MOELLER

Operating Manual

EASY204-DP
PROFIBUS-DP Slave Interface

04/01 AWB-C2528-1401GB

1st published 2001, edition 04/01

Author: Dieter Bauerfeind
Editor: Michael Kämper
Translator: Terence Osborn

Warning!
Dangerous electrical voltage!

Before commencing the installation

- Disconnect the power supply of the device.
- Ensure that devices cannot be accidentally restarted.
- Verify isolation from the supply.
- Earth and short circuit.
- Cover or enclose neighbouring units that are live.
- Follow the engineering instructions (AWA) of the device concerned.
- Only suitably qualified personnel in accordance with EN 50110-1/-2 (VDE 0105 Part 100) may work on this device/system.
- Before installation and before touching the device ensure that you are free of electrostatic charge.
- The functional earth (FE) must be connected to the protective earth (PE) or to the potential equalisation. The system installer is responsible for implementing this connection.
- Connecting cables and signal lines should be installed so that inductive or capacitive interference do not impair the automation functions.
- Install automation devices and related operating elements in such a way that they are well protected against unintentional operation.
- Suitable safety hardware and software measures should be implemented for the I/O interface so that a line or wire breakage on the signal side does not result in undefined states in the automation devices.
- Ensure a reliable electrical isolation of the low voltage for the 24 volt supply. Only use power supply units complying with IEC 60364-4-41 (VDE 0100 Part 410) or HD 384.4.41 S2.
- Deviations of the mains voltage from the rated value must not exceed the tolerance limits given in the specifications, otherwise this may cause malfunction and dangerous operation.
- Emergency stop devices complying with IEC/EN 60204-1 must be effective in all operating modes of the automation devices. Unlatching the emergency-stop devices must not cause restart.
- Devices that are designed for mounting in housings or control cabinets must only be operated and controlled after they have been installed with the housing closed. Desktop or portable units must only be operated and controlled in enclosed housings.

- Measures should be taken to ensure the proper restart of programs interrupted after a voltage dip or failure. This should not cause dangerous operating states even for a short time. If necessary, emergency-stop devices should be implemented.
- Wherever faults in the automation system may cause damage to persons or property, external measures must be implemented to ensure a safe operating state in the event of a fault or malfunction (for example, by means of separate limit switches, mechanical interlocks etc.).

Contents

About This Manual

Target readership

This manual has been produced for automation technicians and engineers. A sound knowledge of PROFIBUS-DP, the programming of the PROFIBUS-DP master and the "easy" control relay is assumed.

Other manuals on the device

The EASY412, EASY600 User Guide (AWB2528-1304-...) should always be used as an additional reference.

Abbreviations and symbols

This manual uses abbreviations and symbols with the following meaning:

hex: Hexadecimal (number system with the base 16)
dec : Decimal (number system with the base 10)
bcd: Binary coded decimal code

▶ indicates instructions on what to do

draws your attention to useful tips and additional information

Attention!
indicates the possibility of minor material damage.

Caution!
indicates the possibility of major damage to property or slight injury.

Warning!
indicates the possibility of major damage to property or serious or fatal injury.

Reading conventions

Except for the first page of chapters and empty pages at the end, the top left of the page shows the chapter title and the top right of the page shows the current section for greater clarity.

1 EASY204-DP

EASY204-DP was developed for automation tasks using PROFIBUS-DP as the communication bus. EASY204-DP can only be operated in conjunction with expandable EASY6.. basic units. The unit is always a PROFIBUS-DP slave in the network.

Device designation

The PROFIBUS-DP slave interface for the "easy" control relay has the type designation EASY204-DP.

System overview

The EASY-PROFIBUS-DP slaves are integrated in a PROFIBUS-DP system.

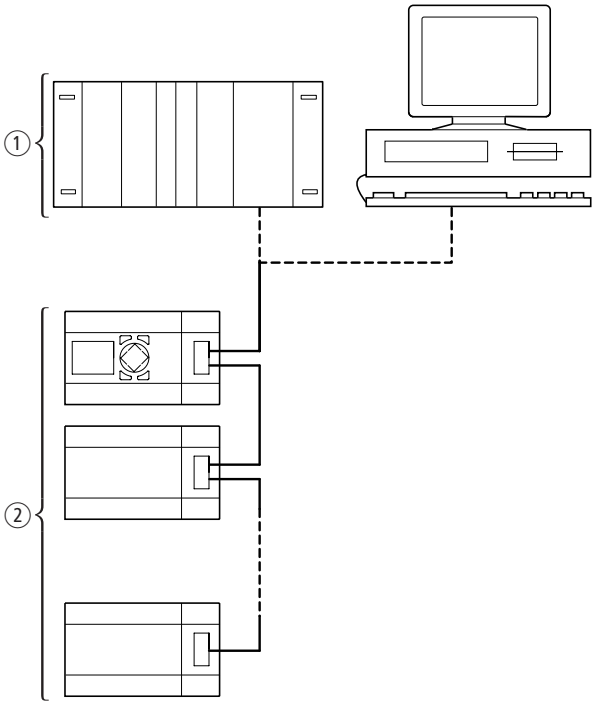


Figure 1: Integration of EASY204-DP in the DP network

① Master area , PLC or PC

② Slave area, e.g. EASY control relay with DP interface

Device setup

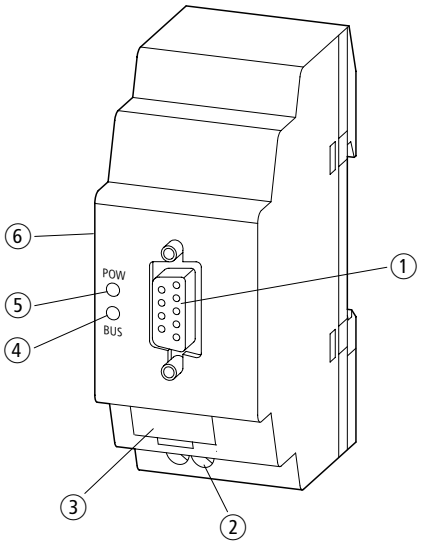


Figure 2: View of the device

① PROFIBUS-DP connection, 9-pole SUB-D socket
② 24 V DC supply voltage
③ Device designation plate
④ BUS communication LED
⑤ POW operation LED
⑥ EASY-LINK socket

Description of device functions

The EASY204-DP module links the PROFIBUS-DP master with an expandable EASY6... control relay.

The following data can be transferred, depending on the module selected in the PROFIBUS GSD file:

- S1 to S8; EASY6.. output range, Run/Stop (inputs of the DP master)
- R1 to R16; EASY6.. input range, Run/Stop (outputs of the DP master)

All function relay data (read data from the point of view of the DP master)

- Timing relays
- Counter relays
- Time switches
- Analog comparators
- Weekday, time, summer/winter time (DST)
- The states of all EASY6.. relays and contacts

The setpoints of the function relays (write data from the point of view of the DP master)

- Timing relays
- Counter relays
- Time switches
- Analog comparators
- Weekday, time, summer/winter time (DST)

Hardware and operating system requirements

The EASY204-DP expansion unit runs with the operating system version 2.4 and higher of the EASY619.. and EASY621.. basic units.

Improper use

"easy" should not be used as a substitute for safety-related controls such as burner or crane controls, emergency-stop or two-hand safety controls.

2 Installation

The same principles apply to EASY6.. basic units with expansion units.

Connecting the power supply

The EASY204-DP unit is run on a 24 V DC power supply (→ Section "Technical Data" from Page 95).

Warning!
Ensure the safe electrical isolation of the 24 V low voltage (SELV) power supply.

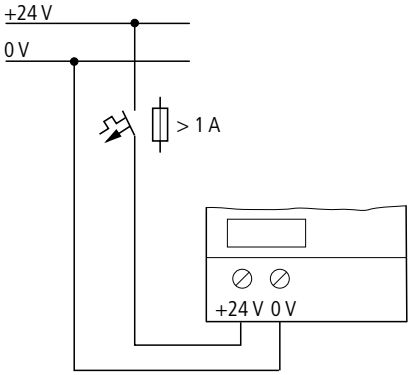


Figure 3: Standard connection

Connecting PROFIBUS-DP

Use a 9-pole SUB-D plug to connect the PROFIBUS-DP interface to the PROFIBUS-DP bus.

For this use the special PROFIBUS-DP plug and the special PROFIBUS-DP cable available from the Moeller range of accessories.

PROFIBUS-DP connection assignment

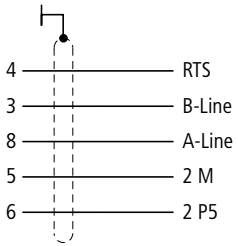


Figure 4: DP connection

3 RxD/TxD-P (B Line)
(4) Control-P (RTS), optional
(5) data ground, optional
(6) VP (plus voltage), optional
8 RxD/TxD-N (A Line)

Connections 3, 8 and the shield are sufficient for data transfer.

Bus terminating resistors

The first and last stations in a bus segment must be connected to the bus with the bus terminating resistor switched on.

Moeller's PROFIBUS-DP data plug enables both bus terminating resistors to be switched on and off.

Potential isolation

Observe the following potential isolation measures:

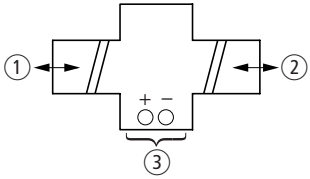


Figure 5: Potential isolation between the power supply and outputs

① Safe isolation of EASY-LINK 240 V AC
② Simple isolation of PROFIBUS-DP
③ 24 V DC supply voltage

Transfer rates

The EASY204-DP module detects the transfer rate automatically. The following transfer rates are supported:

- 9.6 Kbit/s to 12000 Kbit/s

Maximum distances/Bus cable lengths

Distance between two stations when using cable type "A" to DIN 19245 Part 3.

Baud rate [Kbit/s]	Maximum cable length Type "A" [m]
9.6	1200
19.2	1200
93.75	1200
187.5	1000
500	400
1500	200
3000	100
6000	100
12000	100

Distance between two stations when using cable type "B" to DIN 19245 Part 1.

Baud rate [Kbit/s]	Maximum cable length Type "B" [m]
9.6	1200
19.2	1200
93.75	1200
187.5	1000
500	400
1500	–

3 Device Operation

Initial power up

▶ Before switching on, check that you have connected the power supply, the bus connection and the connection to the basic unit correctly.

▶ Switch on the power supply to the basic unit and the PROFIBUS-DP expansion unit.

If the PROFIBUS-DP unit is factory set, the station address of the PROFIBUS-DP station must be set.

PROFIBUS-DP setting the station address

Basic units with display and keypad

The PROFIBUS-DP address on these units can be set in two ways.

- Using EASY-SOFT version 3.1 and higher
- Integrated display and keypad on the "easy" basic unit

Address range: 001 to 126

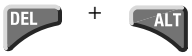
Setting the address on the basic unit with display

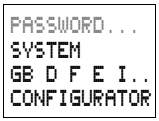
Requirements:

- Basic unit EASY6.., EASY204-DP are switched on
- The basic unit has been "unlocked" (no password protection activated)
- The basic unit has an operating system version 2.4 and higher
- There is no communication between EASY204-DP and the PROFIBUS-DP master

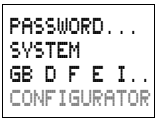
▶ Switch to the System menu.

▶ Press



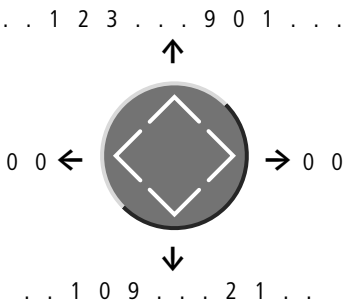


▶ Select "CONFIGURATOR"



▶ Confirm with "OK"

▶ Set address



▶ Transfer address

▶ Cancel address entry

Setting the address via EASY-SOFT:

- Using EASY-SOFT version 3.1 and higher
- <Menu → Online → Configure Expansion Units>

Status LEDs

The EASY204-DP expansion unit has two LEDs.

They are only lit if there is a proper connection via EASY-LINK from EASY204-DP to the basic unit.

POW LED, Function

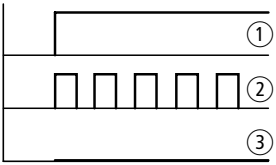


Figure 6: Function of the POW LED

① LED continuously lit:
- – Power supply present
- – Communication with the basic unit aborted

② LED flashing:
- – Power supply present
- – Communication with the basic unit correct

③ LED not lit:
- – No power supply present
- – Communication with the basic unit aborted

BUS LED, Function

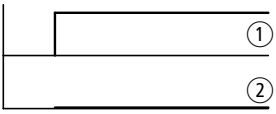


Figure 7: Function of the BUS LED

① LED continuously lit:
– PROFIBUS-DP communication correct

② LED not lit:
– No PROFIBUS-DP communication present

Cycle time of the EASY basic unit

Communication between the EASY6.. basic unit and the EASY204-DP via EASY-LINK increases the cycle time of the basic unit.

In extreme cases the cycle time may increase by 25 ms.

Bear this in mind when considering the reaction times of the basic units.

4 PROFIBUS-DP Functions

Slave modules

The EASY204-DP expansion module is a PROFIBUS-DP slave compliant with EN 50170. EASY204-DP is a modular slave.

You can select the following modules of the EASY204-DP slave in the PROFIBUS-DP Configurator of the master:

- Control commands 7 byte inputs/7 byte outputs
- Data input 3 byte inputs
- Data outputs 3 byte outputs

Diagnostics data

The EASY204-DP PROFIBUS-DP device features the standard diagnostics byte in accordance with the PROFIBUS specification.

Two additional diagnostics bytes are also sent.

Byte 0	Length of additional diagnostics bytes
Fixed 02_{hex}	00000010
Byte 1	Status of EASY-LINK
Value 00_{hex}	EASY-LINK is connected
Value 01_{hex}	EASY-LINK is disconnected

GSD file

A PROFIBUS-DP GSD file is required for selecting the device and for operating it with PROFIBUS-DP. This GSD file is shown in the Appendix.

The file "Moel4d10.gsd" can be obtained at the following Internet address:

- http://www.moeller.net → Service →...
- http://easy.moeller.net → Service/Download →...
- ftp://ftp.moeller.net → EASY →...

Follow the links on these pages.

S40 application module

All the functions of EASY204-DP are supported by the Moeller PS4 and PS416 programmable controllers. The S40-AM-K6-D/GB application module provides complete PLC function blocks. It can be obtained at the following Internet addresses:

- http://www.moeller.net/automation/...
- ftp://ftp.moeller.net/automation/application_modules/

Name:
S40AMK6D.EXE German
S40AMK6G.EXE English

I/O data exchange, operating mode

The appropriate module must be selected for the slave configuration in order for the slave I/O data to be exchanged between slave and master.

- Data input 3 byte inputs
- Data outputs 3 byte outputs
- Control commands 7 byte inputs/7 byte outputs

Data input module: EASY6..- "easy" coils S1 to S8

The normal PROFIBUS-DP master data exchange with the EASY204-DP slave is for input data bytes 0, 1, 2.

Byte	Meaning
0	Operating mode
1	Status of EASY outputs S1 to S8
2	Not assigned

Requirement:
The Data input module has been selected.

→ The output data and control commands cannot be used if only the Data input module has been selected.

- Data input range ("easy" coils S1 to S8, mode)

The master reads bytes 0, 1, 2 for the following data:

Byte 0: Operating mode

"easy" operating mode	Bit 7	6	5	4	3	2	1	0
"Stop"	x	x	x	x	x	x	x	0
"Run"	x	x	x	x	x	x	x	1

x = not valid
0 = 0 signal
1 = 1 signal

Byte 1: Status of S1 to S8 on EASY6..

EASY6.. output	Bit 7	6	5	4	3	2	1	0
S1								0/1
S2							0/1	
S3						0/1		
S4					0/1			
S5				0/1				
S6			0/1					
S7		0/1						
S8	0/1							

Byte 2: Not used

Attention!
Note the following if control commands are used with I/O data at the same time:

- Whilst the control command is being executed, the inputs will remain in the state before the control command was called.
- After the "Control commands" data exchange has been completed, the input bytes are refreshed.

Data output module (operating mode, R1 to R8, R9 to R16)

The normal PROFIBUS-DP master data exchange with the EASY204-DP slave is for output data bytes 0, 1, 2.

Byte	Meaning
0	Operating mode
1	Status of EASY inputs R9 to R16
2	Status of EASY inputs R1 to R8

Requirement:
The Data output module has been selected.

The input data and control commands cannot be used if only the data output module has been selected.

Byte 0: Operating mode

Command	Bit							
	7	6	5	4	3	2	1	0
"Run"	0	0	1	1	0	0	0	0
"Stop"	0	1	0	0	0	0	0	0

Attention!

- If the "Run" command is active, the status of R1 to R16 will not be transferred!
- It makes no sense to continuously send the "Run" and "Stop" commands.

These commands overwrite the menu selection on the device.
The operating mode can no longer be selected locally.

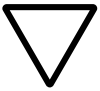
Byte 1: Write status of R9 to R16

EASY6.. input	Bit 7	6	5	4	3	2	1	0
R9								0/1
R10							0/1	
R11						0/1		
R12					0/1			
R13				0/1				
R14			0/1					
R15		0/1						
R16	0/1							

0 = 0 signal
1 = 1 signal

Byte 2: Write status of R1 to R8

EASY6.. input	Bit 7	6	5	4	3	2	1	0
R1								0/1
R2							0/1	
R3						0/1		
R4					0/1			
R5				0/1				
R6			0/1					
R7		0/1						
R8	0/1							



Attention!
Note the following if control commands are used with I/O data at the same time:

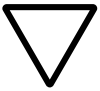
- Whilst the control command is being executed, the inputs will remain in the state before the control command was called.
- After the "Control commands" data exchange has been completed, the output bytes are refreshed.

Control command data exchange

Special services such as

- EASY6.. time
- Timing relays
- Counter relays
- Time switches
- Setpoint and actual values
- Analog value comparators of setpoints and actual values: Read/write
- Input, output, marker, function relay status: Read

can be implemented with the following data exchange procedure. A special command code in byte 0 is used to activate the services required. Data bytes 1 to 6 are used to write or read the values concerned.



Attention!

Whilst the control command is being executed, the input and output data will remain in the state before the control command was called. Only after the "Control commands" data exchange has been completed, will the I/O data be refreshed.

Caution!
Only those values specified for the command code should be used.

Check the values that you write in order to avoid malfunctions.

Requirement:
The Control command module has been selected.

Control command data exchange procedure

A data exchange procedure is required in order to ensure the safe exchange of data from master to slave and vice versa.

Data can only be written if the "easy" basic unit with the LCD display is showing the Status display.

The master initiates the data exchange of control commands. The slave responds. The above operation is carried out via a control bit and a response bit in byte 0. The command code plus control bit 7 is written in byte 0.

Master control bit "Start data control command data exchange":
Byte 0 (write) → Bit 7 status = 1 Data exchange starting

Slave response bit "Data exchange running":
Byte 0 (read) → Bit 7 status = 1 Data exchange running

Master control bit "End data control command data exchange":
Byte 0 (write) → Bit 7 status = 0

Slave response bit Data exchange ended:
Byte 0 (read) → Bit 7 status = 0

The read data is valid after the slave has completed the data exchange.

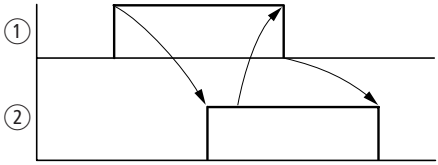


Figure 8: Data exchange procedure

① Master control bit
Byte 0 Bit 7 (write)

② Slave response
Byte 0 Bit 7 (read)

Attention!
If I/O data is used at the same time:

- The input/output bytes are refreshed after the "Control commands" data exchange has been completed.

Read time (weekday, hour, minute winter/summer time)

Byte	Meaning
Command	
0	Command ($3C_{hex}$)
Read (Acknowledge)	
0	Acknowledge response
1	Weekday
2	Hour
3	Minute
4	Winter/summer time (DST)

Command from master

Byte 0: Command code

Byte 0 = $3C_{hex}$ plus control bit 7

→ Note the Byte 0 Bit 7 data exchange procedure.

	Bit							
	7	**6**	**5**	**4**	**3**	**2**	**1**	**0**
Control byte	1/0	0	1	1	1	1	0	0

Slave sends
Byte 0: Acknowledge response

Meaning	Bit							
	7	6	5	4	3	2	1	0
Response bit	1/0							
Fixed		1						
Fixed			0					
EASY204-DP read command rejected, not OK				0	0	0	0	0
Read command OK				0	0	0	1	0

Byte 1: Weekday (value range 00 to 06)

Weekday	Bit							
	7	6	5	4	3	2	1	0
Monday = 0	0	0	0	0	0	0	0	0
Tuesday = 1	0	0	0	0	0	0	0	1
Wednesday = 2	0	0	0	0	0	0	1	0
Thursday = 3	0	0	0	0	0	0	1	1
Friday = 4	0	0	0	0	0	1	0	0
Saturday = 5	0	0	0	0	0	1	0	1
Sunday = 6	0	0	0	0	0	1	1	0

Byte 2: Hour (value range 00 to 23)

Value	Value 10 Bit				Value 1 Bit			
	7	6	5	4	3	2	1	0
0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	1
....								
9	0	0	0	0	1	0	0	1
....								
14	0	0	0	1	0	1	0	0
...								
23	0	0	1	0	0	0	1	1

Byte 3: Minute (value range 00 to 59)

Value	Value 10				Value 1			
	Bit				Bit			
	7	6	5	4	3	2	1	0
00	0	0	0	0	0	0	0	0
...								
10	0	0	0	1	0	0	0	0
...								
21	0	0	1	0	0	0	0	1
...								
42	0	1	0	0	0	0	1	0
...								
59	0	1	0	1	1	0	0	1

Byte 4: Winter/summer time (DST) (value range 00 to 01)

Function	Value 10				Value 1			
	Bit				Bit			
	7	6	5	4	3	2	1	0
Winter time	0	0	0	0	0	0	0	0
Summer time	0	0	0	0	0	0	0	1

Write time (day, hour, minute, winter/summer time)

Byte	Meaning
Write	
0	Command ($2A_{hex}$)
1	Weekday
2	Hour
3	Minute
4	Winter/summer time (DST)
Read (Acknowledge)	
0	Acknowledge response

→ Note the Byte 0 Bit 7 data exchange procedure.

Command from master

Byte 0: Command code

Byte 0 = $2A_{hex}$ plus control bit 7

	Bit							
	7	**6**	**5**	**4**	**3**	**2**	**1**	**0**
Control byte	1/0	0	1	0	1	0	1	0

Byte 1: Weekday (value range 00 to 6_{bcd})

Weekday	Bit							
	7	6	5	4	3	2	1	0
Monday	0	0	0	0	0	0	0	0
Tuesday	0	0	0	0	0	0	0	1
Wednesday	0	0	0	0	0	0	1	0
Thursday	0	0	0	0	0	0	1	1
Friday	0	0	0	0	0	1	0	0
Saturday	0	0	0	0	0	1	0	1
Sunday	0	0	0	0	0	1	1	0

Byte 2: Hour (value range 00 to 23_{bcd})

Value	Value 10 Bit				Value 1 Bit			
	7	6	5	4	3	2	1	0
0_{bcd}	0	0	0	0	0	0	0	0
1_{bcd}	0	0	0	0	0	0	0	1
....								
9_{bcd}	0	0	0	0	1	0	0	1
....								
14_{bcd}	0	0	0	1	0	1	0	0
....								
23_{bcd}	0	0	1	0	0	0	1	1

Byte 3: Minute (value range 00 to 59_{bcd})

Value	Value 10 Bit				Value 1 Bit			
	7	6	5	4	3	2	1	0
00_{bcd}	0	0	0	0	0	0	0	0
...								
10_{bcd}	0	0	0	1	0	0	0	0
...								
21_{bcd}	0	0	1	0	0	0	0	1
...								
42_{bcd}	0	1	0	0	0	0	1	0
...								
59_{bcd}	0	1	0	1	1	0	0	1

Byte 4: Winter/summer time (DST) (value range 00 to 01)

Function	Value 10 Bit				Value 1 Bit			
	7	6	5	4	3	2	1	0
Winter time	0	0	0	0	0	0	0	0
Summer time	0	0	0	0	0	0	0	1

Response from slave
Byte 0: Acknowledge response

Meaning	Bit							
	7	6	5	4	3	2	1	0
Response bit	1/0							
Fixed		1						
Fixed			0					
EASY204-DP write command rejected, not OK				0	0	0	0	0
Write command OK				0	0	0	0	1

Timing relay read actual value (time base, actual value, switch function)

Byte	Meaning
Command	
0	Command (T1 = 41 to T8 = 48_{hex})
Read (Acknowledge)	
0	Acknowledge response
1	Timing relay, time base, control status
2	Value (low byte)
3	Value (high byte)

→ Note the Byte 0 Bit 7 data exchange procedure.

T1 to T8 according to specification in read range.

Command from master

Byte 0: Command code

Byte 0 = 41 to 48_{hex}

Tx

Control byte for	Command in hex	Bit 7	6	5	4	3	2	1	0
T1	41	1/0	1	0	0	0	0	0	1
T2	42	1/0	1	0	0	0	0	1	0
T3	43	1/0	1	0	0	0	0	1	1
T4	44	1/0	1	0	0	0	1	0	0
T5	45	1/0	1	0	0	0	1	0	1
T6	46	1/0	1	0	0	0	1	1	0
T7	47	1/0	1	0	0	0	1	1	1
T8	48	1/0	1	0	0	1	0	0	0

Response from slave
Byte 0: Acknowledge response

Meaning	Bit							
	7	6	5	4	3	2	1	0
Response bit	1/0							
Fixed		1						
Fixed			0					
EASY204-DP read command rejected, not OK				0	0	0	0	0
Read command OK				0	0	0	1	0

Byte 1: Timing relay function, time base, control status

Meaning	Bit							
	7	6	5	4	3	2	1	0
On-delayed						0	0	0
Off-delayed						0	0	1
On-delayed with random switching						0	1	0
Off-delayed with random switching						0	1	1
Single pulse						1	0	0
Flashing						1	0	1
Time base "s"				0	0			
Time base "M:S"				0	1			
Time base "H:M"				1	0			
Trigger coil 0 signal			0					
Trigger coil 1 signal			1					

Meaning	Bit							
	7	6	5	4	3	2	1	0
Reset coil 0 signal		0						
Reset coil 1 signal		1						
Timing relay not processed by operating system	0							
Timing relay processed by operating system	1							

Byte 2: Time actual value (low byte)
Data format: hexadecimal

Value	Bit							
	7	6	5	4	3	2	1	0
00_{hex}	0	0	0	0	0	0	0	0
FF_{hex}	1	1	1	1	1	1	1	1

Byte 3: Time actual value (high byte)
Data format: hexadecimal

Value	Bit							
	7	6	5	4	3	2	1	0
00_{hex}	0	0	0	0	0	0	0	0
FF_{hex}	1	1	1	1	1	1	1	1

Example:
Timing relay T1 has the following features:

T1	
Switch function:	On-delayed
Time base:	M:S
Set time:	60:00
Parameter access:	+
Trigger coil:	Activated

Byte			
Send			
0		11000001	
Acknowledge			
0		01000010	Read valid
1		10101000	Trigger coil activated, time base "M:S", on-delayed
2	10_{hex}	00010000	Set time Low byte
3	$0E_{hex}$	00001110	Set time High byte

Value Set time = $0E10_{hex}$ = 3600
3600 s = 60:00 M:S

Write timing relay set time (time base, set time, switch function)

Byte	Meaning
Write	
0	Command (T1 = 01 to T8 = 08_{hex})
1	Timing relay function, time base, Parameters menu
2	Value --.xx with time base "s"
3	Value xx.-- with time base "s" or--:xx with time base "M:S"
4	Value xx:-- with time base "M:S" or--:xx with time base "H:M"
5	Value xx:-- with time base "H:M"
Read	
0	Acknowledge response
1	Not relevant
2	Value --.xx with time base "s"
3	Value xx.-- with time base "s" or--:xx with time base "M:S"
4	Value xx:-- with time base "M:S" or--:xx with time base "H:M"
5	Value xx:-- with time base "H:M"
6	Hour value in days

→ Note the Byte 0 Bit 7 data exchange procedure.

The time base and set time values are part of an "*.eas file". If these values are changed, the original "*.eas file" no longer matches the one in the EASY6...

Remember this feature when uploading, downloading or comparing "easy" circuit diagrams with EASY-SOFT.

When downloading from the PC the latest version of the "*.eas" is overwritten.

The comparison shows that the circuit diagrams are not identical.

T1 to T8 according to specification in write range.

Value range of the time values
Time base:

- "S" 00.00 to 99.99
- "M:S" 00:00 to 99:59 (M = 00 to 99, S = 00 to 59)
- "H:M" 00:00 to 99:59 (H = 00 to 99, M = 00 to 59)

Command from master
Byte 0: Command code
Byte 0 = 01 to 08_{hex}

Tx

Control byte for	Command in hex	Bit 7	6	5	4	3	2	1	0
		1/0	0	0	0	0	0	0	0
T1	01	1/0	0	0	0	0	0	0	1
T2	02	1/0	0	0	0	0	0	1	0
T3	03	1/0	0	0	0	0	0	1	1
T4	04	1/0	0	0	0	0	1	0	0
T5	05	1/0	0	0	0	0	1	0	1
T6	06	1/0	0	0	0	0	1	1	0
T7	07	1/0	0	0	0	0	1	1	1
T8	08	1/0	0	0	0	1	0	0	0

→ Only the bytes reserved for the required time base should be used.

Byte 1: Timing relay control byte

Meaning	Bit							
	7	6	5	4	3	2	1	0
On-delayed						0	0	0
Off-delayed						0	0	1
On-delayed with random switching						0	1	0
Off-delayed with random switching						0	1	1
Single pulse						1	0	0
Flashing						1	0	1
Time base "s"				0	0			
Time base "M:S"				0	1			
Time base "H:M"				1	0			
Not assigned			0					
Does not appear in the Parameters menu		1						
Appears in the Parameters menu		0						
Processing	1							

Byte 2: Time value "--.xx" time base "S"

Data type: BCD

Value	Value --.x-				Value --.-x			
	Bit				Bit			
	7	6	5	4	3	2	1	0
00_{bcd}	0	0	0	0	0	0	0	0
05_{bcd}	0	0	0	0	0	1	0	1
17_{bcd}	0	0	0	1	0	1	1	1
42_{bcd}	0	1	0	0	0	0	1	0
99_{bcd}	1	0	0	1	1	0	0	1

Byte 3: Time value "xx.--" Time base "S"
Time value "--:xx" Time base "M:S"
Data type: BCD

Value	Value x-.-- "S" Value --:x- "-:S" Bit				Value x-.-- "S" Value --:-x "-:S" Bit			
	7	6	5	4	3	2	1	0
00_{bcd}	0	0	0	0	0	0	0	0
05_{bcd}	0	0	0	0	0	1	0	1
17_{bcd}	0	0	0	1	0	1	1	1
42_{bcd}	0	1	0	0	0	0	1	0
99_{bcd}	1	0	0	1	1	0	0	1

Byte 4: Time value "xx.--" Time base "M:S"
Time value "--:xx" Time base "H:M"
Data type: BCD

Value	Value x-.-- "M:-" Value --:x- "-:M" Bit				Value -x.-- "M:-" Value --:-x "-:M" Bit			
	7	6	5	4	3	2	1	0
00_{bcd}	0	0	0	0	0	0	0	0
05_{bcd}	0	0	0	0	0	1	0	1
17_{bcd}	0	0	0	1	0	1	1	1
42_{bcd}	0	1	0	0	0	0	1	0

Byte 5: Time value "xx:--" Time base "H:M"

Data type: BCD

Value	Value x-:-- "H:-" Bit				Value -x:-- "H:-" Bit			
	7	6	5	4	3	2	1	0
00_{bcd}	0	0	0	0	0	0	0	0
05_{bcd}	0	0	0	0	0	1	0	1
17_{bcd}	0	0	0	1	0	1	1	1

Response from slave

Byte 0: Acknowledge response

Meaning	Bit							
	7	6	5	4	3	2	1	0
Response bit	1/0							
Fixed		1						
Fixed			0					
EASY204-DP write command rejected, not OK				0	0	0	0	0
Write command OK				0	0	0	1	0

Byte 1: Not valid

Bit							
7	6	5	4	3	2	1	0
x	x	x	x	x	x	x	x

This byte does not supply information that is used. The values are not valid.

Byte 2 to byte 6 return the written time value.

→ Time values over 60 s are converted to minutes.
Time values over 60 min. are converted to hours.
Time values over 24 h are converted to days.

Byte 2: Time value "--.xx" time base "S"
Data type: BCD

Value	Value --.x				Value --.-x			
	Bit				Bit			
	7	6	5	4	3	2	1	0
00_{bcd}	0	0	0	0	0	0	0	0
05_{bcd}	0	0	0	0	0	1	0	1
17_{bcd}	0	0	0	1	0	1	1	1
42_{bcd}	0	1	0	0	0	0	1	0
99_{bcd}	1	0	0	1	1	0	0	1

Byte 3: Time value "xx.--" Time base "S"
Time value "--:xx" Time base "H:S"

Value	Value x-.-- "S" Value --:x- "-:S"				Value x-.-- "S" Value --:-x "-:S"			
	Bit				Bit			
	7	6	5	4	3	2	1	0
00_{bcd}	0	0	0	0	0	0	0	0
05_{bcd}	0	0	0	0	0	1	0	1
17_{bcd}	0	0	0	1	0	1	1	1
42_{bcd}	0	1	0	0	0	0	1	0
99_{bcd}	1	0	0	1	1	0	0	1

Byte 4: Time value "xx.--" Time base "M:S"
Time value "--:xx" Time base "H:M"
Data type: BCD

Value	Value x-.-- "M:-" Value --:x- "-:M" Bit				Value -x.-- "M:-" Value --:-x "-:M" Bit			
	7	6	5	4	3	2	1	0
00_{bcd}	0	0	0	0	0	0	0	0
05_{bcd}	0	0	0	0	0	1	0	1
17_{bcd}	0	0	0	1	0	1	1	1
42_{bcd}	0	1	0	0	0	0	1	0

Byte 5: Time value "xx:--" Time base "H:M"
Data type: BCD

Value	Value x-:-- "H:-" Bit				Value -x:-- "H:-" Bit			
	7	6	5	4	3	2	1	0
00_{bcd}	0	0	0	0	0	0	0	0
05_{bcd}	0	0	0	0	0	1	0	1
17_{bcd}	0	0	0	1	0	1	1	1

Byte 6: Time value in days
Data type: BCD

Value	Bit				Days value Bit			
	7	6	5	4	3	2	1	0
00_{bcd}	0	0	0	0	0	0	0	0
04_{bcd}	0	0	0	0	0	1	0	0

Example 1: timing relay
The timing relay T8 has the following features:

Switch function	On-delayed
Time base	"s"
Setpoint time	50

T8 is to be assigned the time base "M:S" and the setpoint time 30 minutes, 25 seconds.

Byte		Bit 7 0	
Send			
0	08_{hex}	00001000	Bit 7: 1/0 toggle
1		10001000	
2		00000000	
3	25_{bcd}	00100101	
4	30_{bcd}	00110000	
5		00000000	
6		00000000	
Acknowledge			
0		01000010	Bit 7: 1/0 toggle
1		xxxxxxxx	Byte not valid
2		00000000	
3	25_{bcd}	00100101	
4	30_{bcd}	00110000	
5		00000000	
6		00000000	

Example 2: timing relay
Timing relay T1 has the following features:

Switch function	**Off-delayed**
Time base	"M:S"
Setpoint time	10:30

T1 is to be assigned the time base "H:M" and the setpoint time 95 minutes, 53 minutes. 95 hours = 3 days, 19 hours

Byte		**Bit**	
		7 0	
Send			
0	01_{hex}	00000001	Bit 7: 1/0 toggle
1		10010001	
2		00000000	
3		00000000	
4	53_{bcd}	01010011	
5	23_{bcd}	00100011	
6	03_{bcd}	00000011	
Acknowledge			
0		01000010	Bit 7: 1/0 toggle
1		xxxxxxxx	Byte not valid
2		00000000	
3		00000000	
4	53_{bcd}	01010011	
5	23_{bcd}	00100011	
6	03_{bcd}	00000011	

Read counter relay actual value

Byte	Meaning
Command	
0	Command (C1 = 49 to C8 = 50_{hex})
Read	
0	Acknowledge response
1	Not relevant
2	Actual value (low byte)
3	Actual value (high byte)

C1 to C8 according to specification in read range.

→ Note the Byte 0 Bit 7 data exchange procedure.

Command from master

Byte 0: Command code

Byte 0 = 49 to 50_{hex}

Cx

Control byte for	Command in hex	Bit 7	6	5	4	3	2	1	0
C1	49	0	1	0	0	1	0	0	1
C2	4A	0	1	0	0	1	0	1	0
C3	4B	0	1	0	0	1	0	1	1
C4	4C	0	1	0	0	1	1	0	0
C5	4D	0	1	0	0	1	1	0	1
C6	4E	0	1	0	0	1	1	1	0
C7	4F	0	1	0	0	1	1	1	1
C8	50	0	1	0	1	0	0	0	0

Response from slave

Byte 0: Acknowledge response

Meaning	Bit							
	7	6	5	4	3	2	1	0
Response bit	1/0							
Fixed		1						
Fixed			0					
EASY204-DP read command rejected, not OK				0	0	0	0	0
Read command OK				0	0	0	1	0

Byte 1: Not valid

	Bit							
	7	6	5	4	3	2	1	0
Not valid	x	X	x	x	x	x	x	x

Byte 2: Counter relay actual value (low byte) in hexadecimal format

Value	Bit							
	7	6	5	4	3	2	1	0
00_{hex}	0	0	0	0	0	0	0	0
FF_{hex}	1	1	1	1	1	1	1	1

Byte 3: Counter relay actual value (high byte) in hexadecimal format

Value	Bit							
	7	6	5	4	3	2	1	0
00_{hex}	0	0	0	0	0	0	0	0
FF_{hex}	1	1	1	1	1	1	1	1

Example:
Counter C5 has the setpoint value 5512

The actual value of counter C5 is: 4711

Byte		**Bit**	
		7 0	
Send			
0	$4D_{hex}$	01001101	Bit 7: 1/0 toggle
Acknowledge			
0	42_{hex}	01000010	Write command OK
1	xx	xxxxxxxx	Values not valid
2	67_{hex}	01100111	Low byte
3	12_{hex}	00010010	High byte

Value $1267_{hex} = 4711_{dec}$

Write counter relay setpoint

Byte	Meaning
Write	
0	Command (C1 = 09 to C8 = 10_{hex})
1	Parameters menu
2	Setpoint value (low byte)
3	Setpoint value (high byte)
Read	
0	Acknowledge response

→ Note the Byte 0 Bit 7 data exchange procedure.

C1 to C8 according to specification in write range.

Value range of the counter values: 0000 to 9999

→ Keep to the value range.

The value is part of an "*.eas file". If these values are changed, the original "*.eas file" no longer matches the one in the EASY6...

Remember this feature when uploading, downloading or comparing "easy" circuit diagrams with EASY-SOFT.

When downloading from the PC the latest version of the "*.eas" is overwritten.

The comparison shows that the circuit diagrams are not identical.

Command from master

Byte 0: Command code

Byte 0 = 09 to 10_{hex}

Cx

Control byte for	Command in hex	Bit 7	6	5	4	3	2	1	0
		1/0	0	0	0	0	0	0	0
C1	09	1/0	0	0	0	1	0	0	1
C2	0A	1/0	0	0	0	1	0	1	0
C3	0B	1/0	0	0	0	1	0	1	1
C4	0C	1/0	0	0	0	1	1	0	0
C5	0D	1/0	0	0	0	1	1	0	1
C6	0E	1/0	0	0	0	1	1	1	0
C7	0F	1/0	0	0	0	1	1	1	1
C8	10	1/0	0	0	1	0	0	0	0

Byte 1: Counter relay control byte

Meaning	Bit 7	6	5	4	3	2	1	0
Not assigned			0	0	0	0	0	0
Does not appear in the Parameters menu		1						
Appears in the Parameters menu		0						
Processing	1							

Byte 2: Counter value (low byte)
Data type: hexadecimal

Value	Bit							
	7	6	5	4	3	2	1	0
00_{hex}	0	0	0	0	0	0	0	0
FF_{hex}	1	1	1	1	1	1	1	1

Byte 3: Counter value (high byte)
Data type: hexadecimal

Value	Bit							
	7	6	5	4	3	2	1	0
00_{hex}	0	0	0	0	0	0	0	0
FF_{hex}	1	1	1	1	1	1	1	1

Response from slave

Byte 0: Acknowledge response

Meaning	Bit							
	7	6	5	4	3	2	1	0
Response bit	1/0							
Fixed		1						
Fixed			0					
EASY204-DP write command rejected, not OK				0	0	0	0	0
Write command OK				0	0	0	0	1

Bytes 1 to 6 return a 0. These bytes are not used.

Example: Change counter relay setpoint
Counter relay C8 has the following features:

- 1532
- C8 is to be assigned the setpoint value 1542
- $0606_{hex} = 1542_{dec}$

Byte		Bit	
		7	0
Send			
0	10_{hex}	00010000	Bit 7: 1/0 toggle
1		10000000	
2	06_{hex}	00000110	
3	06_{hex}	00000110	
Acknowledge			
0		01000001	Bit 7: 1/0 toggle

Read time switches (channel, ON time, OFF time)

Byte	Meaning
Command	
0	Command (⏱1 channel A = $2B_{hex}$ to ⏱4 channel D = $3A_{hex}$)
Read	
0	Acknowledge response
1	Not relevant
2	Weekday, day starting, day ending, Parameters menu
3	ON switch time, minute
4	ON switch time, hour
5	OFF switch time, minute
6	OFF switch time, hour

⏱1 to ⏱4 depending on specified read range.

→ Note the Byte 0 Bit 7 data exchange procedure.

Command from master
Byte 0: Command code
Byte 0 = 2B to $3A_{hex}$

Control byte for	Command in hex	Bit 7	6	5	4	3	2	1	0
01 channel A	2B	0	0	1	0	1	0	1	1
01 channel B	2C	0	0	1	0	1	1	0	0
01 channel C	2D	0	0	1	0	1	1	0	1
01 channel D	2E	0	0	1	0	1	1	1	0
02 channel A	2F	0	0	1	0	1	1	1	1
02 channel B	30	0	0	1	1	0	0	0	0
02 channel C	31	0	0	1	1	0	0	0	1
02 channel D	32	0	0	1	1	0	0	1	0
03 channel A	33	0	0	1	1	0	0	1	1
03 channel B	34	0	0	1	1	0	1	0	0
03 channel C	35	0	0	1	1	0	1	0	1
03 channel D	36	0	0	1	1	0	1	1	0
04 channel A	37	0	0	1	1	0	1	1	1
04 channel B	38	0	0	1	1	1	0	0	0
04 channel C	39	0	0	1	1	1	0	0	1
04 channel D	3A	0	0	1	1	1	0	1	0

Response from slave
Byte 0: Acknowledge response

Meaning	Bit							
	7	6	5	4	3	2	1	0
Response bit	1/0							
Fixed		1						
Fixed			0					
EASY204-DP read command rejected, not OK				0	0	0	0	0
Read command OK				0	0	0	1	0

Byte 1: Not valid

	Bit							
	7	6	5	4	3	2	1	0
Not valid	x	X	x	x	x	x	x	x

Byte 2: Weekday, starting, ending, Parameters menu

	Bit							
	7	6	5	4	3	2	1	0
ON day								
None set						0	0	0
Monday						0	0	1
Tuesday						0	1	0
Wednesday						0	1	1
Thursday						1	0	0
Friday						1	0	1
Saturday						1	1	0
Sunday						1	1	1

	Bit							
	7	**6**	**5**	**4**	**3**	**2**	**1**	**0**
OFF day								
None set			0	0	0			
Monday			0	0	1			
Tuesday			0	1	0			
Wednesday			0	1	1			
Thursday			1	0	0			
Friday			1	0	1			
Saturday			1	1	0			
Sunday			1	1	1			
Switch time								
ON > OFF		1						
ON < OFF		0						
Appears in the Parameters menu								
No	1							
Yes	0							

Byte 3: Minute (ON time)

This byte specifies the minute (ON time) of the channel in hexadecimal format.

Value range: 00 to 59_{bcd}

Value	**Bit**							
	7	**6**	**5**	**4**	**3**	**2**	**1**	**0**
00_{bcd}	0	0	0	0	0	0	0	0
59_{bcd}	0	1	0	1	1	0	0	1

Byte 4: Hour (ON time)

This byte specifies the hour (ON time) of the channel in hexadecimal format.

Value range: 00 to 23_{bcd}

Value	Bit							
	7	6	5	4	3	2	1	0
00_{bcd}	0	0	0	0	0	0	0	0
23_{bcd}	0	0	1	0	0	0	1	1

Byte 5: Minute (OFF time)

This byte specifies the minute (OFF time) of the channel in hexadecimal format.

Value range: 00 to 59_{bcd}

Value	Bit							
	7	6	5	4	3	2	1	0
00_{bcd}	0	0	0	0	0	0	0	0
59_{bcd}	0	1	0	1	1	0	0	1

Byte 6: Hour (OFF time)

This byte specifies the hour (OFF time) of the channel in hexadecimal format.

Value range: 00 to 23_{bcd}

Value	Bit							
	7	6	5	4	3	2	1	0
00_{bcd}	0	0	0	0	0	0	0	0
23_{bcd}	0	0	1	0	0	0	1	1

Example:
Channel "A" 4 has the following data:

- Day: Monday (001) to Friday (101)
- ON: 19:00
- OFF: 06:30
- Switch time ON > OFF (1)
- Channel appears in the Parameters menu

Byte		Bit 7 0	
Send			
0	37_{hex}	00110111	Bit 7: 1/0 toggle
Acknowledge			
0	42_{hex}	01000010	Read command OK
1	xx	xxxxxxxx	Values not valid
2	69_{bcd}	01101001	Parameters menu, on/off direction, switch times, weekdays
3	00_{bcd}	00000000	ON switch time, minute
4	19_{bcd}	00011001	ON switch time, hour
5	30_{bcd}	00110000	OFF switch time, minute
6	06_{bcd}	00000110	OFF switch time, hour

Write time switch (channel, ON time, OFF time)

Byte	Meaning
Write	
0	Command (⏱1 channel A = 12_{hex} to ⏱4 channel D = 21_{hex})
1	Weekday, day starting, day ending, Parameters menu
2	ON switch time, minute
3	ON switch time, hour
4	OFF switch time, minute
5	OFF switch time, hour
Read	
0	Acknowledge response

⏱1 to ⏱4 depending on specified write range.

→ Note the Byte 0 Bit 7 data exchange procedure.

The values are part of an "*.eas file". If these values are changed, the original "*.eas file" no longer matches the one in the EASY6...

Remember this feature when uploading, downloading and comparing "easy" circuit diagrams with EASY-SOFT.

When downloading from the PC the latest version of the "*.eas" is overwritten.

The comparison shows that the circuit diagrams are not identical.

Command from master
Byte 0: Command code
Byte 0 = 12 to 21_{hex}

Control byte for	Command in hex	Bit 7	6	5	4	3	2	1	0
01 channel A	12	0	0	0	1	0	0	1	0
01 channel B	13	0	0	0	1	0	0	1	1
01 channel C	14	0	0	0	1	0	1	0	0
01 channel D	15	0	0	0	1	0	1	0	1
02 channel A	16	0	0	0	1	0	1	1	0
02 channel B	17	0	0	0	1	0	1	1	1
02 channel C	18	0	0	0	1	1	0	0	0
02 channel D	19	0	0	0	1	1	0	0	1
03 channel A	1A	0	0	0	1	1	0	1	0
03 channel B	1B	0	0	0	1	1	0	1	1
03 channel C	1C	0	0	0	1	1	1	0	0
03 channel D	1D	0	0	0	1	1	1	0	1
04 channel A	1E	0	0	0	1	1	1	1	0
04 channel B	1F	0	0	0	1	1	1	1	1
04 channel C	20	0	0	1	0	0	0	0	0
04 channel D	21	0	0	1	0	0	0	0	1

Byte 1: Weekday, starting, ending, Parameters menu

	Bit							
	7	**6**	**5**	**4**	**3**	**2**	**1**	**0**
ON day								
None set						0	0	0
Monday						0	0	1
Tuesday						0	1	0
Wednesday						0	1	1
Thursday						1	0	0
Friday						1	0	1
Saturday						1	1	0
Sunday						1	1	1
OFF day								
None set			0	0	0			
Monday			0	0	1			
Tuesday			0	1	0			
Wednesday			0	1	1			
Thursday			1	0	0			
Friday			1	0	1			
Saturday			1	1	0			
Sunday			1	1	1			
Switch time								
ON > OFF		1						
ON < OFF		0						
Appears in the Parameters menu								
No	1							
Yes	0							

Byte 2: Minute (ON time)
This byte specifies the minute (ON time) of the channel in hexadecimal format.

Value range: 00 to 59_{bcd}

Value	Bit							
	7	6	5	4	3	2	1	0
00_{bcd}	0	0	0	0	0	0	0	0
59_{bcd}	0	1	0	1	1	0	0	1

Byte 3: Hour (ON time)
This byte specifies the hour (ON time) of the channel in hexadecimal format.

Value range: 00 to 23_{bcd}

Value	Bit							
	7	6	5	4	3	2	1	0
00_{bcd}	0	0	0	0	0	0	0	0
23_{bcd}	0	0	1	0	0	0	1	1

Byte 4: Minute (OFF time)
This byte specifies the minute (OFF time) of the channel in hexadecimal format.

Value range: 00 to 59_{bcd}

Value	Bit							
	7	6	5	4	3	2	1	0
00_{bcd}	0	0	0	0	0	0	0	0
59_{bcd}	0	1	0	1	1	0	0	1

Byte 5: Hour (OFF time)

This byte specifies the hour (OFF time) of the channel in hexadecimal format.

Value range: 00 to 23_{bcd}

Value	Bit							
	7	6	5	4	3	2	1	0
00_{bcd}	0	0	0	0	0	0	0	0
23_{bcd}	0	0	0	1	0	0	1	1

Byte 6: Not used

Response from slave

Byte 0: Acknowledge response

Meaning	Bit							
	7	6	5	4	3	2	1	0
Response bit	1/0							
Fixed		1						
Fixed			0					
EASY204-DP write command rejected, not OK				0	0	0	0	0
Write command OK				0	0	0	0	1

Example:

Channel "C" 02 has the following data:

- Day: Monday (001) to Friday (101)
- ON: 19:00
- OFF: 06:30
- Switch time ON > OFF (1)
- Channel appears in the Parameters menu (0)

Channel "C" 2 is to be assigned following data:

- Day: Tuesday (010) to Saturday (110)
- ON: 10:00
- OFF: 17:30
- Switch time ON < OFF (0)
- Channel does not appear in the Parameters menu (1)

Byte		**Bit**	
		7 0	
Send			
0	18_{hex}	00011000	Bit 7: 1/0 toggle
1		10110010	Parameters menu, on/off direction, switch times, week-days
2	00_{bcd}	00000000	ON switch time, minute
3	10_{bcd}	00010000	ON switch time, hour
4	30_{bcd}	00110000	OFF switch time, minute
5	17_{bcd}	00010111	OFF switch time, hour
Acknowledge			
0	41_{hex}	01000001	Write command OK

Read analog and digital inputs (I7, I8, I1 to I16)

Byte	Meaning
Command	
0	Command ($3D_{hex}$)
Read	
0	Acknowledge response
1	Analog value of I7
2	Analog value of I8
3	Status of inputs I1 to I8
4	Status of inputs I9 to I12, I15, I16

The following command is used to read the values of both analog inputs I7, I8 (only EASY...-DC-..) and the logical states of the digital inputs I1 to I16.

→ Note the Byte 0 Bit 7 data exchange procedure.

Command from master

Byte 0: Command code

Byte 0 = $3D_{hex}$

Control byte	Bit							
	7	**6**	**5**	**4**	**3**	**2**	**1**	**0**
$3D_{hex}$	0	0	1	1	1	1	0	1

Response from slave

Byte 0: Acknowledge response

Meaning	Bit							
	7	6	5	4	3	2	1	0
Response bit	1/0							
Fixed		1						
Fixed			0					
EASY204-DP read command rejected, not OK				0	0	0	0	0
Read command OK				0	0	0	1	0

Byte 1: Analog value I7 in hexadecimal format

Value range: 00 to 64_{hex}

Value	Task:
1 V	$0A_{hex}$
5 V	32_{hex}
10 V	64_{hex}

Value (analog)	Bit							
	7	6	5	4	3	2	1	0
I7 00_{hex}	0	0	0	0	0	0	0	0
I7 64_{hex}	0	1	1	0	0	1	0	0

Byte 2: Analog value I8 in hexadecimal format

Value range: 00 to 64_{hex}

Value	Task:
1 V	$0A_{hex}$
6 V	$3C_{hex}$
9 V	$5A_{hex}$

Value (analog)	Bit							
	7	6	5	4	3	2	1	0
I8 00_{hex}	0	0	0	0	0	0	0	0
I8 64_{hex}	0	1	1	0	0	1	0	0

Byte 3: Status of inputs I1 to I8

Value 0 = switched off
Value 1 = switched on

Value	Bit							
	7	6	5	4	3	2	1	0
I1								0/1
I2							0/1	
I3						0/1		
I4					0/1			
I5				0/1				
I6			0/1					
I7		0/1						
I8	0/1							

Byte 4: Status of inputs I9 to I12, I15, I16

Value 0 = switched off
Value 1 = switched on

→ I13 = 0, I14 = 0
If I14 = 1, EASY204-DP has disconnected from the basic unit.

Value	Bit							
	7	**6**	**5**	**4**	**3**	**2**	**1**	**0**
I9								0/1
I10							0/1	
I11						0/1		
I12					0/1			
0				0				
0			0					
I15		0/1						
I16	0/1							

→ I15, I16 are the short-circuit signals for EASY...-DC-.. transistor versions.

Write analog value comparator (function, comparison values)

Byte	Meaning
Write	
0	Command (22 to 29_{hex})
1	Comparison type, comparison values, Parameters menu
2	Comparison value
Read	
0	Acknowledge response

A1 to A8 according to specification in write range.

→ Note the Byte 0 Bit 7 data exchange procedure.

The comparison values and the function are part of an "*.eas file". If these values are changed, the original "*.eas file" no longer matches the one in the EASY6...

Remember this feature when uploading, downloading or comparing "easy" circuit diagrams with EASY-SOFT.

When downloading from the PC the latest version of the "*.eas" is overwritten.

The comparison shows that the circuit diagrams are not identical.

Command from master
Byte 0: Command code
Values from 22 to 29_{hex}

Control byte for	Commands in hex	Bit 7	6	5	4	3	2	1	0
A1	22	0	0	1	0	0	0	1	0
A2	23	0	0	1	0	0	0	1	1
A3	24	0	0	1	0	0	1	0	0
A4	25	0	0	1	0	0	1	0	1
A5	26	0	0	1	0	0	1	1	0
A6	27	0	0	1	0	0	1	1	1
A7	28	0	0	1	0	1	0	0	0
A8	29	0	0	1	0	1	0	0	1

Byte 1: Control byte analog value comparator: Comparator

Meaning	Bit 7	6	5	4	3	2	1	0
Compare: "≧"								0
Compare: "≦"								1
I7 to I8						0	0	
I7 to constant						0	1	
I8 to constant						1	0	
Fixed			0	0	0			
Does not appear in the Parameters menu		1						
Appears in the Parameters menu		0						
Processing	1							

Byte 2: Comparison value for comparison with constant

This byte specifies the comparison value for comparison with a constant.

Value range: 00 to 63_{hex}

Value	Bit							
	7	6	5	4	3	2	1	0
00_{hex}	0	0	0	0	0	0	0	0
63_{hex}	0	1	1	0	0	0	1	1

Response from slave

Byte 0: Acknowledge response

Meaning	Bit							
	7	6	5	4	3	2	1	0
Response bit	1/0							
Fixed		1						
Fixed			0					
EASY204-DP write command rejected, not OK				0	0	0	0	0
Write command OK				0	0	0	0	1

Example:

The analog value comparison A8 has the following features:

- Compare I7 < 4.7 V

The comparison value is reduced to 4.2 V.

Byte		Bit 7 0	
0	29_{hex}	00101001	Bit 7: 1/0 toggle
1		10000011	I7 <= Value
2	$2A_{hex}$	00101010	Comparison value
Acknowledge			
0	41_{hex}	01000001	Write command OK

Read status of P buttons and operating buttons

Byte	Meaning
Command	
0	Command ($3E_{hex}$)
Read	
0	Acknowledge response
1	Status of buttons

The following command is used to read the logical state of the digital pushbutton inputs P1 to P4.

→ Note the Byte 0 Bit 7 data exchange procedure.

The P buttons must be activated in order to read them.

Command from master

Byte 0: Command code

Byte 0 = $3E_{hex}$

Control byte	Bit							
	7	**6**	**5**	**4**	**3**	**2**	**1**	**0**
$3E_{hex}$	0	0	1	1	1	1	1	0

Response from slave
Byte 0: Acknowledge response

Meaning	Bit							
	7	6	5	4	3	2	1	0
Response bit	1/0							
Fixed		1						
Fixed			0					
EASY204-DP read command rejected, not OK				0	0	0	0	0
Read command OK				0	0	0	1	0

Byte 1: Status of pusbuttons

The status of the pushbuttons is only displayed if

- a P button is used in the circuit diagram and
- the pusbuttons are activated on the device.

Meaning	Bit							
	7	6	5	4	3	2	1	0
Status P1								0/1
Status P2							0/1	
Status P3						0/1		
Status P4					0/1			
ESC not pressed/pressed				0/1				
OK not pressed/pressed			0/1					
DEL not pressed/pressed		0/1						
ALT not pressed/pressed	0/1							

Read status of timing relay, time switches and analog value comparator

Byte	Meaning
Command	
0	Command ($3F_{hex}$)
Read	
0	Acknowledge response
1	Status of timing relay
2	Status of counter relays
3	Status of time switches
4	Status of analog value comparators

The following command reads the logical state of all timing relays, time switches and analog value comparators.

→ Note the Byte 0 Bit 7 data exchange procedure.

Command from master

Byte 0: Command code

Byte 0 = $3F_{hex}$

Control byte	Bit							
	7	**6**	**5**	**4**	**3**	**2**	**1**	**0**
$3F_{hex}$	0	0	1	1	1	1	1	1

Response from slave
Byte 0: Acknowledge response

Meaning	Bit							
	7	6	5	4	3	2	1	0
Response bit	1/0							
Fixed		1						
Fixed			0					
EASY204-DP read command rejected, not OK				0	0	0	0	0
Read command OK				0	0	0	1	0

Byte 1: Status of timing relays

	Bit							
	7	6	5	4	3	2	1	0
T1								0/1
T2							0/1	
T3						0/1		
T4					0/1			
T5				0/1				
T6			0/1					
T7		0/1						
T8	0/1							

Byte 2: Status of the counter relays

	Bit							
	7	**6**	**5**	**4**	**3**	**2**	**1**	**0**
C1								0/1
C2							0/1	
C3						0/1		
C4					0/1			
C5				0/1				
C6			0/1					
C7		0/1						
C8	0/1							

Byte 3: Status of time switches

	Bit							
	7	**6**	**5**	**4**	**3**	**2**	**1**	**0**
01								0/1
02							0/1	
03						0/1		
04					0/1			
				0				
			0					
		0						
	0							

Byte 4: Status of analog value comparators

	Bit							
	7	**6**	**5**	**4**	**3**	**2**	**1**	**0**
A1								0/1
A2							0/1	
A3						0/1		
A4					0/1			
A5				0/1				
A6			0/1					
A7		0/1						
A8	0/1							

Read markers, digital outputs and text display

Byte	Meaning
Command	
0	Command (40_{hex})
Read	
0	Acknowledge response
1	Status of markers M1 to M8
2	Status of markers M9 to M16
3	Status of digital outputs Q1 to Q8
4	Status of text display markers D1 to D8

The following command will read the logical state of all markers M1 to M16, digital outputs Q1 to Q7, text display markers D1 to D8.

→ Note the Byte 0 Bit 7 data exchange procedure.

Command from master

Byte 0: Command code

Byte 0 = 40_{hex}

Control byte	Bit							
	7	**6**	**5**	**4**	**3**	**2**	**1**	**0**
40_{hex}	0	1	0	0	0	0	0	0

Response from slave
Byte 0: Acknowledge response

Meaning	Bit							
	7	6	5	4	3	2	1	0
Response bit	1/0							
Fixed		1						
Fixed			0					
EASY204-DP read command rejected, not OK				0	0	0	0	0
Read command OK				0	0	0	1	0

Byte 1: Status of markers M1 to M8

	Bit							
	7	6	5	4	3	2	1	0
M1								0/1
M2							0/1	
M3						0/1		
M4					0/1			
M5				0/1				
M6			0/1					
M7		0/1						
M8	0/1							

Byte 2: Status of markers M9 to M16

	Bit							
	7	**6**	**5**	**4**	**3**	**2**	**1**	**0**
M9								0/1
M10							0/1	
M11						0/1		
M12					0/1			
M13				0/1				
M14			0/1					
M15		0/1						
M16	0/1							

Byte 3: Status of digital outputs Q1 to Q8

	Bit							
	7	**6**	**5**	**4**	**3**	**2**	**1**	**0**
Q1								0/1
Q2							0/1	
Q3						0/1		
Q4					0/1			
Q5				0/1				
Q6			0/1					
Q7		0/1						
Q8	0/1							

Byte 4: Status of text display markers D1 to D8

	Bit							
	7	**6**	**5**	**4**	**3**	**2**	**1**	**0**
D1								0/1
D2							0/1	
D3						0/1		
D4					0/1			
D5				0/1				
D6			0/1					
D7		0/1						
D8	0/1							

Appendix

What Happens If ...?

Event	Explanation	Remedy
POW LED not lit	No power supply	Connect and switch on power supply
POW LED flashing	Data transfer via EASY-LINK OK	
BUS LED not lit	No PROFIBUS-DP data communication	Connect and start PROFIBUS-DP
BUS LED lit	Data transfer via PROFIBUS-DP OK	
Slave not signalling	– No slave address set – No bus terminating resistor present – Cable, plug faulty – No power supply	– Set slave address – Set bus terminating resistors – Check connection – Provide power supply to device
Write command rejected	– Command not permissible – EASY Display not on the Status display	– Change command – Show Status display
Actual value is zero	No actual value present	Function relay does not have an actual value or not triggered

Overview of commands and content of bytes

Data input module

Byte	Meaning
0	Operating mode
1	Status of EASY outputs S1 to S8
2	Not assigned

Data output module

Byte	Meaning
0	Operating mode
1	Status of EASY inputs R9 to R16
2	Status of EASY inputs R1 to R8

Control commands

Read time

Byte	Meaning
Command	
0	Command ($3C_{hex}$)
Read (Acknowledge)	
0	Acknowledge response
1	Weekday
2	Hour
3	Minute
4	Winter/summer time (DST)

Write time

Byte	Meaning
Write	
0	Command ($2A_{hex}$)
1	Weekday
2	Hour
3	Minute
4	Winter/summer time (DST)
Read (Acknowledge)	
0	Acknowledge response

Read timing relay actual value

Byte	Meaning
Command	
0	Command (T1 = 41 to T8 = 48_{hex})
Read (Acknowledge)	
0	Acknowledge response
1	Timing relay, time base, control status
2	Value (low byte)
3	Value (high byte)

Write timing relay setpoint

Byte	Meaning
Write	
0	Command (T1 = 01 to T8 = 08_{hex})
1	Timing relay function, time base, Parameters menu
2	Value --.xx with time base "s"
3	Value xx.-- with time base "s" or--:xx with time base "M:S"
4	Value xx:-- with time base "M:S" or--:xx with time base "H:M"
5	Value xx:-- with time base "H:M"
Read	
0	Acknowledge response
1	Not relevant
2	Value --.xx with time base "s"
3	Value xx.-- with time base "s" or--:xx with time base "M:S"

Byte	Meaning
4	Value xx:-- with time base "M:S" or--:xx with time base "H:M"
5	Value xx:-- with time base "H:M"
6	Hour value in days

Read counter relay actual value

Byte	Meaning
Command	
0	Command (C1 = 49 to C8 = 50_{hex})
Read	
0	Acknowledge response
1	Not relevant
2	Actual value (low byte)
3	Actual value (high byte)

Write counter relay setpoint

Byte	Meaning
Write	
0	Command (C1 = 09 to C8 = 10_{hex})
1	Parameters menu
2	Setpoint value (low byte)
3	Setpoint value (high byte)
Read	
0	Acknowledge response

Read time switch (channel, ON time, OFF time)

Byte	Meaning
Command	
0	Command (1 channel A = $2B_{hex}$ to 4 channel D = $3A_{hex}$)
Read	
0	Acknowledge response
1	Not relevant
2	Weekday, day starting, day ending, Parameters menu
3	ON switch time, minute
4	ON switch time, hour
5	OFF switch time, minute
6	OFF switch time, hour

Write time switch (channel, ON time, OFF time)

Byte	Meaning
Write	
0	Command (1 channel A = 12_{hex} to 4 channel D = 21_{hex})
1	Weekday, day starting, day ending, Parameters menu
2	ON switch time, minute
3	ON switch time, hour
4	OFF switch time, minute
5	OFF switch time, hour
Read	
0	Acknowledge response

Read analog and digital inputs

Byte	Meaning
Command	
0	Command ($3D_{hex}$)
Read	
0	Acknowledge response
1	Analog value of I7
2	Analog value of I8
3	Status of inputs I1 to I8
4	Status of inputs I9 to I12, I15, I16

Write analog value comparators (function, comparator values)

Byte	Meaning
Write	
0	Command (22 to 29_{hex})
1	Comparison type, comparison values, Parameters menu
2	Comparison value
Read	
0	Acknowledge response

Read status of P buttons and operator buttons

Byte	Meaning
Command	
0	Command ($3E_{hex}$)
Read	
0	Acknowledge response
1	Status of buttons

Read status of timing relays, counter relays, time switches and analog value comparators

Byte	Meaning
Command	
0	Command ($3F_{hex}$)
Read	
0	Acknowledge response
1	Status of timing relay
2	Status of counter relays
3	Status of time switches
4	Status of analog value comparators

Read status of markers, digital outputs and text display markers

Byte	Meaning
Command	
0	Command (40_{hex})
Read	
0	Acknowledge response
1	Status of markers M1 to M8
2	Status of markers M9 to M16
3	Status of digital outputs Q1 to Q8
4	Status of text display markers D1 to D8

Overview of commands in ascending order

Command value hex	
01	Write T1 timing relay setpoint
02	Write T2 timing relay setpoint
03	Write T3 timing relay setpoint
04	Write T4 timing relay setpoint
05	Write T5 timing relay setpoint
06	Write T6 timing relay setpoint
07	Write T7 timing relay setpoint
08	Write T8 timing relay setpoint
09	Write counter relay setpoint
0A	Write C2 counter relay setpoint
0B	Write C3 counter relay setpoint
0C	Write C4 counter relay setpoint
0D	Write C5 counter relay setpoint
0E	Write C6 counter relay setpoint
0F	Write C7 counter relay setpoint
10	Write C8 counter relay setpoint
12	Write time switch 1 channel A
13	Write time switch 1 channel B
14	Write time switch 1 channel C
15	Write time switch 1 channel D
16	Write time switch 2 channel A
17	Write time switch 2 channel B
18	Write time switch 2 channel C
19	Write time switch 2 channel D
1A	Write time switch 3 channel A
1B	Write time switch 3 channel B
1C	Write time switch 3 channel C

Command value hex	
1D	Write time switch 3 channel D
1E	Write time switch 4 channel A
1F	Write time switch 4 channel B
20	Write time switch 4 channel C
21	Write time switch 4 channel D
22	Write analog value comparator A1
23	Write analog value comparator A2
24	Write analog value comparator A3
25	Write analog value comparator A4
26	Write analog value comparator A5
27	Write analog value comparator A6
28	Write analog value comparator A7
29	Write analog value comparator A8
2A	Write time
2B	Read time switch 1 channel A
2C	Read time switch 1 channel B
2D	Read time switch 1 channel C
2E	Read time switch 1 channel D
2F	Read time switch 2 channel A
30	Read time switch 2 channel B
31	Read time switch 2 channel C
32	Read time switch 2 channel D
33	Read time switch 3 channel A
34	Read time switch 3 channel B
35	Read time switch 3 channel C
36	Read time switch 3 channel D
37	Read time switch 4 channel A
38	Read time switch 4 channel B

Command value hex	
39	Read time switch 4 channel C
3A	Read time switch 4 channel D
3C	Read time
3D	Read status of analog and digital inputs
3E	Read status of P buttons and operator buttons
3F	Read status of timing relays, counter relays, time switches and analog value comparators
40	Read status of markers, digital outputs and text display markers
41	Read T1 actual value
42	Read T2 actual value
43	Read T3 actual value
44	Read T4 actual value
45	Read T5 actual value
46	Read T6 actual value
47	Read T7 actual value
48	Read T8 actual value
49	Read C1 counter relay actual value
4A	Read C2 counter relay actual value
4B	Read C3 counter relay actual value
4C	Read C4 counter relay actual value
4D	Read C5 counter relay actual value
4E	Read C6 counter relay actual value
4F	Read C7 counter relay actual value
50	Read C8 counter relay actual value

Technical Data

General

Standards and regulations	EN 55011, EN 55022, IEC/EN 61-4, IEC 60068-2-27, IEC 61158
Dimensions	35.5 × 90 × 53
Weight	150 g
Mounting	Top-hat rail to DIN 50022, 35 mm Screw fixing with mounting feet ZB4-101-GF1 (accessories)

Ambient temperatures

Ambient temperature Installed horizontally/vertically	Cold to IEC 60068-2-1 Heat to IEC 60068-2-2	–25 to 55 °C
Condensation		Prevent condensation with suitable measures
Storage/transport temperature		–40 to +70 °C
Relative air humidity	IEC 60068-2-30	5 to 95 %, non-condensing
Air pressure (operation)		795 to 1080 hPa
Corrosion resistance	IEC 60068-2-42 IEC 60068-2-43	SO_2 10 cm^3/m^3, 4 days H_2S 1 cm^3/m^3, 4 days

Ambient mechanical conditions

Pollution degree		2
Degree of protection	EN 50178 IEC 60529 VBG4	IP20
Oscillations	IEC 60068-2-6	10 to 57 Hz (constant amplitude 0.15 mm) 57 to 150 Hz (constant acceleration 2 g)
Shocks	IEC 60068-2-27	18 shocks (semi-sinusoidal 15 g/11 ms)
Drop	IEC 60068-2-31	Drop height 50 mm
Free fall, packaged	IEC 60068-2-32	1 m

Electromagnetic compatibility (EMC)

Electrostatic discharge	IEC/EN 61000-4-2, degree of severity 3	8 kV air discharge, 6 kV contact discharge
Electromagnetic fields	IEC/EN 61000-4-3	Field strength 10 V/m
Radio interference suppression	EN 55011, EN 55022	Limit class A
Burst	IEC/EN 61000-4-4, degree of severity 3	2 kV supply lines, 1 kV signal lines
High-energy pulses (surge)		
EASY...-DC...	IEC/EN 61000-4-5, degree of severity 2	0.5 kV power cable symmetrical
Line-conducted interference	IEC/EN 61000-4-6	10 V

Dielectric strength

Measurement of the air clearance and creepage distance	EN 50178, UL 508, CSC C22.2 No 142
Dielectric strength	EN 50178

Tools and cable cross-sections

Solid	
min.	0.2 mm^2, AWG 22
max.	4 mm^2, AWG 12
Flexible with ferrule	
min.	0.2 mm^2, AWG 22
max.	2.5 mm^2, AWG 12
Slot-head screwdriver, width	3.5 × 0.8 mm
Tightening torque max.	0.5 Nm

Power supply

Rated voltage	
Rated value	24 V DC, –15 %, +20 %
Permissible range	20.4 to 28.8 V DC
Residual ripple	< 5 %
Input current at 24 V DC	Normally 200 mA
Voltage dips (IEC/EN 61131-2)	10 ms
Power dissipation at 24 V DC	Normally 4.8 W

Status LEDs

Power LED (POW)	green
PROFIBUS-DP LED (BUS)	green

PROFIBUS-DP

Device connection	SUB-D 9-pole, socket
Electrical isolation	Bus to power supply (simple) Bus and power supply to "easy" basic unit (safe isolation)
Function	PROFIBUS-DP slave
Interface	RS 485
Bus protocol	PROFIBUS-DP
Baud rates	Automatic search up to 12 MBd
Bus terminating resistors	Connectable via plug
Bus addresses	1 to 126 addressable via "easy" basic unit with display or EASY-SOFT
Services	
Inputs module	All data S1 to S8 (EASY6..)
Output module	All data R1 to R16 (EASY6..)
Control commands module	Read/Write Time, day, summer/winter time (DST) All parameters of the EASY function relays

Dimensions

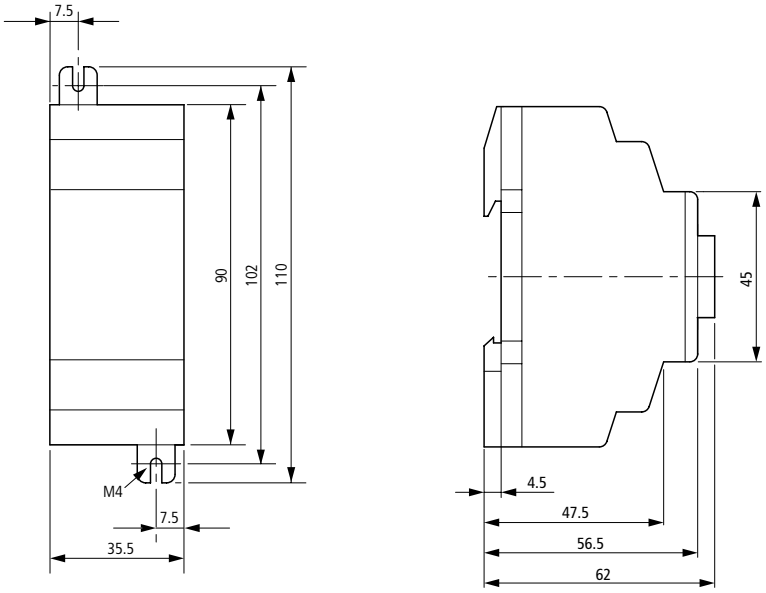


Figure 9: Dimensions EASY204-DP

GSD file

```
Moeller GmbH
; Device: EASY204-DP
; Version: V1.0
; Date: 07.03.01
Author: Dieter Bauerfeind
; Description: GSD file for EASY-DP slave module
Modifications:
;
;
; Copyright (c) 2000 by Moeller GmbH
;=======================================================
#PROFIBUS_DP

GSD_Revision            = 1
Vendor_Name             = "Moeller GmbH"
Model_Name              = "EASY204-DP"
Revision                = "1.0"
Ident_Number            = 0x4D10
Protocol_Ident          = 0 ; PROFIBUS-DP
Station_Type            = 0 ; DP-Slave
FMS_supp                = 0
Hardware_Release        = "V1.0"
Software_Release        = "V1.0"
9.6_supp                = 1
19.2_supp               = 1
93.75_supp              = 1
187.5_supp              = 1
500_supp                = 1
1.5M_supp               = 1
3M_supp                 = 1
6M_supp                 = 1
12M_supp                = 1
```

```
MaxTsdr_9.6             = 60
MaxTsdr_19.2            = 60
MaxTsdr_93.75           = 60
MaxTsdr_187.5           = 60
MaxTsdr_500             = 100
MaxTsdr_1.5M            = 150
MaxTsdr_3M              = 250
MaxTsdr_6M              = 450
MaxTsdr_12M             = 800

Redundancy              = 0
Repeater_Ctrl_Sig       = 1
24V_Pins                = 0

; Bitmap_Device = "EASY_N"
; Bitmap_Diag = "EASY_D"
; Bitmap_SF = "EASY_N"
; the following functions are tested for the certification

Freeze_Mode_supp        = 1
Sync_Mode_supp          = 1
Auto_Baud_supp          = 1
Set_Slave_Add_supp      = 1
Fail_safe               = 0
; Slave belongs to switchgear family
Slave_Family            = 2
; Slave implemented with PROFIBUS-DP-ASIC VPC3.
Implementation_Type     = "VPC3"
;
```

```
Min_Slave_Interval      = 2
Modular_Station         = 1
Max_Module              = 3
Modul_Offset            = 0
Max_Input_Len           = 10
Max_Output_Len          = 10
Max_Data_Len            = 20
User_Prm_Data_Len       = 0
Max_Diag_Data_Len       = 9
Unit_Diag_Bit(0000)     = "EASY-LINK disconnected"

Module                  = "1: Control commands 7 Byte" 0xB6
; General ID format
; 7 bytes I/O control commands; consistency via entire length
;Preset                 = 1
EndModule

Module                  = "2: inputs 3 bytes" 0x92
; General ID format
; 3 byte inputs; consistency via the entire length
;Preset                 = 1
EndModule

Module                  = "3: outputs 3 bytes" 0xA2
; General ID format
; 3 byte outputs; consistency via the entire length
; Preset                = 1
EndModule
```

Glossary

This glossary refers to subjects relating to PROFIBUS-DP.

Acknowledge	Acknowledge signal of the receiver for the signal received.
Active metal component	Conductor or conductive component that is live when in operation.
Address	Identification number of a memory location, a system or module within a network.
Addressing	Assignment and setting of an address for a module in a network.
Analog	Value of a voltage, for example, that is continuously varying in proportion to the voltage it represents. With analog signals the value of the signal can take on any value within the limits specified.
Automation device	Control device with inputs and outputs that is connected to a technical process. Programmable controllers (PLCs) are a special group of automation devices.
Baud	Unit of measure of the data transmission speed. One baud corresponds to the transmission of one bit per second (Bit/s).
Baud rate	Unit of measure of the data transmission speed in Bit/s.
Bidirectional	Working in both directions.
Bonding strap	Flexible conductor, usually braided that connects inactive equipment parts such as the door of a switch cabinet with the frame of the switch cabinet itself.
Bus	Central cable system for data exchange, such as between CPU, memory and I/O level. A bus can consist of several parallel cables for data transfer, addressing, control and power supply.
Bus cycle time	Time interval in which a master serves all slaves and stations in a bus system, i.e.writes its outputs and reads its inputs.

Bus line	Smallest unit connected to a bus consisting of a PLC, a coupling element for modules on the bus and a module.
Bus system	The entirety of all units that communicate with each other via a bus.
Bus terminating resistor	Resistor at the beginning and end of a bus line for preventing disturbance caused by signal reflections and providing bus cable matching. Bus terminating resistors must always be the last unit at the end of a bus segment.
Capacitive coupling	Capacitive (electrical) coupling occurs between conductors that have different potentials. Typical interference sources include parallel signal cables, contactors and static discharges.
Coding element	Two-part element for the unambiguous allocation of electronic and basic module.
Command-capable modules	Command-capable modules are modules with an internal memory set that are capable of executing particular commands (e.g. output substitute values).
Configure	Systematic arrangement of the I/O modules of a station.
CPU	Abbreviation for "Central Processing Unit". Central unit for data processing, the core of a computer.
Digital	Value of a voltage, for example, that can only be represented by a certain number of states within a defined range, usually defined as "0" and "1".
DIN	Abbreviation for "Deutsches Institut für Normungen e.V." (German standards institute).
EMC	Abbreviation for "Electromagnetic Compatibility". The ability of electrical equipment to function trouble-free within a particular environment without a negative effect on the environment concerned.
EN	Abbreviation for "European Norm" or European standard.
Equipment, electrical	All appliances used for the generation, conversion, transmission, distribution and application of electrical energy, such as cables, machines, control devices.
ESD	Abbreviation for "Electrostatic Discharge".

Field bus	Data network on the sensor/actuator level. A field bus connects the devices of the field level. A field bus is characterized by high transmission security and real-time response.
Field supply	Voltage supply to field devices as well as signal voltage.
Frame	Entirety of all interconnected inactive equipment parts that do not have any contact voltage in the event of a fault.
Galvanic coupling	A galvanic coupling occurs when two circuits use the same cable. Typical interference sources include starting motors, static discharges, clocked devices, and a potential difference between the housing of components and the common power supply.
GND	Abbreviation for "GROUND" (0 potential).
Ground	In electrical engineering the name for conductive earth with an electrical potential at any point equal to zero. In the environment of grounding devices, the electrical ground potential may not equal zero. This is called a "reference ground".
ground (verb)	Connection of an electrical conductive component via a grounding device with the ground connection.
Ground connection	One or several components that have a direct and good contact with the ground.
GSD	The device master data files (GSD) contain standardized PROFIBUS station descriptions. They are used to simplify the configuration of the DP master and DP slaves.
hexadecimal	Number system with base 16. Counting from 0 to 9 and then with the letters A, B, C, D, E and F.
I/O	Abbreviation for "Input/Output".
Impedance	Apparent resistance that a component or circuit of several components has for an alternating current at a particular frequency.
Inactive metal parts	Conductive parts that cannot be touched and which are insulated from active metal parts. They can, however, take voltage in the event of a fault.

Inductive coupling	Inductive (magnetic) coupling occurs between two current carrying conductors. The magnetism produced by the currents induces an interference voltage. Typical interference sources include transformers, motors, parallel cables and HF signal cables.
Isolated	Galvanic isolation of the reference potentials of control and load current circuits of I/O modules.
Lightning protection	All measures implemented in order to protect a system from damage caused by overvoltage produced by lightning.
Low impedance connection	Connection with a low resistance to alternating current.
LSB	Abbreviation for "Least Significant Bit". Bit with the lowest significance.
Master	Station in a bus system that controls the communication between the other stations of the bus system.
Master-slave mode	Operating mode in which a station operates as the master to control the communication on the bus.
Mode	Operating mode.
Module bus	The module bus is the internal bus of a XI/ON station. This bus allows communication between the XI/ON modules and the gateway. It operates independently to the field bus.
MSB	Abbreviation for "Most Significant Bit". Bit with the highest significance.
Multi-master mode	Operating mode in which all stations in the system have equal communication rights on the bus.
Namur	German abbreviation for "Standards working group for measurement and control technology". Namur initiators are a special type of two-wire initiator. Their special design with a low internal resistance, fewer components, compact design, provide Namur initiators with a high level of reliability.
Non-isolated	Electrical connection of the reference potentials of control and load current circuits of I/O modules.
Overhead	System management time required in the system in each transmission cycle.

Parameter assignment	Assignment of parameters in the configuration software of the DP master for the individual stations on the bus and their modules.
PLC	Abbreviation for programmable logic controller.
Potential equalisation	Matching of the electrical levels of the bodies of electrical equipment and the bodies of external conductive bodies by means of an electrical connection.
PROFIBUS-DP	PROFIBUS bus system with the DP protocol. DP stands for "decentralized periphery". PROFIBUS-DP is based on DIN 19245 Part 1+4, and was integrated in the European field bus standard EN 50170. It is used for high-speed data exchange between the central DP master and the decentralized peripheral devices, the DP slaves. The comprehensive use is implemented by means of a multi-master concept.
PROFIBUS-DP address	Each PROFIBUS-DP station is assigned an unambiguous PROFIBUS-DP address by means of which it can be addressed by the master.
PROFIBUS-DP master	The PROFIBUS-DP master is the central station and controls the PROFIBUS access of all PROFIBUS-DP slaves.
PROFIBUS-DP slave	PROFIBUS-DP slaves are addressed by the PROFIBUS-DP master and exchange data with it at its request.
Protective conductor	A conductor required for the protection against dangerous currents, designated by the letters PE (abbreviation of "Protective Earth").
Radiated coupling	Radiated coupling occurs when an electromagnetic wave makes contact with a conductor structure. The impact of the wave induces currents and voltages. Typical interference sources include Spark gaps (spark plugs, collectors of electric motors) and transmitters (e.g. radio equipment) that are operated near to the cable structures concerned.
Reaction time	In a bus system the time interval between the sending of a read job and the receipt of the response. Within an input module, the time interval between the change of a signal at the input of the module and the output of the same signal on the bus system.

Reference ground	Ground potential in the area of grounding equipment. Unlike "ground", which always has zero potential, it may have any potential except zero.
Reference potential	Potential from which the voltages of all connected circuits are considered and/or measured.
Repeater	Booster for signals transferred via the bus.
RS 485	Serial interface in accordance with the EIA standard for high-speed data transmission via several transmitters.
Serial	Name for a type of data transmission by which data is transferred on one cable in succession (bit by bit).
Shield	Name of the conductive screen for cables, enclosures and cabinets.
Shielding	All measures and equipment used for connecting system parts with the shield.
Short-circuit-proof	Property of electrical equipment. Short-circuit-proof equipment has the ability to withstand the thermal and dynamic loads that may occur at the location of installation on account of a short-circuit.
Slave	Station in a bus system that is subordinate to the master.
Station	Functional unit or module consisting of several elements.
SUB-D plug	9-pole plug for connecting the field bus.
Topology	Geometric structure of a network or circuit arrangement.
UART	Abbreviation for "Universal Asynchronous Receiver/Transmitter". A "UART" is a logic circuit used for converting an asynchronous serial data sequence into a bit-parallel data sequence or vice versa.
Unidirectional	Working in one direction.

Index