



OPEN DRIVE

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*PROFIBUS DP*

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An interface board, applicable to TDE MACNO's drives of OPEN DRIVE series, is available: it implements the Profibus DP communication's protocol.

According to the directions of the communication's standard profile for the drives (PROFIDrive), the profibus message is split in two independent parts: parameterisation's data and process's data. This allows operating with two different speeds on the two different types of data.

The card is connected to the Profibus bus by a DB9 female connector provided with a pin meaning according to the Profibus's standard:



Pin n.	Name	Description
1	SHIELD	Protective shield
2		
3	A	Rx/Tx positive data
4	DE	Control's signal for repeater
5	GNDISO	0V of supply
6	+5VISO	Output supply +5V
7		
8	B	Rx/Tx negative data
9		

## 1. Application's structure

### 1.1. Node number configuration

The Profibus node number is equal to the serial slave's number set on the drive.  
To change the node number:

- Set **P92** parameter: drive number.
- Save the data in FLASH (C63=1)
- Turn the drive off and on.

See the drive's user manual for the meaning of the parameters and for the saving procedure of the parameters on FLASH.

Name	Description	Range	Default
<b>P92</b>	Profibus knot's address	1÷255	1

The converter, considered as a Profibus slave node, can automatically execute the research of the Profibus master's transmission speed, between the values reported in the table; for each speed is also indicated the maximum length of each Profibus net's segment:

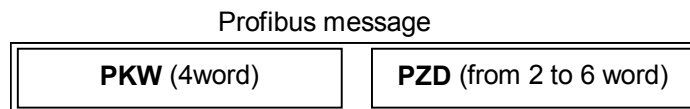
9,6KBd	19,2kBd	45,45kBd	93,75kBd	187,5kBd	500kBd	1,5MBd	3 MBd	6 MBd	12MBd
1200 m	1200 m	1200 m	1200 m	1000 m	400 m	200 m	200 m	200 m	100 m

## 2. Managed services

It has been implemented a cyclical exchange of data based on a particular Profibus message regarding to the directions of the communication's standard profile for PROFIDrive drives.

### 2.1. Profibus message's description

The Profibus message is cyclically transmitted from the master to the drive.  
Two parts make the request to the drive:



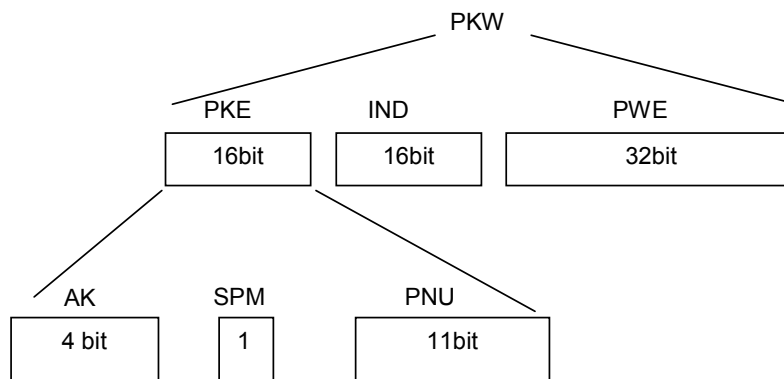
- 1) **PKW** : parameterisation's data
- 2) **PZD** : process's data

The answer from the drive to the master has the same composition.  
The PZD part can be dynamically chosen between several structures (see next paragraph).

#### 2.1.1. Parameterisation's data: PKW

The PKW message's part has a standard length (4 word), and it allows changing the drive's parameters. If no parameters' change is requested by the drive, it is enough to set AK = 0 (No Task). The other fields are automatically ignored.

PKW message is made as follows:



In the following description are listed all the functions and parameters' types allowed by the drive of OPEN DRIVE series.

## AK

The AK field contains the action that has to be executed.  
Valid values for the master's request to the drive:

AK	Description
0	No task
2	Reading word
3	Reading double word
5	Writing word
6	Writing double word

Valid values for the drive's answer to the master:

AK	Description
0	No task
2	Reading word
3	Reading double word
5	Writing word
6	Writing double word
14	Action not permitted

If the drive answers with **14** code (action not permitted), in the PWE field is specified an error code:

PWE	Description
1	Off range value
2	Key protected parameter
3	Protected parameter when the drive is working
4	Not existing parameter
5	Action not permitted

## PNU

The PNU field contains the involved parameter's type. See the booklet of the control's core for parameters' description. The following table explains the value of AK and PNU fields of the profibus message for reading and writing actions:

Description	n. bit	Read (AK)	Write (AK)	PNU
Parameters P	16 o 32	2	5	1
Connections C	16	2	5	2
Internal d	16 o 32	2	-	3
Alarms A	16	2	-	4
Inputs I	16	2	-	5
Outputs O	16	2	-	6
set-up data	16	2	5	10

## IND

The field IND's value corresponds to the order number of the selected size in case of Parameters P, Connections C and internal sizes d.

The field IND is ignored for alarms A, by setting PNU = 4 the answer will be a word of 16 bit, where the logic status bit by bit is equal to the status of the corresponding alarm.

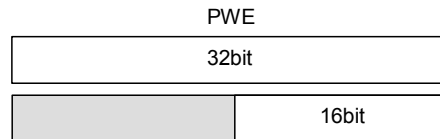
In relation to logic inputs I and logic outputs O is still valid the correspondence bit by bit and the field IND can only value 0 and 1 in order to select the more significant or less significant 16 bit word.

See the booklet of the control's core for internal sizes' description.

## PWE

The field PWE refers to the value of the selected size. See the booklet of the control's core for the internal sizes' description and their accepted value's range.

The fields' lining inside the 32 bit is the following one:

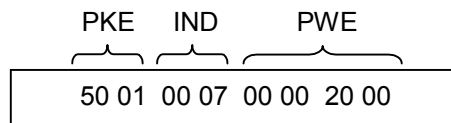


## Examples:

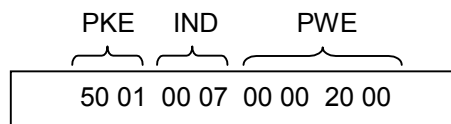
### Example n.1: writing of P7 = 50% (speed jog cw)

Field	Decimal value	Hexadecimal value	Description
AK	= 5	= 05H	(writing word)
PNU	= 1	= 01H	( parameter P)
IND	= 7	= 00 07H	
PWE	= 16383x50/100 = 8192	= 00 00 2000 H	

Request MS -> SL:



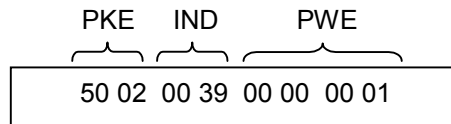
Answer SL -> MS:



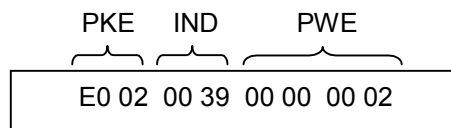
### Example n.2: Writing of C57=1 (it enables the management of the radiator's thermal feeler)

Field	dec. value	hexadec. value	Description
AK	= 5	= 05H	(writing word)
PNU	= 2	= 02H	(connection C)
IND	= 57	= 00 39H	
PWE	= 1	= 00 00 00 01H	

Request MS -> SL:



Answer SL -> MS:

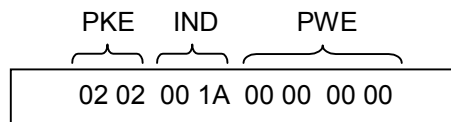


The drive answers by a 0EH code (action not permitted) because the C57 connection is key-protected (PWE = 02). It is necessary to set the key P60=95. C57 connection is still not set.

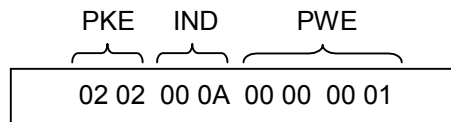
### Example n.3: reading of C26 (it enables linear ramps)

Field	dec. value	hexadec. value	Description
AK	= 2	= 02H	(reading word)
PNU	= 2	= 02H	(connection C)
IND	= 26	= 1AH	

Request MS -> SL:



Answer SL -> MS:

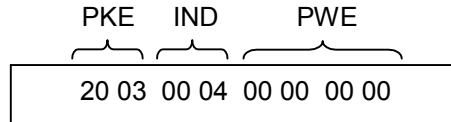


So the connection C26 = 1 (linear ramps are enabled)

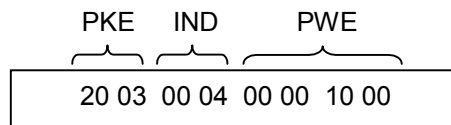
### Example n.4: reading of d4 (revolution's speed)

Field	dec. value	Hexadec. value	Description
AK	= 2	= 02H	(reading word)
PNU	= 3	= 03H	(internal size d)
IND	= 4	= 04H	

Request MS -> SL:



Answer SL -> MS:



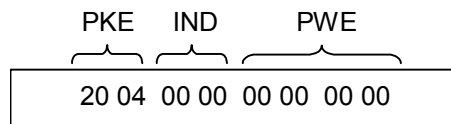
So the read value is 1000H = 4096. According to the instructions' handbook d4 is a percent on range 16383, so

$$V6 = 4096 * 100 / 16383 = 25.0\%$$

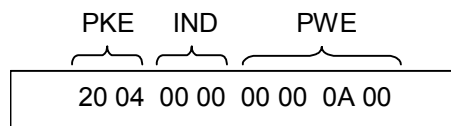
### Example n.5 : reading of the alarms' status

Field	dec. value	Hexadec. value	Description
AK	= 2	= 02H	(reading word)
PNU	= 4	= 04H	(alarms A)

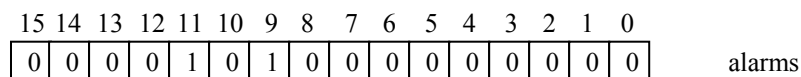
Request MS -> SL:



Answer SL -> MS:



So the read value is 0A00H : there are 2 active alarms, in particular alarms A9 and A11

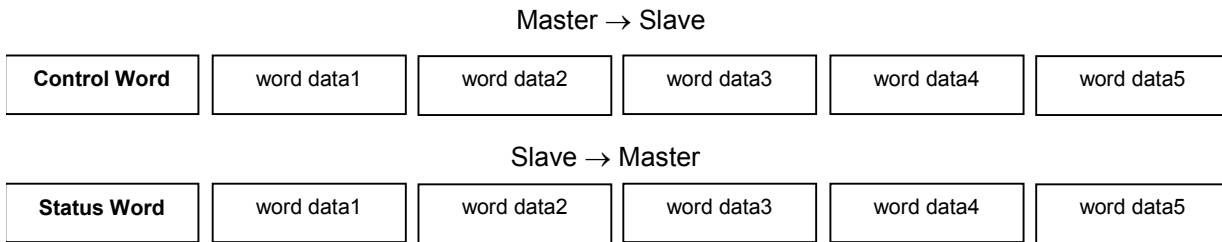




## 2.1.2. Process's data: PZD

The PZD message's part contains the data that needs to be cyclically exchanged between master and slave: I/O, diagnostic, set point, measured speed, etc. These references are considered only if the connection "Enabling references from Fieldbus" (C52=1) is enabled, anyway the converter will always answer with the actual value of the same sizes.

The control's and status's word are defined in the following table:



Control Word:

bit	description
0	Input L.I.1
1	Input L.I.2
2	Input L.I.3
3	Input L.I.4
4	Input L.I.5
5	Input L.I.6
6	Input L.I.7
7	Input L.I.8
8	*** N.U.
9	*** N.U.
10	*** N.U.
11	*** N.U.
12	*** N.U.
13	*** N.U.
14	*** N.U.
15	*** N.U.

Status Word:

bit	Description
0	Output L.O.1
1	Output L.O.2
2	Output L.O.3
3	Output L.O.4
4	*** N.U.
5	*** N.U.
6	*** N.U.
7	*** N.U.
8	Ready drive
9	Working drive
10	*** N.U.
11	*** N.U.
12	*** N.U.
13	*** N.U.
14	*** N.U.
15	*** N.U.

Note1: The run's input (of default L.I.4) is together with the clamp's and the serial's one (AND logic) the other inputs are read at the same time of the clamp's and serial's ones. (OR logic).

Note2: the meaning of the 8 logic inputs and of the 4 logic outputs is the same as the corresponding inputs/outputs of the clamp. See the booklet of the control's core to understand the meaning of the different inputs and outputs and how to shape them.

For the DATA part it is possible to choose one of the following configurations:

0)	Speed (16bit)			
1)	Torque (16bit)			
2)	Speed (16bit)	Torque (16bit)	N.U.	Application's inputs (32bit)
3)	Speed (16bit)	Position (32bit)		Application's inputs (32bit)
4)	Speed(16bit)	Torque (16bit)	Max. torque(16bit)	Application's inputs (32bit)

The ranges of the previous quantities are:

Data	Normalisation	Meaning
Speed	16384	= 100% maximum speed of work
Torque	4095	= 100% nominal torque of the motor
Position	65536	= 1 mechanic rotation
Torque's limit	4095	= 100% nominal torque of the motor

In cases 0, 1 the length of the field DATA is 2 byte, in cases 2, 3, 4 is 10 byte.

The structure is dynamically chosen and can be modified only when the motor is in "Stop".

To set the chosen structure it is necessary to use the part of parameterisation with "set-up data" (PNU = 10), by setting the byte of index 0 (AK = 5, IND = 0) to the desired value (0÷4).

The data coming from the master are references, the data sent by the drive are the real values of the regulated sizes instead.

### Application's inputs

In structures from 2) to 4) in the word data4 and data5 it is possible, in writing, to set the logic status of the application's inputs from I29 to I60.

If some of these inputs are structured also as clamp's inputs, the hard input is the predominant one and the order via Profibus is ignored.

In the same word, in reading, it is available the status of the converter's 32 logic outputs.

## 2.2. Description file's Profibus DP: GSD File

Each Profibus DP disposal is provided with a linked file with extension GSD that specifies all the characteristics, such as allowed transmission's speeds, maximum length of the messages, meaning of the diagnosis' message...

The Profibus master uses the GSD file in order to know the slave's features.

The GSD file OPEN DRIVE is available: OpenDr.gsd