ZPA PEČKY, a.s.

ANNEX OF MOUNTING INSTRUCTIONS

Actuators

MONED, MTNED
MPSED, MOKED

in network Profibus DP

CERTIFICATE

Management system as per
EN ISO 9001 : 2000

In accordance with TÜV CERT procedures, it is hereby certified that

ZPA Pečky, a.s.
Třída 5. května 166
289 11 Pečky
Czech Republic

applies a management system in line with the above standard for the following scope

Development and production of electric actuators, enclosures and sheet metal production.

Certificate Registration No. 04 100 950161
Audit Report No. 624 362/200

Valid until 2009-09-28
Initial certification 1995-03-01

G. Bräutigam
TÜV CERT Certification Body
at TÜV NORD CERT GmbH

Praha, 2006-09-29

This certification was conducted in accordance with the TÜV CERT auditing and certification procedures and is subject to regular surveillance audits.
TÜV NORD CERT GmbH Langemarckstrasse 20 45141 Essen www.tuev-nord-cert.com

TGA-ZM-30-96-00

TÜV NORD

CONTENTS

1. BUS BAR PROFIBUS DP

The industrial bus bar Profibus DP is one of bus bar types used in automation. The bus-bar system of exchanging data between automation systems and technological elements brings costs saving on cabling, putting into operation, and maintenance. It is the most used Profibus DP system in Europe.

1.1. Basic properties

The Profibus DP is designed for fast exchange of data on the lowest technological level. Communication is realized on a two-wire twisted line via the interface RS-485.

One bus bar can serve max. 126 users; of which one or several stations Master and units Slave. Master is e.g. an industrial computer or some PLC. Stations Slave are input/output devices, valves, and drives.

1.2. Operation on bus bar

If there are several stations Master on the bus bar they mutually transfer authorization for access by the method Token Passing. Each Master has certain units Slave assigned and contacts them by the Polling method. The units Slave are permitted to access this bus bar after this call. In this way, the station Master sends control words to the units Slave and reads their state information. Data are exchanged in cyclic way.

1.3. Functional possibilities

- Cyclic data transfer between the station Master and the assigned units Slave.
- Dynamic activation and deactivation of the assigned units Slave by the station Master.
- Testing of configuration of the units Slave by the station Master.
- Synchronization of inputs and/or outputs.
- Diagnostic functions and operation monitoring.

2. CONTROL UNITS DMS2 (SLAVE)

For work in the network Profibus DP, the actuators MONED, MTNED, MPSED, MOKED use the control units DMS2.ZPR and DMS2.PR2. The units have the same functionality; they differ just in mechanical workmanship.

2.1. Technical data

Control unit Slave:	DMS2.ZPR or DMS2.PR2
Surrounding temperature:	-20 °C to +70 °C
Communication protocol:	Profibus DP-VO according to standard EN 50170
Interface:	RS-485
Transfer rate:	9.6 kbit/s – 1.5 Mb/s
Rate detection:	automatic
Electric connection:	Terminals A, B - connecting cross-section max. 1.5 mm^2
	Possibility of connecting termination resistors by a switch
Bus bar line:	Twisted copper wire according to standard EN 50170
Supported operation regimes:	Cyclic data operation, synchronous regime, regime Freeze

Behaviour in case of communication failure or if Master is in the form CLEAR:

Adjustable response of actuator:	- stand in given position
	- set end-limit position Closed or Open
	- set pre-selected intermediate position
Inputs DMS2:	- Working regimes of actuator (two-/three-position regulation)
	- Command Open (two-position regulation)
	- Command Close (two-position regulation)
	- Required position [0 – 1000 ‰] (three-position regulation)
Outputs DMS2:	- Actual position [0 – 1000 ‰]
	- Reaching of torques
	- Torque blocking
	- Change-over switch of functions in position REMOTE
	- Actuator state (Stop, Open, Close)
	- Error report
Address setting:	- by control elements on the actuator lid with support of LCD and internal menu
	- by computer with service program
Permitted addresses:	1 – 125
Control elements:	- change-over switch of functions LOCAL - OFF - REMOTE
	- push-buttons OPEN, STOP, CLOSE
Display:	- two-line alpha-numeric LCD
Signalling:	- LED diodes (after removing cover panel in the terminal board box)

2.2. Application

The table below shows using of control units according to types of actuators. Assemblies of the actuators operated in the network Profibus DP always include a display and control elements.

Actuator type	Board		
	Source + Profib.	Source	Profibus
MONED 52 030-6	DMS2.ZPR		
MTNED 52 442-3	DMS2.ZPR		
MPSED 52 260-6	DMS2.ZPR		
MONED 52 039		DMS2.ZD2	DMS2.PR2
MTNED 52 441		DMS2.ZD2	DMS2.PR2
MOKED 52 325-9		DMS2.ZD2	DMS2.PR2

3. PUTTING ACTUATOR INTO OPERATION

3.1. Basic setting

Connect supply voltage to the power terminal board. By short switching-on the actuator, verify correct sequence of phases. Using the control elements or the computer with service the software DMS2ZPA, set end-limit positions.

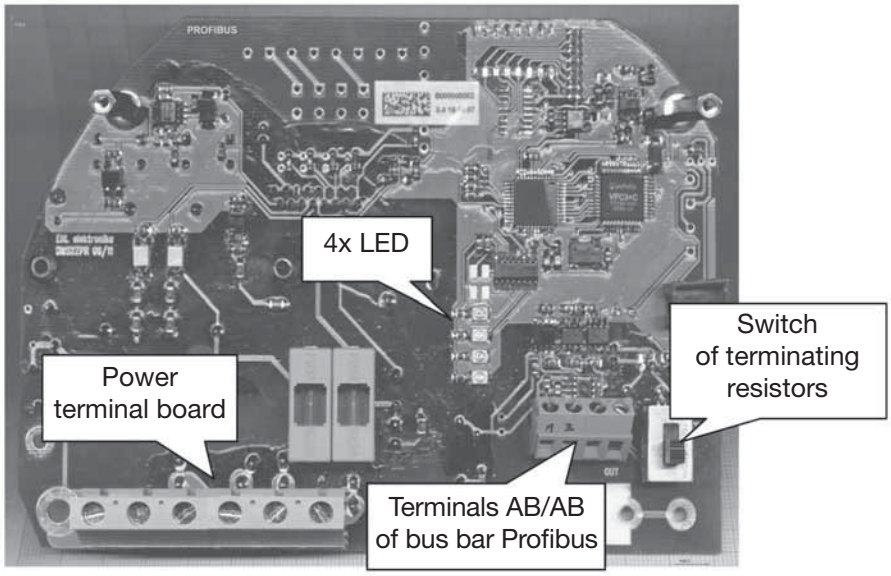


Fig. 1 Control board DMS2.ZPR

3.2. Connection to network Profibus DP

Connect the cable from Master to left terminals A, B designated IN; connect other Slave's of the same branch to right terminals A, B designated OUT.

For the last Slave in the branch, set the change-over switch "Term." to position ON. In other cases, the change-over switch is in position OFF. Secure the cable(s) with a profiled cleat.

3.3. Setting for operation in network

Most settings of the actuator for operation in the network Profibus DP have already been made in the factory. The only setting to be made on site is the address. This can be carried out by push-buttons on the actuator lid (change-over switch of functions in position OFF) or by the computer with the service program DMS2ZPA.

Push-buttons:

By long pressing of the push-button „↵ ESC" enter the setting regime.

SETTING

MENU 1 LANGUAGE

By repeated short pressing of the push-button „▼", or ,,▲" move to the Menu_24 (Address).

MENU 24 ADDRESS

By short pressing of the push-button „↵ ESC“ enter the Menu_24 (Address).

2 ADDRESS

By repeated short pressing of the push-button „▼“ or „▲“ select the address

3 ADDRESS

By long pressing of the push-button „↵ ESC“ confirm the selection

3 > > record < <

By short pressing of the push-button „↵ ESC“ leave the Menu_24 (Address)

MENU 24 ADDRESS

By long pressing of the push-button „↵ ESC“ leave the setting regime

> > END < <

Computer:

In the service program DMS2ZPA, in the menu **Parameters:**

- In the line Address, set the required address in the network (permitted range 1 – 125).
- Save into the actuator memory by clicking on the push-button **“Store”.**
- Moreover, it is possible to click on the value in the line Version and to check in the open window “Parameters” setting in the fields **Version:** *DMS2 FIELDBUS*
  Local control: *LCD internal*
  Configuration CAN: *LCD internal*
  Fieldbus
- By clicking on the push-button **“OK“,** close the window **“Parameters”.**
- Store possible change by clicking on the push-button **“Store”.**

On the actuator lid:

- Check functionality of the display and control push-buttons.
- For operation in network, set the change-over switch of functions to the position „REMOTE“.

3.4. Indication LED

The indication diodes LED are accessible after removing the cover panel in the terminal board box (see Fig. 1). They are not necessarily required for the defect analysis – state of the diodes PROFIBUS ERR and CAN ERR corresponds to errors Fieldbus activity (27) and Fieldbus (25) reported by the system on the display or in the service program in PC.

Meaning of LED’s (from top to bottom):
PROFIBUS ERR (red)

On - control unit Profibus not in state DATA Exchange
Off - control unit Profibus in state DATA Exchange
Blinking - fatal error (switching the actuator off and on necessary)

DATA EX (yellow)

On - control unit Profibus in state DATA Exchange
Off - control unit Profibus not in state DATA Exchange
Blinking - fatal error (switching the actuator off and on necessary)

CAN ERR (red)

On - communication failure of control unit Profibus with sensor
Off - communication of control unit Profibus with sensor OK

POWER (green)

On - power supply to control unit Profibus OK
Off - no power supply to control unit Profibus

4. DATA TRANSFER

4.1. Inputs DMS2

Master can control the actuators MONED with the control system DMS2.ZPR or DMS2.PR2 in the network Profibus DP. Commands are transferred by eight-bit control word, however, the actuators use just the first three bytes; remaining five bytes are a reserve.

Address	Bit	Meaning
0	0	0= two-position control (bits Open and Close) 1= three-position control (position entered in bytes 1 and 2)
	1	-
	2	-
	3	-
	4	-
	5	Open
	6	Close
	7	-
1	0	Required position 0 – 1000 ‰ (higher byte)
	1	
	2	
	3	
	4	
	5	
	6	
	7	
2	0	Required position 0 – 1000 ‰ (lower byte)
	1	
	2	
	3	
	4	
	5	
	6	
	7	

4.2. Outputs DMS2

Master receives information on activity of the actuator and its state data in eight-byte word.

Address	Bit	Meaning
0	0	Actual position 0 – 1000 ‰ (higher byte)
	1	
	2	
	3	
	4	
	5	
	6	
	7	
1	0	Actual position 0 – 1000 ‰ (lower byte)
	1	
	2	
	3	
	4	
	5	
	6	
	7	
2	0	Torque Open
	1	Torque Close
	2	Torque blocking
	3	No remote control
	4	Error of communication with sensor
	5	There are errors in the error archive
	6	Errors
	7	Warning
3	0	Actual sense of rotation of the sensor
	1	00 - Stop 01 - Open 10 - Close
	2	Required sense of rotation
	3	00 - Stop 01 - Open 10 - Close
	4	Actual sense of rotation of the motor
	5	00 - Stop 01 - Open 10 - Close
	6	-
	7	-
4	0	Error – Safe
	1	Error – Control signal < 3 mA
	2	Error – Torque of setting
	3	Error – Torque
	4	Error – Stroke
	5	Error – Sense of rotation
	6	Error – EEPROM
	7	Error – Setting regime

Address	Bit	Meaning
5	0	Error – RAM
	1	Error – Parameters
	2	Error – Torque sensor
	3	Error – Sensor 1
	4	Error – Sensor 2
	5	Error – Sensor 3
	6	Error – Sensor 4
	7	Error – Calibration
6	0	Error – Rotation
	1	Error – Temperature min.
	2	Error – Temperature max.
	3	Error – LCD int.
	4	Error – LCD ext.
	5	Error – Fieldbus module
	6	Error – CAN
	7	Error – TP
7	0	Error – Fieldbus not active
	1	Error – Phase
	2	Error – Relay of service life
	3	Error – Reset
	4	Error – ROM
	5	Error – CAN version
	6	Error – Wrong command
	7	–

5. DESCRIPTION OF ACTUATOR FUNCTIONS

5.1. Working regimes

In the network Profibus DP, it is possible to change over working regimes of the two- or three-position regulation of the actuators and to control them in these regimes.

Byte 0: bit 0 = 0 Two-position regulation
bit 0 = 1 Three-position regulation

5.2. Two-position regulation

The actuator is controlled by bits 5 and 6 of the control byte 0.

Bit 5 = 1 command Open
Bit 6 = 1 command Close

Information of byte 1 and byte 2 is not evaluated.

Value of byte 0 for setting two-position regulation and command Open:

7	6	5	4	3	2	1	0	Hexadecimal
0	0	1	0	0	0	0	0	20

Value of byte 0 for setting two-position regulation and command Close:

7	6	5	4	3	2	1	0	Hexadecimal
0	1	0	0	0	0	0	0	40

5.3. Three-position regulation

Required position of the actuator is entered in the range 0 – 1000 ‰ in the hexadecimal format.

Byte 1: higher byte of required position

Byte 2: lower byte of required position

Example of control bytes for setting position 0, 25, 50, 75 and 100 % in three-position regulation

Position		Byte 0	Byte 1 (higher)	Byte 2 (lower)
[%]	[‰]	[operat. regime]	position	
0	00	01	00	00
25	250	01	00	FA
50	500	01	01	F4
75	750	01	02	EE
100	1000	01	03	E8

ANNEX 1. HEXADECIMAL REPRESENTATION

Binary				Decimal	Hexadecimal
7/3	6/2	5/1	4/0		
2^3	2^2	2^1	2^0		
0	0	0	0	0	0
0	0	0	1	1	1
0	0	1	0	2	2
0	0	1	1	3	3
0	1	0	0	4	4
0	1	0	1	5	5
0	1	1	0	6	6
0	1	1	1	7	7
1	0	0	0	8	8
1	0	0	1	9	9
1	0	1	0	10	A
1	0	1	1	11	B
1	1	0	0	12	C
1	1	0	1	13	D
1	1	1	0	14	E
1	1	1	1	15	F

The lower tetrad of bits (0, 1, 2, 3) and the higher tetrad of bits (4, 5, 6, 7) in the byte have their hexadecimal representation. In this way, data sent by the actuator in bytes 2 – 7 can be decoded (see par. 5.2. Outputs DMS2). For instance, the hexadecimal number 60 means that the bits 5 and 6 are set.

7	6	5	4	3	2	1	0	Hexadecimal
0	1	1	0	0	0	0	0	60

In the bytes 0 – 1, the actuator sends data on actual position. The higher and lower bytes are on the address 0 and 1, respectively. The position is given in ‰.

For instance, the position 100 % is entered as 1000 in the decimal format and as 03 E8 in the hexadecimal format.

Address 0								Address 1							
0				3				E				8			
0	0	0	0	0	0	1	1	1	1	1	0	1	0	0	0
-	-	-	-	-	-	512	256	128	64	32	-	8	-	-	-

512 + 256 + 128 + 64 + 32 + 8 = 1000

ANNEX 2. FILE GSD

GSD File for MODACT DMS2 ProfiBus

Vendor: ZPA Pečky, a.s.
Tř. 5. května 166
28911 Pečky
Czech Republic
Tel.: +420 321 785 141-9
Fax. +420 321 785 165

Function: actuator controls with Profibus-DP interface
Order Number: MODACT DMS2 ProfiBus

---

author: EHL elektronika s.r.o., P. Kolomaznik
Tel.: +420 326 303 010
FAX.: +420 326 303 073

---

history

---

25. 10. 2007 V0.01 first version
30. 10. 2007 V0.02 unsupported transmission rate 3MBaud

#Profibus_DP

GSD_Revision	= 1
General parameters	
Vendor_Name	= „ZPA Pecky, a.s“
Model_Name	= „MODACT DMS2 ProfiBus“
Revision	= „1“
Ident_Number	= 0x0B56
Protocol_Ident	= 0
Station_Type	= 0
FMS_supp	= 0
Hardware_Release	= „06/11“
Software_Release	= „1.X“
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	= 0
6M_supp	= 0
12M_supp	= 0
MaxTsdr_9.6	= 60
MaxTsdr_19.2	= 60
MaxTsdr_93.75	= 60
MaxTsdr_187.5	= 60
MaxTsdr_500	= 100
MaxTsdr_l.5M	= 150
MaxTsdr_3M	= 250
MaxTsdr_6M	= 450
MaxTsdr_12M	= 800
Redundancy	= 0
Repeater_Ctrl_Sig	= 0
24V _Pins	= 0

Slave-Specification:

Freeze_Mode_supp	= 1

Sync_Mode_supp = 1
Set_Slave_Add_Supp = 0
Auto_Baud_supp = 1
Min_Slave_Intervall = 6
Fail_Safe = 0
Modular_Station = 0
Modul_Offset = 0
Slave_Family = 0
Implementation_Type = „VPC3+“
Bitmap_Device =“DMS2“
Max_DiaR-Data_Len = 6

UserPrmData: Length and Preset:
User_Prm_Data_Len = 3
User_Prm_Data = 0x00 ,0x00 ,0x00

Module Definition List
Module =“Module 8 Byte Out, 8 Byte In“ 0xB7
1
EndModule

Note:

*The data file **ZPA_OB56.GSD** contains information on properties of the actuator required by the control station Master.*

*The file can be downloaded from the internet pages of ZPA Pečky a.s., **www.zpa-pecky.cz.***

ZPA PEČKY, a.s.

Development, production and services of electric actuators and switchboards.
Top-quality sheet-metal processing (TRUMPF equipment), powder paint shop.

SURVEY OF PRODUCED ACTUATORS

KP MINI, KP MIDI
Electric rotary (90°) actuators (up to 30 Nm)

MODACT MOK, MOKED, MOKP Ex
Electric rotary (90°) actuators for ball valves and flaps

MODACT MOKA
Electric rotary (90°) actuators for nuclear power stations
application outside containment

MODACT MONJ, MON, MOP, MONED, MONEDJ, MOPED
Electric rotary multi-turn actuators

MODACT MO EEx, MOED EEx
Explosion proof electric multi-turn actuators

MODACT MOA
Electric multi-turn actuators for nuclear power stations
application outside containment

MODACT MOA OC
Electric multi-turn actuators for nuclear power stations
application inside containment

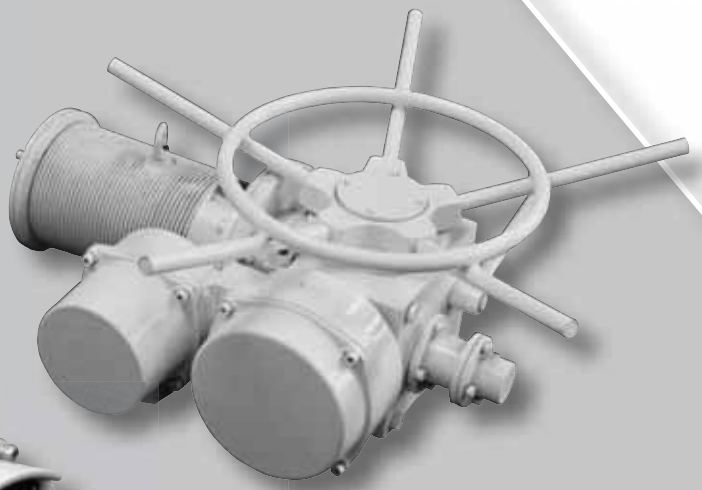
MODACT MPR Variant
Electric rotary (160°) lever actuators with a variable output speed

MODACT MPS Konstant, MPSED
Electric rotary (160°) lever actuators with a constant output speed

MODACT MTN, MTP, MTNED, MTPED
Electric linear thrust actuators with a constant output speed

Deliveries of assembled actuator + valve (or MASTERGEAR gearbox) combinations

TRADITION • QUALITY • RELIABILITY



ZPA Pečky, a.s.
tř. 5. května 166
289 11 PEČKY, Czech Republic
www.zpa-pecky.cz

TÜV CERT
EN ISO 9001:2000
Certificate No. 04 100 950 161

tel.: +420 321 785 141-9
fax: +420 321 785 165
+420 321 785 167
e-mail: zpa@zpa-pecky.cz