

Service instructions ***ProfiBus DP / ProfiNet*** ***DeviceNet / EthernetIP*** ***Modbus TCP / Modbus RTU***

Electronic field bus coupling

Type : DWC-5C
Fabr. No. : ----
Year of constr.: 2013
Order no. : ----

Customer : General
Project : Feldbus-Interface mit AnyBus S
ProfiBus DP / DeviceNet

Pos. No. :

Software : >A3.3X
: >C3.3X



***** SAFETY REGULATIONS *****

The current-carrying device must not be opened. Danger of electric shock is given! Works at the weighing device must be carried out by qualified personnel only. In case of works at the weighing belt the drive must be switched off.

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Revision list

Revision	Date	Author	Chapter	Description
pbus01d	22.12.1995	RA	All	New issue
pbus02d	17.06.1999	RA	All	Parameter OV
pbus03d	23.02.2004	RA	All	Reversal to AnyBus- Interface
pbus04d	24.11.2004	RA	All	Enlarging Status / Bus outputs Chapter DEVICE-Net
Fbus05d	15.09.2006	RA	All	Enlarging Status / Bus outputs Chapter ETHERNET-IP
Fbus06d	03.03.2006	AS	All	Update of Index improvement
Fbus07d	13.12.2010	ER	All	Chapter ETHERNET-IP revised Profinet-IO- added
Fbus08d	25.09.2013	ER		Chapter Modbus TCP and RTU inserted

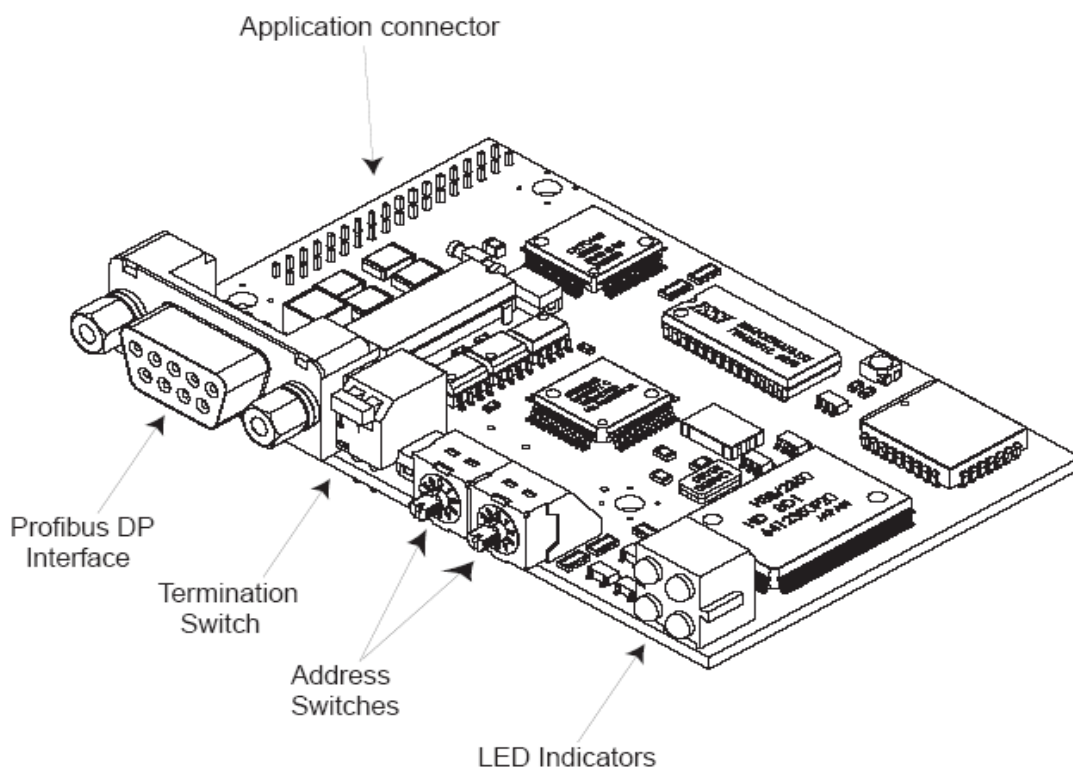
1PROFIBUS-DP

1.1 General

The scale computers of the series DWC-5B or DWC-3C can be equipped with a ProfiBus DP Interface. This interface has to be indicated at the order. A subsequent installation on consultation with the manufacturer will also be possible. The interface is corresponding to ProfiBus Norm DIN 19245 and EN 50170. Beside many other communication solutions optionally also a DP V1 or a ProfiNet-Interface is possible.

1.2 Data transfer rate / Connector assignment

The Interface supports the usual standardized data transfer rates up to 12 MBaud. At higher transfer speeds in any case plugs permitted thereto have to be used.



Connector assignment ProfiBus-connector	
1	Not connected
2	Not connected
3	B-Line Positive RxD/TxD
4	RTS Request To Send*
5	GND BUS Isolated GND from RS 485 side
6	+5 V BUS Isolated +5 V from RS 485 side *
7	Not connected -
8	A-Line Negative RxD/TxD nach RS485- Specification
9	Not connected -

The case-screen is connected with PE

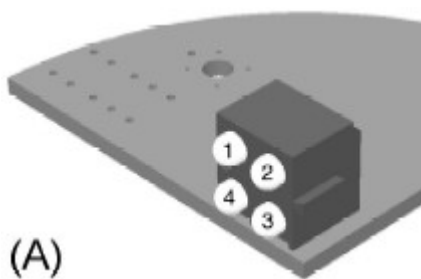
1.3 Station address

The station address is adjustable via two rotary switches at the bottom side of the scale computer. Generally it must be observed that no addresses being already active on the bus system would be double allocated. Take care that the flattened side of the rotary switch is observed.

It is recommended to use normed ProfiBus DP plugs. The cable ends have to be terminated with terminating impedance. Optionally also the terminating impedance installed in the Interface can be employed.

ATTENTION: AFTER CHANGING THE PROFIBUS-DP ADDRESS THE SCALE COMPUTER HAS TO BE TAKEN OFF THE VOLTAGE FOR ABOUT 5 SECONDS IN ORDER TO MAKE POSSIBLE TO OVERTAKE THE NEW ADDRESS !!!

1.4 LED Status messages



LED

- 1 Not used
- 2 **Green:** The module is OnLine and data exchange is possible.
OFF: The module is not OnLine.
- 3 **Red:** The module is OffLine and no data exchange is possible.
OFF: The module is not OffLine
- 4 **Fieldbus Diagnosis**
 - Red blinking 1 Hz** – Error in configuration: IN and/or OUT length, announced during configuration, is not corresponding to the length in the Master system.
 - Red blinking 2 Hz** – Error in the User parameter data: The length announced is not corresponding to the length in the Master system .
 - Red blinking 4 Hz** – Error at the initialization of the Profibus communication in ASIC.
 - OFF:** - No diagnostics active

1.5 Data set up / consistence

The scale computer in principle supports three different data formats for communication with the DP-Master.

These are:

Full
StandardOld
Minimal (only for spare devices !!)

For new plants we recommend to apply the standard *FULL*, since this standard also offers the best enlarging potential for the future.

Data values and parameter code with parameter value are always transferred consistently.

1.6 GSD-file

The required master data are supplied along with the scale computer on disk / CD or can directly be procured from the manufacturer. Data file formats other than the ones described are not possible. The Siemens-Type files used in the past are no longer provided.

For the S5-control the file KUKw1359.gsd should be used. The FULL-protocol is not useful due to its limited memory capacity.

2 PROFINET-IO

2.1 General

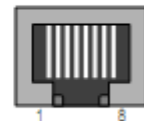
The scale computers of the series DWC-5B and DWC-5C can be equipped with an optional modular Profinet IO – Interface. This interface has to be indicated at the order. A subsequent installation on consultation with the manufacturer will also be possible.

2.2 Data transfer rate / Connector assignment

The Profinet-Bus module operates as Profinet-IO-Device on the Profinet. It offers the full functionality acc. to. Conformity class C. It supports the data telegram being usual for KUKLA. The transmission is done via twisted-pair-cable in full-duplex-mode with 100 Mbit/s. The IP-address settings – as usual for Profinet – are defined at the configuration of the Profinet-IO-Controller and later transferred to the module during start-up of the IO Controller via DCP-Protocol. Alternatively address settings can be done via the device's Software-Interface. Four diagnostic LEDs signal the actual Profinet-status and any error messages.

RJ45 (Standard Connector)

Pin	Signal	Notes
1	TD+	-
2	TD-	-
3	RD+	-
4	-	Normally left unused; to ensure signal integrity, these pins are tied together and terminated to PE via a filter circuit in the module.
5	-	
6	RD-	-
7	-	Normally left unused; to ensure signal integrity, these pins are tied together and terminated to PE via a filter circuit in the module.
8	-	

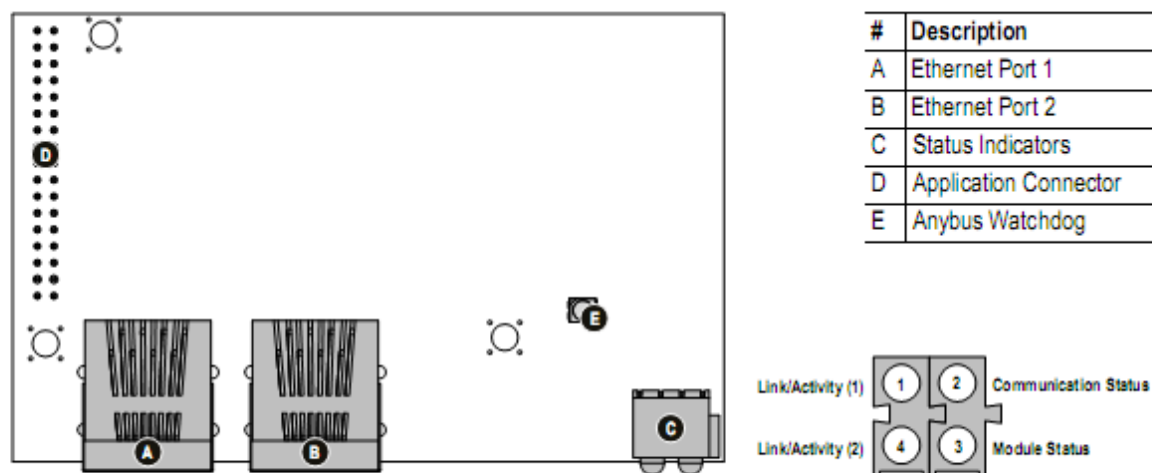


2.3 Data set up / consistence

Please find details concerning data set up in the general part of section „Profibus“ .

For Profinet IO only the standard **FULL** – data telegram is released !

2.4 LED Status messages / Modular organisation



Status Indicators

#	Indication	State	Description
1	Link/Activity (1)	Green	Link established on ethernet port 1
		Green, flashing	Receiving/Transmitting data on ethernet port 1
		Off	Link not established on ethernet port 1
2	Communication Status	Green	On line, Run - Connection with IO Controller established - IO Controller is in RUN state
		Green, 1 flash	On line, STOP - Connection with IO Controller established - IO Controller in STOP state
		Off	Off line - No connection with IO Controller
3	Module Status	Green	Initialized, no error
		Green, 1 flash	Diagnostic data available
		Green, 2 flashes	Blink (used by engineering tools to identify the device)
		Red, 1 flash	Configuration Error - Too many modules/submodules - I/O sizes derived from IO Controller configuration is too large - Configuration mismatch (no module, wrong module)
		Red, 3 flashes	No Station Name or no IP address assigned
		Red, 4 flashes	Internal error
		Off	No power or not initialized
4	Link/Activity (2)	Green	Link established on ethernet port 2
		Green, flashing	Receiving/Transmitting data on ethernet port 2
		Off	Link not established on ethernet port 2

2.5 GSDML- file

The required GSD-XML-files are supplied along with the scale computer on disk / CD or can directly be procured from the manufacturer. Data file formats other than the ones described are not possible. The basic data structure is represented on the following page.

Following steps are required in order to integrate the unit into a Master system:

1. Integration of the unit file GSDML-V2.2-HMS-ABSPIR-20091118.xml or successor version.
2. Installation of an RT-basic module
3. Installation of a 32Byte RT-output module
4. Installation of a 32Byte RT-input module
5. Installation of an 8Byte RT-input module (absolutely to the following addresses !)

HW Konfig - [TEST_PLC (Konfiguration) -- PN_KUKLA_TEST_02]

Station Bearbeiten Einfügen Zielsystem Ansicht Extras Fenster Hilfe

(0) UR

1	CPU 315-2PN/DP
2	MPV/DP
X1	PN-IO
X2	Port 1
X2 P1	Port 2
X2 P2	
3	
4	
5	
6	
7	
8	
9	
10	
11	

Ethernet: PROFINET-IO-System (100)

(1) DWDC5-F

DP-HORM

Suchen: Profi: Standard

PROFINET IO

- Gateway
- HMI
- I/O
- Network Components
- Schaltgeräte
- Sensoren
- Weitere FELDGERÄTE
- General
- Anybus-S PIR
- Migration
- RT
- Andere Module
- RT Ausgangsmodule
- RT AUS 001 byte
- RT AUS 002 bytes
- RT AUS 004 bytes
- RT AUS 008 bytes
- RT AUS 016 bytes
- RT AUS 032 bytes
- RT AUS 064 bytes
- RT AUS 128 bytes
- RT Ein-/Ausgangsmodule
- RT Eingangsmodule
- RT EIN 001 byte
- RT EIN 002 bytes
- RT EIN 004 bytes
- RT EIN 008 bytes
- RT EIN 016 bytes
- RT EIN 032 bytes
- RT EIN 064 bytes

Anybus-S PIR
HMS Industrial Networks
Anybus-S PROFINET IO mit IRT

(1) DWDC5-FN8922

Steckplatz	Baugruppe	Bestellnummer ...	A-Adresse	E-Adresse	Diagnoseadresse	Kommentar
0	DWDC5-FN8922	ABS-PIR			2042*	
X1	Interface				2041*	
F1	R/45 100 MBit/s				2040*	
F2	R/45 100 MBit/s				2039*	
1	RT AUS 032 bytes		288...319			
2	RT EIN 032 bytes		288...319			
3	RT EIN 008 bytes		320...327			
4						
5						

Start

SIMATIC Manager - [...]

HW Konfig - [TEST_P...

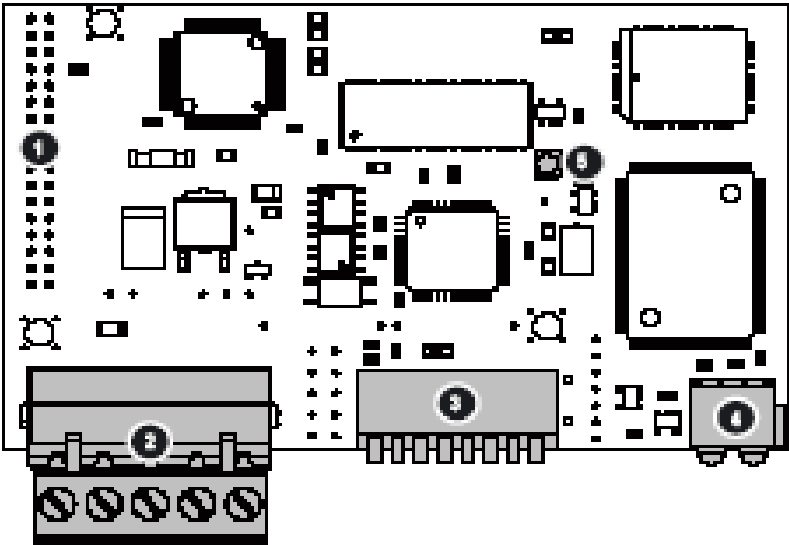
3 Device-Net

3.1 General

The scale computers of the series DWC-5B or DWC-3C can be equipped with DeviceNet Interface. This interface has to be indicated at the order. A subsequent installation on consultation with the manufacturer will also be possible. The interface is corresponding to ODVA-norm.

3.2 Data transfer rate / Connector assignment

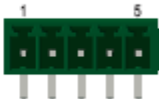
The Interface supports the saleable standardized data transfer rates. It must absolutely be observed that the cable lengths and cable parameters predetermined in the norm are within the permitted limits. Since DeviceNet is based on CAN-Bus, the maximal cable length has to be observed.



#	Description
1	Application Connector
2	DeviceNet Connector
3	Configuration Switches
4	Status Indicators

Connector assignment DeviceNet- connector as per ODVA

Pin	Signal	Description
1	V-	Negative supply voltage ^a
2	CAN_L	CAN_L bus line
3	SHIELD	Cable shield
4	CAN_H	CAN_H bus line
5	V+	Positive supply voltage ^a



3.3 BAUDRATE

The data transfer rate can be set to 125, 250 or 500 KBit/s.

Baudrate	sw. 1	sw. 2
125k	OFF	OFF
250K	OFF	ON
500K	ON	OFF
(reserved)	ON	ON

3.4 MAC- ID

The MAC-ID is to be adjusted according to following table:

Mac ID	sw. 3 (MSB)	sw. 4	sw. 5	sw. 6	sw. 7	sw. 8 (LSB)
0	OFF	OFF	OFF	OFF	OFF	OFF
1	OFF	OFF	OFF	OFF	OFF	ON
2	OFF	OFF	OFF	OFF	ON	OFF
3	OFF	OFF	OFF	OFF	ON	ON
...
62	ON	ON	ON	ON	ON	OFF
63	ON	ON	ON	ON	ON	ON

ATTENTION: AFTER CHANGING THE MAC-ID OR THE BAUDRATE THE SCALE COMPUTER HAS TO BE TAKEN OFF THE VOLTAGE FOR ABOUT 5 SECONDS IN ORDER TO MAKE POSSIBLE TO OVERTAKE THE NEW ADDRESS !!!

3.5 LED Status messages

3.6 Data set up / Consistence

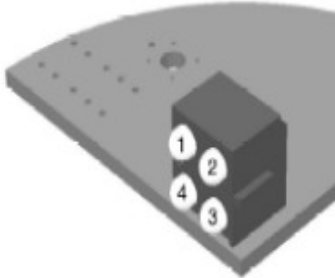
Please find details concerning data set up in the general part of section „ProfiBus“ .

For new plants we recommend to apply the standard *FULL*, since this standard also offers the best enlarging potential for the future.

3.7 EDS- file

The required EDS-files are supplied along with the scale computer on disk / CD or can directly be procured from the manufacturer. Data file formats other than the ones described are not possible.

4 ETHERNET-IP



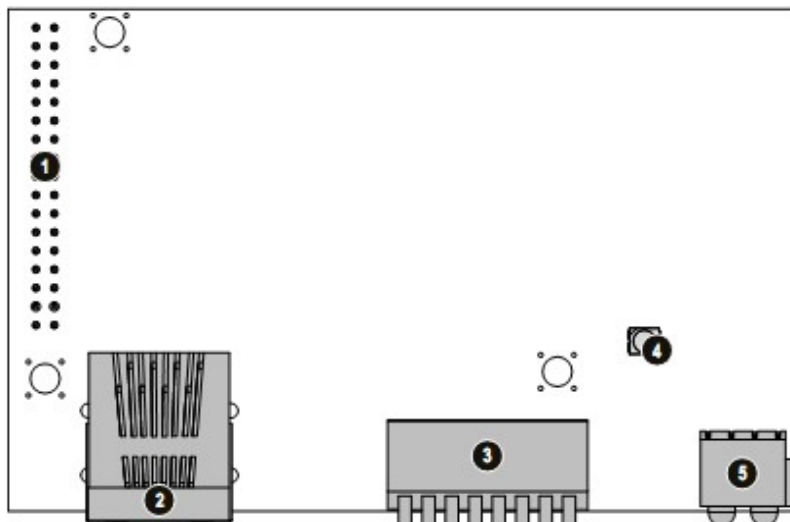
Led	State	Description
1 - Reserved	-	Reserved for future use
2 - Network Status	Off	Not powered / Not online
	Green, steady	Link OK, On line, Connected
	Green, flashing	On line, Not connected
	Red, steady	Critical link failure
	Red, flashing	Connection timeout
3 - Module Status	Off	No power to device
	Green, steady	Device operational
	Green, flashing	Data size bigger than configured
	Red, steady	Unrecoverable fault
	Red, flashing	Minor fault
4 - Reserved	-	Reserved for future use

4.1 General

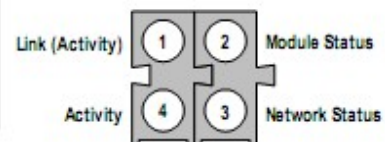
The scale computers of the series DWC-5B and DWC-5C can be equipped with Ethernet-IP Interface. This interface has to be indicated at the order. A subsequent installation on consultation with the manufacturer will also be possible.

4.2 Data transfer rate / Connector assignment

The Interface supports the usual standardized data transfer rates up to 12 MBaud. In case of higher transfer speeds unconditionally approved plugs have to be used thereto.



#	Description
1	Application Connector
2	Ethernet Connector
3	Configuration Switch
4	Anybus Watchdog
5	Status Indicators



4.3 IP-Adress setting

Usually the DIP-switches are set to 0 at the module. In this case the address setting is done via a configuration tool, obtainable from the manufacturer, which usually is included with the EDS-file.

4.4 Data set up / Consistence

Please find details concerning data set up in the general part of section „Profibus“ .

For the Ethernet IP-Interface only the data telegram Standard *FULL* is released.

4.5 EDS- file

The required EDS-files are supplied along with the scale computer on disk / CD or can directly be procured from the manufacturer. Data file formats other than the ones described are not possible.

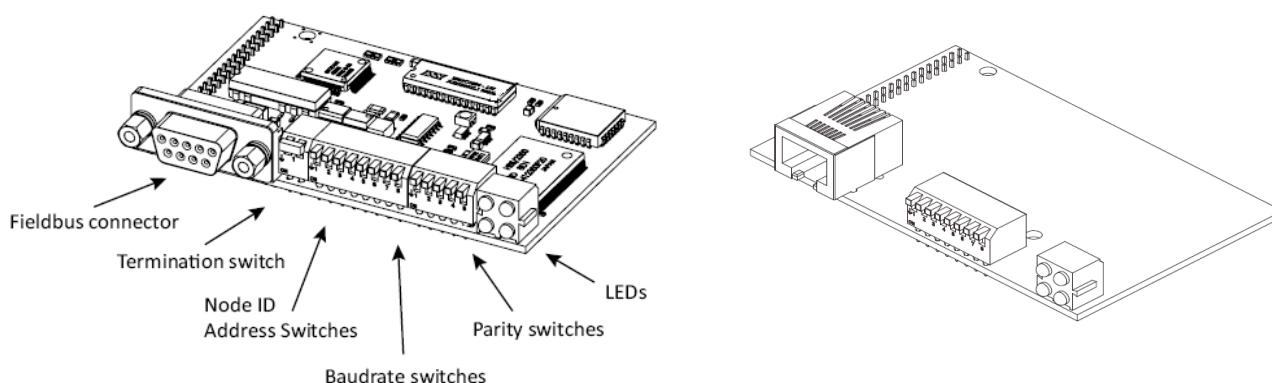
5 MODBUS TCP / MODBUS RTU

5.1 General

The scale computers of the series DWC-3 and DWC-5 can be equipped with ModbusTCP or ModbusRTU Interface. This interface has to be indicated at the order. A subsequent installation on consultation with the manufacturer will also be possible to a limited extent.

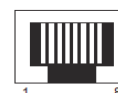
5.2 Data transfer / RJ45 Ethernet or 9 pol D-SUB connector

The Interface supports the usual standards for ModbusTCP or ModbusRTU.
The RTU- version can be operated either in an RS485 Bus or as RS232 in two-point-mode.



Connector assignment Modbus TCP / Ethernet

Ethernet Connector (RJ45)		Anybus	
Pin	Signal	Pin	Signal
1	TX+	-	-
2	TX-	-	-
3	RX+	-	-
4	-	-	-
5	-	-	-
6	RX-	-	-
7	-	-	-
8	-	-	-
Housing	Cable Shield	-	-



Connector assignment Modbus RTU / RS232 oder RS485

Pin	Name	Function
Housing	SHIELD	Cable shield
1	-	Not connected
2	RS232 - TX	Transmit signal
3	RS232 - RX	Receive signal
4	-	Not connected
5	GND	Signal ground
6	+5V	Power supply
7	RS 485- D0 (B)	
8	RS 485+ D1 (A)	
9	-	Not connected

5.3 Data transmission speed

In TCP – version the transmission speed is automatically recognized and adjusted.
At RTU- version the transmission speed has to be set with the Micro-switch block at the front.

5.4 Setting of Modbus RTU

First the physical Interface has to be set via switch 5:

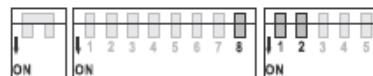
Binary value	Parity type
0	RS-485
1	RS-232



If Bus Interface RS485 is selected, the Bus also has to be terminated correctly.

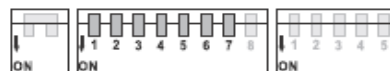
The setting of transmission speed (Baudrate) is done via the switches 8 / 1-2:

Binary value	Baud rate
000	Setting not valid
001	1200
010	2400
011	4800
100	9600
101	19200 (Default on RTU)
110	38400
111	57600



The setting of the node address (NODE-ID) is done via the switches 1-7:

Binary value	Modbus address
0000000	Setting not valid
00000001	1
00000010	2
00000011	3
---	---
---	---
11111111	127

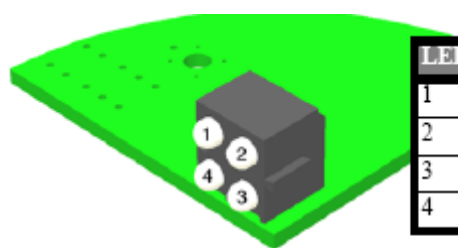


The setting of the check bit (Parity) is done via the switches 3-4:

Binary value	Parity type
00	Setting not valid
01	None (Default on RTU)
10	Even
11	Odd



5.5 Status messages Modbus RTU



LED no.	Description
1	Processing
2	Bus Error
3	Bus Ready
4	HW Setting Status

LED 1 - Processing

LED State	Indications
Flashing Green	Module is receiving a Query and building a response
OFF	No Query is handled in the module at the moment

LED 2 - Bus Error

LED State	Indications
Solid Red	Bus Error (More than 1/10 of all queries have incorrect CRC)
OFF	Normal operation, or module not initialized

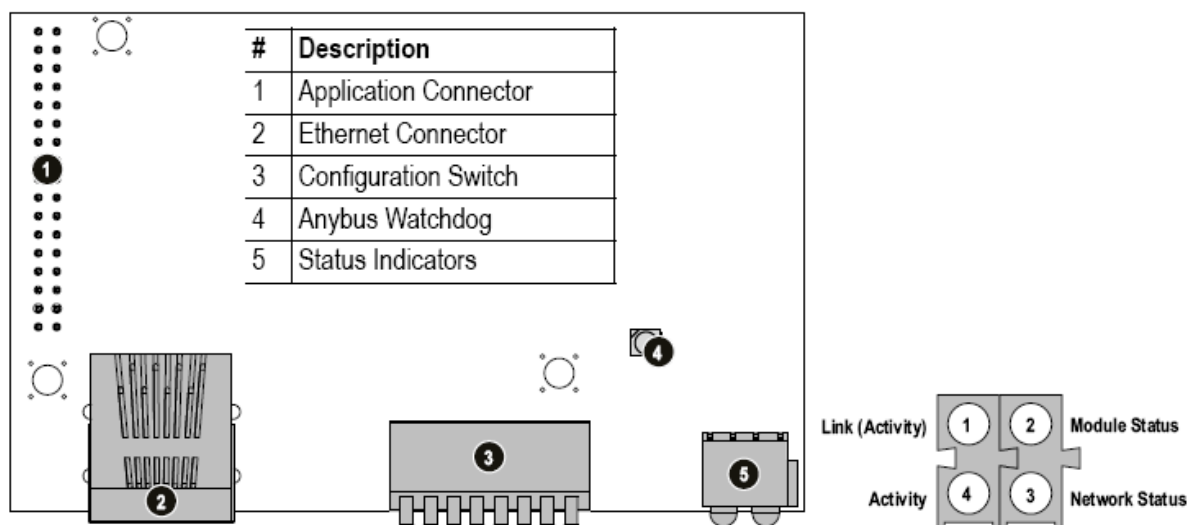
LED 3 - Bus Ready

LED State	Indications
Solid green	Bus is ready (Normal operation)
Solid red	Bus timeout error
OFF	Module is not initialized correctly

LED 4 - HW Settings Status

LED State	Indications
Solid Red	Module DIP switch is set to "NON ACTIVE" status (all in off state or illegal values)
Solid Green	DIP SW settings modified by mailbox message
OFF	DIP Switch settings in use and are OK

5.6 Status messages Modbus TCP



Link (Activity)

Off	Link not sensed
Green	Link sensed

Module Status

Off	No power
Green	Controlled by a Scanner in Run state
Green, flashing	Not configured, or Scanner in Idle state
Red, flashing	A minor recoverable fault has been detected
Red	A major unrecoverable fault has been detected
Alternating Green/Red	Self-test in progress

Network Status

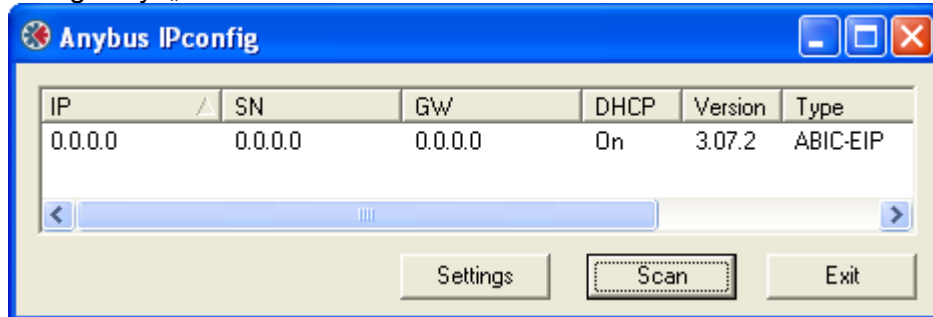
State	Description
Off	No power or no IP address
Green	On-line, one or more connections established (CIP Class 1 or 3)
Green, flashing	On-line, no connections established
Red	Duplicate IP address, fatal error
Red, flashing	One or more connections timed out (CIP Class 1 or 3)
Alternating Green/Red	Self test in progress

Activity

The Activity led flashes green each time a packet is received or transmitted.

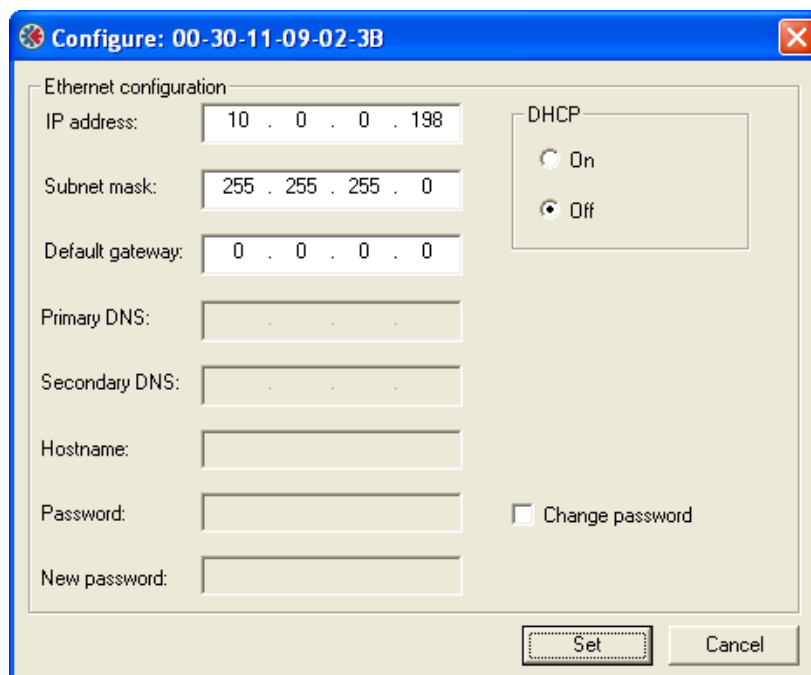
5.7 IP-Address Modbus TCP

After a cold start the module is set to address 0.0.0.0 with activated DHCP. The IP-address is set via the external tool IP Config. Key „Scan“ scans the network for connected fieldbus modules.



Attention: Via key „Settings“ only the active net work interface can be set, but not the IP of the module.

A DOUBLE CLICK at the MODULE LINE opens the configuration dialog of the module. The IP-address as well as the correct Subnetmask have to be set. It also should not be forgotten that DHCP-selection has to be set correctly in order to prevent an overwriting of address at the next module start.



5.8 Modbus Commands

The actual user data are fieldbus-independent and are described in a following chapter. This point describes the specific implementation for Modbus. After setting the IP-communication the DWC-

interface can be checked easily directly from your PC. Corresponding query tools are available on the Internet.

Baseblock ComTest Pro for Modbus Devices

File Edit View Help

Step 1

Serial Ethernet

Port: Com1 Baud Rate: 19200 Data Bits: 8 Bits Parity: None Stop Bits: 1 Stop Bit Delay (ms): 1000 Timeout (ms): 100

☐ Echoback ☐ RTS Control ☐ Reverse CRC

Step 2

Device: 1 Command: Read Holding Register(s) # Registers: 16 Function: 4

Register: 0

☐ Write Single Holding Register ☐ Write Holding Register(s)

☐ Loop Command ☒ Error Checking ☒ Show Error Dialog

Step 3

Start Stop Valid Response(s): 0000030 Error Response(s): 0000000 Timeout(s): 0000000

Read Registers Write Registers Raw Data Data Log

001..016	0000h	7850h	0002h	6DEAh	0000h	8080h	0000h	8813h	0AA4h	0000h	0B2Bh	0BB8h	0000h	3E31h	0000h	0000h
017..032	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
033..048	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
049..064	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
065..080	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
081..096	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
097..112	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
113..125	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

☒ Hexadecimal

Copy Data to Write Registers Copy Data to Log

www.baseblock.com

To query the **actual data (DWC-->PLC)** of the scale computer

the **Modbus-command 3 (ReadHoldingRegister)** from register number 0 or

the **Modbus-command 4 (ReadInputRegister)** from register number 0 on

can be used. The data packet length in Read-directions is 40Byte which corresponds to 20 Modbus registers. The green framed 4-Byte-value of the actual capacity, thus, consists of TWO registers. The red framed value corresponds to counter B.

To **transmit the set values/nominal values (PLC-->DWC)** to the scale computer

the Modbus-command 6 (PresetSingleRegister) with register number 1024 or

the **Modbus-command 16 (PresetMultipleRegister)** from register number 1024 on

can be used. At command 6 for 4-Byte set values it has to be observed, that the command is transmitted twice with successive register numbers. The data packet length in Write-directions is 32Byte which corresponds to 16 Modbus registers.

6 General data set up

MINIMAL

(included only for reasons of compatibility for spare units)

NOT TO APPLY FOR NEW INSTALLATIONS!!!!

StandardOld

Data Word	PLC → DWC	DWC → PLC
1. Word	Capacity	Capacity
2. Word	NOMINAL VALUE	ACTUAL VALUE
3. Word	Nominal Field SW1	Quantity counter B
4. Word	Nominal Field SW2	
5. Word	Word of command	StatusWord
6. Word	interrogation programming- number	Parameter number
7. Word	Parameter value	Parameter value
8. Word		
9. Word		ActualField IW1
10. Word		ActualField IW2
11. Word		ActualField IL1
12. Word		

FULL

Data Word	PLC → DWC	DWC → PLC
1. Word	Capacity	Capacity
2. Word	NOMINAL VALUE	ACTUAL VALUE
3. Word	Digital	Quantity counter B
4. Word	Bus- Inputs	
5. Word	Nominal Field SW1	ERROR/Status DoubleWord (!! 32Bit !!)
6. Word	Nominal Field SW2	
7. Word	Nominal Field SW3	
8. Word	Nominal Field SW4	Digital Bus- outputs
9. Word	Nominal Field SL1	ActualField IW1
10. Word		ActualField IW2
11. Word	Nominal Field SL2	ActualField IW3
12. Word		ActualField IW4
13. Word	interrogation / Programming- number	ActualField IL1
14. Word		
15. Word	Parameter- value	ActualField IL2
16. Word		
17. Word		Parameter- number
18. Word		Parameter- value
19. Word		
20. Word		

Data values and parameter code with parameter value are always transferred consistently.
The framed windows indicate the size of the consistent fields.

Capacity SET VALUE	Nominal - Capacity of the scale Resolution 1/10 kg/h (e.g. 2.45 t/h correspond to number 24500)	PLC 2 Words
Capacity ACTUAL VALUE	Actual Capacity of the scale Resolution 1/10 kg/h (e.g. 2.45 t/h correspond to number 24500)	DWC 2 Words
Digital Bus- Inputs	<i>Digital control commands to the scale computer</i> 0x00000001 START TARE 0x00000002 INTERNAL/EXTERNAL - SWITCH-OVER 0x00000004 JOG Feeder 0x00000008 MIS-RUN SENSOR 0x00000010 BELT RUNS MESSAGE 0x00000020 reserved 0x00000040 DELETE ERROR 0x00000080 FAULT MOTOR 0x00000100 FUSE DEFECTIVE 0x00000200 ENABLE REGU 0x00000400 START BATCH 0x00000800 BREAK BATCH 0x00001000 EMPTY THE SCALE (BATCH OPERATION) 0x00002000 MOTORPOTI – FUNCTION PLUS 0x00004000 MOTORPOTI – FUNCTION MINUS 0x00008000 QUANTITY COUNTER B DELETE/ PRINT 0x00010000 CHARGE SET VALUE INTERNAL/EXTERNAL 0x00020000 SELECTION 0x01 0x00040000 0x10 0x00080000 FINE STREAM 0x00100000 ACTIVATE MOISTURE DISTRACTION 0x00200000 TFIFO / ACTIVATE TIME SHIFTING REGISTER 0x00400000 DISABLE MEASURING 0x00800000 FEEDBACK FILLING(DDW) 0x01000000 FIELD_OPTO1 0x02000000 FIELD_OPTO2 0x04000000 START TEST 0x08000000 FEEDER REDUCER (special application) 0x10000000 RE-CORRECT SPAN (check weigher) 0x20000000 FIELD_OPTO3 0x40000000 FIELD_OPTO4 0x80000000 FIELD_OPTO5	PLC 2 Words
Quantity counter B	actual value of Quantity counters B Resolution 1/10 kg/h (e.g. 267 kg correspond to number 2670)	DWC 2 Words

ERROR /Status DoubleWord	<i>Digital control commands to the scale computer</i>	DWC 2 Words
Protocol „FULL“	0x00000001 FUSE EXTERNAL DEFECTIVE	
	0x00000002 DRIVE/TACHO FAILURE	
	0x00000004 AD- ERROR AT WEIGHING CHANNEL	
	0x00000008 OVERHEAT IN SCALE COMPUTER	
	0x00000010 SPEED ERROR	
	0x00000020 FEEDER ON	
	0x00000040 MIS RUN RECOGNIZED	
	0x00000080 MIN- LOAD	
	0x00000100 MAX- LOAD	
	0x00000200 SLIP RECOGNIZED	
	0x00000400 ERROR AT TEST	
	0x00000800 ERROR AT TARING	
	0x00001000 SCALE DRIVE STOPPED	
	0x00002000 SET VALUE- ERROR	
	0x00004000 BELT EMPTY	
	0x00008000 DEVIATION	
	0x00010000 FLASH- MEMORY PROGRAMMING	
	0x00020000 internal	
	0x00040000 DATA RELOAD DONE	
	0x00080000 FILLING FAILURE (DDW)	
	0x00100000 FAILURE MOVEMENT (DDW)	

Digital Bus-outputs	<i>Digital messages (Status messages) from scale computer</i>	DWC 2 Words
	0x00000001 ERROR	
	0x00000002 READY TO OPERATE	
	0x00000004 OPEN BATCH DISCHARGE	
	0x00000008 FEEDER ON	
	0x00000010 LOAD LESS THAN MIN	
	0x00000020 LOAD WEIGHT GREATER THAN MAX	
	0x00000040 LAY ON TEST WEIGHT	
	0x00000080 TEST OR TARE RUNS	
	0x00000100 BELT EMPTY	
	0x00000200 SLIP RECOGNIZED	
	0x00000400 SCALE DRIVE ON (BATCH OPERATION)	
	0x00000800 DISCHARGE END WEIGHT LESS THAN MIN	
	0x00001000 DISCHARGE END WEIGHT GREATER THAN MAX	
	0x00002000 FIELDRELAY 1	
	0x00004000 FIELDRELAY 2	
	0x00008000 DEVIATION	
	0x00010000 COARSE CURRENT ON (BATCH OPERATION)	
	0x00020000 FINE STREAM ON (BATCH OPERATION)	
	0x00040000 BELT STOPPED	
	0x00080000 FEEDER DIRECTION (MODE FEEDER ON/OFF)	
	0x00100000 FEEDER ON (MODE FEEDER ON/OFF)	
	0x00200000 FEEDER OFF (MODE FEEDER ON/OFF)	
	0x00400000 SCALE MEASURING LENGTH EMPTY	
	0x00800000 FILLING WEIGHING BIN (DDW)	
	0x01000000 FAILURE MOVEMENT (DDW)	
	0x02000000 WEIGHING BIN EMPTY (DDW)	
	0x04000000 DEVIATION RECOGNIZED (DDW/check-weigher)	
	0x08000000 OPERATING MODE EXTERNAL ACTIVE	
	0x10000000 FIELDRELAY 3	
	0x20000000 FIELDRELAY 4	
	0x40000000 FIELDRELAY 5	
	0x80000000 FEEDER REDUCTION	

Nominal Field SW1-SW4 and SL1-SL2	<p><i>Numerical values (Nominal values) to the scale computer</i></p> <p><i>In each of these fields one number can be transferred. It depends on the parameterizing of the scale computer, as which set value the value transferred is interpreted. Please, find the correct parameterizing in the parameter printout of the scale computer.</i></p> <p><i>Following values can be transferred:</i></p> <p>NOMINAL LOAD for FEEDER CHARGE SET VALUE INTERNAL and EXTERNAL ACTUAL MOISTURE SHARE FOR DRY WEIGHT CALCULATION PRE-SCALE SUBTRACTION TIME SHIFTING REGISTER INPUT WAY SHIFTING REGISTER INPUT PRE-BIN ACTUAL VALUE PRE-BIN SET VALUE CALCULATING UNIT INPUTS TRANSFER DATA INPUT</p>	<p>PLC</p> <p>SW1-4 per 1 Word</p> <p>SL1-2 per 2 Words</p>
ActualField IW1-IW4 and IL1-IL2	<p><i>Numerical values (actual values) to the scale computer</i></p> <p><i>In each of these fields a number between 0 and 65535 or in case of Double Words between 0 and 4294967295 can be transferred. It depends on the parameterizing of the scale computer which actual value is inserted in the field. Please, find the correct parameterizing in the parameter printout in picture „FB Fields “.</i></p> <p><i>Following values can be transferred:</i></p> <p>P1 CAPACITY P2 CAPACITY P3 CAPACITY FEEDER SET VALUE DRIVE WEIGHING BELT OR SCREW 0% OUTPUT (FOR REASONS OF TEST) 100% OUTPUT (FOR REASONS OF TEST) TRANSFER VALUE 1 TRANSFER VALUE 2 LOAD AT POINT g1 LOAD AT POINT g2 LOAD AT POINT g3 SCALING FACTOR 2 SET VALUE IN % DEVIATION IN % NOMINAL SPEED FINE STREAM (BATCH OPERATION) FEEDER DEVIATION OUTPUT TIME SHIFTING REGISTER t-FIFO OUTPUT WAY SHIFTING REGISTER s-FIFO GROSS WEIGHT FOR LINE APPLICATIONS PRE-BIN CONTROLLER SPEED ACTUAL VALUE</p>	<p>PLC</p> <p>IW1-4 per 1 Word</p> <p>SL1-2 per 2 Words</p>

Word of command STANDARD OLD ! ATTENTION!! FOR NEW PLANTS PLEASE APPLY „FULL“ PROTOCOL	<i>Digital control commands to the scale computer</i>		PLC	1Words
	0x0001	DELETE ERROR		
	0x0002	QUANTITY COUNTER B DELETE / PRINT		
	0x0004	BELT RUNS MESSAGE		
	0x0008	START TARE		
	0x0010	START TEST		
	0x0200	ACTIVATE FEEDER		
	0x1000	FIELD_OPTO1		
	0x2000	FIELD_OPTO2		
	0x4000	FEEDBACK FILLING (DDW)		

StatusWord	<i>Digital messages (Status messages) from scale computer</i>		DWC 2 Word
STANDARD OLD !	0x0001	READY TO OPERATE	
	0x0002	ERROR MIN-LOAD (DDW-bin MIN)	
	0x0004	LAY ON TEST WEIGHT	
	0x0008	TEST OR TARE RUNS	
ATTENTION!! FOR NEW PLANTS PLEASE APPLY „FULL“ PROTOCOL	0x0010	DRIVE FAILURE	
	0x0020	A/D- ERROR	
	0x0040	OVERHEAT	
	0x0080	FIELDRELAY 1	
	0x0100	FEEDER IN LIMITATION	
	0x0200	TEST WRONG	
	0x0400	TARATION ERROR	
	0x0800	WRONG SET VALUE	
	0x1000	MIS RUN or FAILURE MOVEMENT	
	0x2000	SCALE DRIVE STOPPED	
	0x4000	FEEDER ON / FILLING WEIGHING BIN (DDW)	
	0x8000	OPERATING MODE EXTERNAL ACTIVE	

interrogation programming- number	<i>Mail-Box access possibilities to the internal parameters of the scale computer.</i>	PLC	2 Words at Protocol "FULL" otherwise 1 Word
	<p>Via this field the parameter number requested has to be transferred to the scale computer. The scale computer then responds in the reply-mail box with this parameter code and the appertaining parameter value.</p> <p>A list of possible query/parameter numbers is represented on the following pages.</p> <p>If to the parameter number the value 10000 is added, in the parameter value a new value for this scale computer-parameter can be transferred. In this case the reply-mail box has to be checked, whether the value has been overtaken.</p>		
Parameter number	<i>Mail-Box access possibilities to the internal parameters of the scale computer.</i>	DWC	2 Words at Protocol "FULL" otherwise 1 Word
	<p>This field indicates which parameter is represented in the appertaining field at present. A list of possible parameter numbers is indicated on the following pages.</p>		
Parameter value	<i>Mail-Box access possibilities to the internal parameters of the scale computer.</i>	DWC and PLC	2 Words
	<p>This field indicates the numerical value of the parameters. Percentage values are always represented as numbers from 0-10000 for 0,00 up to 100,00%.</p>		

6.1 Parameter- number

Programming number	Interrogation number	Parameter designation	Unit
Parameter group Status values			
	1	Capacity Actual value	1/10 kg/h
	5	A- Counter A	1/10 kg
	6	Counter B	1/10 kg
	10	Actual Capacity	Percentage
	12	g1-Load Actual value	
	14	Speed Actual value	
	21	AD1 Actual value	Percentage
	22	AD2 Actual value	
	26	BCD1 act.value	Absolute
	27	BCD2 act.value	
	31	Load set value	Percentage
	32	Z-control factor Feeder	
	40	Error code Kukla	DoubleWord 0xxxxxxx H
	50	Opto-Inputs U1 - U4	DoubleWord 0xxxxxxx H
	51	Relay-outputs K1-K6	DoubleWord 0xxxxxxx H
	55	Bitmuster samples of all keys and PA-switch	01 H ENTER-key 02 H Arrows-key 04 H Minus-key 08 H Plus-key 10 H Mode-key 20 H Test-key 40 H Tare-key 80 H PA-switch
Analoge output signale 60 - 89			
	60	P3 CAPACITY	Percentage
	61	FEEDER SET VALUE	
	62	DRIVE WEIGHING BELT	
	63	0% OUTPUT	
	64	TRANSFER VALUE 1	
	65	100% OUTPUT	
	66	LOAD AT POINT g1	
	67	LOAD AT POINT g3	
	68	LOAD AT POINT g2	
	69	SCALING FACTOR 2	
	70	SET VALUE IN %	
	71	P2 CAPACITY	
	72	P1 CAPACITY	
	73	DEVIATION IN %	
	74	NOMINAL SPEED FINE STREAM	
	75	FEEDER DEVIATION	
	76	OUTPUT WAY FIFO s-FIFO	
	77	OUTPUT TIME FIFO t-FIFO	
	78	TRANSFER VALUE 2	
	79	GROSS WEIGHT	
	80	BIN CONTENTS	
	81	PRE-BIN REGULATOR	
	82	SPEED ACTUAL VALUE	
	90	Calculation value RW0	2 Byte- value
	91	Calculation value RW1	
	92	Calculation value RW2	
	93	Calculation value RW3	
	94	Calculation value RW4	
	95	Calculation value RW5	
	96	Calculation value RL0	4 Byte- value
	97	Calculation value RL1	

Parameter group NennData			
10100	100	Nominal capacity	kg/h
10101	101	Multi range-Nominal capacity 1	
10102	102	Multi range-Nominal capacity 2	
10103	103	Multi range-Nominal capacity 3	
10105	105	Rated frequency	Hz
10106	106	Rated speed	1/10 mm
10107	107	Belt length	mm
10109	109	Belt width (only at working width)	mm
10110	110	Serial number	
10111	111	Operating language	0 = German 1 = English 2 = French 3 = Italian 4 = Spanish 5 = Russian
10115	115	Scale computer Config.Byte	4 Byte- value 0x00001 Absolute value tare 0x00002 PGMARKER active 0x00004 Feeder-Function 0x00040 Slip tachometer-Function 0x00100 Batch-Function 0x00200 Log activated 0x02000 Flow metering 0x04000 Dosing 0x10000 Differential dosing 0x20000 Check weigher function
10120	120	MinLOAD -Limit value MaxLoad	Percentage
10121	121	-Limit value	
10122	122	Belt empty	
10123	123	DisableCount	
10124	124	Taration err.	
10127	127	Slip tachometer	Tacho impulses
10130	130	Display unit	0 = XXX.X kg/h 1 = XXXX kg/h 2 = XX.XX t/h 3 = XXX.X t/h 4 = XXXX t/h
10135	135	ImpulseCounterUnit	0 = XXX.X kg 1 = XXXX kg 2 = XX.XX t 3 = XXX.X t 4 = XXXX t
10138	138	Pulse length	ms
10140	140	Test weight	Percentage
10141	141	Lim.of correc.	Percentage 0.0 - 80.0 %
10145	145	Test/Tare Speed	Percentage 10.0 - 75.0 %
	148	latest test result	
10160	160	g3-Length	mm
10161	161	g2-Length	
10164	164	t-Fifo time	s
10170	170	Moisture 0%	Percentage
10171	171	Moisture 100%	Percentage
10172	172	Source of set value for moisture distraction	
10175	175	Disable measuring	
10180	180	Source of set value for int. charge	
10181	181	Source of set value for ext. charge	
10182	182	Post-runtime Charge	s
10190	190	ACTUAL VALUE source for cosPhi	
10191	191	Offset cosPhi	
10192	192	Span cosPhi	
10195		Carry out parameter calculation	Undefined

Parameter group Weighing channel adjustments			
10200	200	Offset weighing channel	Numerical value Long value of WC is used
10201	201	Offset weighing channel	
10202	202	Span weighing channel	
10203	203	Span weighing channel	

10220	220	K-MIN	Percentage
10221	221	K-MAX	
10222	222	K-0	
10240	240	Integration factor Speed	INT s/10
10241	241	Integration factor Display	
10242	242	Display Modus	
10250	250	Integration factor AD1	+/- Ramp
10251	251	Integration factor AD2	
10252	252	Integration factor DA1	
10253	253	Integration factor DA2	
10254	254	Integration factor DA3	
10255	255	(Integration factor DA4)	
10257	257	Integration factor g1	
10258	258	SW-Integrator	
10260 - 10280	260- 280	Delay time for Error messages	s

Parameter group Dosing parameter			
10300	300	Integration factor	1/100
10304	304	Source of nominal value internal	
10305	305	Source of nominal value external	Percentage 0.0 - 25.0 % Percentage 0.0 - 30.0 % Percentage 0.0 - 50.0 % Percentage 0.5 - 50.0 % Percentage 0.3 - 60.0 %
10310	310	Max. deviation	
10311	311	Set value Zero	
10312	312	Minimal set value	
10313	313	Deviation	
10314	314	Control limit	

Parameter group Pre-sets			
10340	340	Pre-sets 1	2 Byte- value
10341	341	Pre-sets 2	
10342	342	%Pre-sets 1	Percentage
10343	343	%Pre-sets 2	
10345	345	Capacity set value Display	Absolute value

Parameter group Scalings			
10350	350	Scaling factor 1	Absolute value
10351	351	Scaling factor 2	
10352	352	Scaling factor 3	

Parameter group Pre-sets			
10360	360	Fixed value 1	
10361	361	Fixed value 2	
10365	365	LoSpeed Tacho	

Parameter group Feeder			
10370	370	Min-Limit	Percentage
10371	371	Max-Limit	Percentage
10372	372	Dead Length	mm
10373	373	Readjustment factor	Percentage
10375	375	Control limit	Percentage
10378	378	Set value source Load set value	Source number
10379	379	Set value source Feeder actual value	Source number
10385	385	Pre-bin Dead time	s
10386	386	Set value source Pre-bin Set value	Source number

Parameter group IO-configuration			
10400-10405	400-405	OPTO Inputs	coded
10420-10425	420-425	RELAY outputs	coded
10450-10453	450-453	AD1/2 Offset / Span	coded
10460-10477	460-477	DA Offset / Span	coded
10490-10495	490-495	FB- Fields	coded

Parameter group Time interrogation / Simulation			
	500	Seconds (active time)	BCD-coded
	501	Minutes	BCD-coded
	502	Hours	BCD-coded
	510	Day	BCD-coded
	511	Month	BCD-coded
	512	Year	BCD-coded
10520	520	Simulation value Speed	Source number
10521	521	Simulation value Load	Source number

Parameter group Loss-in-weight-feeder			
10600	600	Bin	kg
10605	605	Discharge	Absolute value
10606	606	Discharge length	Absolute value
10610	610	Filling ON	Percentage
10611	611	Filling OFF	Percentage
10612	612	Movement failure	Percentage
10613	613	Bin empty	Percentage
10615	615	Filling time	Seconds
10616	616	SettlingTime	Seconds
10619	619	Bin averaging	Seconds
10620	620	Actual value source for control bin	Source number
	630	Deviation check weigher and DDW	Percentage

For transfer of a nominal parameter 10000 (Dec) must be added to the parameter code. All numerical values are indicated in the decimal numerical system. Percentages are transferred as values with 1/100 per cent resolution (e.g. 74.83 % corresponds to the numerical value 7483). All indicated parameter codes up to value 619 also apply to the calculating unit. By that within the scale computer the functionality of a small SPS can be imitated.

6.2 Setting of data format

```
AnyBus
FB Fields
FB ProtocolTyp

== exit <F4>==
```

In Parameter-mode under „COMMUNICATION“ / „AnyBus“ all parameters necessary for the Fieldbus communication can be adjusted.

```
FB Fields
<+> IW1
Drive WB

IW1 Drive WB
IW2 Feeder SW
IW3 P3 Capacity
IW4 g3-load
IL1 P3CapacityKg
IL2 Calculation value0L
```

Under „FB Fields“ it is fixed, in which data field which user data are transferred to the overriding Master.

In the upper part of the display with keys „F1“ and „F3“ a choice has to be done. This choice can be overtaken into the lower data field with key „ENTER“.

```
FB ProtocolTyp
-> ☐ FULL
StandardOld
Minimal

== exit <F4>==
```

In the sub-menu „FB protocol type“ the structure of the whole data telegram is fixed.

A wrong adjustment will cause an incorrect (displaced) transfer of data being more at the back of the data field!

We urgently recommend to use the „FULL“ - protocol, since it offers the most modern possibilities.

For spare devices in older plants both other protocols are implemented.

6.3 Test possibilities of the ProfiBus DP- Interface

```
CONTROL
AD/SYS
DA
RELAY
OPTO/BCD
->COMMUNICATION
SIMULATION
ANALYSIS

== exit <F4>==
```

It is possible to control the data transfer of the Fieldbus Interface. Thereto in menu „CONTROL“ the point „COMMUNICATION“ has to be selected.

```
COMMUNICATION
PLC --> DWC
DWC --> PLC
PAR DWC<-->PLC
AnyBusInfo

COM 1

== exit <F4>==
```

Then the menu points „PLC --> DWC “ or „DWC-->PLC“ must be selected.

Under „PLC --> DWC“ the *Emitting data* of the *Master- Station* are represented.

Under „PAR DWC <--> PLC“ the mailbox data of the parameterizing interface are represented.

„COM 1“ is reserved for the control of the serial Interface.

I

```
PLC --> DWC
P=      0
C=0000000000 hex
SW1=    0
SW2=    0
SW3=    0
SW4=    0
SL1=    0
SL2=    0
== exit <F4>==
```

Under „PB-DP DWC<-PLC“ the *Emitting data* of the *Master- Station* are represented. In the upper part of both pictures general status information about the communication system is visible.

P=	CapacityNominal value	Resolution 1/10 kg/h
S=	ControlWord	
C=	Digital Bus- Inputs	
SW1- SW4	Nominal Fields SW1 to SW4	depending on parameterizing
SL1 SL2	Nominal Fields SL1 to SL2	depending on parameterizing

```
DWC --> PLC
P=      0
B=      0
C=000000000 hex
K=000000000 hex
SW1=    0
SW2=    0
SW3=    0      0
SL1=    0
SL2=    0
```

Under „DWC -->PLC“ the *Reception data* of the *Master- Station* are represented.

P=	ActualCapacity	Resolution 1/10 kg/h
B=	Quantity counter B	Resolution 1/10 kg/h
S=	StatusWord	
SD=	ERROR / Status DoubleWord	
K=	Digital Bus- outputs	
IW1	ActualFields IW1 to IW4	depending on parameterizing
-		
IW4		
IL1	ActualFields IL1 to IL2	depending on parameterizing
IL2		

```
PAR DWC <--> PLC
PLC-->DWC
P=      0
V=      0

DWC-->PLC
N=      0
V=      0

== exit <F4>==
```

The information of the parameter mailbox is represented.

P=	Parameter number received from the PLC	
N=	Parameter number	
V=	Parameter value	

```
anyBusInfo

Bus Modul
WD1 xxxx
WD2 xxxx

FT  0  0
IN  0  0
FS  0  0
IDc4 xit <F4>==
```

The name of the bus module recognized is represented.
x-x-x-x-x is indicated, if no bus module is installed or if the module is defective.

P=	Parameter number received from the PLC	
WD1	internal Watchdog	
WD2		

FT	Internal Information	
IN		
FS		
ID		

7 Implementation DP-Master-Systems

VALID for Profinet-IO and Profibus-DP

For implementation into the control system a DP- Master is required.
The Gsd-File required must be integrated with the suitable Master-projecting tool.

Then an access to the data values is possible. Special attention has to be paid that the interface contains a data field with 6 or 8 byte of consistent data. This information always must be transferred in one piece and cannot be transferred with usual load-(L) and transfer (T) commands on many systems. These data e.g. can be transferred at Siemens S7-systems via the function modules (SFC14 „DPRD_DAT“, SFC15 „DPWR_DAT“) included in the scope of supply of STEP7 or via „FC80/82“ (DWC-3 Communication) provided by us.

Example: (Write Data on Slave on address PW300-PW324)

```

L      L#0                      // Charge nominal (set) value (in this case 0)
T      PAD 300                  // Transfer into nominal(set) value field
L      L#0                      // Charge simultaneously NominalFields SW1 and SW2
T      PAD 304                  // Expedite to Slave
L      W#16#0                  // Charge Word of command
T      PAW 308                  // Set status information to 0
CALL   SFC 15                  // Write consistent data field
LADDR  :=W#16#136              // Attention: Put address into HEX (corresponds to 310 dec)
RECORD :=P#M 140.0 BYTE 6      //
RET_VAL:=MW212

```

The addresses employed (Periphery words PW300 - PW324) are a random configuration. The addresses can be observed and adapted with the help of the hardware manager.

Example: (Read Data from Slave)

```

L      PED 300                  // Charge actual capacity
T      MD 100                   // Store in SPS on marker double word 100
L      PED 304                  // Charge count of counter
T      MD 104                   // Store in SPS on marker double word 104
L      PEW 308                  // Charge Status Word
T      MW 108                   // Store in SPS on marker double word 108
CALL   SFC 14                  // Read consistent data field
LADDR  :=W#16#136              // Attention: Put address into HEX (corresponds to 310 dec)
RET_VAL:=MW210
RECORD :=P#M 110.0 BYTE 6      // Data are deposited on MB110- MB115

L      PEW 316                  // Attention: ActualField IW1 only with StandardOld
T      MW 116                   //
L      PEW 318                  // Attention: ActualField IW2 only with StandardOld
T      MW 118                   //
L      PED 320                  // Attention: ActualField IL1 only with StandardOld
T      MD 120                   //

```

If the protocol „FULL“ is used, the addresses have to adapted correspondingly.