11864";TOTVC="11286";TOTMASS="9096";TOTADDITI VE="1"
EMIS	<ACK>
...	
EMIS	REQUEST,METER,DATA(0) // nach der Druckerausgabe
OBC	<ACK>
	REPORT,METER,DATA(0),CURVT="";CURVC="";CURMASS=""; TOTVT="11864";TOTVC="11286";TOTMASS="9096";TOTADDITIVE="1"
EMIS	<ACK>
...	

„Reinitialisation“ of all relevant preset data is done with SET,METER,ORDER,Retint = „e.g. 103“. This causes all presets in the measuring systems and EMIS to be deleted. The customer numbers (customer match code) and all results and main results are also deleted.

4.4 COM - Schnittstelle

- Neben der CAN-Schnittstelle, die ausschließlich für die Kommunikation mit den Sening® Komponenten verwendet wird, stehen am EMIS zwei serielle Schnittstellen zur Verfügung.
- Ab Softwareversion 3.10 besteht neben der bisher festen Zuordnung COM(0) zum OBC und COM(1) zum Drucker oder FDW-Konverter, die Möglichkeit, die Schnittstellenbelegung und die Übertragungs-parameter zu ändern.
- Die COM(0) wird z. Zt. üblicherweise weiterhin für die Anbindung des OBCs verwendet und ist immer eine RS232 Schnittstelle.
- Die COM(1) kann entweder als RS232 oder als RS485 betrieben werden. Sie kann entweder zur Anbindung eines Druckers / FDW-Konverters oder eines GPS-Moduls verwendet werden.
- Die für die Schnittstellen relevanten Daten werden mit dem COM-Knoten bereitgestellt.

COM Variables			Access	Length
STATUS	LastError	See table in Chapter 5 / page 51	R	50
	Mode	e.g. „READY" „SERVICE": ready for operation	R	10
SETUP	Protocol	e.g. "9600:8:N:1"	R/W	31
	Mode	"OFF" "RS232" / "RS485" only COM(1)	R/W	15
	Queue	"NONE" "OBC" "GPS" "PRN"	R	15
TEXT		Die angegebene ASCII-Zeichenfolge wird direkt ausgegeben. Es sind ausschließlich druckbare ASCII Zeichen zugelassen.	W	220
HEX		Die angegebene ASCII-Zeichenfolge wird im HEX-Format ausgegeben. Wird zur Ausgabe von Steuerzeichen benötigt. (Beispiel: ..,HEX="0D" >> Ausgabe $0D_{Hex}$ Carriage return)	W	220

Comments:

- Mit der Variablen SETUP,Protocol können unterschiedliche Übertragungsparameter eingestellt werden. Als Übertragungsgeschwindigkeiten stehen 2400, 4800, 9600, 19.200, 38.400, und 57.600 Baud zur Verfügung. Die Datenlänge kann 7 oder 8 Bit betragen, für die Parität kann O (Odd), E (Even) oder N (None) gewählt werden. Aus den bisherigen Anwendungen hat sich die Einstellung 9600:8:N:1 bewährt. Höhere Übertragungsgeschwindigkeiten sind erfahrungsgemäß störanfälliger. Baudraten größer 9600 sollten gerade bei ungünstigen Übertragungsstrecken vermieden werden.
- Über SETUP,Queue kann festgestellt werden, welches Gerät dieser Schnittstelle zugewiesen ist. Die Veränderung dieses Wertes erfolgt über die Variable SETUP,Port der Knoten PRN, GPS oder OBC.
- Die Zuweisung eines Gerätes mit entsprechender Schnittstellenkonfiguration erfolgt in zwei Schritten. Es muss die Schnittstelle über COM(n) parametriert werden. Außerdem muss ein Gerät im dafür definierten Knoten (PRN, GPS oder OBC) parametriert und einer Schnittstelle zugeordnet werden. Grundsätzlich kann ein Gerät nur dann einer Schnittstelle zugeordnet werden, wenn kein anderes Gerät diese belegt.

4.5 PRN – (Printer)

- Connecting a printer to an EMIS always makes sense when the idea is for one or several MultiFlows and an OBC to collectively access a printer.
- Before using this printer, a check should therefore firstly be made from each device to see if the printer is available. This is done through the “PRN,STATUS,Mode“ variable which must have the “READY“ value.
- Setting these variables with “OBC“ reserves the printer for the OBC.
- The data at the printer interface is actually outputted by setting the “Text“ or “Hex“ variable. Characters or character sequences written into one of these two variables are directly passed onto the printer interface.
- With the printing over, “PRN,STATUS,Mode“ is to be reset to “READY". The reservation is thus ended. Multiflow reserves the printer, if required, in a similar way.
- The CAN bus accesses the “PRN,STATUS,Mode“ variable by means of “METER“.
- As some of the multiflow data is calibration-relevant, the output is one proceeding directly to the printer. EMIS connects its output driver to the printer for the duration of the meter printer reservation under high ohm conditions.

PRN-Variablen			Zugriff	Länge
STATUS	LastError	See table Chapter 5 / page 51	R	50
	Mode	“READY“, “OBC“, ”METER“ or “ERROR“	R/W	10
SETUP	Port	“NONE“ or “COM(1)“	R/W	15
	ReInit	Setting the variable (any content) outputs the ReInit-string and thus the printer is initialised.	W	15
Text		The indicated ASCII character sequence is directly outputted. Only printable ASCII characters are authorized.	W	220
Hex		The indicated ASCII character sequence is outputted in the HEX format. Is needed for outputting control characters. (Example: ..,Hex=“0D“ >> Output 0DHex Carriage Return)	W	220

Comments:

- Under SETUP,Port, the “printer functionality" must firstly be assigned to a serial interface (usually COM(1)) or it can be deactivated with “NONE“.
- The SET,PRN telegrams (<ACK> from EMIS to the OBC) are only confirmed when all the data has been transferred to the printer.
- The printer can use XON / XOFF to control the data flow. There is no other feedback from the printer.
- When an error occurs during data transfer, EMIS again takes over the printer interface. It needs to be re-requested !

- There is further scope to output control characters from Software version 3.12. In accordance with the char constant Depiction of the C Programming Language, binary data in assocation with a backslash (\ ) can be outputted directly through the “Text“ variable.
- SET,PRN,Text=“ABC\\\”\n\r\x1B123\0” outputs ABC\“ 0AHex 0D Hex 1BHex 123 00Hex thus 12 characters.
  The following are supported - \0 \a \b \f \n \r \t \v \“ \’ \\.
  for instance,\x10 indicates the two characters following \x as being hexa-decimal figures and transformed into a hex value.
- Octal transformation is not supported. Althought this makes the Hex variable superfluous, it continues to be supported for compatibility considerartions.

Supported backslash characters:

Zeichenfolge	HEX-Format	Bezeichnung
\0	0x00	Null
\a	0x07	Bell
\b	0x08	Backspace
\f	0x0C	Form Feed
\n	0x0A	Line Feed
\r	0x0D	Carriage Return
\t	0x09	H-Tabulator
\v	0x0B	V-Tabulator
\“	0x22	doppeltes Hochkomma
\’	0x27	Einfaches Hochkomma
\\	0x5C	Backslash

Example for outputting a text onto a printer:

Direction	Telegramm
EMIS	SET,PRN,STATUS,MODE=”OBC”
OBC	<ACK>
EMIS	SET,PRN,Text=”Testausgabe\r\n”
OBC	<WaitOn>
OBC	<WaitOff>
OBC	<ACK>
EMIS	SET,PRN,Text=”2. Zeile\r\n”
OBC	<WaitOn>
OBC	<WaitOff>
OBC	<ACK>
EMIS	SET,PRN,STATUS,MODE=”READY”
OBC	<ACK>

- The variables stored in earlier versions under RESOURCE,PRN,.. are now directly under PRN,... Programmes should no longer access data via RESOURCE,PRN. To stay compatible for a transitional period with existing OBC software versions, access via RESOURCE will continue to be supported for the moment. The data is identical in both structures. No further support is being given to the “RESOURCE,Mode“ variable. "ASYNC" is always displayed in the "RESOURCE,Protocol“ variable.

4.6 RESOURCE

Access is undertaken as described under (Chapter 4.5 PRN – (Printer) / Page 46), except for the fact that the RESOURCE variable designation must be indicated ahead of PRN.

Example: SET,RESOURCE,PRN,TEXT=“123“ is identical SET,PRN,TEXT=“123“.

This variant is NO LONGER to be used!

4.7 OBC – (On-Board-Computer)

OBC-Variablen			Zugriff	Länge
STATUS	LastError	See table in Chapter 5	R	50
	Mode	e.g. “READY”: ready for operation (see chapter 3.5 / page 16)	R	10
SETUP	Port	“NONE“ or “COM(0)	R/W	15

With the OBC node, the OBC function can be switched off if this interface is needed for other devices in future.

4.8 GPS – (Global Positioning System)

The GPS data is shown in the NMEA 0183, Version 2.0 format – that is just as it is outputted from the GPS receiver (exception: „Speed“ is converted and displayed in km/h).

For the data set groups (GPRMC and GPGGA) a check is made, based on the status in GPRMC<2>, whether the positional data is valid (status = A) or whether the positional data contains inexact data (status = V) e.g. due to poor reception conditions.

If the data is valid, the existing structures “DATA” and “SUBDATA” will be copied to “LASTDATA” and “LASTSUBDATA” before the new data is saved in “DATA” and “SUBDATA”.

Invalid data (status = V) is also saved in “DATA” and “SUBDATA”. In this case, “LASTDATA” and “LASTSUBDATA” will NOT be overwritten, i.e. the last valid data appears in “LASTDATA” or “LASTSUBDATA” (status = L).

GPS-Variables			Access	Length
DEVICE	Name	Product name >> $PGRMT,<1> to “ VER” e.g. “GPS 17“ [1])	R	15
	SWVersion	Software version >> $PGRMT,<1> from “VER“ e.g. “2.05“ [1])	R	10
STATUS	LastError	See table in Chapter **5**	R	50
	Mode	e.g. “READY”: ready for operation	R	10
SETUP	Port	“NONE“ “COM(0)“ or “COM(1)“	R/W	15
	TimeSync	“0“ the EMIS time will NOT be synchronised with the GPS time “1“ the EMIS time will be synchronised with the GPS time (+UTCOffset)	R/W	1
	UTCOffset	“-hh:mm“ “+hh:mm“ Offset which will be added to the UTC time for the EMIS time synchronisation	R/W	6
DATA	Status	>> $GPRMC<2> or „L“ ”A“ = Valid position ”V“ = Invalid position „L“ = Last valid position	R	1
	UTCTime	UTC-time >> $GPRMC<1>	R	6
	UTCDate	UTC-Date >> $GPRMC<9>	R	6
	Lat	Latitude >> $GPRMC<3>	R	9
	LatRef	Latitude reference ”N“ = North or ”S“ = South >> $GPRMC<4>	R	1
	Lon	Longitude >> $GPRMC<5>	R	10
	LonRef	Longitude reference “E“ = East or “W“ = West >> $GPRMC<6>	R	1
	AltMSL	Height above sea level in m >> $GPGGA<9>	R	6
	AltGeo	Geoid height in m >> $GPGGA<10>	R	6
	NoSats	Number of satellites (0 to 12) >> $GPGGA<7>	R	2
	Speed	Speed >> $GPRMC<7> **in km/h**	R	10
	Course	Direction of travel (0° to 359,9°) >> $GPGGA<8>	R	5
SUBDATA	Quali	Quality indicator >> $GPGGA<6>	R	1
	HDop	Horizontal Dilution of Precision >> $GPGGA<8>	R	4
	AgeDiff	Age of differential GPS >> $GPGGA<11>	R	4
	ID	Differential Reference Station ID >> $GPGAA<12>	R	4
LASTDATA	…	Same as DATA		
	…	…		
LASTSUB DATA	…	Same as SUBDATA		
	…	…		

An example for an GPS query:

Direction	Telegram
...	...
EMIS	REQUEST,GPS,DATA
OBC	<ACK>>
OBC	REPORT,GPS,DATA,STATUS="A";UTCTIME="111411";UTCDATE="070508";LAT="5338.5831";LATREF="N";LON="00953.3765";LONREF="E";ALTMSL="15.5";ALTGEO="45.5";NOSATS="03";SPEED="3.9";COURSE="242.7"
EMIS	<ACK>
...	...

5 Error Messages

- All EMIS nodes contain the sub-nodes STATUS with the variables LastError (format: “ErrorCode:ErrorText”). The last occurring error of this device is stored here.
- After read-out of these variables, the error is deleted.
- After receipt of a <NAK>, a read-out of ADMIN,STATUS,LastError should be performed.
- Syntax or format errors occur most often and can be analysed here. In the case of an error code >= 5000 and < 6000 (format 5xnm), this means an error in conjunction with access to an external device. Inference to the relevant device can be drawn from n, inference to the running number from m.
- With a second query of LastError of this device, the error can be determined. Error code and error message originate from the relevant device and are not documented here.

5.1 ADMIN structure

The following errors are currently defined for the ADMIN structure:

Code	Meaning
0000	No error
1000	Unknown command (OpCode) received
1001	Unknown variable was selected
1002	Telegram transmission failed (NAK received)
1003	Neither ACK nor NAK received for transmitted telegram (acknowledgement absent)
1004	No reply received to REQUEST telegram
1005	Reply to REQUEST telegram faulty or incomplete
1006	Index for variable outside permitted limits Example: Meter.Device(99)
1007	No WaitOff received after WaitOn
2000	Assigned value was truncated (character string too long)
2001	Assigned value not possible (telegram format faulty)
2002	Assigned value not possible (above/below permitted range)
2003	Value assignment not possible (specified parameter invalid)
3000	No write access to selected variable
3001	Write access refused. The device is "Busy"
4000	Internal error : ROM
4001	Internal error : RAM
4002	Internal error : EEPROM
4003	Internal error : Clock

50nm	Fault at connected device x: 0 = see LastError for the specified device 1 = device not answering no others are defined n: device group (0:measuring system, 1:QAS) m: sequential number (starting with zero) Example: 5000 = fault at measuring system no. 1
510m	No answer from METER
5110	No answer from QAS
9998	Unknown value for the variable “Mode“
9999	Unknown error

- If 2 errors occur one after another, the first will be overwritten. Therefore it is no longer available after read-out.
- The error codes cannot be changed, but the texts are optional, and can vary between languages and the implementations of the application.

5.2 METER, QAS, etc.

The following errors are currently defined for the device structures (METER, QAS etc.):

Code	Meaning
0xxx	Device ***alarm***, xxx = device specific alarm number Alarms represent faults that do not prevent continued execution of the program
1xxx	Device ***error***, xxx = device specific error number

6 Programming Details

6.1 Original Delivery Note

- The design of the form must satisfy particular requirements for reasons of compatibility with W&M regulations. Since the OBC is not included in the W&M calibration, the measuring system must be capable of autonomously printing a discharge record (the original delivery note), without any reference to the OBC or the EMIS interface.
- 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.
- 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.

Example of the layout of a delivery form:

Original Delivery Note

```
Counter no. Del. note   Date         Product        Discharge type        Volume
*FMC-001    004711   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

(*) - Daten aus geeichten Anlageteilen werden in Sternchen (*) eingeschlossen.

6.2 Example of the Procedure

An example of the progress of communication in the course of a discharge is illustrated below (variable identifications have in some cases been shortened):

OBC	⇔	EMIS	⇔	MultiFlow (TMU)
①		Initialise Network analysis (opt. inc. STATUS)	⇒ at reset or switching on	All nodes
		QAS,DEVICE	⇐	e.g. SPD / NoMix
		METER,DEVICE(n)	⇐	e.g. TMU (measuring system.)
		METER,STATUS(n)	⇒ interrogate ⇐	Status of the TMU
② Initiate discharge	⇒ Mode abfragen	METER,STATUS(n)	⇒	All TMUs: check status
	⇐	METER,STATUS(n)	⇐	All TMU report „Ready“ or „Busy“
Product selection and preset quantities	⇒ only metric products	ORDERS,ReInit ORDERS,PRESET(n) ORDERS,Customer ORDERS,OrderCount	⇒ if OrderCount is set	TMU: Initiate discharge
	⇐ Order confirmation	ORDERS,OrderCount	⇐	Confirmation from TMU
	Repeat for each product	RESULT(n) RESULT(n),Check=“OK“	⇐	Perform discharge, transmit event
		PRN,STATUS,Mode	⇐ ⇒	Reserve printer
		RESOURCE,PRN,TEXT **(only when indirect)**	⇐	Print original delivery note data (usually direct to the port)
		PRN,STATUS,Mode	⇐	Release printer
Management of customer and discharge	⇐ all events at the request of the OBC	ORDERS,RESULT(n)		
③ Drucker reservieren	⇒ ⇐	PRN,STATUS,Mode		
Print other data, e.g. additional unmeasured products and invoicing	⇒	**RESOURCE,PRN,TEXT** **(only when indirect)**		
Release printer	⇒ ⇐	PRN,STATUS,Mode		
④		PRN,STATUS,Mode	⇐ ⇒	Reserve printer
		RESOURCE,PRN,TEXT **(only when indirect)**	⇐	Print trip report (usually direct to the port)
		PRN,STATUS,Mode	⇐	Release printer

Summary:

- ① - The procedure is initiated with the analysis of the CAN Bus system, in which the EMIS interface identifies the devices connected.
- ② - The discharge process itself follows, including printing the original delivery note data.
- ③ - OBC then adds other positions (unit load, freight costs, etc.) and the data of the bill.
- ④ - Finally the measuring system prints a trip report (end of shift).
- For more details, see chapter 6.2.1 / page 57

6.2.1 Hints for programming of measuring systems

NOTE: Deliveries are generally defined for each job / customer, not for a complete shift or day, i.e. the procedure described below has to be performed separately for each customer / delivery !

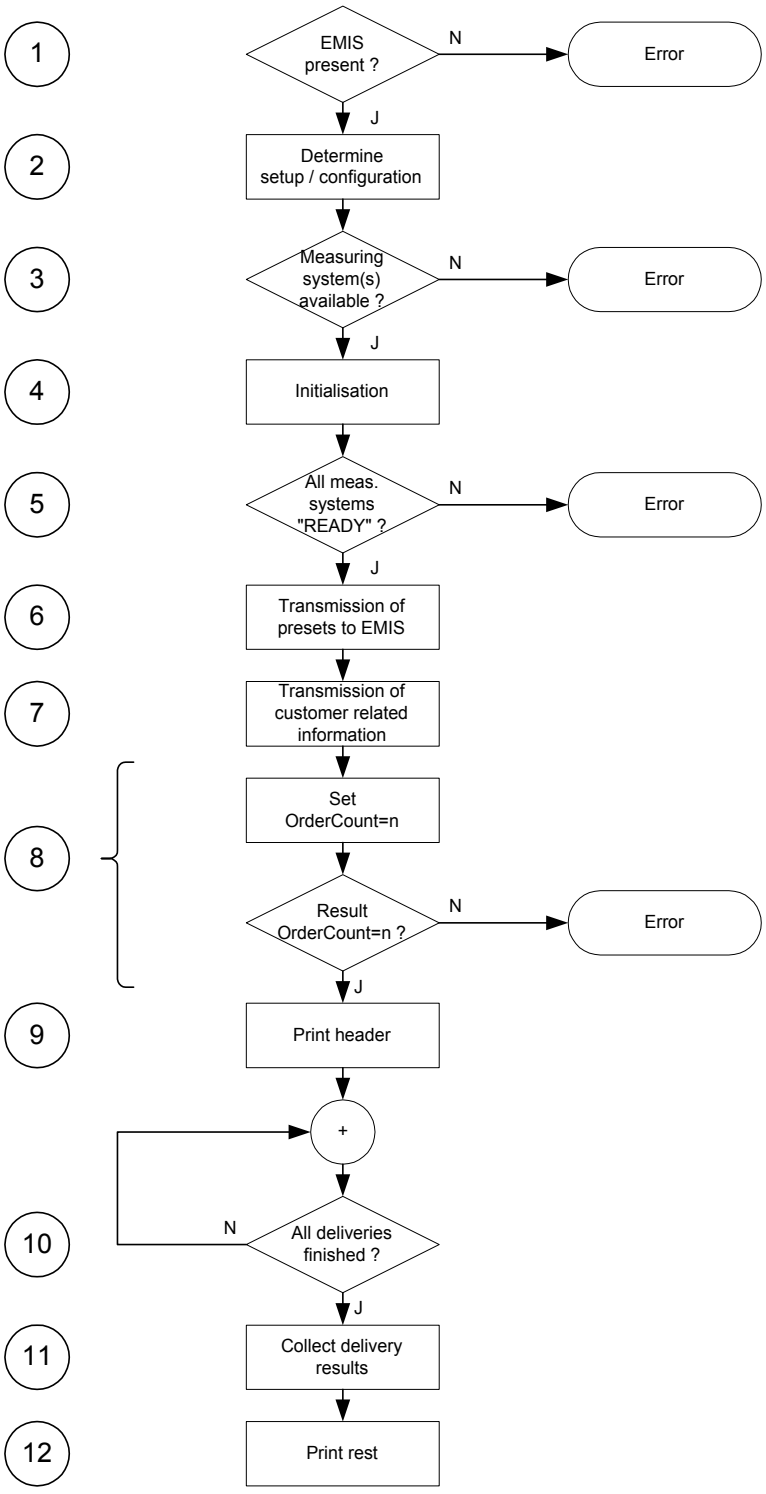

Figure 4: Flowchart / hints for programming

1 - Check if EMIS is present

Direction	Telegram
EMIS	SET,ADMIN,PROTOCOL,Ping="TEST"
OBC	<ACK>
OBC	REPORT,ADMIN,PROTOCOL,PING="TEST"
EMIS	<ACK>

EMIS-gateway present.

⇨ Proceed with the program.

Direction	Telegram
EMIS	SET,ADMIN,PROTOCOL,Ping="DIESER TEST-STRING IST ZU LANG"
OBC	<NAK>
OBC	REPORT,ADMIN,PROTOCOL,PING="DIESER TEST-STR"
EMIS	<ACK>

EMIS-gateway present, text length for ping exceeds the specification.

⇨ Proceed with the program.

Direction	Telegram
EMIS	SET,ADMIN,PROTOCOL,Ping="TEST"
OBC	... (keine Antwort)

No answer, EMIS-Gateway not present.

⇨ Display an error message, program can not be proceeded.

2 - Determine setup / Configuration

Direction	Telegram
EMIS	REQUEST,ADMIN,VEHICLE
OBC	<ACK>
OBC	REPORT,ADMIN,VEHICLE,NAME="4711 - 08/15"
EMIS	<ACK>

The OBC may for example identify the system by evaluation of the received information.

Direction	Telegram
EMIS	REQUEST,METER,SETUP
OBC	<ACK>
OBC	REPORT,METER,SETUP,METERCOUNT="2";AUTOSCAN="1"
EMIS	<ACK>

EMIS is scanning the CAN-bus for measuring systems during start-up (AUTOSCAN="1") and has found two systems (METERCOUNT="2").

⇨ Proceed with the program if the result corresponds to the expected amount.

Direction	Telegram
EMIS	REQUEST,METER,SETUP
OBC	<ACK>
OBC	REPORT,METER,SETUP,METERCOUNT="0";AUTOSCAN="1"
EMIS	<ACK>

EMIS is scanning the CAN-bus for measuring systems during start-up (AUTOSCAN="1") and did not find any systems (METERCOUNT="0"). Possible reason: measuring system(s) not switched on.

⇨ O OBC must perform error treatrment (e.g. display "please check measuring system(s)").

3 - Check if measuring systems are able to communicate

It is assumed that only one measuring system is connected to EMIS to make the further explanations in this chapter easier. If more than one systems is connected, all procedures described below have to be repeated for each measuring system.

Direction	Telegram
EMIS	REQUEST,METER,STATUS(0)
OBC	<ACK>
OBC	REPORT,METER,STATUS(0),LASTERROR="000:Ready to receive next order";MODE="READY"
EMIS	<ACK>

The measuring system is connected, in operation and ready to receive the next order (MODE="READY").

⇨ Proceed with the program.

Direction	Telegram
EMIS	REQUEST,METER,STATUS(0)
OBC	<ACK>
OBC	REPORT,METER,STATUS(1),LASTERROR="001:Locked with actual operation";MODE="BUSY"
EMIS	<ACK>

The measuring system is connected and in operation, but not able to receive the next order at present (MODE="BUSY"). This is caused e.g. by manual input at the measuring system (menu-mode) or a delivery in process.

⇨ Proceed with the program for the moment.

Direction	Telegram
EMIS	REQUEST,METER,STATUS(0)
OBC	<NAK>
EMIS	REQUEST,ADMIN,STATUS
OBC	<ACK>
	REPORT,ADMIN,STATUS,LASTERROR="5100:METER device not present";MODE="READY"
EMIS	<ACK>

The measuring systems does not answer the requests by EMIS.

⇨ OBC must perform error treatment (e.g. display “please check measuring system(s)”).

4 - Initialisation / clear all memories and devices

Direction	Telegram
EMIS	SET,METER,ORDERS,REINIT="xxx"
OBC	<ACK>

Initialisation of measuring system(s) and EMIS memory acknowledged.

⇨ Proceed with the program.

Direction	Telegram
EMIS	SET,METER,ORDERS,REINIT="xxx"
OBC	<NAK>
EMIS	REQUEST,ADMIN,STATUS
OBC	<ACK>
OBC	REPORT,ADMIN,STATUS,LASTERROR="5100:METER device not present"; MODE="READY"
EMIS	<ACK>

The (or one of the) measuring system(s) does not answer the requests by EMIS. The error code will help to identify the system which caused the error (see chapter 4.8).

⇨ OBC must perform error treatment (e.g. display “please check measuring system(s)”).

5 - Verify the success of the initialisation

Direction	Telegram
EMIS	REQUEST,METER,STATUS(0)
OBC	<ACK>
OBC	REPORT,METER,STATUS(0),LASTERROR="000:Ready to receive next order";MODE="READY"
EMIS	<ACK>

The measuring system is connected, in operation and ready to receive the next order (MODE=“READY“), i.e. initialisation was sucessfull.

⇨ Proceed with the program.

Direction	Telegram
EMIS	REQUEST,METER,STATUS(0)
OBC	<ACK>
OBC	REPORT,METER,STATUS(1),LASTERROR="001:Locked with actual operation";MODE="BUSY"
EMIS	<ACK>

The measuring system is connected and in operation, but not able to receive the next order at present (MODE=“BUSY“). This is caused e.g. by a delivery in process.

⇨ OBC must perform error treatment (e.g. display “please check measuring system(s)”).

Direction	Telegram
EMIS	REQUEST,METER,STATUS(0)
OBC	<NAK>
EMIS	REQUEST,ADMIN,STATUS
OBC	<ACK>
	REPORT,ADMIN,STATUS,LASTERROR="5100:METER device not present"; MODE="READY"
EMIS	<ACK>

The measuring systems does not answer the requests by EMIS.

⇨ OBC must perform error treatment (e.g. display “please check measuring system(s)”).

6 - Transmission of presets to EMIS

Direction	Telegram
EMIS	SET,METER,ORDERS,PRESET(0),PCODE="1";VOLUME="10000";PUNIT="L"
OBC	<ACK>
EMIS	SET,METER,ORDERS,PRESET(1),PCODE="3"
OBC	<ACK>
EMIS	SET,METER,ORDERS,PRESET(1),VOLUME="2000"
OBC	<ACK>
EMIS	SET,METER,ORDERS,PRESET(1),PUNIT="L"
OBC	<ACK>

Up to 10 presets (index 0..9) may be transmitted for the present version of EMIS. Both presets in the example above have been acknowledged by EMIS. The example shows two alternatives: Transmission of all preset-information with one set command (preferred variant) or transmission of the preset data with separate telegrams.

⇨ Proceed with the program.

Direction	Telegram
EMIS	SET,METER,ORDERS,PRESET(0),PCODE="1"
OBC	<ACK>
EMIS	SET,METER,ORDERS,PRESET(1),PCODE="3"
OBC	<NAK>
EMIS	REQUEST,ADMIN,STATUS
OBC	<ACK>
	REPORT,ADMIN,STATUS,LASTERROR="1006:Index out of range"; MODE="READY"
EMIS	<ACK>

Each preset has to be transmitted completely in the correct order. If one preset is not completed, EMIS will reject the transmission of further presets.

7 - Transmission of customer information

Customer related information (e.g. customer number) can be transmitted optional. If supported by the measuring system, this data can be printed together with the measuring results on the original receipt.

Direction	Telegram
EMIS	SET,METER,ORDERS,CUSTOMER="12345678"
OBC	<ACK>

The transmission has been acknowledged by EMIS.

⇨ Proceed with the program.

Direction	Telegram
EMIS	SET,METER,ORDERS,CUSTOMER="123456789"
OBC	<NAK>
EMIS	REQUEST,ADMIN,STATUS
OBC	<ACK>
	REPORT,ADMIN,STATUS,LASTERROR="2000:string too long"; MODE="READY"
EMIS	<ACK>

The customer number exceeds the specified length (max. 8 chars.). EMIS answers with <NAK> and truncates the number to the max. length (in this example: “12345678”).

⇨ Proceed with the program.

8 - Transmission of the presets to the measuring system(s)

Direction	Telegram
EMIS	SET,METER,ORDERS,ORDERCOUNT="2"
OBC	<ACK>
OBC	REPORT,METER,ORDERS,ORDERCOUNT="2"
EMIS	<ACK>

EMIS was able to transmit the two presets to at least one measuring system.

⇨ Proceed with the program.

Direction	Telegram
EMIS	SET,METER,ORDERS,ORDERCOUNT="2"
OBC	<ACK>
OBC	REPORT,METER,ORDERS,ORDERCOUNT="0"
EMIS	<ACK>

EMIS konnte die Produktvorgaben nicht an die Messanlagen übertragen.

⇨ perform error treatment (e.g. repeat from step 4).

Direction	Telegram
EMIS	SET,METER,ORDERS,ORDERCOUNT="3"
OBC	<NAK>
EMIS	REQUEST,ADMIN,STATUS
OBC	<ACK>
	REPORT,ADMIN,STATUS,LASTERROR="2002:value out of range"; MODE="READY"
EMIS	<ACK>

The ORDERCOUNT variable is set to a number that doesn't match the number of presets received by EMIS (see step 6).

⇨ OBC must perform error treatment (e.g. repeat from step „**0**“)

9 - Print header

Direction	Telegram
EMIS	SET,PRN,STATUS,MODE="OBC"
OBC	<ACK>

The printer is now assigned to the OBC.

⇨ Proceed with the program.

Direction	Telegram
EMIS	SET,PRN,STATUS,MODE="OBC"
OBC	<NAK>
EMIS	REQUEST,ADMIN,STATUS
OBC	<ACK>
OBC	REPORT,ADMIN,STATUS,LASTERROR="3000:no write access"; MODE="READY"
EMIS	<ACK>
EMIS	REQUEST,PRN,STATUS,MODE
OBC	<ACK>
OBC	REPORT,PRN,STATUS,MODE="METER"
EMIS	<ACK>

The printer access was rejected by EMIS since another device (a measuring system in the example above) is occupying the printer.

⇨ OBC must perform error treatment (e.g. repeat requesting printer access).

If printer is assigned to OBC:

Direction	Telegram
EMIS	SET,PRN,TEXT="Lieferschein\r\n"
OBC	<WaitON>
OBC	<WaitOFF>
OBC	<ACK>
...	...
EMIS	SET,PRN,STATUS,MODE="READY"
OBC	<ACK>

After discharge the measuring system(s) access the printer for printing the original receipt. The printer access is requested from EMIS. For this reason the OBC must release the printer after printing the header by sending

SET,PRN,STATUS,MODE="READY" wieder freigibt.

10 - Check if all discharges are finished

The measuring results can be found in the METER,ORDERS,RESULT(n) area. For a clear assignment the order corresponds to the presets, i.e. RESULT(0) contains the measuring results which correspond to PRESET(0), RESULT(1) corresponds to PRESET(1) etc.

Direction	Telegram
EMIS	REQUEST,METER,ORDERS,RESULT(0),Check
OBC	<ACK>
OBC	REPORT,METER,ORDERS,RESULT(0),CHECK=""
EMIS	<ACK>

The result is not yet available. The procedure shown above must be performed for all expected results.

Reasons: The discharge is not finished (in case of MultiFlow measuring systems, the actual mode can be determined by command REQUEST,METER(n),STATUS,MODE . If EMIS reports *MODE="BUSY"*, the discharge is in progress) or the measuring system was not able to discharge the corresponding product (e.g. the system is not configured for this product).

It must be considered that the job distribution can not be determined If several measuring systems are connected.

⇨ OBC must continue waiting for the result(s), interruption by the operator must be provided (if necessary)

Direction	Telegram
EMIS	REQUEST,METER,ORDERS,RESULT(0),Check
OBC	<ACK>
OBC	REPORT,METER,ORDERS,RESULT(0),CHECK="OK"
EMIS	<ACK>

The result is available. The procedure shown above must be performed for all expected results.

⇨ Proceed with the program.

11 - Collect delivery results

Direction	Telegram
EMIS	`REQUEST,METER,ORDERS,RESULT(0)`
OBC	`<ACK>`

OBC	`REPORT,METER,ORDERS,RESULT(0),PCODE="001";VOLUME="  10020";`
	`PUNIT="L";METERID="- ? - ";RECEIPTID="0000000017";MODEID="15";`
	`AVTEMP="+50,4";TUNIT="_C";DATE="28.11.00";STARTTIME="10:02";`
	`ENDTIME="10:14";VT="010330,00";VC="010020,00";MASS="008480,00";`
	`CHECK="OK"`

EMIS	`<ACK>`

The procedure shown above must be performed for all expected results.

⇨ Proceed with the program.

12 - Printing further data by OBC

After transmission of the results the OBC may print further information, e.g. delivery note, invoice, etc. The procedure is equal to the example shown in step 9 (print header).

6.3 Printer control

a Reserving the printer

The EMIS gateway is managing the printer, i.e. every device (OBC, measuring system, etc.) must request printer access before printing. The current user of the printer is listed in the variable “RESOURCE,PRN,STATUS,MODE“:

METER	measuring system (e.g. MultiFlow)
QAS	QAS device (e.g. MultiSeal)
OBC	On-Bord-Computer
READY	unused / free

Direction	Telegram
EMIS	SET,PRN,STATUS,MODE=“OBC“
OBC	<ACK>

The printer is now assigned to the OBC.

⇨ Proceed with the program.

Direction	Telegram
EMIS	SET,PRN,STATUS,MODE=“OBC“
OBC	<NAK>
EMIS	REQUEST,ADMIN,STATUS
OBC	<ACK>
OBC	REPORT,ADMIN,STATUS,LASTERROR="3000:no write access"; MODE="READY"
EMIS	<ACK>
EMIS	REQUEST,PRN,STATUS,MODE
OBC	<ACK>
OBC	REPORT,PRN,STATUS,MODE=“METER“
EMIS	<ACK>

The printer access was rejected by EMIS since another device (a measuring system in the example above) is occupying the printer.

⇨ O must perform error treatment (e.g. repeat requesting printer access).

b Sending data to the printer

Di The transmission of data to the printer is done like shown in chapter 6.2.1 / page 57 - 0 (step 9). During transmission of data the max. length for the variables TEXT and HEX may not be exceeded.

c Releasing the printer

The OBC must release the printer after printing so other devices are able to access the printer.

Direction	Telegram
EMIS	SET,PRN,STATUS,MODE=“READY“
OBC	<ACK>

7 Warranty and Service

In addition to the dealer's legal warranty in the purchase agreement we grant 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 F. A. Sening. With electronic products the registration form must have been received at Sening fully completed and signed by the installation department.
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 caused by the chemical and electrochemical effects of water or other liquids, electrical or electromagnetic influences and or caused by abnormal ambient conditions in general,
   - 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 times, travelling costs and working time for the service staff and any transport costs occurred are billed or not reimbursed.
6. Work under warranty does not imply any extension 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. Any more extensive or additional claims, in particular those for compensation of damages or consequential damages occurred outside of the device are expressly excluded, provided no liability is deemed mandatory in law.
8. Weitergehende oder andere Ansprüche, insbesondere solche auf Ersatz außerhalb des Gerätes entstandener Schäden oder Folgeschäden sind, soweit eine Haftung nicht zwingend gesetzlich angeordnet ist, ausdrücklich ausgeschlossen.

8 Address and Contact

Important Note

All explanations and technical details given in this documentation have been produced and edited by the author with the greatest care. However the possibility of errors cannot be completely eliminated. We 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:

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Appendix A

E7 Protocol – TDL formated data

As an alternative to the “DOK-411 Communcation“, there is the additional possibility since the emergence of the EMIS software version 3.12 to recall some information in the TDL format (see DIN 26051-1 and DIN 26051-2). The protocol used here varies slightly from the one described above. Communicatioin is done in keeping with the E7 specification. This involves a protocol oriented to the DOK-411 format which 7 leading European manufacturers commercially involved with communication on the tank truck have agreed to. The E7 specification is available as a separate doument.

Definitions are provided for several sub-nodes in a further "TDL" designated node. The EMIS currently supports the L_FILE, SYSTEM, GPS, PRN and AUX sub-nodes.

TDL,L_FILE

In a similar manner to QAS,EVENT, the TDL,L_FILE node can recall setup and event information. Given that basically no other data is available, the TDL formatted output solely represents data conversion from the setup or event table (see Chapters 4.2.1.2 and 4.2.1.3).

The entry in the setup table (TDL Identifier 800 Field index) specifies the index of the individual setup information in the TDL string (see Setup information TDL Identifier 800).

Example from the setup table:

Setup description	TYPE	VALUE1	VALUE2	TDL Identifier 800 Field index
Number of output drivers	SET02	**IO**	0 to 4 e.g. **2**	**4**

REPORT,TDL,L_FILE=800,20060106143800,11,FAS,**2**,0,0, …..

In the event table (4.2.1.3 / Page 33) conversion into the TDL format is listed in the line below.

Example from event table:

Event / sensor	TYPE	VALUE1	VALUE2
API coupling (Sensor status)	**AST**	*CoNo* e.g. **3**	“**L**“ = locked “U“ = unlocked
TDL	**42,S,V1,2,(1) (2) >> V2[..]**		

The API coupling for Compartment 3 was closed at 17:40 on 11/10/2005

Event report line fromREQUEST,QAS,EVENT-query:

```
REPORT,QAS,EVENT,TYPE="AST";VALUE1="3";VALUE2="L";
DATE="11.10.2005";TIME="17:40"
```

Event report line fromREQUEST,TDL,L_FILE-query:

```
REPORT,TDL,L_FILE=42,20051011174000,3,2,1
```

A description of how the individual event table information is converted is given in Chapter 4.2.1.3 / Page 33 Page (Information on converting DOK-411 in TDL data sets).

Not all setup information or events occuring in the system are defined in DIN 26501. For those missing use is made of the 8xx Sening® identifier to establish specific telegrams.

TDL,L_FILE – Identifier 8xx

Thanks to DIN 26051-2 (TDL-2) non-used identifiers and/or manufacturer-specific data sets can be used. To allow this identifier to distinguish between differing data set types, the following holds good for Sening® :

Field index 0 Identifier 8xx (DIN 26051-2)
Field index 1 Time stamp (DIN 26051-1)
Field index 2 CAN node ID of the QAS (DIN 26051-2)
Field index 3 Manufacturer abbreviated identifier „FAS“
Field index 4 .. n: Data

Depending on type, the data (Field index 4 to Field index n) can be differentiated into content, number and format.

Sening® TDL Identifier 8xx in general

Identifier	Identifier name	Record configuration	Field index	Description
8xx	NODE_CONF	8xx,S,N,C,N,..	0	Identifier 8xx
			1	DIN 26051-1 Time stamp
			2	Manufacturer-specific device configuration Code number as per DIN26051-2 #L108 (CAN-Node-ID)
			3	Manufacturer abbreviated code DIN26051 #L102 "FAS"
			4 .. n	Data

TDL Identifier 800 – Setup information

Identifier	Identifier name	Record configuration	Field index	Description
800	NODE_CONF	800,S,N,N,N,N,N, N,N,N,N,N, N,N,N,N,N, N,N,N,N,N, N,N,N,N,N, N,N	2	Manufacturer-specific device configuration Code number as per DIN26051-2 #L108 (CAN-Node-ID)
			3	Manufacturer code DIN26051 #L102 "FAS"
			4	Number of output drivers 0 to 4
			5	Dipstick 0 = No 1 = Yes
			6	Tank truck type 0 = Direct delivery 1 = Truck with metering packages 2 = Hybrid vehicle
			7	Number of compartments 01 to 24
			8	Number of overfill prevention devices 0 to 4
			9	Footvalve pressure balanced 0 = No 1 = Yes
			10	Monitor pipeline fill level 0 = No 1 = Yes
			11	Double sensors for remaining quantity 0 = No 1 = Yes
			12	Separate in-line valve controller 0 = No 1 = Yes
			13	Armature cabinet locking device 0 = No 1 = Yes
			14	Loading mode 0 = Truck

Identifier	Identifier name	Record configuration	Field index	Description
				1 = Compartment
			15	Switch on filling release valve when … 0 = Loading mode 1 = Connected
			16	Switch off filling release valve given … 0 = Compartment fault 1 = Loading fault 2 = System fault
			17	Automatic opening 0 = No 1 = Yes 2 = Not with manual entry of loading plan
			18	Close compartment after loading: 0 = No 1 = Yes
			19	Compartment empty test 0 = No 1 = Yes without override 2 = Yes with override
			20	Leave compartment open after empty test 0 = No 1 = Yes
			21	Delivery on filling side: 0 = No 1 = Yes
			22	Dome cover sensors present 0 = No 1 = Yes
			23	API coupling sensors present 0 = No 1 = Yes
			24	Foot valve sensors present 0 = No 1 = Yes
			25	In-line valve sensors present 0 = No 1 = Yes
			26	Overfill protector sensors present 0 = No 1 = Yes
			27	Sensor for left armature compartment flap present 0 = No 1 = Yes
			28	Sensor for right armature compartment flap present 0 = No 1 = Yes
			29	Sensor for water detector present

Identifier	Identifier name	Record configuration	Field index	Description
				0 = No 1 = Yes

TDL Identifier 800 – Event information

Valve Driver Digital Input - VDI

Identifier	Identifier name	Record configuration	Field index	Description
820	NODE_CONF	820,S,N,C,N,N	4	Valve driver incoming number
			5	Action

Wetleg Digital Input - WDI

Identifier	Identifier name	Record configuration	Field index	Description
821	NODE_CONF	821,S,N,C,N,N	4	Wetleg interface incoming number
			5	Action

AS Amplifier OPE

Identifier	Identifier name	Record configuration	Field index	Description
822	NODE_CONF	822,S,N,C,N	4	Number of the AS amplifiers used

Error Staus Quality Assurance - EQS

Identifier	Identifier name	Record configuration	Field index	Description
823	NODE_CONF	823,S,N,C,C,C	4	Error-String-1
			5	Error-String-2

ANA dead man's switch DMS

Identifier	Identifier name	Record configuration	Field index	Description
824	NODE_CONF	824,S,N,C,N	4	ANA-Status

ACCU-Load Communication - ALC

Identifier	Identifier name	Record configuration	Field index	Description
825	NODE_CONF	825,S,N,C,N,N	4	Connection status

Water sensor - WTR

Identifier	Identifier name	Record configuration	Field index	Description
826	NODE_CONF	826,S,N,C,N,N	4	Compartment no.
			5	Sensor status

TDL Identifier 850 – new event information

EMIS "passes on" the data received from the QAS given a QAS,EVENT request to the OBC, i.e. no analysis or formating takes place. This means that unknown events from revised QAS versions can be easily handed on to the OBC. In contrast for the TDL output, the QAS data is changed into a new format in the EMIS – something which of course is only possible with known data. To output new and thus unknown data in the TDL format, the identifier is outputted with the possible 3 parameters in 3 strings.

Identifier	Identifier name	Record configuration	Field index	Description
850	NODE_CONF	850,S,N,C, C,C,C	4	TYP (see Chapter 4.2.1 / Page 30)
			5	VALUE1 (see Chapter 4.2.1)
			6	VALUE2 (see Chapter 4.2.1)

Example:

Event / sensor	TYPE	VALUE1	VALUE2
XXX example	**XXX**	*CoNo* e.g. **3**	“AB“ = passiv “CD“ = active “EF“ = not connected “**GH**“ = short-circuit “IJ“ = invalid / unknown
TDL	**unknown**		

Event report line fromREQUEST,QAS,EVENT-query:

REPORT,QAS,EVENT,TYPE=“**XXX**“;VALUE1=“**3**“;VALUE2=“**GH**“;
DATE=“11.10.2005“;TIME=“17:40“

Event report line fromREQUEST,TDL,L_FILE-query:

REPORT,TDL,L_FILE=850,20051011174000,11,FAS,**XXX**,**3**,**GH**

Event table arranged by TDL identifiers

	TYPE	V1	V2
GPO data (NOT up-to-date)			
8,S,+23.33016,+42.712133,,3			
	GPO	North–South data	East–West data
GPS data (up-to-date)			
8,S,+23.33016,+42.712133,,6			
	GPS	North–South data	East–West data
Power ON / OFF			
20,S,49			
	PWR	„0“ = switched off	
20,S,16			
	PWR	„1“ = switched on	

	TYPE	V1	V2
Compartment status			
40,S,V1, ,0			
	CFS	*KaNr*	"0" = empty
40,S,V1, ,1			
	CFS	*KaNr*	"1" = not empty
40,S,V1, ,1			
	CFS	*KaNr*	"2" = remaining quantity (not empty)
40,S,V1			
	CFS	*KaNr*	"3" = unknown
40,S,V1, ,2			
	CFS	*KaNr*	"4" = full
40,S,V1			
	CFS	*KaNr*	"5" = Fault
Seal status			
40,S,V1, , ,2			
	CST	*KaNr*	"E" = empty (not sealed)
40,S,V1, , ,2			
	CST	*KaNr*	"R" = remaining quantity (not sealed)
40,S,V1, , ,1			
	CST	*KaNr*	"S" = sealed
40,S,V1, , ,3			
	CST	*KaNr*	"L" = second sealing when loading
40,S,V1, , ,3			
	CST	*KaNr*	"D" = second sealing when discharging
40,S,V1, , ,0			
	CST	*KaNr*	„?" = unknown
Manual entry of loading plan			
41,S,V1,V2, , , ,8			
	MLI	*KaNr*	*PrCo*

	TYPE	V1	V2
Discharge			
41,S, , ,0, , , ,V2 [3)]			
	TKNG	"0" = End of discharge	AsNo or CoNo if no AS installed
41,S,V1, ,0, , , ,V2 [3)]			
	TKNG	CoNo *at start of discharging*	AsNo or CoNo if no AS installed
Override (at discharge)			
41,S,V1, ,0, , ,8			
	OVR	*KaNr*	"0" = End of override
41,S,V1, ,0, , ,8,V2 [3)]			
	OVR	*KaNr*	*AsNo* or *CoNo* if no AS installed
Loading Mode			
41,S,V1, ,1			
	PKNG	KaNr	"0" = end of loading
41,S,V1,V2,1			
	PKNG	KaNr	*PrCo* at start of loading
Uncoded loading			
41,S,V1, ,1, , , ,1 [3)]			
	UCL	*KaNr*	"0" = end of loading
41,S,V1,V2,1, , , ,1 [3)]			
	UCL	*KaNr*	PrCo at start of loading
1 in [8] bezeichnet uncodierte Beladung			
Product code correction (with loading)			
41,S,V1, ,1, , ,8			
	PCC	KaNr	"0" = end of loading
41,S,V1,V2,1, , ,8			
	PCC	KaNr	PrCo at start of loading

	TYPE	V1	V2
Footvalve (sensor status)			
42,S,V1,1,1			
	BST	*KaNr*	"L" = closed (pressure low)
42,S,V1,1,2			
	BST	*KaNr*	"H" = open (pressure high)
API coupling (Sensor status)			
42,S,V1,2,1			
	AST	*KaNr*	"L" = locked
42,S,V1,2,2			
	AST	*KaNr*	"U" = entriegelt (Unlocked)
Dome cover (Sensor status)			
42,S,V1,3,1			
	DST	*KaNr*	"L" = locked
42,S,V1,3,2			
	DST	*CoNo*	"U" = unlocked
Vapour recovery hose monitoring			
42,S, ,5,2,V1			
	VRC	"1-4" GPS connection No. 1-4	"0" = interrupted
42,S, ,5,1,V1			
	VRC	"1-4" GPS connection No. 1-4	"1" = connected
42,S, ,5,2,5			
	VRC	Collective GPS connection	"0" = interrupted
42,S, ,5,1,5			
	VRC	Collective GPS connection	"1" = connected
Hose conductivgity test (Vapour recovery and discharge hose)			
42,S, ,5,2, , ,0110 [3)]			
	GTR	"0" = Fault	Example: 0110
42,S, ,5,1, , ,1001 [3)]			
	GTR	"1" = OK	Example: 1001

	TYPE	V1	V2
Armature cabinet flap (Sensor status)			
42,S, ,7,1,1			
	CAB	"L" = left	"0" = closed
42,S, ,7,1,2			
	CAB	"R"= right	"0" = closed
42,S, ,7,2,1			
	CAB	"L" = left	"1" = open
42,S, ,7,2,2			
	CAB	"R"= right	"1" = open
In-line valve (Sensor status)			
42,S,V1,11,1			
	LST	*KaNr*	"L" = closed (pressure low)
42,S,V1,11,2			
	LST	*KaNr*	"U" = open (pressure high)
Sensor for remaining quantity			
42,S,V1,13,2			
	NSI	Sensor number	"0" = dry
42,S,V1,13,1			
	NSI	Sensor number	"1" = wet
42,S,V1,13,6			
	NSI	Sensor number	"2" = interrupted
42,S,V1,13,5			
	NSI	Sensor number	"3" = short-circuit
Overfill protection device (Sensor status)			
42,S,V1,17,1			
	COF	*ChNo. for which the overfill protection has triggered*	

	TYPE	V1	V2
Overfill prevention Level sensor			
42,S, ,20,2,1, ,1 [3)]			
	OPD	Level sensor no.	"0" = interrupted
42,S, ,20,1,2, ,1 [3)]			
	OPD	Level sensor no.	"1" = connected
42,S, ,20,8,1, ,1 [3)]			
	OPD	Level sensor no.	"2" = released
42,S, ,20,9,2, ,1 [3)]			
	OPD	Level sensor no.	"3" = NOT released
42,S, ,20,0,1, ,1 [3)]			
	OPD	Level sensor no.	"4" = defective
1 in [7] signifies overfill prevention level sensor			
Overfill prevention device TAG (Sensor status)			
42,S, ,20,8,1, ,2 [3)]			
	TOP	*TAG-Nr*	"2" = released
42,S, ,20,9,2, ,2 [3)]			
	TOP	*TAG-Nr*	"3" = NOT released
42,S, ,20,0,3, ,2 [3)]			
	TOP	*TAG-Nr*	"4" = defective
2 in [7] signifies overfill prevention TAG			
Vapour recovery overpressure (Sensor)			
42,S, ,21,2			
	VEP	"0" NO overpressure	
42,S, ,21,1			
	VEP	"1" = overpressure	
Vapour recovery underpressure (Sensor)			
42,S, ,22,2			
	VNP	"0" NO overpressure	
42,S, ,22,1			
	VNP	"1" = underpressure	

	TYPE	V1	V2
Locking brake (Sensor status)			
42,S, ,25,8			
	SPB	"0" = released	
42,S, ,25,9			
	SPB	"1" = engaged	
Footvalve left = standard (solenoid valve)			
43,S,V1,1,1			
	BVL	*KaNr*	"0" = closed
43,S,V1,1,2			
	BVL	*KaNr*	"1" = open
Footvalve right (solenoid valve)			
43,S,V1,1,1,2			
	BVR	*KaNr*	"0" = closed
43,S,V1,1,2,2			
	BVR	*KaNr*	"1" = open
Interlock release (left + right) (solenoid valve)			
43,S, ,7,1			
	ILP	"0" = NO release	
43,S, ,7,2			
	ILP	"1" = Release	
In-line valve (solenoid valve)			
43,S,V1,11,1			
	LMV	*KaNr*	"0" = closed
43,S,V1,11,2			
	LMV	*KaNr*	"1" = open
Solenoid valve			
43,S,0,19,1,V1			
	VEN	Valve number	"0" = switched off (closed)
43,S,0,19,2,V1			
	VEN	Valve number	"1" = switched on (open)

	TYPE	V1	V2
Magnet code API hall sensor			
45,S, ,V1, , ,1, ,0			
	HMC	*KaNr*	"0" = NO code
45,S, ,V1, , ,1, ,V2			
	HMC	*KaNr*	Magnet code (NO PrCo !!)
Magnet code AS amplifier (Level sensor)			
45,S, ,V1, , ,2, ,0			
	OMC	Level sensor no.	"0" = NO code
45,S, ,V1, , ,2, ,V2			
	OMC	Level sensor no.	*Level sensor magnet code (NO PrCo !!)*
TAG product code			
45,S, ,V1, , ,4			
	TPC	*TAG-Nr*	"00 00 00" = NO code
45,S, ,V1, , ,4, ,56, , ,12,34			
	TPC	*TAG-Nr*	Example: "12 34 56"
NOMIX operating mode			
47,S, , ,0,0 [3)]			
	SCU	"D" = discharge mode	"Q" = default e.g. for magnet codes
47,S, , ,0,1 [3)]			
	SCU	"D" = discharge mode	"N" = NoMix TAG codes
47,S, , ,1,0 [3)]			
	SCU	"L" = loading mode	"Q" = default e.g. for magnet codes
47,S, , ,1,1 [3)]			
	SCU	"L" = loading mode	"N" = NoMix TAG codes
47,S, , ,2 [3)]			
	SCU	"M" = Menü	
47,S, , ,3 [3)]			
	SCU	"R" = Remote Access	
47,S, , ,4 [3)]			
	SCU	"S" = Standby	
47,S, , ,5 [3)]			
	SCU	"E" = Error	

	TYPE	V1	V2
Central unit DIP-switch			
47,S,2,10,V1,0 [3]			
	DIP	*"n" = switch no's 1 to 8*	„0" = AUS
47,S,2,10,V1,1 [3]			
	DIP	*"n" = switch no's 1 to 8*	„1" = ON
Valve driver digital input			
820,S,*NoID*,FAS,1,0 [4]			
	VDI	"1" = external setup key switch	"0" = passiv
820,S,*NoID*,FAS,1,1 [4]			
	VDI	"1" = external setup key switch	"1" = active
820,S,*NoID*,FAS,2,0 [4]			
	VDI	"2" = External ANA	"0" = passiv
820,S,*NoID*,FAS,2,1 [4]			
	VDI	"2" = External ANA	"1" = active
Wetleg Digital Input			
821,S,*NoID*,FAS,1,0 [4]			
	WDI	"1" = compressed air sensor	"0" = Pressure Low / passive
821,S,*NoID*,FAS,1,1 [4]			
	WDI	"1" = compressed air sensor	"1" = Pressure High / aktive
821,S,*NoID*,FAS,2,0 [4]			
	WDI	"2" = GPSÜ (vapour recovery hose overpressure)	"0" = Pressure Low / passive
821,S,*NoID*,FAS,2,1 [4]			
	WDI	"2" = GPSÜ (vapour recovery hose overpressure)	"1" = Pressure High / aktive
AS amplifier			
822,S,*NoID*,FAS,0 [4]			
	OPE	"0" = AS channels deactivated	
822,S,*NoID*,FAS,V1 [4]			
	OPE	"n" = no. of channels	
Quality assurance (Error status)			
823,S,*NoID*,FAS, xy[:zz][xy], x:zz [4]			
	EQS	String "xy[:zz][xy]"	String "x:zz"

	TYPE	V1	V2
DMS Dead man's switch			
824,S,*NoID*,FAS,0 [4]			
	DMS	"0" = ANA switched off	
824,S,*NoID*,FAS,1 [4]			
	DMS	"1" = ANA switched on	
824,S,*NoID*,FAS,2 [4]			
	DMS	"2" = ANA Alarm	
824,S,*NoID*,FAS,3 [4]			
	DMS	"3 = ANA emergency off	
ACCU load communication (Connection to the ACCU load)			
825,S,*NoID*,FAS,V1 [4]			
	ALC	"0" = interrupted	
825,S,*NoID*,FAS,V1 [4]			
	ALC	"1" = connected	
Water detection (Sensor status)			
826,S,*NoID*,FAS,V1,0 [4]			
	WTR	*KaNr*	"0" = passiv
826,S,*NoID*,FAS,V1,1 [4]			
	WTR	*KaNr*	"1" = active (water in compartment)
826,S,*NoID*,FAS,V1,2 [4]			
	WTR	*KaNr*	"2" = not connected
826,S,*NoID*,FAS,V1,3 [4]			
	WTR	*KaNr*	"3" = short-circuit
826,S,*NoID*,FAS,V1,4 [4]			
	WTR	*KaNr*	"4" = invalid / unknown

[3]) manufacturer-specific data field expansion, which is not specified in this way in DIN 26051

[4]) new manufacturer-specific data field identifier 8xx (see appendix A …)

CoNo Compartment number 1 to n, where 1 is the tank compartment following the driver's cab

AsNo Overfill prevention device number

PrCo Product code as per DIN 26051-1 (P53), can be extended or changed in the QAS sysstem

NoID CAN account number of the QAS unit (typical = 11)

Example for a TDL,L_FILE request

Direction	Telegram
EMIS	**REQUEST,TDL,L_File**
OBC	<ACK>
OBC	REPORT,TDL,L_FILE=0,20060106143641,300 // TDL-Version
EMIS	<ACK>
OBC	REPORT,TDL,L_FILE=1,20060106143641,FAS,EMIS2,02.00EMIS2,,03.12EMIS2,,21,18DM0019
EMIS	<ACK>
OBC	<Syn>>
OBC	<Syn>>
OBC	REPORT,TDL,L_FILE=800,20060106143800,11,FAS,2,0,0,05,3,1,0,0,0,0,0,0,0,2,1,2,0,1,0,0,0,0,0,1,0 // Setup-Informationen
EMIS	<ACK>
OBC	REPORT,TDL,L_FILE=47,20060105161800,,,0,0 // 1. Event
EMIS	<ACK>
OBC	REPORT,TDL,L_FILE=43,20060105161800,0,19,2,8
EMIS	<ACK>
OBC	REPORT,TDL,L_FILE=43,20060105161900,0,19,1,8
EMIS	<ACK>
…	
OBC	REPORT,TDL,L_FILE=47,20060106143800,,,4
EMIS	<ACK>
OBC	**<EOT>**

Example for a TDL,L_FILE request with CAN cancellation by the OBC

Direction	Telegram
EMIS	**REQUEST,TDL,L_File**
OBC	<ACK>
OBC	REPORT,TDL,L_FILE=0,20060106143641,300 // TDL-Version
EMIS	<ACK>
OBC	REPORT,TDL,L_FILE=1,20060106143641,FAS,EMIS2,02.00EMIS2,,03.12EMIS2,,21,18DM0019
EMIS	<ACK>
OBC	<Syn>
OBC	<Syn>
OBC	REPORT,TDL,L_FILE=800,20060106143800,11,FAS,2,0,0,05,3,1,0,0,0,0,0,0,0,2,1,2,0,1,0,0,0,0,0,1,0
EMIS	<ACK>
OBC	REPORT,TDL,L_FILE=47,20060105161800,,,0,0 // 1. Event
EMIS	<ACK>
…	
OBC	REPORT,TDL,L_FILE=47,20060105161900,,,3 // letztes ACK-quittiertes EVENT
EMIS	<ACK>
OBC	REPORT,TDL,L_FILE=47,20060106143800,,,4 // NICHT-ACK-quittiertes EVENT
EMIS	**<CAN>** // Abbruch durch den OBC

Example for a TDL,L_FILE request with specification of start date and time

Direction	Telegram
EMIS	`REQUEST,TDL,L_FILE,Date=20060101123000 // Start: 1.1.2006 12:30:00`
OBC	`<ACK>`
OBC	`REPORT,TDL,L_FILE=0,20060106143641,300 // TDL-Version`
EMIS	`<ACK>`
OBC	`REPORT,TDL,L_FILE=1,20060106143641,FAS,EMIS2,02.00EMIS2,,03.12EMIS2,,21,18DM0019`
EMIS	`<ACK>`
OBC	`<Syn>>`
OBC	`<Syn>>`
OBC	`REPORT,TDL,L_FILE=800,20060106143800,11,FAS,2,0,0,05,3,1,0,0,0,0,0,0,0,2,1,2,0,1,0,0,0,0,0,1,0 // Setup-Informationen`
EMIS	`<ACK>`
OBC	`REPORT,TDL,L_FILE=47,20060101161800,,,0,0 // 1. Event`
EMIS	`<ACK>`
…	
OBC	`REPORT,TDL,L_FILE=47,20060106143800,,,4`
EMIS	`<ACK>`
OBC	`<EOT>`

Comments:

- EMIS can even transmit a <CAN> within a REPORT telegram (e.g. when after an XOFF the OBC does not transmit any XON for 5 sec. or when the menu is activated at the QAS. The transfer of ETX and BCC is then dropped.
- Following an XOFF from the OBC, EMIS does not transmit any <SYN>.
- A REPORT telegram from the OBC acknowledged with a <NAK> is repeated by the EMIS until it is acknowledged with an <ACK> or the transfer is ended with a <CAN>.
- Given that the OBC does not transmit any acknowledgement for a report telegram (e.g. no ACK), then <SYN> is transmitted every second until a <CAN> from the EMIS stops the transfer after 5 seconds.

TDL,SYSTEM

Requests on system information or information on faults having arisen can be made through the SYSTEM sub-node. As no separating character for various variables is envisaged in the E7 specification, there are no group requests. The SYSTEM sub-node variables must be requested one by one.

Example:

Direction	Telegram
EMIS	REQUEST,TDL,SYSTEM,TDL_Vers
OBC	<ACK>
OBC	REPORT,TDL,SYSTEM,TDL_VERS=0,20060104145323,300
EMIS	<ACK>
	…
EMIS	REQUEST,TDL,SYSTEM,TDL_Format
OBC	<ACK>
OBC	REPORT,TDL,SYSTEM,TDL_FORMAT=SDC
EMIS	<ACK>
	…
EMIS	REQUEST,TDL,SYSTEM,LastError
OBC	<ACK>
OBC	REPORT,TDL,SYSTEM,LASTERROR=00000:No Error
EMIS	<ACK>
	…
EMIS	REQUEST,TDL,SYSTEM,DateTime
OBC	<ACK>
OBC	REPORT,TDL,SYSTEM,DATETIME=20060104145401
EMIS	<ACK>
	…
EMIS	REQUEST,TDL,SYSTEM,Devices
OBC	<ACK>
OBC	REPORT,TDL,SYSTEM,DEVICES=1,20060104145420,FAS,EMIS2,02.00EMIS2,,03.12EMIS2,,21,18DL0001
EMIS	<ACK>
	…
EMIS	REQUEST,TDL,SYSTEM, Sys_Err
OBC	<ACK>
OBC	REPORT,TDL,SYSTEM,SYS_ERR=9,20060104145435
EMIS	<ACK>
	…

TDL,GPS

The two PDA and Trailer variables are available for the GPS information. In the trailer variable the EMIS can provide GPS information which it has received form an EMIS-connected GPS module.

Example:

Direction	Telegram
EMIS	`REQUEST,TDL,GPS,Trailer`
OBC	`<ACK>`
OBC	`REPORT,TDL,GPS,TRAILER=8,20040901100139,-010.519043,+53.532944,0000,06,1.10,,4.4,201.0`
EMIS	`<ACK>`

In the PDA variable, the OBC can provide the EMIS with GPS information given that the GPS module is installed at the OBC. Whilst EMIS saves this information, it does not use it for internal purposes.

Example:

Direction	Telegram
EMIS	`SET,TDL,GPS,PDA=8,20050901160547,+010.999999,-53.000000,0000,06,1.10,,60.4,221.8`
OBC	`<ACK>`
	…
EMIS	`REQUEST,TDL,GPS,PDA`
OBC	`<ACK>`
OBC	`REPORT,TDL,GPS,TRAILER=8,20050901160547,+010.999999,-53.000000,0000,06,1.10,,60.4,221.8`
EMIS	`<ACK>`

TDL,PRN,Port

1 to 10 values can be saved in the Port variable. However, the printer installed at the EMIS is always used irrespective of the value.

EMIS does not support any sensoring on paper recognition at the printer. That is why the Staus=0 (printer ready) is always returned even when no printer has been parameterised at the EMIS. The CMD variable is not supported i.e. whilst values can be written into the variable, they produce no effects.

Apart from these limitations, the printer is controlled as described in the E7 specification.

TDL,AUX

An output is supported by the QAS system (see QAS,AUX,OutRelease). This output can also be accessed with TDL,AUX,OUT(1). The output is passive at 0 and active at 1. TDL,AUX,OUT(10) is a special feature. The effect of this variable being set to 0 is for the event request to be transmitted with setup information. No setup information is transmitted should the variable have the 1 value (see QAS,SETUP,NoSeP).

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