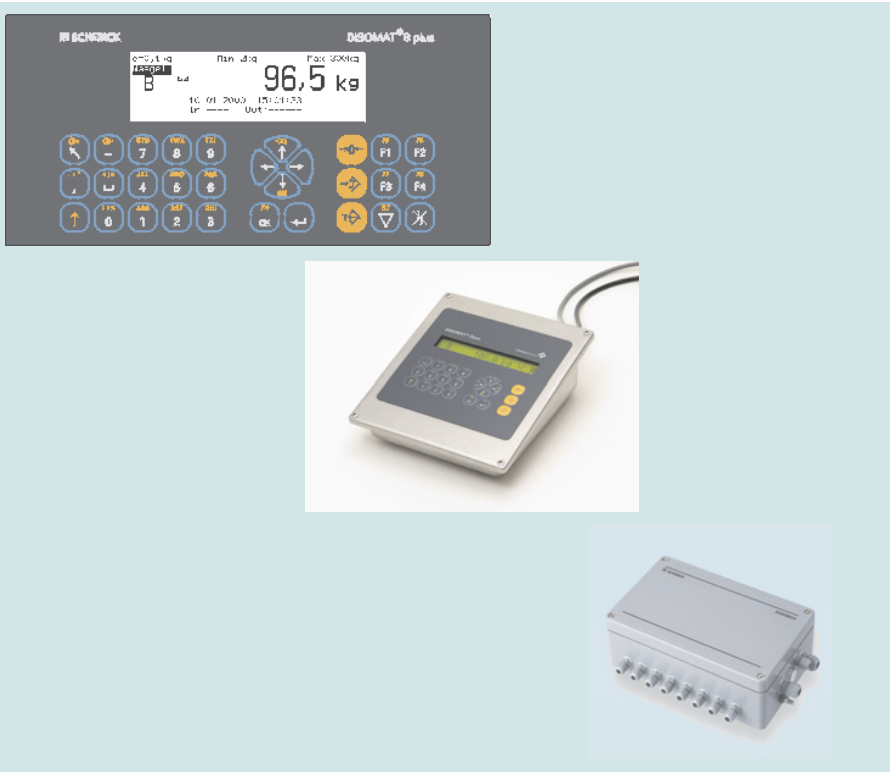
schenck process

DISOMAT® Bplus, DISOMAT® Opus, DISOBOX

Data Communication



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BV-H2316GB

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Schenck Process GmbH
Pallaswiesenstraße 100, 64293 Darmstadt, Germany
www.schenckprocess.com

Contents

1 On Manual

For Whom Has It Been Written?

This manual serves the technician and programmer wishing to control DISOMAT ® B plus, hereafter called DISOMAT or device, via an EDP system or prepare own function block linkages.
It is assumed that he is familiar with the DISOMAT functions and has some basic knowledge of the data exchange in local PC networks (point-to-point connections and bus systems).

Software Versions

DISOMAT from Version VWW 20400/11
DISOBOX from Version 20430-03
Opus from Version 20700-01

What Is Described?

The description details among others:

- Protocols
- EDP commands
- Bus connections
- Complete function block concept

What If You Meet A Term You Don’t Know?

Refer to the index at the end of manual.

Supplementary Documentation Overview

	Internal Number	Ordering Number
DISOMAT ® B plus System Manual	BV-H 2140GB	D739 040.01
DISOMAT ® B plus Operating Manual	BV-H 2139GB	D739 039.01
DISOMAT ® Opus System Manual	BV-H2310GB	
DISOMAT ® B Operating Manual	BV-H2313GB	

- Reserved for notes -

2 Safety Hints

Use For The Intended Purpose

Always control **DISOMAT** in accordance with its use for the intended purpose described in the relevant system manual.
Any use other than originally intended is considered inappropriate.

General Risks

Designed to the latest state of the art, **DISOMAT** is safe in operation. Residual risks may be given if the device is operated by unskilled personnel or improperly handled.

Safety-Minded Work

- Anyone entrusted with the data processing of DISOMATs should have read and understood the manual and in particular the safety instructions.
- Only trained and authorised personnel may connect **DISOMAT**s to a data processing system and trigger it via the data line. The weighing functions are supposed to be known.
- Never acknowledge error messages before the cause of fault has been removed and any risk is ruled out.
- Never acknowledge error messages requiring password input before the cause of fault has been remedied. If control systems are connected to **DISOMAT** slave, ensure that the controls remain in safe state after error acknowledgement.

Identification of Residual Risks

Some commands may be used interactively only. This applies to all safety crictical commands, e.g. error acknowledgement and start of feeding.
You will know such commands by the presence of the symbol on the left.
If these commands are executed with operator's acknowledgement, there is danger of personal injury and/or material damage.
When controlling **DISOMAT** via EDP, ensure that safety critical commands are started only after operator's acknowledgement. If this is not possible, do not use safety critical commands in EDP control.

Safety Hints For The User

- The user company shall bear the responsibility for proper data processing for the connected **DISOMAT**s.
- Responsible persons working on plant are required to know and read the safety hints given in Operating and Commissioning Instructions.
- Before commissioning, responsible persons are required to check to see if operation of **DISOMAT** might jeopardize the safety of other machines or system components. If need be, additional safety hints have to be formulated.

2.1 Information for Users of Certified Scales

Requirements of non-legal-for-trade additional equipment/EDP systems employed in commercial applications

Legal situation

For use in commercial applications, measuring results must be acquired using certified measuring systems.

The transfer of measurement values to non-legal-for-trade additional equipment *) "EDP Systems" for the preparation of vouchers is permitted under the proviso that

- the scale or a verified (certified) piece of additional equipment records and stores the measurement values in unchanged and undeletable fashion
- measurement values can be accessed by both parties of the commercial transaction.

The weighing system user is responsible for compliance with legal requirements.

*) According to the Weights & Measures regulations, additional equipment and measurement systems are treated alike. Verification Act and Verification Ordinance consider this predicament and pose demands on the EDP systems and programs used in commercial applications.

Requirements on EDP connection / Measurement value acquisition and preparation of vouchers

1. Call for legal-for-trade measurement values (ensure legal-for-trade data saving)

   - The call for a legal-for-trade measurement value must meet the requirements given in SCHENCK manuals BV-H2139 (s. EDP Format) and BV-H2141 (s. EDP Commands).
   - When changing the prompting mode from EDP to scale, always check to see if data saving properly operates.
   - The use of measurement values for any voucher without previous legal-for-trade data saving, e.g. in case of error message, is prohibited and will constitute an offence to the Weights & Measures regulations.

2. **Identification of measurement values**

   - For traceability, the legal-for-trade measurement values - from legal-for-trade data memory to voucher - must be complete with relevant identifications (attributes), e.g.

     - Date/time
     - Cons.No.
     - Vehicle no.

   - The voucher must include the following comments:
     “ Measurement values from freely programmable additional equipment. Legal-for-trade memory values can be viewed.”

3. **Period of legal-for-trade data saving**

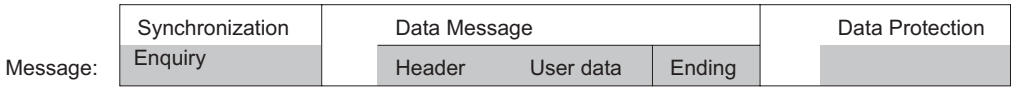
   The storage period for legal-for-trade measurement values is minimum 3 months. When storing new measurement values ever after, the oldest measurement value is overwritten. Storage periods > 3 months can be set.

3 Introduction

If connected to and remote-controlled from a superordinate EDP system (process computer, PC, programmable logic controls), certain declarations on electrical connections (physical level) and data communication are necessary.
DISOMAT can be integrated in a local network via serial interface. Data communication uses the protocols known in the field of programmable logic controls.

Protocols comprise a set of rules established for connection set-up, formatting and data encoding as well as for ensuring faultfree transmission. All protocols used operate with reports for sending and receiving of data blocks *messages)* and confirmation of connection (*acknowledgement).*
All protocols feature the immediate response behaviour: **DISOMAT** responds to each message directly and with time-delayed commands, automatically sends an additional message reporting due execution (e.g. taring complete).

Data to be transmitted, the socalled **user data**, are packed in data messages which additionally include control and block check characters.
The control characters determine beginning and end of the data message. To that end, user data are limited either by a start- or end-of-text character, or a message header determines the total length of data message.
Permitting the receiver to recognize errors in data transmission, the **block check characters** (BCC) serve for data protection.
Data and user data as such can be character-encoded (e.g. 7-bit ASCII, 8-bit ASCII) or transmitted as binary bit strings.



3.1 Protocol Overview

For communication via serial interface, the following protocols are available in **DISOMAT :**

I**nterface for PCs:**

- SCHENCK Standard Protocol, s. Item 4.1.1
- SCHENCK Poll Protocol, s. Item 4.1.2
- SIEMENS 3964R, s. Item 4.1.3
- ASCII-S5, s. Item 4.1.4
- ASCII-Modbus, s. Item 4.1.5

Interface for PLC:

- Modbus Protocol, s. Item 5.1
- Profibus-DP-Protocol, s. Item 5.2
- Interbus-S-Protocol, s. Item 5.3

3.2 **DISOMAT** Interface Parameters

Before operating the interface, enter various parameters.
With **DISOMAT** , parameters are entered, or selected, in menu tree at the following menu items:

- PERIPHERALS ½ INTERFACES

- PERIPHERALS ½ COMMUNICATION ½ EDP

PERIPHERALS ½ COMMUNICATION ½ FIELDBUS

-

For details, please see **DISOMAT ® B plus** Operating Manual BV-H 2139XX.

4 Computer, PC Coupling

4.1 Protocols

4.1.1 SCHENCK Standard Protocol (DDP 8672) Protocol Agreements

	Synchronisation	Data Message			Data Protection
Message:	Enquiry	Header	User data	Ending	
	<ENQ>	<STX>	...	<ETX>	<BCC>

In the following, the individual data transmission elements are characterized. The sequence of elements is not to be understood as time sequence.

Enquiry
The sender starts data transmission with control character **<ENQ>**.

Acknowledgement
The receiver acknowledges the enquiry with
<ACK> (ready to receive)
or **<NAK>** (not ready).

Data Message
The data messages (send, request and response messages) are constructed as follows:
<STX> User Data **<ETX><BCC>**

Acknowledgement
Receiver acknowledges successful data transmission with **<ACK>**; faulty data transmission, with **<NAK>.**

Error Recognition
Receiver acknowledges with **<NAK>** or one of the two stations fails to send feedback within preset period of time.

Behaviour Upon Errors In Data Transmission

Upon errors in data transmission, sender repeats sending various times.
With errors in connection set-up, repeats start from enquiry.
With faulty transmission of user data, repeats start with data message.

Synchronization,Monitoring Times, Repeats:

Acknowledgement monitoring time	tq	2 seconds
Response monitoring time	ta	5 seconds
Enquiry monitoring time	te	2 seconds
Max. number of enquiry repeats:		3
Max. number of data repeats:		3

Data Protection, Block Check Character Generation

BCC is formed as longitudinal parity over all character sent exclusive of <STX>.
BBC bits complete number of bits 1 of a bit number line to even (s. Example) parity bit is not formed in accordance with this rule. It is generated from the 7 bits of the BBC itself.
Receiver for his part generates the BCC code and compares it with block check characters received..

Example: Block check character formation for AB34 data.

Bit No.	STX	A	B	3	4	ETX	BCC
7	0	1	1	0	0	0	0
6	0	0	0	1	1	0	0
5	0	0	0	1	1	0	0
4	0	0	0	0	0	0	0
3	0	0	0	0	1	0	1
2	1	0	1	1	0	1	1
1	0	1	0	1	0	1	1
Parity bit Here: Odd	0	1	1	1	0	1	0

(Longitudinal: Always even and BCC parity same as character parity)

Sending Priority

The **DISOMAT** units always have low priority. If both stations attempt to start data communication, **DISOMAT** aborts sending and goes to receiving state.

Sequence

1. Sample Sequence:

DISOMAT with address 01 is to transmit current weight values to EDP.

1) EDP sends command for weigh data transmission to **DISOMAT (01#TG#)**.

Master (EDP)	Slave (DISOMAT)	Protocol Element
<ENQ>		Enquiry
	<ACK>	Acknowledgement
<STX>01#TG#<ETX><BCC>		Request message
	<ACK>	Acknowledgement

2) **DISOMAT r**esponds with response message comprising net and tare weights, weight change per time unit (dW/dt) and scale status information.

Master (EDP)	Slave (DISOMAT)	Protocol Element
	<ENQ>	Enquiry
<ACK>		Acknowledgement
	STX>01#TG#netto#tara#dg/dt#status# <ETX><BCC>	Response message
<ACK>		Acknowledgement

2. Example: Command with delayed response

DISOMAT with address 01 is to be tared remote-controlled via EDP.

1) EDP sends taring command **(01#AT#)** to DISOMAT .

Master (EDP)	Slave (DISOMAT)	Protocol Element
<ENQ>		Enquiry
	<ACK>	Acknowledgement
<STX>01#TG#<ETX><BCC>		Request message
	<ACK>	Acknowledgement

2) Taring is possible only under certain conditions, e.g. **DISOMAT** must have recognized no-motion. This may take some seconds. Therefore, **DISOMAT** sends an immediate response message informing EDP that the command is being processed.

Master (EDP)	Slave (DISOMAT)	Protocol Element
	<ENQ>	Enquiry
<ACK>		Acknowledgement
	<STX>01#TG#<ETX><BCC>	Response message direct
<ACK>		Acknowledgement

S=0: Command execution OK
S¹ 0: Command execution faulty

3) **DISOMAT** tries to tare scale and, once command is successfully executed, sends a response message including the information **01#AT#0#** (user data). If the command could not be performed **(DISOMAT** has not recognized no-motion after a certain timeout), the response includes a number unequal to **0, e.g. 01#AT#1#**.

Master (EDP)	Slave (DISOMAT)	Protocol Element
	<ENQ>	Enquiry
<ACK>		Acknowledgement
	<STX>01#TG#<ETX><BCC>	Response message delayed
<ACK>		Acknowledgement

4.1.2 SCHENCK Poll Protocol (DDP 8785)

This protocol has been developed from the SCHENCK Standard Protocol (see Item 4.1.1, or Spec Sheet DDP8 672) and is used for special applications, for instance, running weight display in superordinate PC.
EDP starts communication direct with request message and **DISOMAT** responds with corresponding data record. This is done **without acknowledgement and without repeat in case of error**. Transmission of data contents is secured through block check mechanism (recognition of faulty messages).
Note:
With this protocol, important response messages can get lost, particularly the delayed response messages whose output time is not exactly predictable.
Examples:

- The feed result message **(DO)** may be output several hours after start of feeding.
- The delayed message of the taring command **(AT)** follows only in no-motion.

Protocol Agreements

Message:	Synchronization	Data Message			Data Protection
	Enquiry	Header	User data	Ending	
		<STX>	....	<ETX>	<BCC>

In the following, the individual data transmission elements are characterized. The sequence of elements is not to be understood as timely sequence.

Enquiry
Omitted!

Data Message
The data messages (send, request and response messages) are constructed as follows:

<STX> User Data **<ETX><BCC>**

Acknowledgement
Omitted!

Error Recognition
One of the two stations does not send feedback within preset period of time.

Behaviour Upon Errors in Data Transmission

Upon errors in data transmission (timeout), sender retries data request.

Synchronization, Monitoring Times, Repeats:

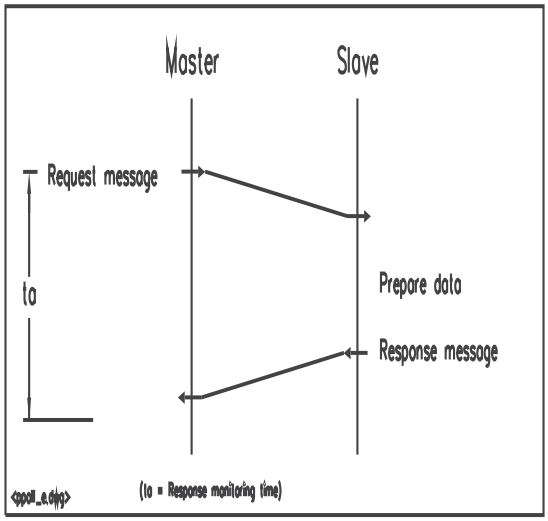
- No acknowledgement
- Response monitoring time **ta** : 5 sec.
- No enquiry
- No data repeats
- **No** EDP error on **DISOMAT**

Data Protection, Block Check Character Generation

See Item 4.1.1, page 7.

Sending Priority
The DISOMAT units always have low priority. If both stations try to start data communication, **DISOMAT** aborts sending and goes to receiving state.

Sequence



Example:
EDP sends command for weigh data acquisition and transmission to **DISOMAT** .

<STX>01#TG#<ETX><BCC> >

DISOMAT reponds directly with data message.

< <STX>01#TG#netto#tara#dg/dt#status#<ETX><BCC>

4.1.3 Schenck Minproz

Minproz was consciously developed as a very simple procedure. Its set-up without character check or block check characters makes it possible to trigger telegrams from a terminal program for testing purposes (such as Windows Hyperterminal). The fact that there is no block check means that data can be falsified without decection. This is the reason why it is not advisable to apply this procedure when operating the scale.

Master starts communication with the request message direct and **DISOMAT** responds with the corresponding data record. On either side, this takes place **without acknowledgement, block check and repeat in case of error**.

Protocol Agreements

	Synchronisation	Data Message			Data Saving
Message:	Enquiry	Header	User data	Ending	
	—-			<CR>	

Enquiry, acknowledgement, error recognition
omitted!

Data message
Data messages (send, request and reponse messages) are constructed as follows:

User data **<CR>**

Example:

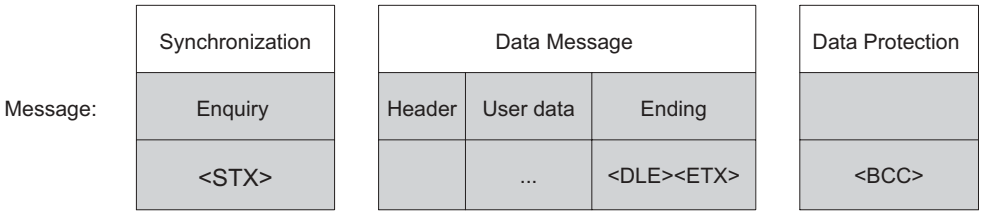
EDP sends command for acquisition and transfer of weigh data to **DISOMAT**.

01#TG#<CR> >

DISOMAT responds with data message direct.

< 01#TG#net#tare#dW/dt#status#<CR>

4.1.4 Siemens Protocol 3964R Protocol Agreements



In the following, the individual data transmission elements are characterized. The sequence of elements is not to be understood as timely sequence.

Enquiry
Sender starts data transmission with control character **<STX>**.

Acknowledgement
The receiver acknowledges the enquiry with **<DEL>** (ready to receive) or **<NAK>** (not ready).

Data Message
Data messages (send, request and response messages) are construction as follows:

User data <DLE><ETX><BCC>

Acknowledgement
Receiver acknowledges successful data transmission with **<DLE>**; faulty transmission, with **<NAK>**.

Error Recognition
Receiver acknowledges with **<NAK>** or one of the two stations fails to send feedback within preset period of time.

Behaviour Upon Errors in Data Transmission

Upon errors in data transmission, sender repeats sending various times.
In principle, repeats start from enquiry.

Synchronization, Monitoring Times, Repeats:

- Acknowledgement monitoring time **tg** 2 sec.
- Response monitoring time **ta** 5 sec.
- Enquiry monitoring time **te** 2 sec.
- Max. number of enquiry repeats 5
- Max. number of data repeats 5

Data Protection, Block Check Character Generation

See Item 4.1.1, page 7.

Sending Priority

DISOMAT aways has low priority. If both stations try to start data communication, **DISOMAT** aborts sending and returns to receiving state.

Value Range

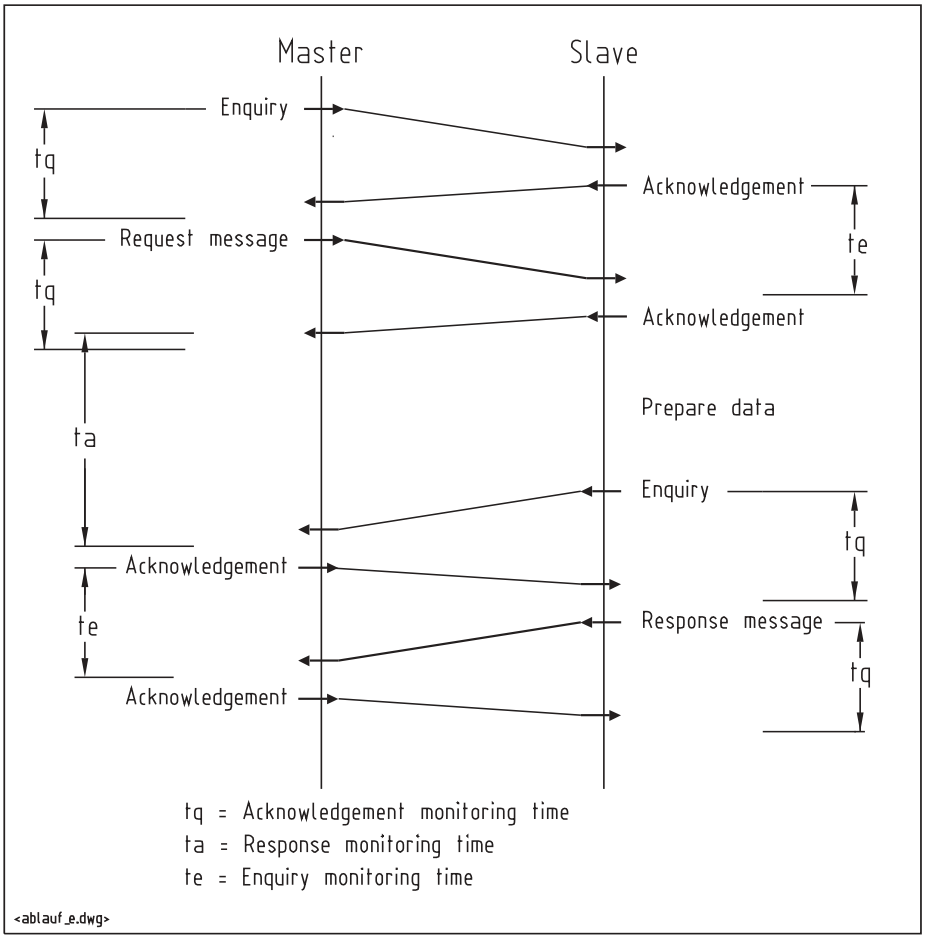
The value range of transmitted characters of a data section covers 8 bits, i.e. in hexadecimal representation 00 to FF.
This value range requires a special treatment of user datas' end code **(<DLE>)**, if the bit string of the <DLE> character is included in user data. This is done by doubling the <DLE><DLE> Doubling<DLE> character.

<DLE> Doubling

<DLE> occurring in user data is doubled by transmitter, for receiver to completely receive user data.
If **two** <DLE> codes are received, receiver resets doubling and treats <DLE> as data byte.

Data Request Sequence

Example:



1) EDP sends command for weigh data transmission upon no-motion.

Master (EDP)	Slave (DISOMAT)	Protocol Element
<STX>		Enquiry
	<DLE>	Acknowledgement
		Response message
01#TS#<DLE><ETX><BCC>	<DLE	Acknowledgement

2) EDP receives immediate response that command has understood. The code in response message stands for the status of the EDP command.
0=OK, 1=Error

Master (EDP)	Slave (DISOMAT)	Protocol Element
	<STX>	Enquiry
<DLE>		Acknowledgement
	01#TS#s#<DLE><ETX><BCC>	Response message
<DLE>		Acknowledgement

s = 0: Command execution OK
s¹ 0: Command execution faulty

3) Then, **DISOMAT** sends delayed message. If command can be executed within preset period of time (20 seconds), delayed message includes requested data, here: weight values and status. If not, corresponding error message is output after elapse of preset period of time.

Master (EDP)	Slave (DISOMAT)	Protocol Element
	<STX>	Enquiry
<DLE>		Acknowledgement
	01#TS#netto#tara#status<DLE><ETX><BCC>	Response message
<DLE>		Acknowledgement

4.1.5 ASCII-S5

The protocol used with SIMATIC S5/S7 differs from the SIEMENS 3964R protocol by the 10-byte message header ahead of user data which comprises address, command and length information. In **DISOMAT** this protocol is called “S5”.

In SIMATIC S5 Mode, all data are transmitted in ASCII code.
Data block or word are represented hexadecimally (0..FF)

To address a scale,

- the data block (DB) for scale number (0...255) must be used and
- the message code must be included in data word (DW).

For corresponding values, see Table “EDP Commands” at Item 4.2.2.

Example: “Request weight in no-motion" to DW=6, “Periodic request” to DW=7.

The address of the **AD messages sent from DISOMAT** consists of data block and data word (firmly preset) for the message code. See Item 4.2.2.

Protocol Agreements

Message:	Synchronization	Data Message			Data Protection
	Enquiry	Header	User data	Ending	
	<STX>	10 Bytes	...	<DLE><ETX>	<BCC>

In the following, the individual data transmission elements are characterized. The sequence of elements is not to be understood as timely sequence.

Enquiry

Sender starts data transmission with control character **<STX>**.
Data Message

Data messages (send, request and response messages) are constructed as follows:
Message header User Data **<DLE><ETX><BCC>**.

Acknowledgement

Receiver acknowledges successful data transmission with **<DLE>**; faulty data transmission, with **<NAK>**.

Error Recognition

Receiver acknowledges with **<NAK>** or one of the two stations fails to send feedback within preset period of time..

Behaviour Upon Errors in Data Transmission

Upon errors in data transmission, transmitter repeats sending various times. Repeats always start from enquiry.

Synchronization, Monitoring Times, Repeats

- Acknowledgement monitoring time **tq** = 2 sec.
- Response monitoring time **ta** = 5 sec.
- Enquiry monitoring time **te** = 2 sec.
- Max. number of enquiry repeats: 5
- Max. number of data repeats 5

Sending Priority

DISOMAT always has low priority. If both stations try to start data communication, **DISOMAT** aborts sending and goes to receiving state.

Value Range

The value range of transmitted characters of a data section covers 8 bits, i.e. in hexadecimal representation 00 to FF.
This value range requires a special treatment of user datas' end code **(<DLE>)**, if the bit string of the <DLE> character is included in user data. This is done by doubling the <DLE> character.

<DLE> Doubling

<DLE> occurring in user data is doubled by transmitter, for receiver to completely receive user data.
If **two** <DLE> codes are received, receiver resets doubling and treats <DLE> as data byte.

Request Message Header With ”S5” Protocol

In ”S5” mode, all data in the message header are represented in **hexadecimal** fashion. All messages start with two zero bytes (∅∅) followed by message type (ED or AD), data block address, data word address and two coordination flags.

Byte No.	Meaning
1	00
2	00
3	Message type (ED or AD)
4	
5	Data block address = Scale number
6	Data word address = Command code
7	Data length (≥ 1) in words
8	
9	Coordination flag To keep configuration work down and ensure maximum data safety, value FF is expected for every byte.
10	
11 ...	Data; length indicated in 7th and 8th byte. (At least one data word must be sent.)

AD and ED Message Descriptions:

AD messages (SEND messages) consist of message header (10 bytes) followed by data. Response message contains a 4-byte status information.

ED messages (FETCH messages) consist of message header (10 bytes). Response message comprises 4-byte status information and requested data.

AD Message Construction

AD message in the Clear Tare example (AC)
Request message (SIMATIC ⇒ **DISOMAT**)

>

Byte No.	hex.	ASCII	Meaning
1	00		
2	00		
3	41	A	Command: Output
4	44	D	Type: Data
5	21		Destination: DB = Scale no., e.g. 33
6	02		Destination: DW = Clear Tare command code
7	00		Number
8	01		Number : 1 DW
9	FF		Coordination flag (byte)
10	FF		Coordination flag (bit)
11	20		1st data byte — (blank)
12	20		2nd data byte – (blank)

Response message (**DISOMAT** ⇒ SIMATIC).

<

Byte No.	hex.	Meaning
1	00	4-byte fixed length
2	00	
3	00	
4	xx	xx= Error code (00 = Job OK; unequal to 00 = Error)

ED Message Construction

ED message in the ”*Request Weight*” example (TG)

This command returns the weight values to SIMATIC without no-motion inquiry. SIMATIC can read out scale status (see Item 4.3). In our example, net = -123.5kg, tare=100.0kg and material flow=12.3kg/sec.

Request message (SIMATIC ⇒ **DISOMAT**)

>

Byte No.	hex.	ASCII	Meaning
1	00		
2	00		
3	45	E	Command: Input
4	44	D	Type: Data
5	21		Source: DB = Scale number, e.g. 33
6	02		Source: DW = Request weight command code
7	00		Number
8	0e		Number : 14 DW
9	FF		Coordination flag (byte)
10	FF		Coordination flag (bit)

Response message (**DISOMAT** ⇒ SIMATIC)

<

Byte No.	hex.	ASCII	Meaning
1	00		
2	00		
3	00		
4	00		Error number (00 = No error)
5	20		1st data byte
6	2d	-	2nd data byte
7	31	1	3rd data byte
8	32	2	4th data byte Net
9	33	3	5th data byte
10	2c	,	6th data byte
11	35	5	7th data byte
12	23	#	8th data byte - Separator
13	20		9th data byte
14	20		10th data byte
15	31	1	11th data byte
16	30	0	12th data byte Tare
17	30	0	13th data byte
18	2c	,	14th data byte
19	30	0	15th data byte
20	23	#	16th data byte - Separator
21	20		17th data byte
22	20		18th data byte
23	20		19th data byte Material flow kg/s
24	31	1	20th data byte
25	32	2	21st data byte
26	2c	,	22nd data byte
27	33	3	23rd data byte
28	23	#	24th data byte - Separator
29	63	c	25th data byte - Scale status n1
30	30	0	26th data byte - Scale status n0
31	23	#	27th data byte - Separator
32	00		28th dummy byte

or, if an error has occurred:

<

Byte No.	hex.	ASCII	Meaning
1	00		4-byte fixed length
2	00		
3	00		
4	00		xx = error number (00 = OK; not 00 = error)

Further Examples

Acquire Tare

Send message **AT**:

>

Byte No.	Hex.	ASCII	Meaning
1	00		
2	00		
3	41	A	Command: Output
4	44	D	Type: Data
5	21		Destination: DB = Scale number, e.g. 33
6	01		Destination: DW = Tare command code
7	00		Number
8	01		Number : 1 DW
9	FF		Coordination flag (byte)
10	FF		Coordination flag (bit)
11	20		1st data byte - blank
12	20		2nd data byte - blank

Direct response message

<

Byte No.	**Hex.**	**Meaning**
1	00	4-byte fixed length
2	00	
3	00	
4	00	Error code (00 = No error)

Delayed response message

Once weighing system has recognized no-motion or the 20-second no-motion timeout has elapsed, **DISOMAT** sends the following message:

<

Byte No.	Hex.	ASCII	Meaning1
1	00		
2	00		
3	41	A	Command: Output
4	44	D	Type: Data
5	32		Destination: DB settable in menu tree, e.g. 50
6	54		Destination: DW permanently assigned with AT = 84
7	00		Number:
8	01		Number: 1 DW
9	FF		Coordination flag (byte)
10	FF		Coordination flag (bit)
11	30	0	1st data byte - Status 0 = OK 1 = Not effected
12	23	#	2nd data byte - Separator

Feeding Stopped

Send message **BR**:

Byte No.	Hex.	ASCII	Meaning
1	00		
2	00		
3	41	A	Command: Output
4	44	D	Type: Data
5	32		Destination: DB settable in menu tree, e.g. 50
6	50		Destination: DW = perm. assigned with BR = 80
7	00		Number:
8	01		Number : 1 DW
9	FF		Coordination flag (byte)
10	FF		Coordination flag (bit)
11	31	1	Feeding Stopped code
12	23	#	Separator

>

Response message:

<

Byte No.	Hex.	Meaning
1	00	4-byte fixed length
2	00	
3	00	
4	00	Error code

DISOMAT automatically sends this message to SIMATIC provided that feeding has been started by SIMATIC and the data block address has been entered at **DISOMAT** menu item EDP Configuration in decimal fashion (e.g. 50, hex 32).

This message is output if:

- First **HA** command (Stop Feeding) from SIMATIC
- **AB** command (Abort Feeding) from SIMATIC
- First stop via keyboard or input contact
- Error in feeding operation.

Restart stopped feeding operation with ‘Start Feeding’ (**”GO”**, hex 24).

4.1.6 ASCII - Modbus

The ASCII-Modbus protocol corresponds to the message construction described at Item 5.2. The user data, however, are in the ASCII format.

For type and address values, see “ZDV Commands” table at Item 4.2.2.

4.2 Message Descriptions

4.2.1 User Data Construction

Data construction in protocol frame is organized as follows:

Address # EDP Command# Specific Data#

Address Meaning

Used to distinguish multiple scales or **DISOMAT** units operating in group mode, the scale address must have two digits, e.g. 04 and an ASCII code.

DISOMAT units equipped with two channels reserve 4 addresses/channel.
Enter scale address in menu tree at Item ‘4431:EDP’.

1st address identifies the displayed scale.

2nd address …Scale 1
3rd address …Scale 2
4th address …Twin-unit scale

EDP Commands

The ”EDP Command” field consists of a 2-digit ASCII code used as abbreviation of the command to be executed on DISOMAT , see Table at Item 4.2.2.

Example: AT Aquire Tare
ES Enter Setpoint

For ASCII-S5, the ‘Address #EDP Command#‘ sequence is replaced by the message header of SEND/FETCH (AD/ED) messages.
The ”EDP Command” field is converted into data words within the addressed data block.

The ‘Specific Data‘ are transmitted as user data in the ASCII code.

Specific Data

This part of the user data is variable and corresponds to the parameters sent to **DISOMAT** using the relevant EDP command.

The Address and EDP Command fields are separated by #.

Example:
Scale adress 1 means:
Adress 1 = displayed scale
Adress 2 = Scale 1
Adress 3 = Scale 2
Adress 4 = Twin unit scale

If multiple devices are present on a bus, next **DISOMAT** receives scale address 5.

4.2.2 EDP Commands

Table of DISOMAT EDP Commands								
Command	Code (ASCII message)	Type with SIMATIC S5	Data Word DW with SIMATIC S5/S7				Typ with J-Bus	Address with J-Bus
		* = Not implemented	DW		Data length			
			dec.	hex.	dec.	hex.	dec.	dec.
Scale Commands Group:								
Acquire tare	AT	AD	1	1			6	1
Clear tare	AC	AD	2	2			6	2
Enter tare	ET	AD	3	3			16	3
Set to zero	AZ	AD	4	4			6	4
Connect scale	WN	AD	10	0a				
Request weight and dW/dt	TG	ED	5	5	14	0e	3	5
Request weight in no-motion	TS	AD	6	6			*	*
Start cyclic output	SZ	AD	7	7			*	*
Feeding Group:								
Enter setpoint	ES	AD	32	20			16	32
Request setpoint *	AS	ED	33	21	5	5	3	33
Enter material number and setpoint	SE	AD	41	29			16	41
Request current material number and setpoint	SR	ED	42	2a	7	7	3	42
Request material data>Request material data	SD	AD	43	2b			16	43
Request balance	SA	*						
Read material balance	GB	ED	34	22	9	9	3	34
Clear balance	SB	ED	40	28	50	32	3	40
Start feeding using current data	BL	AD	35	23			6	35
Material specific feed start	GO	AD	36	24			6	36
Stop feeding	SG	AD	45	2d			16	45
Abort feeding	HA	AD	37	25			6	37
Request feed status	AB	AD	38	26			6	38
Request extended feed status	DG	ED	39	27	9	9	3	39
Control Group, General:	DA	*						
Read all contacts	DK	ED	64	40	25	19	3	64
Set EDP contacts	EK	AD	65	41			16	65
Contact status	TA	ED	68	44	53	35	*	*
Request error	AF	ED	66	42	21	15	3	66
Acknowledge error	QU	AD	67	43			6	67
DISOMAT compatible								
Read function block parameters	AD	*	*				*	*
Set function block parameters	EP	AD	71	47			16	71
DISOMAT								
Read function block parameters	PL	*	*				*	*
Set function block parameters	PS	AD	87	57			16	87
Start processing function block	FS	AD	74	4a			6	74
PLC order message (bits)	SS	AD	77	4d		0e	16	77
PLC read message (bits)	SL	ED	78	4e	14		3	78

Control Group, General:								
Set fast comparator	SK	AD	79	4f			16	79
Read fast comparator	GK	*	*				*	*
Disable keyboard	LK	AD	81	51			6	81
Enable keyboard	UK	AD	82	52			6	82
Weight message for legal-for-trade PC	PC	*	*				*	*

Parametrization Group:								
Request device ID	ID	ED	128	80	44	2b	3	128
Read print pattern	DL	*	*				*	*
Set print pattern	DS	AD	130	82			16	130
Set time	EU	AD	131	83			16	131
Read MAX values	LM	ED	138	8a	15	0f	3	138
Set MAX values	SM	AD	139	8b			16	139
Read fixed tare vaues	LF	ED	144	90	50	32	3	144
Set fixed tare values	SF	AD	145	91	50	32	16	145

Printing Group:								
Enter string 1	EB	AD	96	60			16	96
Enter 1 of 5 strings	EI	AD	98	62			16	98
Print message	DR	AD	97	61			16	97

In addition to the messages described above (all started from EDP), there is a number of messages initiated by DISOMAT .

Note:

Not applicable to Modbus mode (DISOMAT always slave)
In SIMATIC S5 mode, these messages are sent only if the destination data block set in DISOMAT dialog unequals zero. In this case, messages are sent to the data word in this destination DB with fixed offset.

Feeding complete	DO[1]	AD	0	0	12	0c		
Weight in no-motion	TS	AD	16	10	10	0a		
Periodic weight transmission	TG	AD	32	20	14	0e		
Feeding stopped	BR	AD	80	50	1	1		
Taring complete	AT	AD	84	54	1	1		
Zero set complete	AZ	AD	88	58	1	1		
Printout complete	DR	AD	100	64				

[1] is sent only if started via message (**GO,** or **SG**).

Table of DISOMAT EDP Command Formats				
Command	Code	Send or Request Message	Response Message direct	Delayed
Scale Commands Group:				
Acquire tare	AT	WN#AT#	WN#AT#s# Message being processed	WN#AT#s# Command executed
Clear tare	AC	WN#AC#	WN#AC#s#	
Enter tare value	ET	WN#ET#tara# Tara = tare weight	WN#ET#s# S ≠ 0 with multi-divisional scale, if tare value is bigger than small range	
Set to zero	AZ	WN#AZ#	WN#AZ#s# Message being processed	WN#AZ#s# Command executed
Connect scale Not available for Opus	WN	WN#WN#	WN#WN#w# w: Scale currently connected	
Request weight	TG$)	WN#TG#	WN#TG#netto#tara#dG/dt#status# Netto: Net (7-digit) tara: Tare (7-digit) dg/dt: Material flow (7-digit) status: Scale status (see Item 4.3) e.g. # -123,5# 50,0# 0,0#c0# kg/t/g depending on scale calibration	
Request weight in no-motion	TS $)	WN#TS#	WN#TS#s# Message being processed	WN#TS#netto#tara#status# This message is sent once weighing system has recognized no-motion or the 20-sec. timeout has elapsed.
Start cyclic output	SZ	WN#SZ#w# w: Period in multiples of 0.1 seconds Admissible values: 0 or 5...99 (w=0 cuts off output))	WN#SZ#s# Message being processed	Cyclic: WN#TG#netto#tara#dg/dt#status#
* WN = 00 leaves scale as it is WN = 01, 02, 03 connects addressed scale				
$) **Note: Commands TG and TS do not start weight recording in DISOMAT (printout, legal-for-trade memory). Therefore they must never be used to start any legal-for-trade weighing operation. Please exclusively use command DR.**				

Table of DISOMAT EDP Command Formats				
Command	Code	Send or Request Message	Response message direct	Delayed
Feeding Group:				
Enter setpoint  Not available for Opus	ES	WN#ES#g# g: Setpoint for mat. type 1 (max. 7-digit) e.g. #100# kg/t/g/ depending on scale calibration	WN#ES#s#	
Request setpoint Not available for Opus	AS	WN#AS#	WN#AS#g# g: Setpoint (8-digit, right-flush, 3 after-comma places) e.g. # 100.000# kg/t/g/ depending on scale calibration	
Enter material number and setpoint 	SE	WN#SE#n#soll#ak# n: Setpoint number 1-10/Opus 1-2 soll: Setpoint (max. 7-digit) ak: Opt. order code, max. 25 digits text = 5 strings z.B #1#100#xy# kg/t/g depending on scale calibration	WN#SE#S#	
Request current material number and setpoint	SR	WN#SR#	WN#SR#n#soll# n: Material number 1-10 soll: Setpoint e.g. # 1# 100,0# kg/t/g depending on scale calibration	

Table of DISOMAT EDP Command Formats				
Command	Code	Send or Request Message	Response message direct	Delayed
Feeding Group:				
Enter material data	SD	WN#SD#n#vf#vk#hk#tol#opt# n: Material number 1-10 vf: Pre-fill contact threshold vk: Pre-act contact threshold hk: Main contact threshold tol: Tolerance range opt: Optimization factor soll*: *: setpoint. With SWA VKD20400 only e.g. #1#10#20#10#5#0,1# kg/t/g depending on scale calibration	WN#SD#s#	
Request material data	SA	WN#SH#n# n: Material number 1-10/Opus 1-2	WN#SH#vf#vk#hk#tol#opt# For parameters, see DS command	
Request balance	GB	WN#GB#	WN#GB#g#w# g: Balance total (11-digit, right-flush, with 2 after-comma places) w: Number of dumps (max. 5-digit)	
Read material balance	SB	WN#SB#	WN#SB#sb1#sb2#...#sb10# sb1...sb10 : Material balance (9-digit, right-flush, after-comma places and representation in display format e.g. # 123,4#...kg/t/g depending on scale calibration	
Clear balance	BL	WN#BL#	WN#BL#s#	
Start feeding using current data 	GO	WN#GO#	WN#GO#s#	

Table of DISOMAT EDP Command Formats				
Command	Code	Send or Request Message	Response message direct	Delayed
Feeding Group:				
Start material specific feeding 	SG	WN#SG#n#soll#ak# n : Material number 1-10 soll : Setpoint ak : Opt. order code max. 25 digits text = 5 strings	WN#SG#s#	
Stop feeding	HA	WN#HA#	WN#HA#s#	Response: WN#BR# Feeding stopped
Abort feeding	AB	WN#AB#	WN#AB#s#	Response: WN#BR# Feeding aborted and WN#DO# Feeding complete
Request feed status	DG	WN#DG#	WN#DG#stat#ist#soll# stat: Feed status 0 / 1 / 2 No/Active/Stopped ist: Actual value soll: Setpointt	
Request extended feed status	DA	WN#DA#	WN#DA#stat#istg#sollg#sn#ist#soll#fg#ak#fk# stat: Feed status 0/1/2= No/Active/Stopped istg: Actual value total sollg: Setpoint total sn: Material number ist: Current dump actual value soll: Current dump setpoint fg: Release status 1= Feed start possible ak: Order code max. 25 digits Text = 5 strings fk: Function block code (configuration code) max. 10 digits text. e.g. Receiving Scale’	

Table of DISOMAT EDP Command Formats				
Command	Code	Send or Request Message	Response Message direct	Delayed
Control Group, General:				
Read all contacts	TK	WN#TK#	WN#TK#x1#x2#x3#x4#x5#x6#x7#x8#x9#x10#x11#x12#x13#x14#a1#a2# x1..x4: Position of inputs contacts 1-4 x5..x10: Position of output contacts 1-6 x11..x14: Position of virtual EDP contacts 1-4 a1,a2: Analog EDP outputs (10-digit, right-flush, 3 after-comma places) (Contact set = 1, Contact not set = 0)	

Table of DISOMAT EDP Command Formats				
Command	Code	Send or Request Message	Response Message direct	Delayed
Control Group, General:				
Contact status	TA	WN#TA#	WN#TA'Netto#Tara'Status'WK# Int-InW#Int-Ä# ICP-In-W#ICP-In-Ä# Int-Out-W#Int-Out-Ä# ICP-Out-W#ICP-Out-Ä# PLS-In-W#PLS-In-Ä# PLS-Out-W#PLS-Out-Ä# EDV-Kontakte# Net: Display format, 7-digit Tare: Display format, 7-digit Status: 4-digit, hex, bit-coded WK:Scale code 1 (Scale 1), 2 (Scale 2), 3 (Twin-Unit) Int-In-X: Internal input contacts, 2-digit, hex, bit-coded X == W: Current values X == Ä: Change since last message ICP-In-X: I/O expansion input contacts, 4-digit, hex, bit-coded X == W: Current values X == Ä: Change since last message Int-Out-X: Internal output contacts, 2.digit, hex, bit-coded X == W: Current values X == Ä: Change since last message ICP-Out-X: I/O expansion output contacts, 4-digit, hex, bit-coded X == W: Current values X == Ä: Change since last message PLS-In-X: PLC inputs, 4-digit, hex, bit-coded X == W: Current values X == Ä: Change since last message PLS-Out-X: PLC outputs, 4-digit, hex, bit-coded X == W: Current values X == Ä: Change since last message For EDP contacts, see "TK" message.	

Table of DISOMAT EDP Command Formats				
Command	Code	Send or Request Message	Response Message direct	Delayed
Control Group, General:				
Set EDP contacts 	EK	WN#EK#x1#x2#x3#x4# or WN#EK#x1#x2#x3#x4#abcd# X1...x4: Contacts 1...4 Set contact =1 Do not set contact =0 abcd; PLC input function blocks, hex, bit-coded, e.g. 000f# **DISOMAT** automatically resets EDP contact after reading.	WN#EK#s#	
Request error	AF	WN#AF#	WN#AF#E-Text# E-Text: Result number and text as displayed (max. 40 digits)	
Acknowledge error 	QU	WN#QU#	WN#QU#s# Error of the **M**essage, **W**arning and **A**larm classes can be acknowledged by key operation. Error of fault class **S** can be acknowledged in **DISOMAT** menu tree after password input.	
DISOMAT compatible Read function block parameters Not available for Opus	AP	WN#AP#b# b: Function block code (see 'Data Communication' manual DKI116 Item 6.4)	WN#AP#b#p1#..#pn# b: Function block code p1..pn: Parameters	
DISOMAT compatible Set function block parameters  Not available for Opus	EP	WN#EP#b#p1#...#pn# b: Function block code (see 'Data Communication' manual DKI116 Item 6.4) p1..pn: Parameters	WN#EP#s#	

Table of DISOMAT EDP Command Formats				
Command	Code	Send or Request Message	Response Message direct	Delayed
Control Group, General:				
DISOMAT Read function block parameters Not available for Opus	PL	WN#PL#b# b: Function block code, see relevant function block description	WN#PL#b#p1#...#pu# b: Function block code p1...pn: Function block parameter values For number, see relevant function block description.	
DISOMAT Set function block parameters Not available for Opus	PS	WN#PS#b#p1#...#pn# b: Function block code p1...pn: Parameter values	WN#PS#s# s: Status 7 = Feeding active. Parameter change not possible at the time being!	
PLC order message (bits) Not available for Opus	SS	WN#SS#XX# XX= 2 order bytes (for explanation, see Item 4.3, page 38)	WN#SS#s#	Further response messages according to request: WN#AT#s#, WN#AZ#s#, WN#BR#s# etc.
PLC read message (bits) Not available for Opus	SL	WN#SL#	WN#SL#B1B2B3#netto#brutto#dg/dt# B1: Byte 1 = Scale status B2: Byte 2 = EDP and input contacts B3: Byte 3 = Output contacts (For meaning, see Item 4.3, page 38) Netto: Net (7-digit) Brutto: Gross (7-digit) dW/dt:: Material flow (7-digit)	
Set fast comparator  Not available for Opus	SK	WN#SK#n#e#ein#aus# n: Comparator number 1-6 e: Activate: 0/1 No/Yes ein: Switch-on value aus: Cut-off value	WN#SK#s#	
Read fast comparator Not available for Opus	GK	WN#GK#n# n: Comparator number	WN#GK#n#e#ein#aus# For parameters, see SK command.	

Table of DISOMAT EDP Command Formats				
Command	Code	Send or Request Message	Response Message direct	Delayed
Control Group, General:				
Disable keyboard for 1 min.	LK	WN#LK#	WN#LK#s	
Enable keyboard	UK	WN#UK#	WN#UK#s	
Weight message for legal-for-trade PC	PC	WN#PC#kennung# Kennung: 8 optional ASCII characters for unambiguous message identification	WN#PC#kennung#g1#g2#status#w1#w2#w3#typ#w.b#F-Text# Code: 8-digit code (copy from request message) g1,g2: Net, tare status: Scale status w1: Full scale in kg w2: Number of increments w3: Scale unit 0 / 1 / 2 / 3 kg / g / t / lb typ: Scale type 0 / 1 / 2 single-range/ multi-div. / multi-range w.b: Range scale number F-Text: Error number and text	

Table of DISOMAT EDP Command Formats				
Command	Code	Send or Request Message	Response Message direct	Delayed
Parametrization Group:				
Request device ID	ID	WN#ID#	WN#ID#t sk sd sn# t: Text **DISOMAT** Schenck Process GmbH sk: Software code sd: Generation date sn: Device serial number	

Table of DISOMAT EDP Command Formats				
Command	Code	Send or Request Message	Response Message direct	Delayed
Parametrization Group:				
Read print pattern	DL	WN#DL#nr# nr: Number of print pattern 1/2/3/4	WN#DL#nr#muster# nr: Number 1-3 = Format of prints 1-3 Number 4 = EDP format (variable element) Number 5 = Page header format Number 6 = L-f-T memory format variable text)> muster: Print pattern format string	
Set print pattern	DS	WN#DS#nr#muster# For parameters, see DL command.	WN#DS#s#	
Set Time	EU	WN#EU#TT.MM.JJ#hh:mm:ss# Day.Month.Year#Hour:Minute:Second	WN#EU#s#	
Read MAX values Not available for Opus	LM	WN#LM#	WN#LM#dg#bl#sch# dg: Max. dW/dt (10-digit, right-flush, 3 after-comma places) bl: Max. balance (12-digit, right-flush, 2 after-comma places) sch: Max. dumps (5-digit)	
Set MAX values Not available for Opus	SM	WN#SM#dg#bl#sch# For parameters, see LM command.	WN#SM#s#	
Read fixed tare	LF	WN#LF#	WN#LF#w1#...#w9# w1..w9: Fixed tare values	
Set fixed tare values	SF	WN#SF#w1#...#w9# w1..w9: Fixed tare values	WN#SF#s#	

Table of DISOMAT EDP Command Formats				
Command	Code	Send or Request Message	Response Message direct	Delayed
Printing Group:				
Enter string 1	EB	WN#EB#text# Text: max. 30 digits	WN#EB#s#	
Enter 1 of 5 strings	EI	WN#EI#n#text n: String number 1-5 text: Max. 25 digits	WN#EI#s	
Print message	DR	WN#DR#n#text# n: Number of print pattern text: String texts (max. 25 digits) or with multiple strings WN#DR#n#text1#text2#...#text5# text1-text5: Max. 25 digits per string text * n = 0 Recording in l-f-t memory n = 1...6: Print pattern Texts are printed if the respective print pattern includes string codes BZ1...BZ5. See Operating Manual BV-H 2139, Item 5.2.1.2.	WN#DR#s# s not 0 = no no-motion, repeat sending.	After printing: WN#DR#n#x#status#string# n= Print pattern number X=0 Printing OK X=1 Printing error X= 2 Error upon legal-for-trade storage Status= Scale status, see item 4.3, page 38 String= Formatted string. For example, see Operating Manual Item 5.2.1.5 , EDP Format The length of the weight representation is generally constant but depends on system configuration, e.g. 1-Scale system, l-f-t brackets, Unit “t” # <0.00t> B # —> Length 17 1-Scale system, no l-f-t brackets, Unit “kg” # 150.0kg B # —> Length 15 2-Scale system, l-f-t brackets Unit “t” # <17.34t> B 1# —> Length 17

The DR command starts weight recording on DISOMAT (printer, legal-for-trade memory). Therefore it can be used to start a legal-for-trade weighing operation. When further processing the weighing in non-legal-for-trade plant sections, please see the hints given at Item 2.1.

Table of DISOMAT EDP Command Formats				
Command	Code	Send or Request Message	Response Message direct	Delayed
DISOMAT Messages Group: DISOMAT initiates message				
Feeding complete	DO	WN#DO#g1#g2#g3# g1: Actual value g2: Actual value - setpoint g3: Optimized main contact This message is sent only if feeding has been started by message (GO or SG)		
Feeding stopped	BR	WN#BR#		

4.3 Commands Explanations

WN Scale number always in 2-digit form, e.g. 01

s Codes number of EDP command status

If the code number unequals 0, command was not properly executed.

S = 0: Command execution OK
s>< 0: Command execution faulty

status Scale status in hexadecimal format

Bit No.	Meaning
0	Underrange
1	Overrange (weight > full scale value)
2	Tare computed
3	Exact zero
4	—- Not used —-
5	Weight invalid
6	Tare acquired
7	No-motion recognized

With 16-bit status:

Bit No.	Meaning
8	Initialisation
9	—- Not used —-
10,11	Range (1,2,3)
12	In zeroing range
13	Twin-unit scale
14	Multi-divisional scale
15	Multi-range scale

Example: Status ”c0” is interpreted as hexadecimal number 0xc0 and converted into binary 1100 0000.

Bit:	**76543210**	Bits 6 and 7 are set, i.e. tare is acquired;
Value:	**11000000**	no-motion, recognized.

Note:Hexadecimal numbers a...f are **always transmitted as lower-case letters.**

SS Used in PLC order message

Message type: Bit output
Data block: Scale number
Data word: 4d (hex)

Message construction: 16 bits, each bit coding an order to connected scale.
Bit setting starts order. Meaning of individual bits:

Bit No.	Meaning
0	Acquire tare
1	Clear tare
2	Set to zero
3	Start feeding
4	Stop feeding
5	Abort feeding
6	Clear balance
7	Acknowledge error
8-15	Standby

Selected command is executed only upon first sending of message (”rising edge”).
To have command executed, reset relevant signal.

SL Used in PCL read message

Byte	Explanation	Bit No.	Meaning
1	Scale status	0	Underrange
		1	Overrange
		2	Tare computed
		3	Exact zero
		4	Resolved mode
		5	Weight invalid
		6	Tare acquired
		7	No-motion
2	Output of DISOMAT physical input	8	Contact 1
		9	Contact 2
		10	Contact 3
		11	Contact 4
		12	EDP 1
	Output of DISOMAT virtual (EDP) outputs statusses:	13	EDP 2
		14	EDP 3
		15	EDP 4
3	Output of DISOMAT physical output contact statusses	16	Contact 1
		17	Contact 2
		18	Contact 3
		19	Contact 4
		20	Contact 5
		21	Contact 6
		22	Standby
		23	Standby

Sequence in message:

Bytes:	1	2	3
Bits:	76543210	15...8	23...16

5 Coupling for PLC, PMS

This chapter describes the coupling between a PLC/PMS and a system of the DISOMAT B plus family (DISOMAT B plus weighing terminal or DISOBOX), hereafter called “controller”. If parts of the description specifically refer to one of the two units, this is explicitly referenced.

5.1 MODBUS Protocol

The MODBUS protocol general specification describes two types of data coding:

1. 7-bit ASCII framing
2. RTU framing

The controller exclusively uses the RTU framing.

The specification below dedicates to the special features used for interfacing a Process Management System (PMS) and the controller.

5.1.1 Terminology

The following items represent
HEXADECIMAL values in 0x1234 form, and
DECIMAL values in 1234 form.

5.1.2 Logical Hierarchy

Process management system is bus master; controller units are treated as single slaves.
A message cycle always consists of a Master (PMS) request and a slave response. The response is either the acknowledgement of an order received from Master, or a data record requested by Master.

5.1.3 Physical Arrangement

Both a point-to-point coupling via RS232/RS422 and a bus coupling via RS485 (2- or 4-wire) are possible.
Coupling can be made using a free interface on base board or an interface on the add-on card.

5.1.4 Data Format

DISOMAT always uses the RTU format with the following standard character representation (possible settings via control station in brackets).
Settings always result in an 11-bit character frame.

8 - O - 1	8 data bits, odd parity, 1 stop bit
(8 - E - 1)	8 data bits, even parity, 1 stop bit
(8 - N - 2)	8 data bits, no parity, 2 stop bits.

Transmission temporally starts with MSB.
Setpoints and measurement values can be transferred in the IEEE float format (IEEE 754, 32 bits) and in the integer format. With the latter, a 16-bit word is available whose resolution can be set in the range of 0 .... MAXINCREMENTS. Maximum resolution is 215-1 increments.
Example: Transmit value 150.5 in IEEE format (in line sequence):

byte 1: Sign/exponent	byte 2: Mantissa 1	byte 3: Mantissa 2	byte 4: Mantissa 3
0x43	0x16	0x80	0x00

All control and status information is represented in form of a binary signal using the 8 data bits of every character.
In addition, all control and status information can be treated as single bit information.

5.1.5 Transmission Protection

All characters are protected by a parity bit (see MODBUS specification).
Messages are protected by checksum (CRC16) (see MODBUS specification).
Response on transmission errors is determined by the MODBUS specification.
Data exchange between scale and management system can be protected by timeout. In this case, controller expects a message of PMS in defined intervals. The type of message is irrelevant. Time interval and type of controller response on missing messages can be set on controller by parameters (DISOMAT Bplus: see Operating Manual BV-H2139, Item 5.3.2.9 Fct. 434_Event Classes). If timeout is set to zero, controller does not monitor data flow between controller and Master.

5.1.6 Sequences

Defined sequences to be observed for data presetting are described at the relevant items.

5.1.7 Station Addresses

Every controller receives a slave address starting from 1 in rising sequence. In the following text, the highest settable address is called MAXSLAVE. The address is set on controller in the dialog mode. MAXSLAVE has value 254. Zero is the broadcast address.

5.1.8 Baud Rate

Baud rate is maximum 19200 bits/sec. and can be selected on controller.
Other possible settings are 600, 1200, 2400, 4800 and 9600 baud.

5.1.9 Data Message Construction

To ease data processing in PMS, data are sorted by data types (binary, analog) and transmitted in form of separate messages.

As a rule, all messages are constructed as follows:

T1 T2 T3	Slave Address	Function Code	Data	Check CRC16	T1 T2 T3
Break	8 bits	8 bits	n * 16 bits	16 bits	Break

Multiple measurement values can be transmitted at the same time.
To do so, the data registers start addresses and then the data themselves are added to one another in the DATA field. The number of data is determined by the LENGTH field (word count, or byte count). Depending on function code and transmission direction, this information is found in different locations (explicit or implicit length indication). In the case of single value transmission (function code 5 or 6) , the length indication is omitted.

Function Codes:

Function Code	Description
1	Bitwise rereading of control information (one/multiple bits)
2	Bitwise reading of status information (one/multiple bits)
3	Wordwise (re)reading of setpoints and measurement values (one/multiple words)
4	Wordwise reading of status information (one/multiple words)
5	Bitwise (re)reading of control information (always one bit)
6	Wordwise writing of control bits or setpoints (always one data word)
15	Bitwise writing of control information (one/multiple bits)
16	Wordwise writing of setpoints in IEEE format (one/multiple data words)

DISOBOX only:	
23	Wordwise writing of control bits or setpoints and re-reading of predefined process images (“fixed formats”).

Note:

More often than not, the host system must add a so-called segment address (depending on function code) to the data address described.
In addition, the data address must be incremented by 1 since the Modbus protocol’s register addresses start from 1.
Configure the data address as follows:
Data address = segment address + controller address + 1.

Data Field Construction:

Data message from PMS

ADDRESS HI	Data register start address
ADDRESS LO	Data register start address
VALUE HI	Data register contents
VALUE LO	Data register contents

Request message from PMS

ADDRESS HI	Data register start address
ADDRESS LO	Data register start address
LENGTH HI	Data fields number in words
LENGTH LO	Data fields number in words

Measurement value message from controller

LENGTH	Data fields number in bytes
VALUE 1 HI	Data register contents
VALUE 1 LO	
...	
VALUE n HI	
VALUE n LO	

All fields are of 8-bit length.

5.1.10 Error Message Construction

Error messages are constructed as follows:

T1 T2 T3	Slave Address	Function Code	Error Code	CRC16	T1 T2 T3
Break	8 bits	8 bits	8 bits	16 bits	Break

In error message, value 0x80 is added to FC or to request. For meaning of error codes, please see table below.

Error Code	Meaning
1	Station does not support requested function (FC).
2	Data address faulty, e.g. - Data address out of range - Data address with IEEE or odd - Data offset + length too big
3	Data type wrong, e.g. - Wrong data with FC 5 (admissible: 0xFF00 and 0x0000) - Data length smaller than 0 - Requested length too big

5.1.11 Coupling Address Ranges

The following data areas are defined for the Modbus coupling:

Write area with
- Control information
- Setpoints (in IEEE or integer format)
- Setpoints (in the LONG integer format)
- Text

Read area with
- Status information
- Measurement values (in IEEE- oder Integer-Format)
- Readings (in the LONG integer format)
- Text

Data From Process Management System

The data from the host system can always be assigned to one of the groups specified:
Control bits - The information transmitted is assigned to one of the 16 bits of the PLS-DIn1-16 function block. What effect the control information has depends upon how the function block is wired. Please ensure that the desired function block is also loaded (function 425, load fixed wiring).The positive flank functions with all control bits and each state has to be available at least 100 ms to be unambiguously identified. The bit should be taken back after carrying out the

control function. The bit number (i.e., which of the 16 possible bits you want to change) can be seen from the four lowest value bits of the LO data address. For example, if the basic data address is 0 x 1010, this references bit 0. The 0 x 101F address addresses bit 7 in highbyte. The value 0 x FF in the highbyte of the control word sets the flag and value 0 x 00 clears the flag (function code 5).

Commands- A 16-bit data word is always transmitted as a command. There has to be a change for a command to be effective. If you would like to execute the same command several times, you have to transmit the ZERO command between commands.

Analog setpoints - These values can be transmitted as an IEEE floating point value (4 bytes) or as a whole-number value (2 bytes).

- (String) texts

Control Information (PLS-DIn 1-16 and commands)

The message to controller (function codes 5, 15, 6) contains binary information. Information can be reread with function codes 1 and 3. Please remember that the base data addresses have changed in the course of development. Theses example relate to the current addresses.

Bus address	1... MAXSLAVE
Function codes	1, 5, 15 bit operations
Function codes	3, 6, 16 word operations
Data base address	0x0010 Kommandos, old: 0x1000 0x0020 PLS-DIn 1...16, old: 0x1010
Number of data words/bits	0x0002 / 0x0020

General control message (commandos):

Slave address (1 byte)	FC (1 byte)	Data address (2 bytes)	Data (2 bytes)	CRC

Wordwise presetting of commands:

Slave address 0x01 ... 0xfe	FC 0x06	Data address 0x0010	Data (1 word)	CRC

Example for wordwise presetting (Kommandos):

Slave address	FC	Data address	Data	CRC	Meaning
0x01	0x06	0x0010	0x0001		Acquire tare
0x01	0x06	0x0010	0x0002		Clear tare
0x01	0x06	0x0010	0x0003		Set to zero
0x01	0x06	0x0010	0x0080		Acknowl. error
0x01	0x06	0x0010	0x0000		Reset

Note:
You can only preset commands with FC 6 or 16, which is a number, not bit-coded data. This means that only one command can be executed per transmission.

Example for bitwise presetting (PLS-Din 1...16):

Slave address	FC	Data address	Data	CRC	Meaning
0x01	0x05	0x0020	0xFF00		Set PLS-DIn 1,
0x01	0x05	0x0020	0x0000		reset PLS-DIn 1
0x01	0x06	0x0020	0x0010		Set PLS-DIn 5

Data Address		Meaning		
0x0010	Low byte	Command number (refer to the section on available data settings)		
0x0020	Low byte function blocks	PLS -DIn-1	Bit address	0x0020
		PLS -DIn-2		0x0021
		PLS -DIn-3		0x0022
		PLS -DIn-4		0x0023
		PLS -DIn-5		0x0024
		PLS -DIn-6		0x0025
		PLS -DIn-7		0x0026
		PLS -DIn-8		0x0027
0x0020	High byte function blocks	PLS -DIn-9	Bit address	0x0028
		PLS -DIn-10		0x0029
		PLS -DIn-11		0x002A
		PLS -DIn-12		0x002B
		PLS -DIn-13		0x002C
		PLS -DIn-14		0x002D
		PLS -DIn-15		0x002E
		PLS -DIn-16		0x002F

Setpoints in IEEE Format

The message to controller (function code 16) includes setpoints in IEEE format. Information can be reread using function code 3.

Bus address	1... MAXSLAVE
Function codes	16, 3
Data base address	0x0x100; old: 0x2000
Number of data words	0x0012

General message in IEEE format:

Slave address (1 byte)	FC (1 byte)	Data address (2 bytes)	Length in words (2 bytes)	Bytecount (1 byte)	Data/ Value (4 bytes)	CRC (1 byte)

Setpoint presetting in IEEE format:

Slave address	FC	Data address	Number in words	Bytecount	Data	CRC
0x01... 0xfe	0x10	0x0100	0x0012	0x0024		

Sample setpoint message (manual tare 1=100kg for slave 1):

Slave address	FC	Data address	Length in words	Bytecount	Data	CRC
0x01	0x10	0x0100	0x0002	0x04	0x42c80000	

Refer to the section on available data settings

Setpoints in Integer Format

You can also transmit the IEEE setpoints with the 6/16 function codes in the integer format. For reference, the full scale value set by parameter is always used.

Ex.: 0 ... MAXINCREMENTS correspond to 0 ... full scale in kg.
Information can be reread using function code 3.

Bus address	1... MAXSLAVE
Function codes	6, 16, 3
Data base address	0x0200
Data base address	0x0009

Refer to the section on available data settings for the table of valid addresses.

Note:
Values in the integer format are always positive. Negative values are set to zero.

Setpoints in the LONG integer format

Bus address	1... MAXSLAVE
Function codes	16, 3
Data base address	0x0800
Data base address	0x0006

Refer to the section on available data settings for the table of valid addresses

Sending Texts to Controller

This message can be used, for instance, to send formatted print strings to controller. The maximum text length is 32 characters per string.
The print form processes 25 of these 32 characters. The rest is not used and is replaced by the zero value when reading back. All strings can also be combined into one setpoint telegram and every sub string can be filled up to 32 bytes.

Bus address	1..MAXSLAVE
Function codes	16, 3
Data base address	0x0600; old: 0x6000
Number of data words	0 x 0010 (words per string)

The following text presettings have been implemented:

Meaning	Text-ID
String text 1	1 (Data base address 0x0600)
String text 2	2 (Data base address 0x0610)
String text 3	3 (Data base address 0x0620)
String text 4	4 (Data base address 0x0630)
String text 5	5 (Data base address 0x0640)

General message format:

Slave address	FC	Data address	Length in words	Bytecount	Text-ID	Data / Text	CRC
(1 byte)	(1 byte)	(2 bytes)	(2 bytes)	(1 byte)	(2 bytes)	(up to 160 bytes)	(2 bytes)

Some examples of text setpoint telegrams for slave 1

- String text 1
- String text 3
- All string texts (1-5)

Slave address	FC	Data address	Length in words	Bytes	Data	CRC
0x01	0x10	0x0600	0x0010	0x20	0x41424344...	
0x01	0x10	0x0620	0x0010	0x20	0x41424344...	
0x01	0x10	0x0600	0x0050	0xA0	0x41424344..	

If the number of text bytes is odd, fill up the text with a space at the end.

Data To Process Management System Status Information

The following message serves for request of status information. Status information can be requested wordwise (function code 4) or bitwise (function code 2). FC3 can also be used instead of FC4.

Bus address	1... MAXSLAVE
Function codes	2, 4, (3)
Data base address	0x1300; old: 0x3000
Number of data words/bits	0x0018/0x0180

General request message:

Slave address (1 byte)	FC (1 byte)	Data address (2 bytes)	Length (2 bytes)	CRC (2 bytes)

Wordwise request of status information

Slave address 0x01 ... 0xFE	FC 0x04	Data address 0x1300	Length in words 0x0018	CRC

Bitwise request of status information

Slave address 0x01 ... 0xFE	FC 0x02	Data address 0x1300	Number of bits 0x00180	CRC

An example of a request (status word):

Slave address 0x01 0x01	FC 0x04 0x02	Data address 0x1300 0x1300	Length 0x0001 0x0010	CRC

Refer to the section on available data for the controller data for the list of valid addresses

Measurement Values
Measurement Values in IEEE Format

Measurement values in the integer format can be requested by the management system using the following message.
Units are always kg or kg/second.

Bus address	1... MAXSLAVE
Function codes	4, (3)
Data base address	0x0700; old: 0x4000
Number of data words	0x00D0

General request message:

Slave address (1 byte)	FC (1 byte)	Data address (2 bytes)	Length (2 bytes)	CRC (2 bytes)

Request for measurement values in IEEE format:

Slave address 0x01 ... 0xFE	FC 0x03	Data address 0x0700	Length in words 0x007C	CRC

Sample request for Scale 1 GROSS weight:

Slave address 0x01	FC 0x03	Data address 0x0700	Length 0x0002	CRC

Refer to the section on available data for the controller data for the table of valid addresses

Measurement Values in Integer Format

The host system can request the IEEE readings in the integer format with the following telegram. For reference, the full scale value set by parameters is always used.

Units are always kg or kg/second.

Bus address	1..MAXSLAVE
Function codes	4, (3)
Data base address	0x0400
Number of data words	0x0010

The base data address can be calculated from the IEEE address according to the formula (refer to the section on available data for the controller data).

$$Adr_{INT} = 400_{HEX} + (Adr_{IEEE} - 700_{HEX}) / 2$$

e.g. nominal weight, unrounded, kg

$400_{HEX} + (736_{HEX} - 700_{HEX}) /2 =$

$400_{HEX} + 36_{HEX} / 2 = 400_{HEX} + 1B_{HEX} = 41B_{HEX}$

Note:
Values in the INTEGER format are always positive. Negative values are always set to zero.

Measurement Values LONG-Integer-Format

Bus address	1..MAXSLAVE
Function codes	4, (3)
Data base address	0x0900
Number of data words	0x000E

Refer to the section on available data for the controller data for the list of valid addresses

Reading DISOMAT Texts

This message is used, for instance, for reading formatted texts (print strings, etc.). The maximum text length is 32 characters per string.

Bus address	1..MAXSLAVE
Function codes	4, (3)
Data base address	0x0500
Number of data words	0 x 0010, data words per string

General request message:

Slave address (1 byte)	FC (1 byte)	Data address (2 bytes)	Length (2 bytes)	CRC (2 bytes)

Sample text request:

Slave address 0x01	FC 0x03	Data address 0x0500	Length 0x0010	CRC

5.1.12 Parameterizing Modbus Interface Parameters

(Quick Selection 4335, Enter Password or Use DISOPLAN)

DISOMAT B plus:

Own address	1
Reference value	32767
Full scale	100000
Interface	S1
Timeout	0.0s

DISOBOX:

Own address	1
Timeout	0.0s
Interface	>FB<
Swapping	>BIG endian<
Reference value	32767
Full scale	100000

Acknowledge input with [OK] key.

Parameter Meanings:

- **Own address** — Determines bus address (0-254)
- **Reference value** — Used to translate a physical quantity into increments to be transmitted (1...32767), e.g. 10 000 000kg <=> 32 767 increments.
- **Full scale** — Maximum value to be transmitted in kg; (0 ... 10 000 000).
- **Interface** — Select fieldbus interfaces (B plus: OFF, S1, S2, S3, S4) (DISOBOX: XSS, FB)
- **Timeout** — For monitoring interface in seconds 0s = No monitoring 1...300s = Value range

DISOBOX only

- Swapping — Byte sequence for floating point values and words on the bus (BIG endian, BYTE swap, WORD swap, LITTLE endian)

Note:
If monitoring is active,
- Address error
- Function code error
- Faulty length indications

are displayed on **DISOMAT** display as communication error.

5.2 Profibus-DP Protocol

The Profibus-DP protocol general specification is included in EN50170. The specification below describes the special characteristics of the interface between a process management system (PMS) and **controller**.

ATTENTION:
Please note that the last physical station must terminate Profibus using a terminal resistor. When removing this station from bus, communication faults can occur.

For DISOBOX, please see Item “Transmitting Fixed Formats”.

5.2.1 Terminology

The following items represent
HEXADECIMAL values in 0x1234 form, and
DECIMAL values in 1234 form.

5.2.2 Logical Hierarchy

Process management system is bus master; controller units are treated as slaves.
A message cycle always consists of a Master (PMS) request and a slave response (controller). Bus master cyclically fetches a max. 70-byte (B plus), or 32-byte (DISOBOX), process image from controller and cyclically returns a max. 56-byte (B plus), or 32-byte (DISOBOX), command message to controller.
The Master is informed about the current size of the process image through selection of the right modules from the device master file (see Assignment of Profibus Interface Parameters to Modules in GSD File table at the end of this chapter).

Attention:

Controller is designed as modular slave. If a new module is activated on Master, the corresponding parameter record must be activated on controller , and vice versa.

Example:

Parameter record	ID number	4
	Text block	4-byte text

Module (s. GSD) ”Basic module - short text + 4x add-on module for one read value”

DISOMAT B plus only:
Since data also have to be communicated to the Profibus interface module, **DISOMAT** requires to be restarted!

5.2.3 Data Format

Setpoints and measurement values are transmitted in the IEEE float format (IEEE 754, 32 bits) or in the Siemens float format.
Transmission temporally starts with MSB.

5.2.4 Transmission Protection

Data exchange between scale and management system can be protected by timeout. In this case, controller expects a message from PMS in defined intervals. The type of message is irrelevant. Time interval and type of controller response on missing messages can be set on controller by parameters (see Operating Manual BV-H2139, Item 5.3.2.9 Fct. 434_Event Classes). If timeout is set to zero, controller does not monitor data flow between controller and Master.

5.2.5 Sequences

Any defined sequence to be observed for data presetting is described at the relevant items.

5.2.6 Station Addresses

Every controller receives a slave address starting from 0 in rising sequence. In the following text, the highest settable address is called MAXSLAVE. The address is set on controller in the dialog mode. MAXSLAVE has value 126.

5.2.7 Data Segments

The following data segments are defined for the Profibus interface:

Write area including
- Control information
- Setpoints in the IEEE format,
- Setpoints in the LONG integer format
- Texts from Master to controller

Read area including
- Status information
- Measured values in the IEEE format
- Measured values in the LONG integer format
- Controller texts.

4-byte blocks can be clearly addressed using a 2-byte ID. See tables given in Items to follow.
Since there is no special Profibus profile for the weighing equipment, data construction uses the existing Variable Speed Drives profile.
In this profile, user data construction for cyclic channel MSCY_C1 is called Parameter Process Data Object (PPO).

This guideline specifies the user data construction for the drives the Master can use to access the drive slaves by means of cyclic data transfer MSCY_C1. The MSCY_C1 data communication is divided into two areas that can be transmitted in every message:

- Process Data Area (PZD), i.e. control words and setpoints, or status information and actual values.
- Text area (TXT) for reading/writing of texts, e.g. print strings, string text

The type of PPO used by PROFIBUS-DP-Master to address the controller can be configured from Master when the bus system is commissioned. The selection of the proper PPO type depends on the controller's function in the automated network. The process data are transmitted always and used to guide the controller in the automation process, e.g. acquire tare, enter values.

5.2.8 User Data Construction

Cyclic data transmission messages are of the following basic construction:

Protocol frame (Header)	**Texts (TXT)** Optional	**User Data** **Process Data (PZD)**	Protocol frame (Trailer)

Fig. 1 Profibus messages basic construction

27 PPO types have been defined:

- User data **without** text area with defined default and process data **(white)** and up to 8 optional values selected using the ID **(grey**). See also Fig. 2 or
- user data **with** text area and above described process data selection.

The altogether 27 PRO types are composed of the four basic modules (s. GSD file).

Text Area (TXT)

Using the TXT message part, up to 128-byte texts can be read or written. The requisite mechanisms or order/response codes are described at Item "Text Transmission Via Profibus DP".
There are 4- and 20-byte text blocks. The longer variant should be used only with bigger amounts of text so as to keep transmission time down.

Process Data Area (PZD)

The process data are used to transmit control words and setpoints (orders: Master 6 controller), or status words and actual values (responses: controller 6 Master). Transmitted process data are effective immediately.

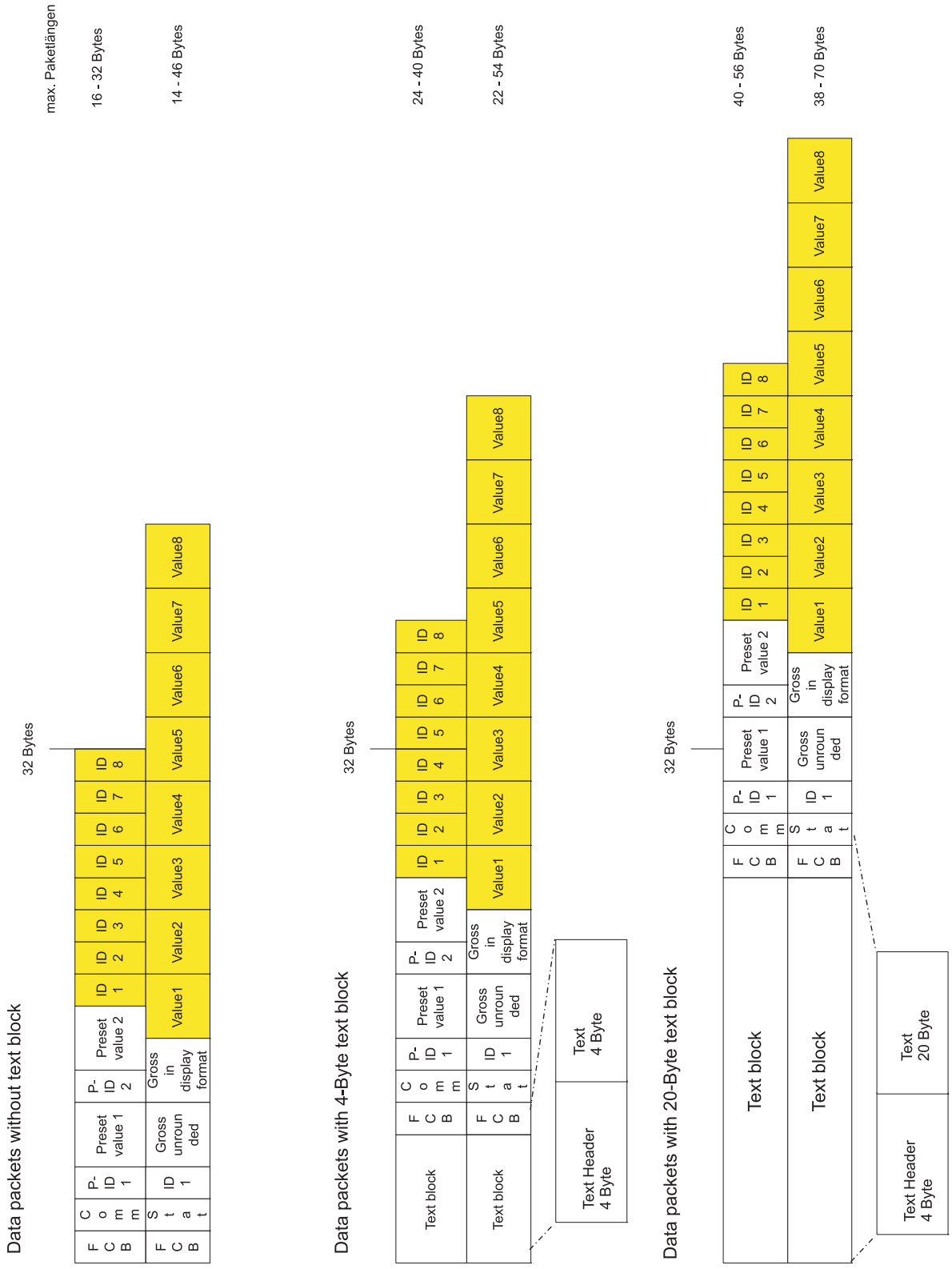


Fig. 2 Profibus messages user data construction

The bright areas represent the minimum number of available message sections. These cannot be changed. Depending on set parameters, messages can be expanded by as many IDs as required by the application.
Maximum package size:

	Profibus	DeviceNet
DISOMAT B plus	70 bytes	32 bytes
DISOBOX	32 bytes	32 bytes

Note:
Reading-writing double words in S7 systems: please remember that the double words of the DISOMAT Bplus cannot be read or written with the SFC14 and SFC15 function blocks of the S7 systems. In these cases, please use direct periphery access.

Sample Messages

The figure below shows the basic construction of Profibus messages in the controller system. The first line shows the message from bus master to controller; the second, the controller response.

Sample 1: Data transmission without text block and without variable user-defined IDs.
Parameter settings
Text block No
ID no. 0

Message from Master to controller

FCB bin. out (2 bytes)	Commands (2 bytes)	ID (2 bytes)	Manual tare of FCB analog (4 bytes)	ID (2 bytes)	Manual tare or FCB analog (4 bytes)

Controller response

FCB bin in (2 bytes)	Displayed scale status (2 bytes)	Mirror IDhier: zero (2 Byte)	Displayed scale Gross (4 Byte)	Displayed scale Gross rounded in display format (4 Byte)	- - (2 Byte)

Command message used to change manual tare for Scale/Group 1 and preset first analog value or analog function block:

FCB binary	Command	Manual Tare 1 ID	Manual Tare 1 Value	ID FCB1/1	Value
xx xx xx xx	xx xx	2000	42 10 00 00	200C	42 C8 00 00

Values for (control) commands
00 01 Tare Displayed Scale
00 02 Clear Tare Displayed Scale
00 03 Zero Displayed Scale

Note:

In Master-controller message, identifiers and relevant values are expected always in the same sequence and position.
If an ID assumes zero, relevant value is not evaluted.
Control and status information are comprised to 4-byte packages. If a wrong ID is used, data are rejected. To be properly identified by the controller, preset data must be available for minimum 100 ms.

In the response message, values are identified by their position in message. Therefore, no IDs are required.

Sample 2: Data transmission without text block, with 2 variable user defined Ids

Parameter settings

Text block	No
ID no.	2

Message from Master to controller

FKB PLS-DIn 1...16	Com-mands	ID	Manual tare of FCB analog	ID	Manual tare of FCB analog	ID1	ID 2
(2 Byte)	(2 Byte)	(2 Byte)	(4 Byte)	(2 Byte)	(4 Byte)	(2 Byte)	(2 Byte)

Controller response

FKB PLS-DIn 1...16	Displaye d scale status	Mirror ID = ID 1	Displayed scale Gross	Displayed scale Gross rounded in display format	Value ID 1	Value ID 2
(2 bytes)	(2 Byte)	(2 Byte)	(4 Byte)	(4 Byte)	(2 Byte)	(2 Byzt)

Comments:
Addition of IDs in the Master—> controller message causes the controller to enter the desired values into the response message. The value sequence corresponds to the ID sequence. The IDs may stem from any data segment, so that the preset value can be reread as well.

If an ID is recognized as faulty, corresponding value is set to zero in response. During active user data transfer, IDs should not be changed. If they are, ID cannot be clearly assigned to value at the time of changeover.

Sample 3: **Data transmission with text block and without variable user defined IDs**

Parameter settings
Text block 4-byte text block
ID no. 0

Text block always precedes residual data.

Message from Master to controller

TKE (1 Byte)	IND (1 Byte)	TWE1 (1 Byte)	TWE2 (1 Byte)	FCB PLS-DIn (2 bytes)	Commands (2 bytes)	ID (2 bytes)	Manual tare or FCB analog (4 bytes)	ID (2 bytes)	Manual tare or FCB analog (4 bytes)

Controller response

TKE (1 Byte)	IND (1 Byte)	TWE1 (1 Byte)	TWE2 (1 Byte)	FCB PLS-DOut (2 bytes)	Displayed scale status (2 Byte)	Spiegel-ID Hier: NULL (2 Byte)	Displaye d scale Gross (4 Byte)	Displayed scale Gross rounded in display format (4 Byte)

Text Transmission Via Profibus DP

This item refers to the 4-byte text block. For the 20-byte text block (DISOMAT B plus only), explanations can be interpreted accordingly. The latter differs by number of text user data that can be transmitted per cycle.

4 data words					
TKE (1 word)		INDICES (2 word)		TWE (3 and 4 word)	
AK	Text-ID	AKT	MAX	TWE1	TWE2

Fig. 3 Text block basic construction

Order ID (TKE)

1st word Text ID (TKE) is always a 16-bit value.
The first byte (AK) includes the order, or response, ID.
The second byte (Text_ID) includes an ID (1 … 255) used to specify the text type in detail.

The following text types have been implemented:

Meaning	Text-ID
String text 1	1
String text 2	2
String text 3	3
String text 4	4
String text 5	5

For meaning of order ID (Master —> controller message), see Table 1.

For meaning or response ID (controller—> Master message), see Table 2. Depending on order ID, only certain response IDs can be used.

Order ID	Meaning	Pos. response	Neg. response
0	No order	0	—
2	Write text to scale (4 bytes)	2	7

Tab. 1 Order IDs (AK) Master station —> DISOMAT

Response ID	Meaning
0	No order
2	Text fragment transmission OK
7	Unable to execute order (error number in TWE2)

Tab. 2 Response IDs (AK) DISOMAT —> Master station

Text Index (IND)

2nd word — Text index consists of two bytes, i.e. current index (=offset in text string being read or written) and maximum text index (= total text length).

Text (TWE)

3rd and 4th word — TWE includes the maximum 4 bytes or 20 Byte of text segment currently transmitted

Error number	Meaning
2	Min/Max value exceeded
3	No access privilege
5	Order not implemented

Tab. 3 Error numbers

Error Number (TWE2)

If response ID has value 7 (unable to execute order), an error number as per Table 4 is stored in TWE2.

Order/response processing rules

Master keeps repeating order until having received relevant response.
Master identifies relevant reponse by:

- Reponse ID evaluation
- If need be, by text index IND evaluation.

If cyclic mode does not require any information from the PKW interface (only PZD data are relevant). order ”No Order” has to be output.

Read text (transmit text from DISOMAT to Master)

If there is a new text, the text is requested piecewise, but no more than 4 or 20 bytes per cycle. While the maximum index always gives the length of the text, the sequence 0, 4, 8 is in the current index with the 4-byte text block to the maximum index.

- the sequence 0, 20, 40 is in the current index with the 20-byte text block to the maximum index.

Beispiel
Lesen eines 18 Byte langen Textes mit dem 4-Byte-Textblock
(“This is an example”)
xx optional characters

0101 00 12 xx xx xx xx …	Request
0201 00 12 54 68 69 73	Response ”This”
0101 04 12 xx xx xx xx …	
0201 04 12 20 69 73 20 …	Response ” is ”
0101 08 12 xx xx xx xx …	
— Response —	” an E”
0101 0C 12 xx xx xx xx …	
— Response —	“xamp”
0101 10 12 xx xx xx xx …	
— Response —	”le”
0101 12 12 xx xx xx xx …	End message (master has read complete text)

Write text (Master text transmitted to controller)

Text is transmitted by fragments of maximum 4 bytes or 20 bytes per cycle. During that max. index always the length of the text indicates, stands in the current index

- the sequence 0, 4, 8 is in the current index with the 4-byte text block to the maximum index
- the sequence 0, 20, 40 is in the current index with the 20-byte text block to the maximum index.

For example:
Setting a text 18 bytes long with a 4-byte text block
(“This is an example”)

(controller response not represented)
0201 00 12 54 68 69 73
0201 04 12 20 69 73 20
0201 08 12 61 6E 20 65
0201 0C 12 78 61 6D 70
0201 10 12 6C 65 xx xx xx optional characters (not part of text)
0201 12 12 xx xx xx xx End message (application has acquired text)

The end message where the current index is set equal to the maximum index has to always be transmitted regardless of the length of the text. It is only transmitted to the scale after transmitting this package.

Data From Process Management System

DP write register (control information and analog presettings)

Representation without text block

Object index	ID	Contents
0-1	0x1002	The PLS-DIn 1-16 function block (PLS-DIn 9-16 is transmitted first followed by PLS-DIn 1-8)
2-3	**0x1000**	1 byte unused Refer to the list of available data for the command number in LOW byte (1 byte)
4-5		ID1 Analog presettings (s. list)
6-9		Value for ID1 analog presetting
10-11		ID2 analog presetting (s. list)
12-15		Value for ID2 analog presetting
16-17		ID 1
18-19		ID 2
20-21		ID 3
22-23		ID 4
24-250		ID 5
26-27		ID 6
28-29		ID 7
30-31		ID 8

Displayed Scale Commands

Enter respective command ID into command byte. Action is triggered immediately after correct receipt. With ”Clear Tare” command, check to see that manual tare value is set to ZERO simultaneously with command.Die Kennungen für PLS-DIn 1...16 und die Kommandos werden nicht übertragen.
Sie dienen lediglich als Verweis auf die Liste der “Verfügbaren Daten”.

Refer to the section on available data settings for valid setpoints
To preset values via fieldbus:
DISOMAT B plus lets you enter the above values using the following sources:

- EDP protocol (B plus)
- Local control field (menu tree of function key(s) (B plus)
- Fieldbus

1. Setpoint and material number:
   The fieldbus is the only determining source if the ID assigned to the value is transferred using the message from Master to controller . Values of other sources are then overwritten upon next fieldbus cycle.
   If you wish to change value via fieldbus, select desired value in fieldbus protocol and transfer to controller complete with relevant ID. To enable presetting via other sources, set setpoint / material no. IDs in fieldbus message to zero or to the ID of another value. This means that the preset IDs determine the preferable source.

2. Other values:
   Manual tare of displayed scale as well as data PLS-AIN-1 … PLS-AIN-4 are acquired by controller after every change of the corresponding value.

   controller acquires the value after min. 100 ms. To ensure proper acquisition, let timeout elapse or re-read current value. To start re-reading, set corresponding READ ID.

Data To Process Management System

DP Read Register (status information and measurement values)
Representation without text block

Object index	Byte	ID	Contents	OP Object ID
0	0 - 1	**0x300C**	Function blocks PLS-OUT 1 ...16	0x50
1	2 - 3	**0x3000**	Scale status Displayed Scale	0x50
2	4 - 5	**0x3002**	Request (ID reflected)	0x50
3	6 - 9	**0x4000**	Gross weight Displayed scale unrounded in kg	0x93
4	10 - 13	**0x4010**	Gross value Displayed Scale rounded in display format	0x93
5	14 - 17	ID s. list	Value 1	0x93
6	18 - 21	ID s. list	Value 2	0x93
7	22 - 25	ID s. list	Value 3	0x93
8	26 - 29	ID s. list	Value 4	0x93
9	30 - 33	ID s. list	Value 5	0x93
10	34 - 37	ID s. list	Value 6	0x93
11	38 - 41	ID s. list	Value 7	0x93
12	42 - 45	ID s.list	Value 8	0x93

Word = 16-bit data word
Long = data double word

Note:
When range 1 and range 2 have been set, the scale is in range 3.
The identifiers in bolt print are not transmitted because they are only used as a reference to the list of available data.

Refer to the section on available data for the controller data for the reading ID list.

5.2.9 Parameterizing Profibus DP Interface Parameters

Bplus:
(Quick Selection 4335, Password Input)

Parameters:

Own address	8
Number of IDs	0
Text block	>No<
Data format	>IEEE<
Timeout	0.0 s

Enter data and acknowledge with [OK] key.

Meaning of Parameters:

- **Own address** Station address for Profibus (0...126)
- **Number of IDs** IDs of all values to be requested customer specifically (0...8).
- **Text block** Determines whether a fixed text block is to precede residual user data, or not. As well as its size, if any (Low, 4 bytes, 20 bytes).
- **Data format** Format for all floating point numbers (IEEE, SIEMENS-KG)
- **Timeout** For monitoring interface in seconds
  0s = No monitoring
  1...300s = Value range

Parameters Number of IDs , text block, station address do not become effective before reset. Until reset, the old (effective) values are displayed.

Note:
If monitoring is active, **DISOMAT** indicates timeouts and faulty IDs as communication error.

DISOBOX:

(Quick Selection 4332, Enter Password or Use DISOPLAN)

- **Own address** **63**
- **Timeout** 0.0s
- **User data** >No Text/4 ID<
- **Data format** >IEEE<
- **Swapping** >BIG Endian<

Acknowledge input with [OK] key.

Parameter Meanings:

- **Own address** Stations address for Profibus (0...126)
- **Timeout** For interface monitoring in seconds;
  0s = no monitoring
  1...300s = value range
- **User data** “No Text/4 ID”, “Text/2 ID”, “Fixed Formats”; lets you compile the data to be requested via Profibus. You can request 4 customized data WITHOUT text, 2 customized data WITH text or Fixed Formats.
  The FIXED FORMATS setting should have priority with DISOBOX.
- **Data format** For all floating point numbers
  (IEEE, SIEMENS-KG)
- **Swapping** Byte sequence for floating point numbers and words on bus
  (BIG endian, BYTE swap, WORD swap, LITTLE endian)
  The standard Profibus setting is BIG Endian

Note:
If monitoring is active, both timeouts and faulty IDs can be displayed on DISOBOX as communication errors.

5.2.10 Projecting Aids

Profibus standard DIN 19245, Part 3, defines a device masterfile.
Address: bvwww.schenck.net\Steuerungen\Profibus lets you download the relevant Profibus projecting file (.gsd).

Note:

- The DBP104F0 version is the standard version of the GSD file. If you use the Siemens S7 hardware configurer in a version older than 5.1, use GSD file ”DBP204F0.GSD” designed to describe the process image in another form so that older versions of the configuration tool can be used without any problems.
- In file DBP204F0.GSD, the number after”PPO” corresponds to the number of parameterized IDs.
- You can also load the current GSD files from Profibus website”www.profibus.com (Libraries-Schenck Process-controller-DISOMAT B plus)”.
- In the S7 hardware configurator, you will find **DISOMAT** at: **Profibus-DP/Other Field Units/Controller/DISOMAT B plus**

Table: Parameter settings assignment of Profibus interface to GSD file modules

Parameter: TEXT BLOCK	Parameter: NUMBER of IDs		GSD File Modules
NO	0	Basic module - No Text	
NO	1		+1x Add module for one read value
NO	2		+2x Add module for one read value
NO	3		+3x Add module for one read value
NO	4		+4x Add module for one read value
NO	5		+5x Add module for one read value
NO	6		+6x Add module for one read value
NO	7		+7x Add module for one read value
NO	8		+8x Add module for one read value
Short Text	0	Basic module - Short Text	
Short Text	1		+1x Add module for one read value
Short Text	2		+2x Add module for one read value
Short Text	3		+3x Add module for one read value
Short Text	4		+4x Add module for one read value
Short Text	5		+5x Add module for one read value
Short Text	6		+6x Add module for one read value
Short Text	7		+7x Add module for one read value
Short Text	8		+8x Add module for one read value

Parameter: TEXT BLOCK	Parameter: NUMBER of IDs		GSD File Modules
Long Text	0	Basic module - Long Text	
Long Text	1		+1x Add module for one read value
Long Text	2		+2x Add module for one read value
Long Text	3		+3x Add module for one read value
Long Text	4		+4x Add module for one read value
Long Text	5		+5x Add module for one read value
Long Text	6		+6x Add module for one read value
Long Text	7		+7x Add module for one read value
Long Text	8		+8x Add module for one read value

5.2.11 Abbreviations Used

AK	Order or reponse code	First text code byte
TKE	Text code	Composed of PNU and AK
PZD	Process data range	Current control, setpoint, status and measurement value data
PPO	Parameter Process Data Object	Cyclic data package complete user data information
TWE	Text value	Current text fragment

5.2.12 For Further Reading

Profibus Standard	EN50170
Siemens Documentation	‘SIMOVERT MASTERDRIVES, Item 8.2 -Profibus-DP’.
Profibus User Organisation	www.profibus.com
Profibus DP Basics Tips and Tricks for the User	Manfred Popp, Hüthig-Verlag, 1997

5.3 DeviceNet Protocol

For DISOBOX, please see Item 5.4 “Transmitting Fixed Formats”.

5.3.1 Terminology

Hereto below,
HEXADECIMAL values are represented in form 0x1234;
DECIMAL values, in form 1234.

5.3.2 Logical Hierarchy

The Process Management System is bus Master, the controllers are treated as single slaves.
A message cycle always consists of a Master request (PMS) and a slave response. Bus Master fetches a max. 32-byte process image from controller and returns a max. 32-byte command message.

5.3.3 Data Format

Transmission of setpoints and measurement values uses the IEEE-Float-Format (IEEE 754, 32 bits) or the Siemens-Float-Format.
Transmission temporally starts with MSB.

5.3.4 Transmission Protection

Transmission from controller to host system can be protected by a timeout set on controller. The latter then expects a message from host system in certain intervals. Timeout and type of reaction on pending messages can be set on controller by parameter. TIMEOUT = 0 means that the data flow between controller and host system is not monitored.

5.3.5 Sequences

Where a certain data presetting sequence is to be observed, the latter is detailed at the appertaining item.

5.3.6 Station Addresses

Every controller receives a slave address starting from 0 in rising sequence. In the text below, the highest settable address is called “MAXSLAVE”. The address is set on controller in the dialog mode. MAXSLAVE has value 63.

5.3.7 User Data Construction

The data contents are identical with those of the Profibus-DP coupling (see items 5.2.7 and 5.2.8).

5.3.8 Setting DeviceNET Interface Parameters

(Quick Selection 4332, Enter Password or Use DISOPLAN)

- **Own address** 63
- **Timeout** 0.0s
- **Baud rate** >125kb<
- **User data** >No Text/4 ID<
- **Data format** >IEEE<
- **Swapping** >BIG endian<

Acknowledge inputs with [OK] key.

Parameter Meanings:

- **Own address** Station address for DeviceNet (0...63)
- **Timeout** For interface monitoring in seconds;
  0s = no monitoring
  1...300s = value range
- **Baud rate** on DeviceNet (125kB, 250kB, 500kB)
- **User data** “No Text/4 ID”, “Text/2 ID”, “Fixed Formats”; let you compile data to be requested via DeviceNet.
  You can request 4 customized data WITHOUT text, 2 customized data WITH text, or fixed formats.

- **Data format** for all floating point numbers (IEEE, SIEMENS-KG)

- **Swapping** Byte sequence for floating point numbers and words on bus (BIG endian, BYTE swap, WORD swap, LITTLE endian)
  The LITTLE Endian setting makes sense in connection with ROCKWELL control systems.

Note:
If monitoring is active, both timeouts and faulty IDs are displayed on DISOBOX as communication errors.

5.4 Transmitting Fixed Formats (DISOBOX)

5.4.1 Requesting Fixed Formats

DISOBOX - Field bus data

Fixed - Images, valid for Profibus-DP, DeviceNet and Modbus serial with FC 23

Upper line: Master data to scale
Lower line: Scale response

8 Channel values (kg, unrounded) in parallel

Fixed 1	FCB	Comm	I D	Preset 1		I D	Preset 2		Fix-I D (1)	I D	Preset 3		I D	Preset 4		unused 0x0
	Value Channel 1		Value Channel 2		Value Channel 3		Value Channel 4		Value Channel 5		Value Channel 6		Value Channel 7		Value Channel 8	

Channel values (kg, unrounded) und Status

Fixed 2	FCB	Comm	I D	Preset 1		I D	Preset 2		Fix-I D (2)	I D	Preset 3		I D	Preset 4		unused 0x0
	FCB	Error Status	Mirror Fix-I D	Status 1-2	Status 3-4	Value Channel 1		Value Channel 2		Value Channel 3		Value Channel 4		Status Scale 1	Gross Scale 1	
Fixed 3	FCB	Comm	I D	Preset 1		I D	Preset 2		Fix-I D (3)	I D	Preset 3		I D	Preset 4		unused 0x0
	FCB	Error Status	Mirror Fix-I D	Status 5-6	Status 7-8	Value Channel 5		Value Channel 6		Value Channel 7		Value Channel 8		Status Scale 2	Gross Scale 2	

Scale values (kg, unrounded)

Fixed 4	FCB	Comm	I D	Preset 1		I D	Preset 2		Fix-I D (4)	I D	Preset 3		I D	Preset 4		unused 0x0
	FCB	Error Status	Mirror Fix-I D	Status Scale 1	Gross Scale 1		Status Scale 2	Gross Scale 2		Status Scale 3	Gross Scale 3		Status Scale 4	Gross Scale 4		unused 0x0

Scale values (Net in display format)

Fixed 5	FCB	Comm	I D	Preset 1		I D	Preset 2		Fix-I D (5)	I D	Preset 3		I D	Preset 4		unused 0x0
	FCB	Error Status	Mirror Fix-I D	Status Scale 1	Net Scale 1		Status Scale 2	Net Scale 2		Status Scale 3	Net Scale 3		Status Scale 4	Net Scale 4		unused 0x0

Number of Bytes	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32

Scale values (kg, unrounded), DISOBOX-Software version VWW20431 (8 Scales) required

Fixed 6	FCB	Comm	I D	Preset 1		I D	Preset 2		Fix-I D (6)	I D	Preset 3		I D	Preset 4		unused 0x0
	FCB	Error Status	Mirror Fix-I D	Status Scale 5	Gross Scale 5		Status Scale 6	Gross Scale 6		Status Scale 7	Gross Scale 7		Status Scale 8	Gross Scale 8		unused 0x0

Scale values (Net in display format), DISOBOX-Software version VWW20431 (8 Scales) required

Fixed 7	FCB	Comm	I D	Preset 1		I D	Preset 2		Fix-I D (7)	I D	Preset 3		I D	Preset 4		unused 0x0
	FCB	Error Status	Mirror Fix-I D	Status Scale 5	Net Scale 5		Status Scale 6	Net Scale 6		Status Scale 7	Net Scale 7		Status Scale 8	Net Scale 8		unused 0x0

DISOMAT B plus compatible

NO_PARA_ID No Parameters, 2 Preset-ID, 4 Read-ID	FCB	Comm	I D	Preset 1		I D	Preset 2		I D 1	I D 2	I D 3	I D 4	unused 0x0		
	FCB	Status Scale	Mirror I D 1	Gross		Gross DispFmt		Value 1		Value 2		Value 3		Value 4	unused 0x0

The process image below is NOT available for Modbus!

PARA_ID with Parameters, 2 Preset-ID, 2 Read-ID	PKW		FCB	Comm	I D	Preset 1		I D	Preset 2	I D 1	I D 2	unused 0x0
	PKW		FCB	Status Scale	Mirror I D 1	Gross		Gross DispFmt		Value 1	Value 2	unused 0x0

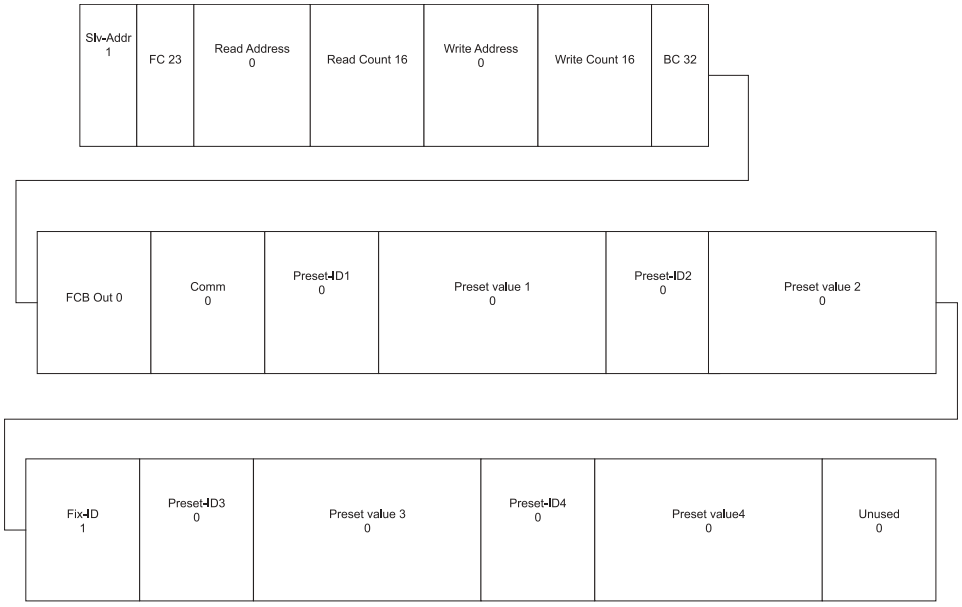
In addition to the transmission types described at Items 5.1 to 5.3 (using 2 preset IDs and 2, or 4, request IDs, the transmission of so-called fixed formats can be selected on DISOBOX. With Profibus-DP and DeviceNet protocols, “Fixed Formats” are selected in the User Data Configuration; with Modbus, by using function code 23.
Please note that Modbus/TCP does **not** support the fixed format feature.
Overview of available fixed formats, see figure above.

The Master -> DISOBOX message can transmit binary outputs to function blocks, commands and up to 4 preset IDs. The position in message normally reserved for the 1st request ID can be replaced by the fixed format to be transmitted from DISOBOX to Master.

Save fixed format 1 (8 rounded values), all other fixed formats transmit binary inputs of function blocks and highest available event/error number followed by the so-called Mirror ID indicating the fixed format currently active in output, and the fixed format data.

Unless fixed format 1 is used, the Mirror ID can be used to detect when the new fixed format is available in the response. After selection/deselecton of fixed format 1 and application of the new fix ID, the new format is output after typically 300 ms.

Sample request of fixed format 1 via ModBUS:



Master requests fixed format 1. All other presettings are binary 0, i.e. they are ignored save the function block outputs.

5.4.2 Data Formats Description

5.4.2.1 Statusses

Error Status

The error status includes the number of the highest error available on DISOBOX or 0 for “No Error”.

Channel Status (“Status 1-2", ”Status 3-4", “Status 5-6", ”Status 7-8")

The channel statusses are bit-coded and comprise 1 byte each. The statusses of two channels are comprised to form a word and are divided as follows:

Status 1-2

High Byte	Status Channel 1
Low Byte	Status Channel 2

For meanings of single bits, please see the table below:

Bit 0 (LSB)	Initialization
Bit 1	Reserved for internal processing
Bit 2	Reserved for internal processing
Bit 3	Measuring signal too big
Bit 4	Load cell cable broken
Bit 5	Reserved for internal processing
Bit 6	Reserved for internal processing
Bit 7 (MSB)	Reserved for internal processing

IMPORTANT
Valid channel weights are formed only if relevant channel status has 0 value, i.e. all above described bits must be set to 0 !

Scale Statusses

The scale statusses are bit-coded and comprise 1 word (2 bytes) each.
For meanings of single bits, please see table below.

Bit 0 (LSB)	Scale in underrange
Bit 1	Scale in overrange
Bit 2	Tare computed
Bit 3	Exact zero
Bit 4	Standby
Bit 5	Weight invalid
Bit 6	Scale tared
Bit 7	No-motion
Bit 8	Measurement being initialized; no weight acquisition
Bit 9	Standby
Bit 10	Scale in range 1
Bit 11	Scale in range 2
Bit 12	Scale in zeroing range
Bit 13	Twin-unit
Bit 14	Multi-divisional scale
Bit 15	Multi-range scale

ATTENTION
Most bits in the scale statusses are scale-specific and useful only if DISOBOX is configured as scale, i.e. all parameters must have been entered using menu item 441:SCALE.

DISOBOX can also operate as weight value transducer on canal level. To that end, only the channel parameters (menu item:445 Channel) must be acquired. Then only bit 5 (Weight invalid) and bit 8 (Measurement being initialized) are relevant. The residual bits refer to non-configured **scale** settings and must/can be ignored.

6 Interfacing Ethernet

This chapter describes the functionality of devices of the DISOMAT B plus family (DISOMAT B plus weighing terminal or DISOBOX) operating as servers on the Ethernet. Hereafter, these devices are called “controller(s)”. If parts of this description exclusively refer to one of the two devices, this is explicitly indicated. Furthermore, the term “scale” (DISOMAT B plus) is used synonymously with the term “group” (DISOBOX).

The description details:

- Configuration of Ethernet interface module (determination of characteristics and assignment of station addresses)
- FIELDBUS mode: data exchange between Ethernet client and controller via Modbus/TCP
- WEBSERVER mode: preparation and call of a WEB page
- MultiServer service program
- Diagnostic and troubleshooting instructions.

For description of interface module hardware, see manuals BV-H2140GB (DISOMAT and DISOBOX), or BV-H2251GB (DISOBOX only).

6.1 Ethernet Interface Module Functions

- Module is connected using RJ45 connector (DISOMAT B plus), or 5-pole Phoenix connector XE 3 and a waterproof M12 plug (DISOBOX).
- In FIELDBUS mode, server can exchange data with up to 3 clients at the same time. When using the DISOPLAN commissioning tool, the latter can be assigned to one of the three eligible channels provided that interfacing is done via network. The data are sent in form of Modbus(RTU)/TCP packages, or expected as such from the outside. The functionality is detailed below.

In parallel:

- Multiple, easy-to-configure, dynamic WEB pages show random process values of the controller. On standard, values are represented in XML format. A custom stylesheet lets you realise any form of representation. For browsers incapable of interpreting XML data, conversion to standard HTLM can be selected .
- Bus interface monitoring
- Easy parameterisation of interface module using the base unit’s operating environment or DISOPLAN.
- The MultiServerTools PC program is designed to support you during commissioning and in normal WEB SERVER mode.

6.2 Parameterising Controller (Interface Module)

DISOMAT can be parameterised using its control unit, or DISOPLAN.
DISOBOX is parameterised using DISOPLAN DISOBOX.
The parameter description equally holds for both devices.

Parameter	Value Range	Default Value	Explanation
Protocol type	All fieldbus protocols	Off	Selected protocol: Modbus/TCP
Host timeout	0 ... 300 s	0 s	Used for interface monitoring. ZERO values means that interface is **not** monitored.
WEB coding	HTML, XML	XML	Determines type of WEB page coding. In case of XML, stylesheet determines data representation in browser.
DHCP	Yes, No	No	Determines how IP address is to be assigned.
IP address		192.168.240.1	Assigns IP address manually
Netmask		255.255.255.0	Determines subnet mask
Gateway		0.0.0.0	Determines standard Gateway address

Instructions

When operating the controllers on a local subnet with own network card, we recommend to set the PC network adaptor as follows:

- IP address: 192.168.240.254
- Netmask: 255.255.255.0
- Gateway: 0.0.0.0
- Controllers 1-n: 192.168.240.n
  where n=1-253
- Select unique IP addresses. Ask your system administrator for free valid addresses.

6.2.1 Checking Station Addresses

The network parameterisation described above can be checked using the MultiServer scanner program (see Item 1.5.5).
You can also check network parameters using the PING command available on any PC, e.g. “ping 192.168.240.1”
After successful check, the terminal’s response time is displayed.

6.2.2 Available Data

Please use the identifiers from the Available Data Table.

6.2.3 Configuring Process Image

On standard, the following controller data segments are transferred from, or to, Ethernet interface module in cycles.

DISOBOX

700H-70EH	Displayed scale data
730H-746H	Group values
748H-756H	Current channel weights (channels 1-8)
1300H-1470H	All status information
	All commands and preset values

DISOMAT

700H-746H	All DISOMAT measurement values
1300H-1470H	All status information
	All commands and preset values

The configuration possibility described below exclusively concerns measurement values: address range 7xx, hexadecimal.
All other values are subject to fixed configuration.

Sometimes it is desirable to transfer fewer data but more frequently and in granted time intervals. Therefore the big group of measurement values (floating point values and thus higher computing expenditure) can be configured. To do so, the CUSTOMER_xxx directories offer configuration files named TRANSFER.CFG. Each of these files can includes up to 3 lines with the following meanings:

Line number = data start address (dec), data end address (dec), counter
[; comments]

Start and end addresses are inclusive, i.e. they are refreshed automatically.
The counter indicates how often the data are refreshed:
1 = every cycle; n = every n-th cycle.
After a semicolon, a comment can be added.

Example 1

1=1792,1862,1
All measurement value concerning DISOMAT are refreshed every cycle.

Example 2

1=1864,1878,1
For a DISOBOX, all channel weights are continuously refreshed. In the present configuration, a 200 ms refresh interval can be granted.

6.3 Fieldbus Mode

In FIELDBUS mode, the controller behaves like a Modbus/TCP server in accordance with standard “OPEN MODBUS/TCP SPECIFICATION, Release 1.0, 29 March 1999“ and masters all function codes of Classes 1 and 2 (save FC7), as well as the most important codes of Class 2 (FC15 and 23).
Data representation fully orients to the Modbus standard. The task of the Modbus message checksum (CRC16) is performed by the TCP safety layer. From the 6-byte message header defined by the OPEN MODBUS standard, the controllers only use the 6th byte for transmission of data length. The residual bytes are returned in the response 1:1.
To prepare the ground for later extensions, these header bytes (1-5) should not be used; set them to ZERO.

6.3.1 Station Addresses

In the Ethernet network, all stations are uniquely identified by their IP addresses, so that the Modbus slave address can always be set to 1.

6.3.2 Function Codes (FC)

The table below lists the codes used and explains their meanings:

FC [dec]	Meaning
1	Bitwise re-reading of control information (one/multiple bits)
2	Bitwise re-reading of status information (one/multiple bits)
3	Wordwise (re-)reading of setpoints and measurement values (one/multiple words)
4	Wordwise reading of status information (one/multiple words)
5	Bitwise (re-)reading of control information (always 1 bit)
6	Wordwise writing of control bits or setpoints (always 1 data word)
8	Diagnosis (subcodes 0 and 1 only)
15	Bitwise writing of control information (one/multiple bits)
16	Wordwise writing of commands (one/multiple data words)
23	Wordwise writing and simultaneous reading of data (one/multiple data words) This function code can be used wherever FC3 or FC16 is possible.

6.3.3 Transmission Safety

With Modbus/TCP, the transmission safety is ensured by the protective measures of the TCP layer.

6.3.4 Error Codes

Controllers only use Modbus error codes 01 to 03. With CRC errors, no response is sent.

Error Code	Meaning
1	Station does not support polled function (FC)
2	Data address wrong ID or SC out of range Data offset + length too big
3	Data type wrong Data with FC 5 wrong (admitted: 0xff00 and 0x0000) Data length < 0 Polled length too big Data address with IEEE or INT32 value odd

6.3.5 Data Formats

Transmission starts with MSB. Setpoints and measurement values are transferred in the IEEE float format (IEEE754, 32 bits). All control information and statusses are represented in form of a binary signal using the 8 data bits of each character. In addition, all control and status information can be treated as single bit information.

6.3.6 Process Values

Every cyclic data segment includes values of the same type. The addresses of the data within a segment are consecutively added. The data of a segment can be read or written using a single message.

6.3.7 Data Exchange Overview

Function Codes Used In Cyclic Data Transmission				
FC	**Data Segment**	**Data Direction** **P = Preset** **R = Read** **RR = Re-read**	**Smallest Data Unit**	**Data Format**
15	Command	P	Bit	
5	Command	P	Bit	
1	Command	RR	Bit	
16	Command	P	Word	
6	Command	P	Word	
3	Command	R	Word	
16	Setpoints	P	Double word	IEEE
3	Setpoints	R	Double word	IEEE
3	Setpoints	R	Double word	ULONG
2	STATUS	R	Bit	
4	STATUS	R	Word	
3	STATUS	R	Word	
3	MEAS. VALUES	R	Double word	IEEE
4	MEAS. VALUES	R	Double word	IEEE
4	MEAS. VALUES	R	Double word	ULONG

Note
In many cases, the host system must add a so-called segment address (depending on function code) to the described data address. Furthermore, the data address must be incremented by 1 since the Modbus protocol's register addresses start from 1.
Example:
The data address is configured like this:
Data address = segment address + controller address + 1.

6.3.8 Message Samples

The following lines show the construction of the Modbus/TCP messages. The first column represents the message from bus Master to scale; the second, the scale response.

Data to Scale	Scale Reponse	Meaning
00 00 00 00 00 06 01 06 0010 0001	00 00 00 00 00 06 01 06 0010 0001	Tare
00 00 00 00 00 06 01 03 0300 0001	00 00 00 00 00 05 01 03 02 xx xx	Read group status
00 00 00 00 00 06 01 03 0748 0010	00 00 00 00 00 23 01 03 20 xx xx	Read Gross weights 1-8
00 00 00 00 00 0B 01 10 0110 0002 04 4323 5678	00 00 00 00 00 06 01 10 0110 0002	Write setpoint (value=163.34)

6.3.9 Settings on Modbus/TCP Master

- If data from various segments are used (s. Data List), every segment needs at least one message.
- Set correct byte sequence for IEEE format values
- Maximum admissible message length is 256 bytes including header and trailor bytes.

6.3.10 Diagnosis and Troubleshooting

The event message is a general message for all errors concerning the fieldbus connection:

- Different station addresses on Master and scale
- Fieldbus module - base card interconnecting cable defective
- Fieldbus cable defective or improperly connected. For proper connection, see chapter Fieldbus Hardware VET (BVH2140).
- Selected protocol type does fit add-on card. Change parameterization or exchange module.
- Timeout parameter value too small. Change scale parameterization.
- Inadmissible ID (data address) detected in Master -> scale message.

See also Error Codes item.

6.4 WEB SERVER Mode

The WEB SERVER mode uses the HTTP protocol. Using a standard browser (e.g. Microsoft Internet Explorer), optional controller process data can be displayed.

6.4.1 WEB Server Files

The MultiServer Loader program automatically loads the specific device files onto the Ethernet module. These files can be started from the start page using the references. After installation of the “Multiserver” service program (see Item 6.5) all DISOMAT standard files are stored write-protected in the “…\Modbus-TCP\Disco\DISOMAT\…“ directory. The DISOBOX files can be found at “…\Modbus-TCP\Disco\DISOBOX\…“.
To ensure peak functionality, never change these files. If you wish to create further files (WEB pages), use the CUSTOMER_DISOMAT, or CUSTOMER_DISOBOX directory. To this directory, the following rules apply:

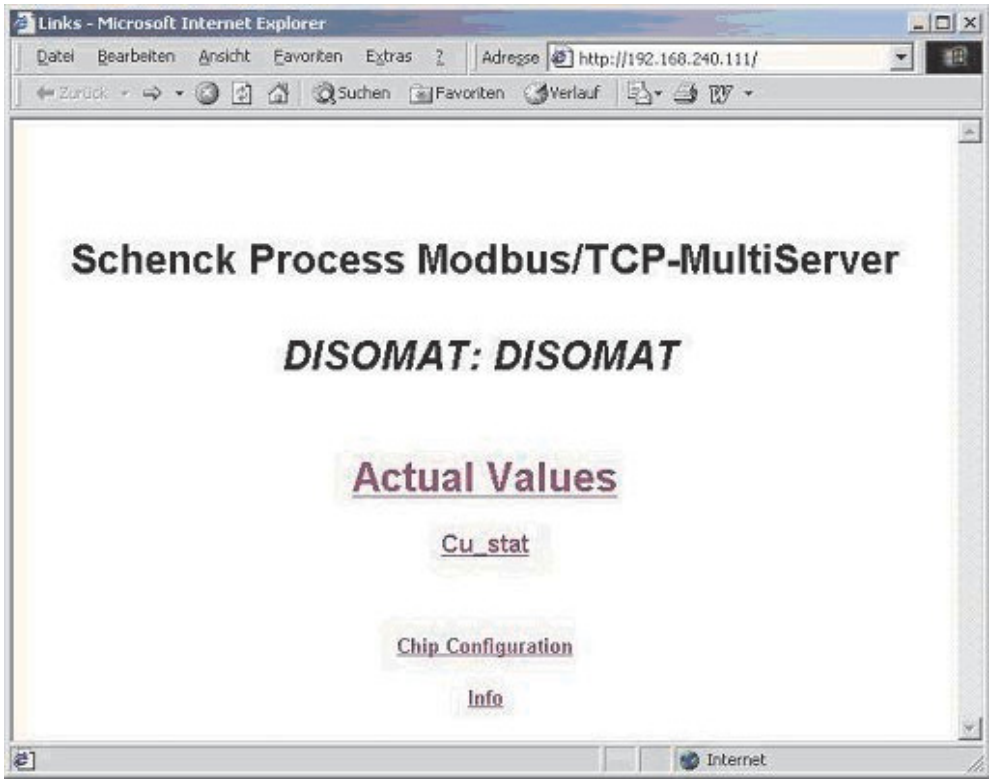
Ensure that all names of user-defined configuration files designed to appear as links on the device start page start with CU_ (**CU**stomer). The residual 5 name digits can be assigned at will (e.g. CU_STAT1.TXT). File extension TXT is a must.

Stylesheet file DATA.XSL ensures desired representation of values provided that WEB-CODING parameter is set to XML. To change the form of data representation, create a stylesheet file using the name of the configuration file and add data extension XSL. If no special stylesheet file is available, standard stylesheet DATA.XSL is used. Store stylesheet file on the Customer_DISOxxx directory.
For construction of configuration files, see separate item.

6.4.2 Start Page

If all files are loaded and the IP address has been entered into the brower's address field, e.g. http://192.168.240.11, start page is displayed and comprises:

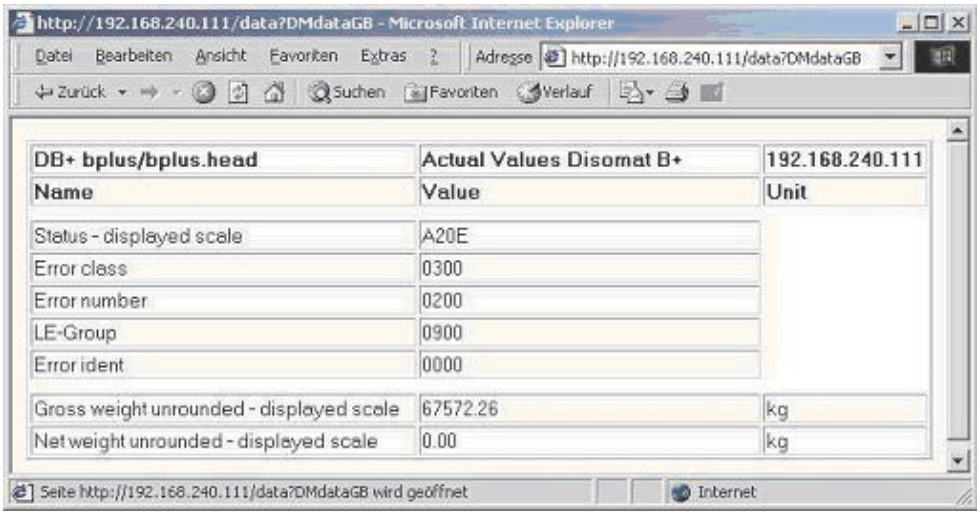
- in 2 line: information assigned by the commissioner, i.e. device name, device family, designation of WEB page, reference to actual data corresponding to the input in Line 2
- if necessary, reference to user-defined WEB pages (smaller letters, starting with CU_)
- reference to chip configuration page
- link to information page, display of current program version and settings at the time of download.



Sample start page

6.4.3 Displaying Actual Values

Sample dynamic WEB page



DB+ bplus/bplus.head	Actual Values Disomat B+	192.168.240.111
Name	**Value**	**Unit**
Status - displayed scale	A20E	
Error class	0300	
Error number	0200	
LE-Group	0900	
Error ident	0000	
Gross weight unrounded - displayed scale	67572.26	kg
Net weight unrounded - displayed scale	0.00	kg

6.4.4 WEB Server Call Conventions

The start page already references the standard and user-defined configuration files.
To be able to use the additional capabilities of the WEB server, the present item describes the manual browser inputs.
The following codes are used:

DBdatayy.txt	DISOBOX configuration file (yy = wildcard for language code)
DMdatayy.txt	DISOMAT configuration file
CU_xxxxx.txt	User-specific configuration file
Datax.txt	Optional configuration file
NoXSL	Argument used to read the mere XML data of scale via HTTP protocol. Data are supplied once-only per call and can be used, for instance, to further process data using another program. For construction of returned data, see “Representing XML Data” item.
Call without arguments	**IP/data** (data refers to the point of entry into the CGI table and is therefore invariable). Standard call implicitly searches for configuration file DBdatayy.TXT/DMdatayy.TXT and tries to

represent data using stylesheet file DATA.XSL (or HTML file).

Call with arguments Arguments are separated from one another using a question mark:**IP/data?abc?NoXSL**
(argument means: configuration file ”abc.txt”, no stylesheet)

The table below shows some examples for correct and faulty (grey) calls.

Call	Configuration file (.txt)	Stylesheet (.xsl)	Comments
IP/data?data	DBdatayy.txt	Data.xsl	Shows data from DBdatayy.txt file using stylesheet data.xsl (standard call)
IP/data1?data1	CU_Data1.txt	CU_Data1.xsl	Displays data from CU_Data1.txt file using user-specific stylesheet CU_Data1.xsl. Files are loaded from CUSTOMER_DISOMAT/ CUSTOMER_DISOBOX directories.
IP/data?data1?NoXSL	Data1.txt	—	No stylesheet is used. XML raw data are sent to browser.
IP/NoXSL			Inadmissible call → CGI input not available
IP/Data?xxx			Inadmissible; CGI input case-sensitive!
IP/data?xxx?NOXSL			Inadmissible; NoXSL case-sensitive!
IP/data?NoXSL			Expected result not supplied. NoXSL can be used as second argument only. .

Note:

- Abort cyclic browser outputs by (repeated) operation of ESC key. Key F5 (Update) lets you resume cyclic processing.
- Shortcut ALT-Pos1 lets you go to the browser start page.
- Please note that browser stores some files in the TEMPORARY INTERNET FILES directory. In case of doubt, delete these files before going on.
- The names of configuration and stylesheet files should meet the 8+3 name convention.

6.4.5 Configuring WEB Page

To be able to represent a page, the browser needs to know:
1. what data are to be represented
2. how these data shall be represented.

The information on point 1 is comprised in the DATA.TXT file. In the case of the page depicted at Item 1.6.3, data are represented as follows (line numbers are not included in file; they merely serve as reference for explanation of contents):

Line No.	Contents
1	;ID, Type, Text, Unit, Precision (with floating point numbers)
2	0001,HEAD,-,-,-
3	0001,HEAD,Name,Value,Unit
4	,,,,
5	,,,,
6	768,UINT16-H,Status - Gross weight
7	800,UINT16-H,Error class
8	816,UINT16-H,Error number
9	832,UINT16-H,LE group
10	848,UINT16-H,Error ID
11	,,,,
12	,,,,
13	1792,FLOAT,Gross unrounded - Gross weight,kg,2
14	1806,FLOAT,Gross unrounded - Gross weight,kg,2

Changes made to this file automatically acquire all language-dependent and national particularities (e.g. different units).

Explanations on data construction
General Information:

- All lines starting with a semicolon are comment lines.
- Separate all line inputs by comma.
- 4 blank fields generate a separator line (e.g. between lines 4 and 5).
- Program automatically recognizes umlauts and special characters and translates them into respective HTML codes.
- The WEB server can process the following information:

ID(s)	Value identification in controller	IDs unmistakably identify a controller process value. See Data List.
(Data) Type	Enter one of the data types below :	Always use upper-case characters!
	HEAD	Identifies one the two table headlines. The 1st line contains 3 blank fields automatically filled with program version and IP address. The 2nd field can be filled with any title text, e.g. 0001,HEAD,-,Actual Data Scale 1,-
	BOOL	Determines that exactly one bit from the process image is to be viewed. The bit status is represented by YES (bit=1) or NO (bit=0).
	UINT8-H	One data byte is displayed in hexadecimal fashion.
	UINT8	See above, however, decimal representation
	UINT16-H	One 16-bit data word is displayed in hexadecimal fashion.
	UINT16	See above, however, decimal representation
	UINT32-H	Represents a 32-bit data word in hexadecimal fashion (ID bold-appearing in data list)
	UINT32	See above, however, decimal representation
	FLOAT	Corresponding value is shown in the floating point format. The precision can be set separately (s. Precision).
Text	Refers to the value to follow	
Unit	Unit, if required	
Precision	Number of after-comma places with floating point values	Acts only on floating point values

An XML file with current values is generated by interpretation of the DATA.TXT file.

6.4.6 Representing XML Data

To display the XML file generated by the Ethernet module, you need a browser capable of interpreting XML, e.g. IE5 plus option pack and IE6 (on standard). In case of doubt, select HTML representation. To update your Internet Explorer Version 5, a service pack is available (s. “For Further Reading“ item).

To represent the data of the XML file, the browser additionally needs an XSL file (style sheet) that informs him HOW the data are to be displayed. The file supplied readies the data in form of a table. However, any other representation including backgrounds, etc. can also be generated. If need be, load further graphics files into the Ethernet module. .

The XML file printout below shows the keywords (TP, XVal, XNam and XDim) used to prepare your own style sheet. The headlines feature HD in place of the ID in data lines.

```
<?xml version="1.0" ?>
<Values>
<HD No="0001" TP="HEAD" XVal="Actual Values Disomat B+" XNam="DB+ bplus/bplus.head"
XDim="192.168.240.111" />
<HD No="0001" TP="HEAD" XVal="Value" XNam="Name" XDim="Unit" />
<ID No="" />
<ID No="" />
<ID No="0768" TP="UINT16-H" XVal="A20E" XNam="Status - displayed scale" XDim="" />
<ID No="0800" TP="UINT16-H" XVal="0300" XNam="Error class" XDim="" />
<ID No="0816" TP="UINT16-H" XVal="0200" XNam="Error number" XDim="" />
<ID No="0832" TP="UINT16-H" XVal="0900" XNam="LE-Group" XDim="" />
<ID No="0848" TP="UINT16-H" XVal="0000" XNam="Error ident" XDim="" />
<ID No="" />
<ID No="" />
<ID No="1792" TP="FLOAT" XVal="67572.26" XNam="Gross weight unrounded - displayed scale"
XDim="kg" />
<ID No="1806" TP="FLOAT" XVal="0.00" XNam="Net weight unrounded - displayed scale" XDim="kg"
/>
</Values>
```

Upload the standard XSL file from the Ethernet module onto your PC.

6.4.7 Representing HTML Data

While XML data and their representation are separate and processing takes place in the browser, a HTML page is completely generated in module and only displayed by the browser.
The advantage is that virtually any browser can represent the selected tabulated form without any problems.

6.5 The MultiServerTool Service Programme

The Ethernet module is equipped with an independent processor system needing a current firmware and configuration files for its operation. Every module comes with a set of files enabling the device to be instantly used as TCP server. This applies to its use as FIELDBUS or WEB server. The “MultiServerTools.EXE“ program lets you change firmware and configuration data. The fieldbus module can be used only if all downloads are performed using this program. The program functions are detailed below. The end user, or operator, can modify certain files.

6.5.1 Download and Installation

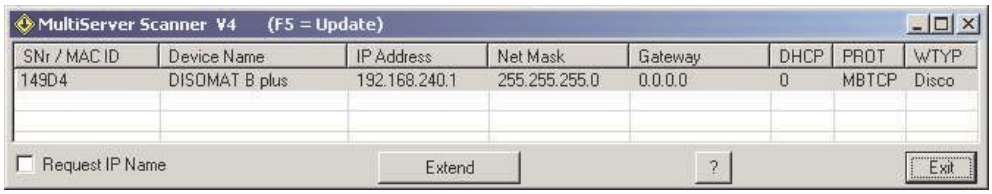
The MultiServer Tools program starts from a fixed directory structure. The latter is determined by the setup program and must not be changed in order to ensure peak functionality of Loader module and commissioning tools.
Depending on operating system version and selected language, the paths are selected so that all invariable subroutines are installed using the program path preset by Microsoft (CSIDL_PROGRAM_FILES); and all variable files, using the All Users application files path (CSIDL_COMMON_APPDATA). For clear orientation, use the HELP INFO of the MultiServer tool to view the paths..

The “MultiServerTools” program (VPC 28000) can be loaded from the public Schenck Process download area **(bvwww.schenck.net\ Pfad: Bus Systems, Communication-TCP/IP\ MultiServerTools.SetupVx.zip).**
After unpacking of zip file, program is installed upon start of setup program.

After start of program, the MultiServerScanner window is the first to open.

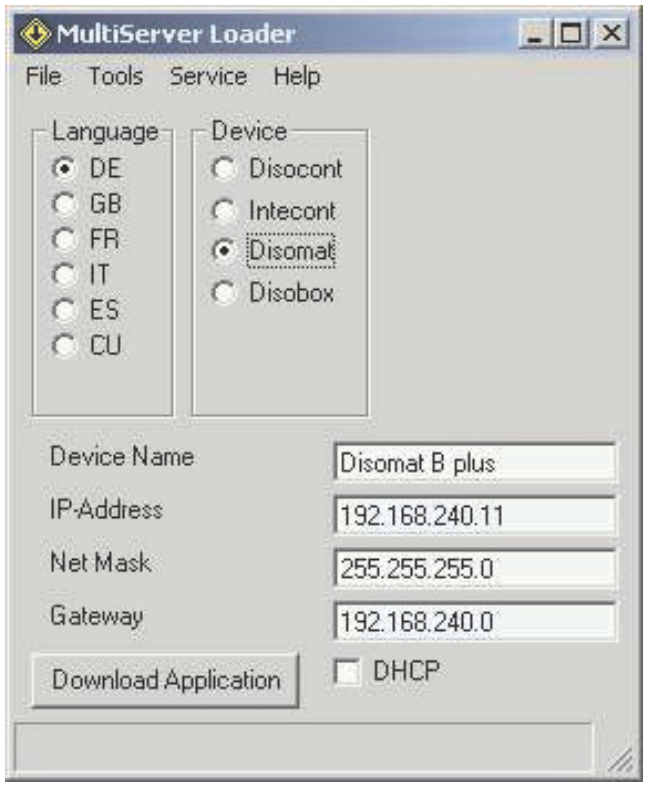
6.5.2 MultiServerScanner

The MultiServerScanner lets you acquire all Ethernet modules available in network. All modules responding to broadcast are entered into a list, for you to select a device and start the Web browser using the right mouse button. The start page displayed lets you select a web page and view the cyclically refreshed values. Key F5 (Update) lets you add new controllers to list. Further functions can be called only after password input.



6.5.3 MultiServerLoader

The MultiServerLoader subroutine lets you add some commissioning and service functions to the scanner. Start program using the “StartMultiServerLoader“ button and enter password “network“.



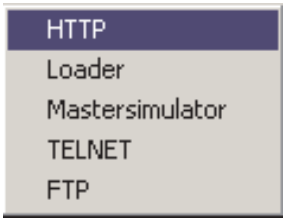
This subroutine prompts for input all parameters required to perform a download:

- Language used in all WEB server displays
- Device family used
- The device name is designed for device identification and must no exceed 20 digits.
- The IP adress is the unique address of the Ethernet module in network.

Note
Go to scanner module, click on line indicating name and IP address of desired device, and all values are transferred to the Loader module. If required, values can be adjusted before next download.

To be able to start a download, enter at least the IP address. The Download Application button lets you start transfer of desired files. Active transmission is reported by the hourglass pointer and displayed in the program status line. If transfer is complete, connection terminates automatically and all inputs remain stored, so that a further device with the same settings can be loaded. All status messages are recorded by program and can be viewed in service menu at the “Show FTPLogFile“ entry.
Downloading also loads the current firmware version of the interface module. This is an integral part of the MultiServerTools program, i.e. If a firmware update is necessary, the current version of the MultiServer tool is loaded and installed, before WEB pages and firmware are installed in device as described above.

TOOLS Menu



- HTTP: It tries to start the standard web browser with the preset address.

This menu item comprises further useful tools for WEB server and fieldbus mode.

Note
You can also reach the Tools menu using the right mouse button.
The Tools menu is also available in the Scanner module and can be reached using the right mouse button. If started via Scanner module, the address of the line selected last is valid.

SERVICE Menu

The SERVICE menu offers some commissioning tools that are but seldom used.

- **Edit Configuration**: lets you edit the Web pages. Display shows the directory tree as created by the setup program. Select file, and edit using the editor. The editor's SAVE function lets you store the changed file in the same location on directory. The SAVE AS function lets you add a new file in the same or another location on the directory tree. Please note that changes in the DISOMAT/DISOBOX standard directory can produce errors in the ACTUAL VALUES display. Preferably use an existing file as pattern and store the changed file in the CUSTOMER_DISOMAT/CUSTOMER_DISOBOX directory using the SAVE AS function. The name of the new file should start with "CU_" (for **CU**stomer) and meet the DOS name convention "8+3". This also ensures that after reloading of application software the newly added file is entered into the WEB server's start page and can be started from there via mouse click
- **Show FTPLogFile**: lets you check loading process (s. MultiServerLoader)

Note

- The freshly loaded Multiserver version is active only after reset (power-up) of controller (download option "ALL")! In the residual cases, loading program ensures correct update. If Web server is active during download, update (F5 button) may be necessary.
- For more information on WEB server files, see relevant item of the present chapter.

6.5.4 For Further Reading

OPEN MODBUS/TCP SPECIFICATION	Schneider Electric, Release 1.0, 29 March 1999
Modicon Modbus Protocol Reference Guide	PI-MBUS-300 Rev. J/1996
HTML documents of Messrs. BECK	http://www.beck-ipc.com
XML service pack for Microsoft Internet Explorer	

Note

Any external documents and updates can be downloaded from the Schenck Process Service Page (www.schenck-process.de, path: Service-Download-Controller-TCP).

6.6 Appendix

6.6.1 ASCII Tables with HTML Codes

Scan-code	ASCII hex	dez	Zeichen	Scan-code	ASCII hex	dez	Zch.	Scan-code	ASCII hex	dez	Zch.	Scan-code	ASCII hex	dez	Zch.
	00	0	NUL		20	32	SP		40	64	@	0D	60	96	`
	01	1	SOH ^A	02	21	33	!	1E	41	65	A	1E	61	97	a
	02	2	STX ^B	03	22	34	"	30	42	66	B	30	62	98	b
	03	3	ETX ^C	29	23	35	#	2E	43	67	C	2E	63	99	c
	04	4	EOT ^D	05	24	36	$	20	44	68	D	20	64	100	d
	05	5	ENQ ^E	06	25	37	%	12	45	69	E	12	65	101	e
	06	6	ACK ^F	07	26	38	&	21	46	70	F	21	66	102	f
	07	7	BEL ^G	0D	27	39	'	22	47	71	G	22	67	103	g
0E	08	8	BS ^H	09	28	40	(	23	48	72	H	23	68	104	h
0F	09	9	TAB ^I	0A	29	41	)	17	49	73	I	17	69	105	i
	0A	10	LF ^J	1B	2A	42	*	24	4A	74	J	24	6A	106	j
	0B	11	VT ^K	1B	2B	43	+	25	4B	75	K	25	6B	107	k
	0C	12	FF ^L	33	2C	44	,	26	4C	76	L	26	6C	108	l
1C	0D	13	CR ^M	35	2D	45	-	32	4D	77	M	32	6D	109	m
	0E	14	SO ^N	34	2E	46	.	31	4E	78	N	31	6E	110	n
	0F	15	SI ^O	08	2F	47	/	18	4F	79	O	18	6F	111	o
	10	16	DLE ^P	0B	30	48	0	19	50	80	P	19	70	112	p
	11	17	DC1 ^Q	02	31	49	1	10	51	81	Q	10	71	113	q
	12	18	DC2 ^R	03	32	50	2	13	52	82	R	13	72	114	r
	13	19	DC3 ^S	04	33	51	3	1F	53	83	S	1F	73	115	s
	14	20	DC4 ^T	05	34	52	4	14	54	84	T	14	74	116	t
	15	21	NAK ^U	06	35	53	5	16	55	85	U	16	75	117	u
	16	22	SYN ^V	07	36	54	6	2F	56	86	V	2F	76	118	v
	17	23	ETB ^W	08	37	55	7	11	57	87	W	11	77	119	w
	18	24	CAN ^X	09	38	56	8	2D	58	88	X	2D	78	120	x
	19	25	EM ^Y	0A	39	57	9	2C	59	89	Y	2C	79	121	y
	1A	26	SUB ^Z	34	3A	58	:	15	5A	90	Z	15	7A	122	z
01	1B	27	Esc	33	3B	59	;		5B	91	[		7B	123	{
	1C	28	FS	2B	3C	60	<		5C	92	\		7C	124	|
	1D	29	GS	0B	3D	61	=		5D	93	]		7D	125	}
	1E	30	RS	2B	3E	62	>	29	5E	94	^		7E	126	~
	1F	31	US	0C	3F	63	?	35	5F	95	_	53	7F	127	DEL

HTML-code	ANSI hex	dez	Zeichen	HTML-code	ANSI hex	dez	Zch.	HTML-code	ANSI hex	dez	Zch.	HTML-code	ANSI hex	dez	Zch.
&#x80;	80	128	€		A0	160		&Agrave;	C0	192	À	&agrave;	E0	224	à
&#x81;	81	129	□	&iexcl;	A1	161	¡	&Aacute;	C1	193	Á	&aacute;	E1	225	á
&#x82;	82	130	‚	&cent;	A2	162	¢	&Acirc;	C2	194	Â	&acirc;	E2	226	â
&#x83;	83	131	ƒ	&pound;	A3	163	£	&Atilde;	C3	195	Ã	&atilde;	E3	227	ã
&#x84;	84	132	„	&curren;	A4	164	¤	&Auml;	C4	196	Ä	&auml;	E4	228	ä
&#x85;	85	133	…	&yen;	A5	165	¥	&Aring;	C5	197	Å	&aring;	E5	229	å
&#x86;	86	134	†	&brvbar;	A6	166	¦	&AElig;	C6	198	Æ	&aelig;	E6	230	æ
&#x87;	87	135	‡	&sect;	A7	167	§	&Ccedil;	C7	199	Ç	&ccedil;	E7	231	ç
&#x88;	88	136	ˆ	&uml;	A8	168	¨	&Egrave;	C8	200	È	&egrave;	E8	232	è
&#x89;	89	137	‰	&copy;	A9	169	©	&Eacute;	C9	201	É	&eacute;	E9	233	é
&#x8A;	8A	138	Š	&ordf;	AA	170	ª	&Ecirc;	CA	202	Ê	&ecirc;	EA	234	ê
&#x8B;	8B	139	‹	&laquo;	AB	171	«	&Euml;	CB	203	Ë	&euml;	EB	235	ë
&#x8C;	8C	140	Œ	&not;	AC	172	¬	&Igrave;	CC	204	Ì	&igrave;	EC	236	ì
&#x8D;	8D	141	□	&shy;	AD	173		&Iacute;	CD	205	Í	&iacute;	ED	237	í
&#x8E;	8E	142	Ž	&reg;	AE	174	®	&Icirc;	CE	206	Î	&icirc;	EE	238	î
&#x8F;	8F	143	□	&macr;	AF	175	¯	&Iuml;	CF	207	Ï	&iuml;	EF	239	ï
&#x90;	90	144	□	&deg;	B0	176	°	&ETH;	D0	208	Ð	&eth;	F0	240	ð
&#x91;	91	145	‘	&plusmn;	B1	177	±	&Ntilde;	D1	209	Ñ	&ntilde;	F1	241	ñ
&#x92;	92	146	’	&sup2;	B2	178	²	&Ograve;	D2	210	Ò	&ograve;	F2	242	ò
&#x93;	93	147	“	&sup3;	B3	179	³	&Oacute;	D3	211	Ó	&oacute;	F3	243	ó
&#x94;	94	148	”	&acute;	B4	180	´	&Ocirc;	D4	212	Ô	&ocirc;	F4	244	ô
&#x95;	95	149	•	&micro;	B5	181	µ	&Otilde;	D5	213	Õ	&otilde;	F5	245	õ
&#x96;	96	150	–	&para;	B6	182	¶	&Ouml;	D6	214	Ö	&ouml;	F6	246	ö
&#x97;	97	151	—	&middot;	B7	183	·	&times;	D7	215	×	&divide;	F7	247	÷
&#x98;	98	152	˜	&cedil;	B8	184	¸	&Oslash;	D8	216	Ø	&oslash;	F8	248	ø
&#x99;	99	153	™	&sup1;	B9	185	¹	&Ugrave;	D9	217	Ù	&ugrave;	F9	249	ù
&#x9A;	9A	154	š	&ordm;	BA	186	º	&Uacute;	DA	218	Ú	&uacute;	FA	250	ú
&#x9B;	9B	155	›	&raquo;	BB	187	»	&Ucirc;	DB	219	Û	&ucirc;	FB	251	û
&#x9C;	9C	156	œ	&frac14;	BC	188	¼	&Uuml;	DC	220	Ü	&uuml;	FC	252	ü
&#x9D;	9D	157	□	&frac12;	BD	189	½	&Yacute;	DD	221	Ý	&yacute;	FD	253	ý
&#x9E;	9E	158	ž	&frac34;	BE	190	¾	&THORN;	DE	222	Þ	&thorn;	FE	254	þ
&#x9F;	9F	159	Ÿ	&iquest;	BF	191	¿	&szlig;	DF	223	ß	&yuml;	FF	255	ÿ

7 Available Data

7.1 Default Values

WRITE Fieldbus

Codes						Meaning	Additional information	DISOMAT B PLUS	DISOBOX	VWW20400/11	WW20430/03	VWW20431/03
Profibus DeviceNet			Modbus Modbus/TCP									
(hex)	(dez)		(hex)	(dez)								
Command number meanings (bit information and commands)												
1000	4096	Num.	10	16	DW	Command number				x	x	x
						Command number meanings						
					DW	1	Tare	Displayed scale	Displayed scale	x	x	x
					DW	2	Clear tare	Displayed scale	Displayed scale	x	x	x
					DW	3	Zero Set	Displayed scale	Displayed scale	x	x	x
					DW	4	Tare	Scale1	Scale1	x	x	x
					DW	5	Clear tare	Scale1	Scale1	x	x	x
					DW	6	Zero Set	Scale1	Scale1	x	x	x
					DW	7	Tare	Scale2	Scale2	x	x	x
					DW	8	Clear tare	Scale2	Scale2	x	x	x
					DW	9	Zero Set	Scale2	Scale2	x	x	x
					DW	10	Tare	Scale3	Scale3	x	x	x

Codes						Meaning	Additional information	DISOMAT B PLUS	DISOBOX	VWW20400/11	WW20430/03	VWW20431/03
Profibus DeviceNet			Modbus Modbus/TCP									
(hex)	(dez)		(hex)	(dez)								
					DW	11	Clear tare	Scale3	Scale3	x	x	x
					DW	12	Zero Set	Scale3	Scale3	x	x	x
					DW	13	Tare		Scale4			x
					DW	14	Clear tare		Scale4			x
					DW	15	Zero Set		Scale4			x
					DW	16	Tare		Scale5			x
					DW	17	Clear tare		Scale5			x
					DW	18	Zero Set		Scale5			x
					DW	19	Tare		Scale6			x
					DW	20	Clear tare		Scale6			x
					DW	21	Zero Set		Scale6			x
					DW	22	Tare		Scale7			x
					DW	23	Clear tare		Scale7			x
					DW	24	Zero Set		Scale7			x
					DW	25	Tare		Scale8			x
					DW	26	Clear tare		Scale8			x
					DW	27	Zero Set		Scale8			x
					DW	80	Record		Displayed scale	x	x	x
					DW	81	Record		Scale1	x	x	x
					DW	82	Record		Scale2	x	x	x
					DW	83	Record		Scale3	x	x	x
					DW	84	Record		Scale4			x

Codes						Meaning	Additional information	DISOMAT B PLUS	DISOBOX	VWW20400/11	WW20430/03	VWW20431/03
Profibus DeviceNet			Modbus Modbus/TCP									
(hex)	(dez)		(hex)	(dez)								
					DW	85	Record		Scale5			x
					DW	86	Record		Scale6			x
					DW	87	Record		Scale7			x
					DW	88	Record		Scale8			x
					DW	128	Acknowledge the highest available error			x	x	x
			20	32		Function blocks (16 Bit) PLS-Din 1...16				x	x	x
Default values (floating point values, IEEE)												
2000	8192		100	256	DDW	Manual tare		Displayed scale	Displayed scale	x	x	x
2004	8196		102	258	DDW	—				x	x	x
2008	8200		104	260	DDW	—				x	x	x
200C	8204		106	262	DDW	PLS -AIn-1				x	x	x
2010	8208		108	264	DDW	PLS -AIn-2				x	x	x
2014	8212		10A	266	DDW	PLS -AIn-3				x	x	x
2018	8216		10C	268	DDW	PLS -AIn-4				x	x	x
201C	8220		10E	270	DDW	Material number				x	x	x
2020	8224		110	272	DDW	Setpoint in kg				x	x	x
Default values (integer values, ULONG)												
8000	32768		800	2048	DDW	Date; for coding, see Profibus specifications				x	x	x

Codes						Meaning	Additional information	DISOMAT B PLUS	DISOBOX	VWW20400/11	WW20430/03	VWW20431/03
Profibus DeviceNet			Modbus Modbus/TCP									
(hex)	(dez)		(hex)	(dez)								
8004	32772		802	2050	DDW	Time; for coding, see Profibus specifications				x	x	x
8008	32776		804	2052	DDW	Material number				x	x	x

7.2 Controller Data

READ Fieldbus

Codes						Meaning	Additional information	DISOMAT B PLUS	DISOBOX	VWW20400/11	VWW20430/03	VWW20431/03
Profibus DeviceNet			Modbus Modbus/TCP									
(hex)	(dez)		(hex)	(dez)								
Status information (bit information); refer to column 3 for exceptions												
3000	12288		1300	4864	DW	Scale status (as a data word, 16-bit); see below for details.		Displayed scale	Displayed scale	x	x	x
			1300	4864	Bit 1	Scale in underrange				x	x	x
			1301	4865	Bit 2	Scale in overrange				x	x	x
			1302	4866	Bit 3	Manual or fixed tare acquired				x	x	x
			1303	4867	Bit 4	Exact zero				x	x	x
			1304	4868	Bit 5					x	x	x
			1305	4869	Bit 6	Weight invalid				x	x	x
			1306	4870	Bit 7	Scale tared				x	x	x
			1307	4871	Bit 8	Scale in no-motion				x	x	x
			1308	4872	Bit 9	Measuring being initialised, no weights are acquired.				x	x	x
			1309	4873	Bit 10					x	x	x
			130A	4874	Bit 11	Scale in Range 1				x	x	x
			130B	4875	Bit 12	Scale in Range 2				x	x	x
			130C	4876	Bit 13	Scale in zeroing range				x	x	x

Codes						Meaning	Additional information	DISOMAT B PLUS	DISOBOX	VWW20400/11	VWW20430/03	VWW20431/03
Profibus DeviceNet			Modbus Modbus/TCP									
(hex)	(dez)		(hex)	(dez)								
			130D	4877	Bit 14					x	x	x
			130E	4878	Bit 15	Multi-divisional scale				x	x	x
			130F	4879	Bit 16	Multi-range scale				x	x	x
		Num.	1310	4880	DW	Mirror ID (1st requested ID)				x	x	x
3004	12292	Num.	1320	4896	DW	Class of highest available error 0: no event 1: message, 2: warning, 3: alarm, 4: malfunction				x	x	x
		Num.	1330	4912	DW	Number of highest available error				x	x	x
3008	12296	Num.	1340	4928	DW	LU group of highest available error				x	x	x
		Num.	1350	4944	DW	Error ID				x	x	x
300C	12300		1360	4960	DW	Function blocks binary in (16 Bit) PLS-Dout 1...16				x	x	x
			1370	4976	DW	Status (for details, s. Status-ID 1300H/3000H)		Waage 1	Scale1	x	x	x
3010	12304		1380	4992	DW	Status (for details, s. Status-ID 1300H/3000H)		Scale2	Scale2	x	x	x
			1390	5008	DW	Status (for details, s. Status-ID 1300H/3000H)		Verbund	Scale3	x	x	x
3014	12308		13A0	5024	DW	Status (as 16-bit data double word)		Disobox1-Channel 1-2	Channel 1-2	x	x	x
			13A0	5024	Bit 1	Initialise Channel 1				x	x	x
			13A1	5025	Bit 2					x	x	x
			13A2	5026	Bit 3					x	x	x
			13A3	5027	Bit 4	Measuring signal too high Channel 1				x	x	x
			13A4	5028	Bit 5	Load cell cable broken Channel 1				x	x	x
			13A5	5029	Bit 6					x	x	x
			13A6	5030	Bit 7					x	x	x

Codes						Meaning	Additional information	DISOMAT B PLUS	DISOBOX	VWW20400/11	VWW20430/03	VWW20431/03
Profibus DeviceNet			Modbus Modbus/TCP									
(hex)	(dez)		(hex)	(dez)								
			13A7	5031	Bit 8					x	x	x
			13A8	5032	Bit 9	Initialise Channel 2				x	x	x
			13A9	5033	Bit 10					x	x	x
			13AA	5034	Bit 11					x	x	x
			13AB	5035	Bit 12	Measuring signal too high Channel 2				x	x	x
			13AC	5036	Bit 13	Load cell cable broken Channell 2				x	x	x
			13AD	5037	Bit 14					x	x	x
			13AE	5038	Bit 15					x	x	x
			13AF	5039	Bit 16					x	x	x
			13B0	5040	DW	Status (for details, s. Status--ID 13A0H/3014H)		Disobox1-Channel 3-4	Channel 3-4	x	x	x
3018	12312		13C0	5056	DW	Status (for details, s. Status-ID 13A0H/3014H)		Disobox1-Channel 5-6	Channel 5-6	x	x	x
			13D0	5072	DW	Status (for details, s. Status-ID 13A0H/3014H)		Disobox1-Channel 7-8	Channel 7-8	x	x	x
301C	12316		13E0	5088	DW	Status (for details, s. Status-ID 13A0H/3014H)		Disobox2-Channel 1-2		x		
			13F0	5104	DW	Status (for details, s. Status-ID 13A0H/3014H)		Disobox2-Channel 3-4		x		
3020	12320		1400	5120	DW	Status (for details, s. Status—ID 13A0H/3014H)		Disobox2-Channel 5-6		x		
			1410	5136	DW	Status (for details, s. Status-ID 13A0H/3014H)		Disobox2-Channel 7-8		x		
3024	12324	Num.	1420	5152	DW	Unit (0:kg 1:g 2:t 3:lb), High-Word/Low-Byte				x	x	x
			1430	5168	DW	Status (for details, s. Status-ID 1300H/3000H)			Scale4			x

Codes						Meaning	Additional information	DISOMAT B PLUS	DISOBOX	VWW20400/11	VWW20430/03	VWW20431/03
Profibus DeviceNet			Modbus Modbus/TCP									
(hex)	(dez)		(hex)	(dez)								
3028	12328		1440	5184	DW	Status (for details, s. Status-ID 1300H/3000H)			Scale5			x
			1450	5200	DW	Status (for details, s. Status-ID 1300H/3000H)			Scale 6			x
302C	12332		1460	5216	DW	Status (for details, s. Status-ID 1300H/3000H)			Scale 7			x
			1470	5232	DW	Status (for details, s. Status-ID 1300H/3000H)			Scale 8			x
												x
Measurement values (floating point values, IEEE); refer to column 3 for exceptions										x	x	x
4000	16384		700	1792	DDW	Gross weight	unrounded in kg	Displayed Scale	Displayed Scale	x	x	x
4004	16388		702	1794	DDW	Tare weight	unrounded in kg	Displayed Scale	Displayed Scale	x	x	x
4008	16392		704	1796	DDW	dG/dt	unrounded in kg	Displayed Scale	Displayed Scale	x	x	x
400C	16396		706	1798	DDW	Net weight	unrounded in kg	Displayed Scale	Displayed Scale	x	x	x
4010	16400		708	1800	DDW	Gross weight	rounded in display format	Displayed Scale	Displayed Scale	x	x	x
4014	16404		70A	1802	DDW	Tare weight	rounded in display format	Displayed Scale	Displayed Scale	x	x	x
4018	16408		70C	1804	DDW	dG/dt	rounded in display format	Displayed Scale	Displayed Scale	x	x	x
401C	16412		70E	1806	DDW	Net weight	rounded in display format	Displayed Scale	Displayed Scale	x	x	x
4020	16416		710	1808	DDW	Balance (total) 100000 resid. (kg)				x	x	x
4024	16420		712	1810	DDW	Balance (total) 100000 multiple (kg)				x	x	x

Codes						Meaning	Additional information	DISOMAT B PLUS	DISOBOX	VWW20400/11	VWW20430/03	VWW20431/03
Profibus DeviceNet			Modbus Modbus/TCP									
(hex)	(dez)		(hex)	(dez)								
4028	16424		714	1812	DDW	Balance (current material type) 100000 resid. (kg)				x	x	x
402C	16428		716	1814	DDW	Balance (current mat. type) 100000 multiple (kg)				x	x	x
4030	16432		718	1816	DDW	PLS -AOut-1				x	x	x
4034	16436		71A	1818	DDW	PLS -AOut-2				x	x	x
4038	16440		71C	1820	DDW	PLS -AOut-3				x	x	x
403C	16444		71E	1822	DDW	PLS -AOut-4				x	x	x
4040	16448		720	1824	DDW	Recorded tare	rounded in display format			x	x	x
4044	16452		722	1826	DDW	Recorded net	rounded in display format			x	x	x
4048	16456	UINT32	724	1828	DDW	Recorded cons.no. (data format) ULONG-Integer)				x	x	x
404C	16460		726	1830	DDW	Recorded cons.no. (float data format)				x	x	x
4050	16464		728	1832	DDW	Current material number (float data forma)				x	x	x
4054	16468		72A	1834	DDW	Current setpoint in kg (float data format)				x	x	x
4058	16472		72C	1836	DDW	—				x	x	x
405C	16476		72E	1838	DDW	—				x	x	x
4060	16480		730	1840	DDW	Gross weight	unrounded in kg	Scale 1	Scale 1	x	x	x
4064	16484		732	1842	DDW	Tare weight	unrounded in kg	Scale 1	Scale 1	x	x	x

Codes						Meaning	Additional information	DISOMAT B PLUS	DISOBOX	VWW20400/11	VWW20430/03	VWW20431/03
Profibus DeviceNet			Modbus Modbus/TCP									
(hex)	(dez)		(hex)	(dez)								
4068	16488		734	1844	DDW	dW/dt	unrounded in kg	Scale 1	Scale 1	x	x	x
406C	16492		736	1846	DDW	Net weight	unrounded in kg	Scale 1	Scale 1	x	x	x
4070	16496		738	1848	DDW	Gross weight	unrounded in kg	Scale 2	Scale 2	x	x	x
4074	16500		73A	1850	DDW	Tare weight	unrounded in kg	Scale 2	Scale 2	x	x	x
4078	16504		73C	1852	DDW	dW/dt	unrounded in kg	Scale 2	Scale 2	x	x	x
407C	16508		73E	1854	DDW	Net weight	unrounded in kg	Scale 2	Scale 2	x	x	x
4080	16512		740	1856	DDW	Gross weight	unrounded in kg	Verbund	Scale 3	x	x	x
4084	16516		742	1858	DDW	Tare weight	unrounded in kg	Verbund	Scale 3	x	x	x
4088	16520		744	1860	DDW	dW/dt	unrounded in kg	Verbund	Scale 3	x	x	x
408C	16524		746	1862	DDW	Net weight	unrounded in kg	Verbund	Scale 3	x	x	x
4090	16528		748	1864	DDW	Gross weight	unrounded in kg	Disobox1-Channel 1	Channel 1	x	x	x
4094	16532		74A	1866	DDW	Gross weight	unrounded in kg	Disobox1-Channel 2	Channel 2	x	x	x
4098	16536		74C	1868	DDW	Gross weight	unrounded in kg	Disobox1-Channel 3	Channel 3	x	x	x
409C	16540		74E	1870	DDW	Gross weight	unrounded in kg	Disobox1-Channel 4	Channel 4	x	x	x
40A0	16544		750	1872	DDW	Gross weight	unrounded in kg	Disobox1-Channel 5	Channel 5	x	x	x
40A4	16548		752	1874	DDW	Gross weight	unrounded in kg	Disobox1-Channel 6	Channel 6	x	x	x
40A8	16552		754	1876	DDW	Gross weight	unrounded in kg	Disobox1-Channel 7	Channel 7	x	x	x

Codes						Meaning	Additional information	DISOMAT B PLUS	DISOBOX	VWW20400/11	VWW20430/03	VWW20431/03
Profibus DeviceNet			Modbus Modbus/TCP									
(hex)	(dez)		(hex)	(dez)								
40AC	16556		756	1878	DDW	Gross weight	unrounded in kg	Disobox1-Channel 8	Channel 8	x	x	x
40B0	16560		758	1880	DDW	Gross weight	rounded in display format	Scale 1	Scale 1	x	x	x
40B4	16564		75A	1882	DDW	Tare weight	rounded in display format	Scale 1	Scale 1	x	x	x
40B8	16568		75C	1884	DDW	dW/dt	rounded in display format	Scale 1	Scale 1	x	x	x
40BC	16572		75E	1886	DDW	Net weight	rounded in display format	Scale 1	Scale 1	x	x	x
40C0	16576		760	1888	DDW	Gross weight	rounded in display format	Scale 2	Scale 2	x	x	x
40C4	16580		762	1890	DDW	Tare weight	rounded in display format	Scale 2	Scale 2	x	x	x
40C8	16584		764	1892	DDW	dW/dt	rounded in display format	Scale 2	Scale 2	x	x	x
40CC	16588		766	1894	DDW	Net weight	rounded in display format	Scale 2	Scale 2	x	x	x
40D0	16592		768	1896	DDW	Gross weight	rounded in display format	Verbund	Scale 3	x	x	x
40D4	16596		76A	1898	DDW	Tare weight	rounded in display format	Verbund	Scale 3	x	x	x
40D8	16600		76C	1900	DDW	dW/dt	rounded in display format	Verbund	Scale 3	x	x	x
40DC	16604		76E	1902	DDW	Net weight	rounded in display format	Verbund	Scale 3	x	x	x
40E0	16608		770	1904	DDW	Gross weight	unrounded in kg	Disobox2-Channel 1		x		
40E4	16612		772	1906	DDW	Gross weight	unrounded in kg	Disobox2-Channel 2		x		
40E8	16616		774	1908	DDW	Gross weight	unrounded in kg	Disobox2-Channel 3		x		
40EC	16620		776	1910	DDW	Gross weight	unrounded in kg	Disobox2-Channel 4		x		
40F0	16624		778	1912	DDW	Gross weight	unrounded in kg	Disobox2-Channel 5		x		

Codes						Meaning	Additional information	DISOMAT B PLUS	DISOBOX	VWW20400/11	VWW20430/03	VWW20431/03
Profibus DeviceNet			Modbus Modbus/TCP									
(hex)	(dez)		(hex)	(dez)								
40F4	16628		77A	1914	DDW	Gross weight	unrounded in kg	Disobox2-Channel 6		x		
40F8	16632		77C	1916	DDW	Gross weight	unrounded in kg	Disobox2-Channel 7		x		
40FC	16636		77E	1918	DDW	Gross weight	unrounded in kg	Disobox2-Channel 8		x		
4100	16640		780	1920	DDW	Gross weight	unrounded in kg		Scale 4			x
4104	16644		782	1922	DDW	Tare weight	unrounded in kg		Scale 4			x
4108	16648		784	1924	DDW	dW/dt	unrounded in kg		Scale 4			x
410C	16652		786	1926	DDW	Net weight	unrounded in kg		Scale 4			x
4110	16656		788	1928	DDW	Gross weight	unrounded in kg		Scale 5			x
4114	16660		78A	1930	DDW	Tare weight	unrounded in kg		Scale 5			x
4118	16664		78C	1932	DDW	dW/dt	unrounded in kg		Scale 5			x
411C	16668		78E	1934	DDW	Net weight	unrounded in kg		Scale 5			x
4120	16672		790	1936	DDW	Gross weight	unrounded in kg		Scale 6			x
4124	16676		792	1938	DDW	Tare weight	unrounded in kg		Scale 6			x
4128	16680		794	1940	DDW	dW/dt	unrounded in kg		Scale 6			x
412C	16684		796	1942	DDW	Net weight	unrounded in kg		Scale 6			x
4130	16688		798	1944	DDW	Gross weight	unrounded in kg		Scale 7			x
4134	16692		79A	1946	DDW	Tare weight	unrounded in kg		Scale 7			x
4138	16696		79C	1948	DDW	dW/dt	unrounded in kg		Scale 7			x
413C	16700		79E	1950	DDW	Net weight	unrounded in kg		Scale 7			x
4140	16704		7A0	1952	DDW	Gross weight	unrounded in kg		Scale 8			x

Codes						Meaning	Additional information	DISOMAT B PLUS	DISOBOX	VWW20400/11	VWW20430/03	VWW20431/03
Profibus DeviceNet			Modbus Modbus/TCP									
(hex)	(dez)		(hex)	(dez)								
4144	16708		7A2	1954	DDW	Tare weight	unrounded in kg		Scale 8			x
4148	16712		7A4	1956	DDW	dW/dt	unrounded in kg		Scale 8			x
414C	16716		7A6	1958	DDW	Net weight	unrounded in kg		Scale 8			x
4150	16720		7A8	1960	DDW	Gross weight	rounded in display format		Scale 4			x
4154	16724		7AA	1962	DDW	Tare weight	rounded in display format		Scale 4			x
4158	16728		7AC	1964	DDW	dW/dt	rounded in display format		Scale 4			x
415C	16732		7AE	1966	DDW	Net weight	rounded in display format		Scale 4			x
4160	16736		7B0	1968	DDW	Gross weight	rounded in display format		Scale 5			x
4164	16740		7B2	1970	DDW	Tare weight	rounded in display format		Scale 5			x
4168	16744		7B4	1972	DDW	dW/dt	rounded in display format		Scale 5			x
416C	16748		7B6	1974	DDW	Net weight	rounded in display format		Scale 5			x
4170	16752		7B8	1976	DDW	Gross weight	rounded in display format		Scale 6			x
4174	16756		7BA	1978	DDW	Tare weight	rounded in display format		Scale 6			x
4178	16760		7BC	1980	DDW	dW/dt	rounded in display format		Scale 6			x
417C	16764		7BE	1982	DDW	Net weight	rounded in display format		Scale 6			x
4180	16768		7C0	1984	DDW	Gross weight	rounded in display format		Scale 7			x
4184	16772		7C2	1986	DDW	Tare weight	rounded in display format		Scale 7			x
4188	16776		7C4	1988	DDW	dW/dt	rounded in display format		Scale 7			x
418C	16780		7C6	1990	DDW	Net weight	rounded in display format		Scale 7			x
4190	16784		7C8	1992	DDW	Gross weight	rounded in display format		Scale 8			x
4194	16788		7CA	1994	DDW	Tare weight	rounded in display format		Scale 8			x
4198	16792		7CC	1996	DDW	dW/dt	rounded in display format		Scale 8			x

Codes						Meaning	Additional information	DISOMAT B PLUS	DISOBOX	VWW20400/11	VWW20430/03	VWW20431/03
Profibus DeviceNet			Modbus Modbus/TCP									
(hex)	(dez)		(hex)	(dez)								
419C	16796		7CE	1998	DDW	Net weight	rounded in display format		Scale 8			x
Measurement values (integer values, ULONG)												
7000	28672		900	2304	DDW	Current date; for coding, see Profibus specifications				x	x	x
7004	28676		902	2306	DDW	Current time; for coding, see Profibus specifications				x	x	x
7008	28680		904	2308	DDW	Recorded date				x	x	x
700C	28684		906	2310	DDW	Recorded time				x	x	x
7010	28688		908	2312	DDW	Recorded cons.no.				x	x	x
7014	28692		90A	2314	DDW	Current material number				x	x	x
7018	28696		90C	2316	DDW	Number of the locked scale				x	x	x

7.2.1 Date/Time Format

The Data Type Date consists of a calendar date and a time.
Notation: Date / Time
Range of Values: ms to 99 years
Coding: in 7 octets

Parameter	Range of Values	Meaning of the Parameters
ms	0...59 999	milli-seconds
min	0...59	minutes
SU	0,1	0: standard time, 1: summer time
RSV		reserve
h	0...23	hours
d. of w.	1...7	day of week: 1 = Monday, 7 = Sunday
d. of m.	1...31	day of month
months	1...12	months
years	0...99	years (without the century)

bits	8	7	6	5	4	3	2	1	
octets	15	14	13	12	11	10	9	8	
1	2 2	2	2	2	2	2	2	2	0...59 999 ms
	7	6	5	4	3	2	1	0	
2	2	2	2	2	2	2	2	2	
			5	4	3	2	1	0	0...59 min
3	RSV	RSV	2	2	2	2	2	2	
				4	3	2	1	0	0...23 hours
4	SU	RSV	RSV	2	2	2	2	2	
	day of week			day of month					1...7 d. of w.
	2	1	0	4	3	2	1	0	
5	2	2	2	2	2	2	2	2	1...31 d. of m.
			5	4	3	2	1	0	1...12 months
6	RSV	RSV	2	2	2	2	2	2	
		6	5	4	3	2	1	0	0 ... 99 years
7	RSV	2	2	2	2	2	2	2	

MSB

Schenck Process GmbH
Pallaswiesenstr. 100
64293 Darmstadt, Deutschland
www.schenckprocess.com

Tel.: +49 (0)61 51-32 0
Fax: +49 (0)61 51-32 11 72
E-Mail: sales@schenckprocess.com

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