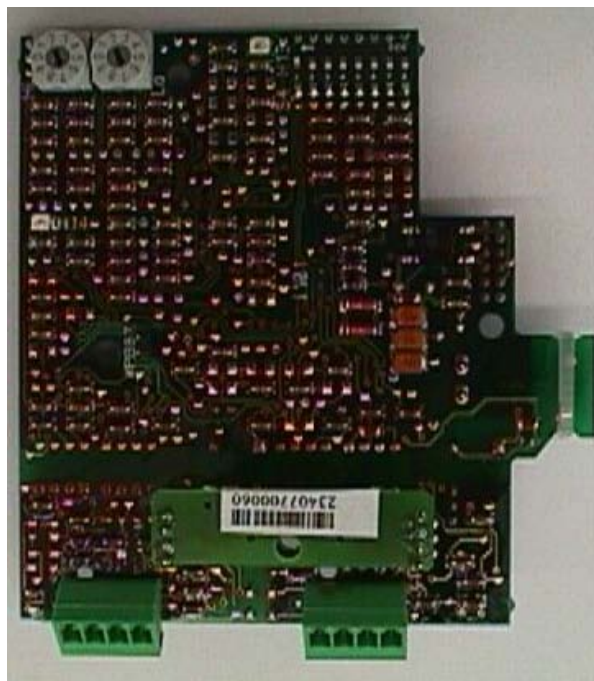


**SUPPLEMENT OPERATING
INSTRUCTIONS FOR
DREHMO-ACTUATORS MATIC C**

WITH

INTEGRAL SERIAL BUS INTERFACE

PROFIBUS DP



Version 1.0
05.05.2000

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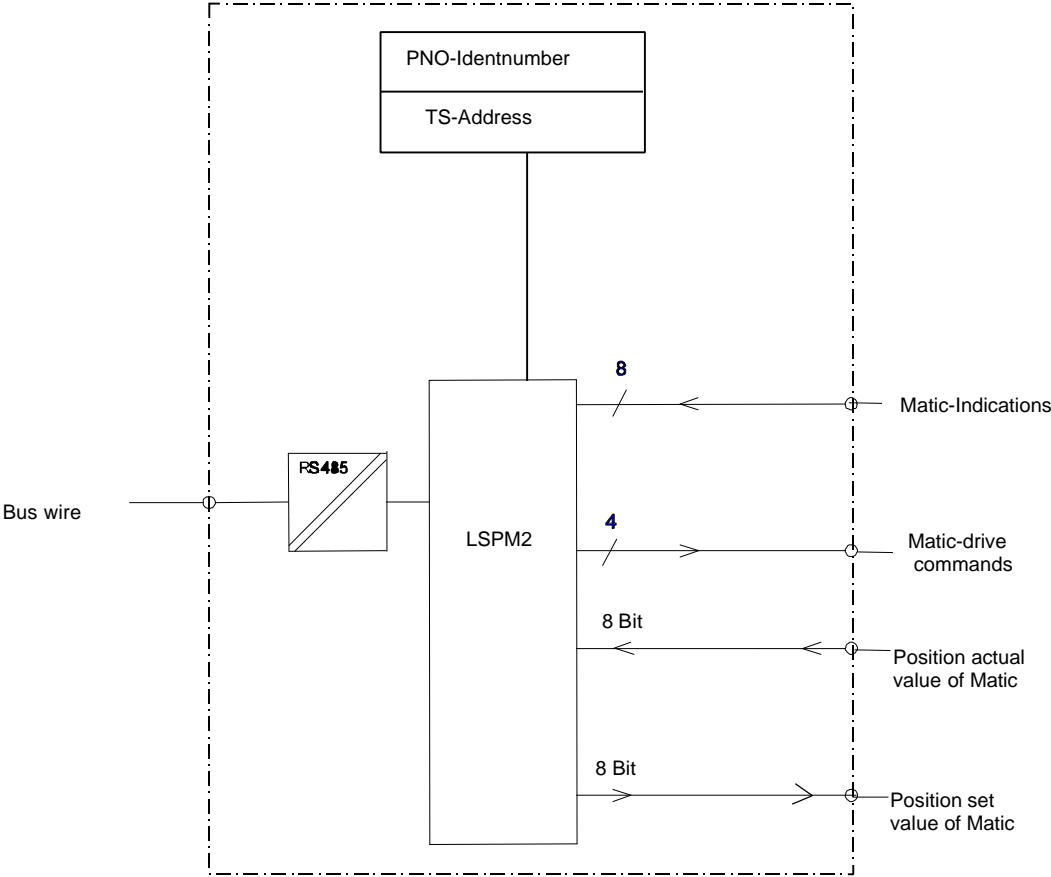
1. GENERAL

The bus-interface is integrated on the base PCB-board of the MATIC C control unit. The „bus connection for DREHMO“ **PROFIBUS DP** is a 2-wire RS 485 bus-interface. It is required to convert the parallel command- and indication signals of the DREHMO-Actuators series MATIC C to the serial bus-protocol of the **PROFIBUS DP**. The design is based on the standard EN 50170.

Inputs (drive commands) of the actuators (=output of the interface) as well as outputs (Indications) of the actuator (=output to the interface) are transmitted serial on 16 bit wide in- and output channels to the master.

2. PROJECTING THE BUS-SYSTEM

2.1 Principle Profibus DP



SUPPLEMENT OPERATING INSTRUCTIONS FOR DREHMO-ACTUATORS
MATIC C WITH INTEGRAL SERIAL BUS INTERFACE PROFIBUS DP

2.2 I/O-Pattern of the PROFIBUS DP, Matic C

| Input-Byte 0 | | Output-Byte 0 | |
|------------------------|----------------------------------|------------------------|---------------------------------|
| (Actuator indications) | | (Commands to Actuator) | |
| Bit 0 | Common failure | Bit 0 | AUTOMATIC (modulating actuator) |
| Bit 1 | Driving open | Bit 1 | Command STOP |
| Bit 2 | Driving close | Bit 2 | Command CLOSE |
| Bit 3 | Remote/Automatic | Bit 3 | Command OPEN |
| Bit 4 | End position Open | Bit 4 | 0 output |
| Bit 5 | End position Close | Bit 5 | X |
| Bit 6 | Switch off OK in open direction | Bit 6 | X |
| Bit 7 | Switch off OK in close direction | Bit 7 | X |

| Input-Byte 1 | | Output-Byte 1 | |
|----------------------------|--|-------------------------|--|
| (Actuator Actual position) | | (Actuator Set Position) | |
| 4mA** = 46 Decimal | | 4mA** = 46 Decimal | |
| 20mA** = 230 Decimal | | 20mA** = 230 Decimal | |

** equals the limit positions 4mA CLOSE and 20mA for OPEN.

The availability and the processing of the actual value as well as the processing of the set value depends on the electronic equipment and the parameter setting by DIP switches S1 and S2 on the base PCB-Board of the MATIC C.

Description of indications

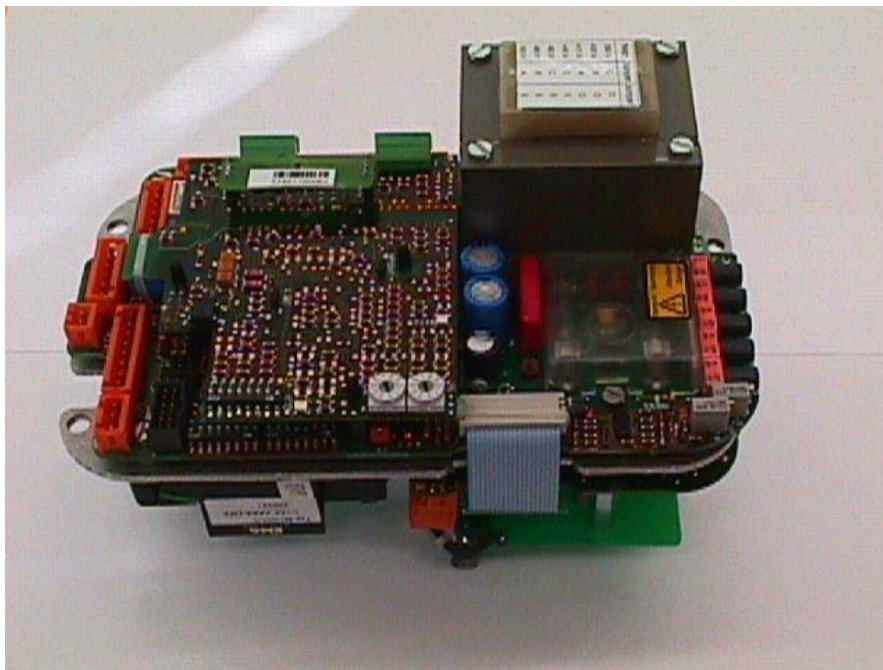
| | |
|------------------------------|---|
| Common failure | Signalling: Motor temperature exceeded, loss of control voltage and depending on programming „exceeding of torque“. |
| Driving OPEN | Indicates the actuator driving in OPEN direction. |
| Driving CLOSE | Indicates the actuator driving in CLOSE direction. |
| Remote/Automatic | On local control station without additional positioner it is indicated the actuator can be driven from remote with OPEN/STOP/CLOSE signals. This is even also for the MATIC I version valid. On local control station with additional positioner it is indicated the actuator can be driven from remote by the set value if the AUTOMATIC-Command ist valid. |
| Torque (switch off)-CLOSE OK | If exceeding the max. adjusted torque in CLOSE direction erases the signal (active low) and the actuator is stopped. |
| Torque (switch off)-OPEN OK | As above but for CLOSE direction. |
| Limit position CLOSE | Indicates limit position CLOSE is reached. |
| Limit position OPEN | Indicates limit position CLOSE is reached. |
| Travel Actual Value | Actual position of the valve. |

Description of Commands

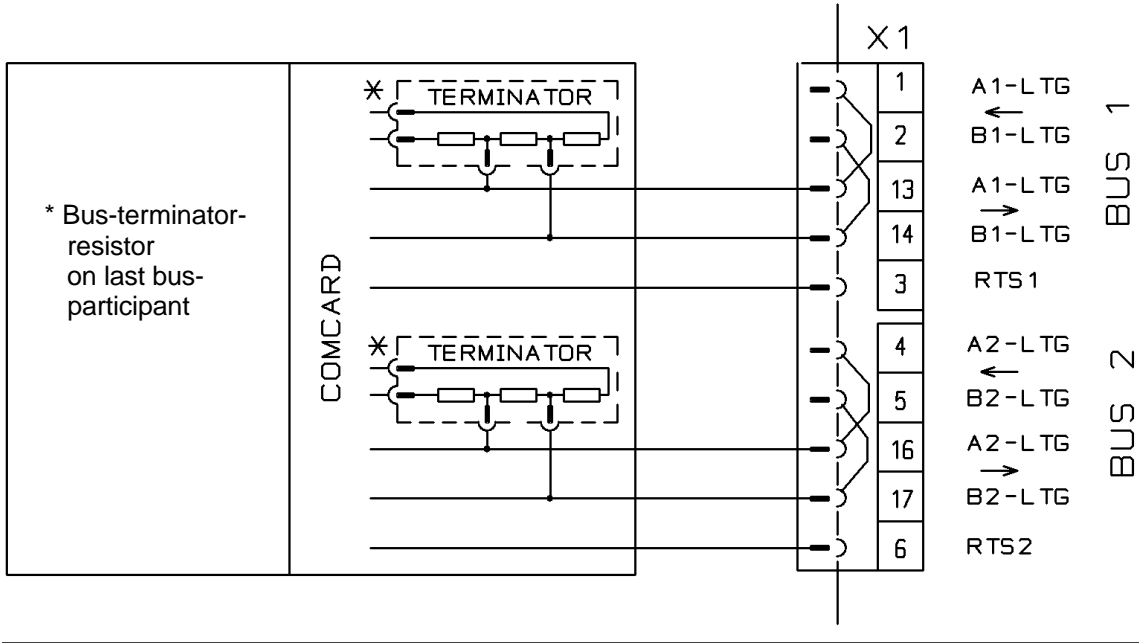
| | |
|-------------|--|
| AUTOMATIC * | Enables the internal positioner, i.e. the actuator can be controlled by the 4..20mA signal |
| STOP | Actuator stops |
| CLOSE | Actuator drives to OPEN-direction. |
| OPEN | Actuator drives to CLOSE-direction. |
| Set-Value * | Analogue Set-Value, on which the actuator drives if AUTOMATIC signal is enabled |

* Availability depending on the MATIC C Equipment ordered.

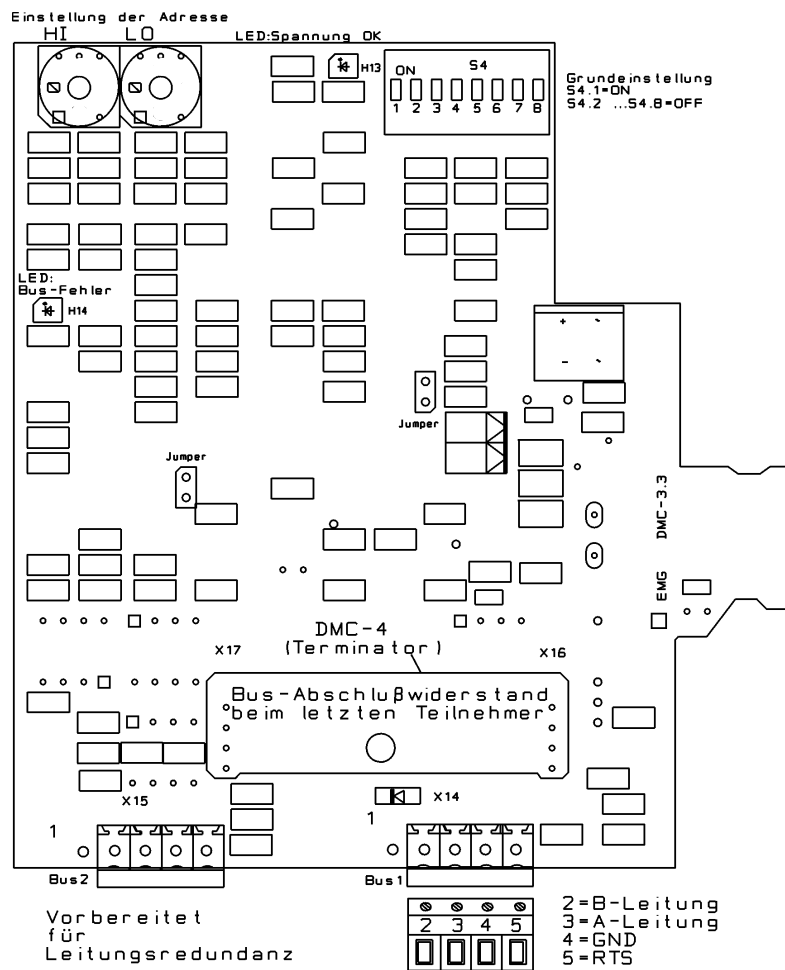
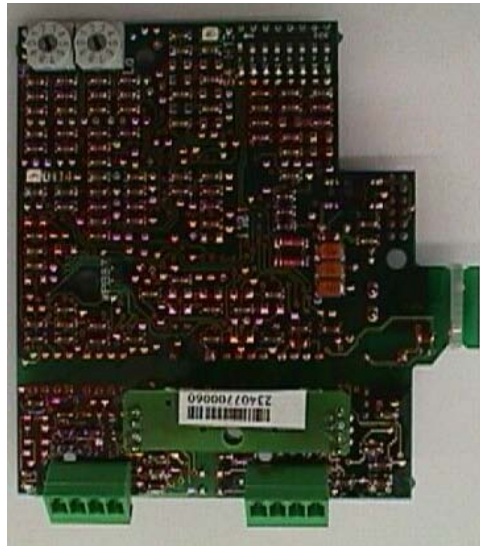
2.3 Arrangement/ Setting of the Bus-Interface



2.4 Detail of wiring diagram Matic C with Profibus DP



SUPPLEMENT OPERATING INSTRUCTIONS FOR DREHMO-ACTUATORS MATIC C WITH INTEGRAL SERIAL BUS INTERFACE PROFIBUS DP



Connecting the PROFIBUS wires (A and B) is done by the compact plug. The T-connector is realized on the customer connecting side.

The terminator is connected to the last actuator in a line. Be sure that the shielding of the bus cables is good conducting connected to the actuator housing (see remarks for projecting the PROFIBUS).

The line lengths to an external T-connector shall not exceed the allowed maximum (see PNO – information).

2.4.1 Address-Setting

The address for the PROFIBUS consists of a station-address.

For the setting the address switches HI and LO are used (see Page 8).

Any address can only be used one time in the whole bus system. The address range is from 1 to 99 decimal.

2.5 Putting into operation

If all supply and bus-wires are connected, the actuator is ready for operation. A separate setting of the bus-interface on preset actuators is not required.

NOTE:

The applicable rules and MATIC-C operation instructions have to be considered.

2.6 Failure Analysis

- Actuator doesn't send signals to the bus:
 - Correct wiring to terminals?
 - Voltage supply OK?
 - Bus termination correct? (Busterminators only at segment ends)
 - Stations address only advised once?
 - Stations address located above Highest Station Address (HSA) of the already working stations? (Projecting of DP) ?

- Actuator disturbs on switching (OPEN or CLOSE) other stations?:
 - Correct terminals used? (wires A and B changed wrong?)
 - Busterminator connected, but not located at segment end?
 - Values for $\min T_{SDR}$ and $\max T_{SDR}$ adjusted to other stations?

- Actuator rejects connection to the operating system?
 - (if possible analyse failure indication)
 - Exists already a connection to another station?
 - Addressparameter correct ?

3. TECHNICAL DATA

3.1 Characteristic Data of the Fieldbus Interface

Characteristic data of the remote bus interface

Identification-Number 0x0686

Electrical Connection

Bus connector: Bus RS485
PG13,5 Cabel entry

Baudrate: by Master, max. 1,5MBaud

Protocol: acc. to EN 50 170

Insulation check: Mains Supply: Nominal Insulation < 250V
Acc. to. DIN VDE 160 Chap. 7.5
Testvoltage 1,5kV
Nominal Insulation 250...<500V
Testvoltage 2kV

Busconnectors: Nominal Insulation < 50V
Testvoltage 0,5kV

Cabel entries with shielding:

- a) Lapp Kabel
U.I.LAPP GmbH & Co.KG
Schulze-Delitzsch-Str. 25
70 765 Stuttgart
Tel.: 07 11 - 78 38 01
Fax: 07 11 - 78 38 26 4

Adaptor with earthing connector
Type: SHVE

The exact cable data must be known for ordering (diameter, cross section, shielding)

- b) ICORE international
ICORE INTERNATIONAL GmbH
Friedberger Str. 2
61 350 Bad Homburg v.d.H. 1
Tel.: 0 61 72 - 8 30 74 - 76
Fax: 0 61 72 - 8 39 16

Cable entry with IRIS® shielding contact
Types: **System IRIS® Baureihe 70**
 System IRIS® Baureihe 72
 UNI-IRIS Pg-Verschraubung
 UNI-IRIS M-Verschraubung

The exact cable data must be known for ordering (diameter, cross section, shielding)

- c) HUMMEL
Metall- und Kunststofftechnik GmbH
Postfach 2 60
79 176 Waldkirch
Tel.: 0 76 81 - 4 71 10
Fax: 0 76 81 - 57 49

Cable entry with two contact washers
Type: **WADI-D, IP 68 on request**

Cable entry with direct shielding contacting
Types: **HSK-M-EMV**
 HSK-MZ-EMV

Cable entry with two cone washers
Type: **ZSE**
 SE

Cable entry for naval use acc. to DIN 89280-Z
Type: **DIN 98280-Z**

The exact cable data must be known for ordering (diameter, cross section, shielding)

- d) BELECTRIC
Burgfrauenstr. 85
13 465 Berlin
Tel.: 0 30 - 4 04 90 57
Fax: 0 30 - 4 04 90 14

Cable entry for naval use acc. to DIN 89280-Z

**Type: Bronze cable entry for cables with
shielding
DIN 89280-Z version Z**

The exact cable data must be known for ordering (diameter, cross section, shielding)

4. PROJECTING NOTES

The allowed data of the net dimensioning are defined on the PROFIBUS by the data rate and the RS 485 standard. Because of the RS 485 standard on more than 32 stations or on larger dimensions of the network a segmentation of the cable system is required. The according cablesegments can be coupled transparent by repeaters.

4.1 Cable system

Acc. to EN 50170 is specified:

| | Cable type A DIN19245 Teil 3 (DP) |
|--------------------|-----------------------------------|
| Wave impedance | 135 – 165 Ohm |
| Capacity per metre | < 30 pF/m |
| Loop resistance | < 110 Ohm/km |
| Wire diameter | > 0,64 mm |
| Cross section | > 0,34 mm ² |

Table 1: Cable specification

Depending on these cable parameters following max. allowable lengths of the cable segments result:

| | | | | | | | |
|--------------|-------|-------|-------|-------|-----|------|--------|
| Baudrate | 9,6 | 19,2 | 93,75 | 187,5 | 500 | 1500 | kbit/s |
| Cable type A | 1.200 | 1.200 | 1.200 | 1.000 | 400 | 200 | m |

Table 2: Segment lengths

On data rates up to 500 kbit/sec the T-cables shall not be longer than 0,3 m.
In any case this branches have to be considered for the total length of the system (see PNO notes)

4.2 Terminator Resistors

An eye has to be put on the terminator resistors on both segments ends. By these terminators the wire is terminated with the wave impedance and the zero level is defined.

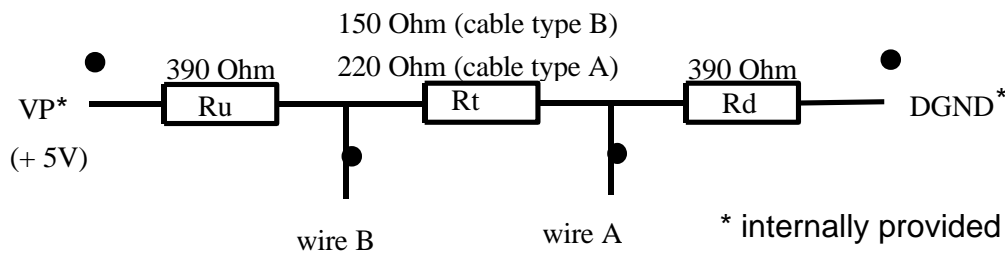


Figure: Terminator resistors

Multiple Terminators beneath bus terminations will cause signal disturbances on the bus and must be avoided!

While installing the signal cables the applicable conditions have to be considered.

- do not install in direct near to mains supply cables
- do not fold, it may damage the shielding.

The allowed data of the net dimensioning are defined on the PROFIBUS by the data rate and the RS 485 standard. Because of the RS 485 standard on more than 32 stations or on larger dimensions of the network a segmentation of the cable system is required (see Table 2). The according cablesegments can be coupled transparent by repeaters.

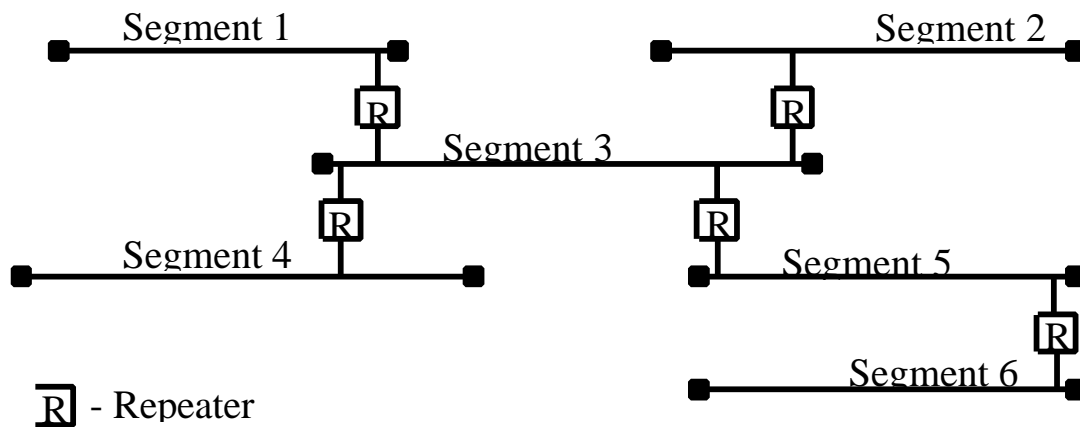


Figure: Example of a segmented bus structure

4.3 Over voltage protection

On outdoor installation of bus or signal cables it shall be considered:

- Usage of standard cables in on both sides earthed metal pipe. The single metal pipes have to be connected to each other. The metal pipes shall be on buildings entry connected to potential earth.
- Usage of cables with lightning resistive shielding

4.5 GSD-File

Die latest GSD-file can be downloaded on <http://www.drehmo.com>.

```
; GSD-Datei der Profibus-DP Schnittstelle für Drehmo-  
Stellantriebe  
; Hersteller: Elektro-Mechanik GmbH. Industriestr.1, 57482  
Wenden  
; Tel.: 02762-612-0  
; Ersteller: E2, Mü/G  
; Stand: 24.07.1997  
;  
;  
#Profibus DP  
Vendor_Name = "EMG, Wenden"  
Model_Name = "DBM1-PBx/DS"  
Revision = "V1.0"  
Ident_Number = 0x0686  
Protocol_Ident = 0  
Station_Type = 0  
FMS_supp = 0  
Hardware_Release = "V1.0"  
Software_Release = " "  
9.6_supp = 1  
19.2_supp = 1  
93.75_supp = 1  
187.5_supp = 1  
500_supp = 1  
1.5M_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  
  
Redundancy = 0  
Repeater_Ctrl_Sig = 2  
24V_Pins = 0  
;  
;--Slave spezifische Werte-----  
;
```

SUPPLEMENT OPERATING INSTRUCTIONS FOR DREHMO-ACTUATORS MATIC C WITH INTEGRAL SERIAL BUS INTERFACE PROFIBUS DP

```
Freeze_Mode_supp = 1
Sync_Mode_supp = 1
Auto_Baud_supp = 1
Set_Slave_Add_supp = 0
User_Prm_Data_Len = 05
User_Prm_Data = 0x00, 0x00, 0x00, 0x00, 0x00
Min_Slave_Intervall = 1
Modular_Station = 0

;Modul für Datentransfer
;
Module = "DP Antriebssteuergerät 16A/16E" 0x21, 0x11
EndModule
```