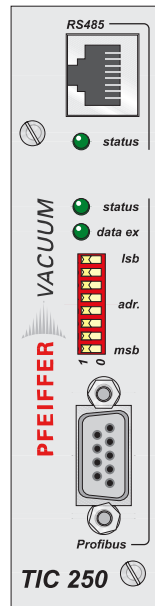


Operating Instructions

TIC 250

Profibus-DP gateway



Index

	Page
1. Safety Precautions	3
2. Understanding The TIC 250	4
2.1. For Your Orientation.....	4
Delivery Consignment	4
2.2. Product Description.....	4
2.3. Description Of The Front Panel	5
Connection Options	5
Proper Use	5
Improper Use	5
3. Installation	6
3.1. Preparations For Installation.....	6
3.2. Fitting To A Top Hat Rail	6
3.3. Fitting Directly To The TC 600	6
4. Operations	8
4.1. General.....	8
4.2. Switching ON The TIC 250.....	8
4.3. Illuminated Displays	8
5. Modules	9
5.1. "STANDARD" (Modul number 1)	10
5.2. "POWER" (Modul number 2)	11
5.3. "OPHRS_PUMP" (Modul number 3)	11
5.4. "OPHRS_DRV" (Modul number 4)	12
5.5. "TMS" (Modul number 5)	12
5.6. "VENTING" (Modul number 6)	13
5.7. "FIXED_VALUE_OUT" (Modul number 7)	13
5.8. "FIXED_VALUE_IN" (Modul number 8)	14
5.9. "FIXED_STRING_OUT" (Modul number 9)	14
5.10. "FIXED_STRING_IN" (Modul number 10)	15
5.11. "RANDOM_VALUE_OUT" (Modul number 11).....	15
5.12. "RANDOM_VALUE_IN" (Modul number 12)	16
5.13. "FAIL_SAFE" (Modul number 13)	17
6. Extended Diagnosis Data	18
7. Useable Parameters For The PFEIFFER-Protocol	20
7.1. Data Typs	21
8. Configuring And Parametering The TIC 250	21
8.1. Limitations	21
8.2. Tips.....	21
9. What To Do In The Case Of Breakdowns?	22
10. Maintenance, Service	22
11. Technical Data	23
11.1. Data List.....	23
11.2. Dimensions Diagram	23
12. Accessories	23
12. Supplementary Information	24
13. Terminology Explanations, Abbreviations	25
Manufacturer's Declaration	annex 1

1. Safety Precautions

- ☞ Read and follow all the instructions in this manual.
- ☞ Inform yourself regarding:
 - Hazards which can be caused by the unit,
 - Hazards which can arise in your system,
- ☞ Comply with all safety and accident prevention regulations.
- ☞ Check regularly that all safety requirements are being complied with.
- ☞ Take account of the ambient conditions when installing the TIC 250. The protection type is IP20.

The unit is protected against the ingress of foreign bodies $\geq \varnothing 12$ mm. Because water protection is not provided the unit must be fitted into a suitable housing (please see Section 3. Installation).
- ☞ Do not carry out any unauthorised conversions or modifications on the unit.
- ☞ Do not open the housing cover when the unit is connected to the mains nor during pumping operation.
- ☞ Take account of the prescribed voltage when connecting the cable to the various plugs.
- ☞ When returning the unit to us please note the shipping instructions.

Pictogram Definitions



Danger of an electric shock.



Danger of personal injury.



Danger of damage to the unit or system.

2. Understanding The TIC 250

2.1. To Your Orientation

Symbols Used

The following symbols are used throughout in the illustrations:

- ⚡ Electrical connection

Abbreviations Used

TMP = Turbomolecular pump
DCU = Display and control unit
TC = Electronic drive unit
TPS = Mains unit

Operating instructions In The Text

➔ Here, you have to do something.

Delivery Consignment

The following components are included on delivery:

- TIC250
- Two top hat rail securing units
- Two screws M4x65
- One disk with GSD file
- One connecting cable 13 cm

2.2. Product Description

The TIC250 is a gateway*, which enables connection of the Electronic Drive Unit TC 600 and TCM1601 to the Profibus DP. For this, each drive unit requires a TIC250.

The TIC250 has been designed as a modular slave. Various functions are grouped in modules. Parameter and configuration data are dependent on the selected modules. The modules available can be classified as follows (see Chapter 5):

Classic Profibus Modules

These modules contain specific functions at fixed positions, such as, for example, pump on/off, error messages, rotation speed settings, etc..

Pre-Defined Parameter Access

If specific requirements are known in advance and if these are attainable via the parameters on the Pfeiffer serial interface, but are not contained in the classic modules, these parameters can be directly accessed via these modules. The parameter number of the Pfeiffer serial interface, fixed for once and for all in the parameter telegram.

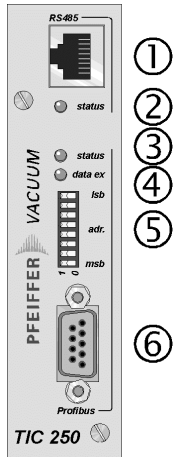
Freely Selectable Parameter Access

If the Pfeiffer serial interface parameters have to be accessed during operations and are constantly changing or are not known in advance, a parameter can be directly accessed by entering a parameter number and value. These modules are the nearest to the Pfeiffer serial interface.

"fail-safe" Data

These modules can be used to define what the slave should do if the master changes to the clear condition or if the communication with the master is defective. The pump can then be brought into the "secure condition". The definition of this condition is made via these modules.

2.3 Description Of The Front Plate



All operating and display elements are located on the front panel.

- 1 RS485-Serial Interface
- 2 RS485 Status-LED
- 3 Profibus Status-LED
- 4 data-exchange-LED
- 5 Adress Selection Switch
- 6 Profibus Connection

Connecting Options

The TIC 250 is prepared for the following connections:

- RS 485 (for the communication with the electronic drive unit)
- Profibus-DP

The TIC 250 has been tested and cleared by the appropriate authorities in accordance with EN 61010/VDE0411 "Safety Ordinance For Electrical Units"

Proper Use

The TIC 250 may only be used to connect the electronic drive units TC 600 und TCM 1601 to a Profibus.

Only the operation with Profibus-DP is supported.

Improper Use

Improper is:

- Uses not covered above, and, in particular,
- Connection to pumps and units which is not permitted in their operating instructions.
- Connection to units which contain touchable and voltage carrying parts.

Improper use will cause any rights regarding liability and guarantees to be forfeited.

3. Installation

3.1. Preparations For Installation



Unauthorised modifications or alterations to the unit are not allowed.

- ➔ Disconnect mains power before installation work.



Danger of an electrical shock.

Installation location: Protected against the weather.

The following is applicable for open buildings and operations rooms which are not fully air conditioned:

Temperature: +5°C - +40°C.

Relative humidity: 5 - 85%, non-condensing.

Air pressure: 86 kPa - 106 kPa

3.2. Fitting To A Top Hat Rail

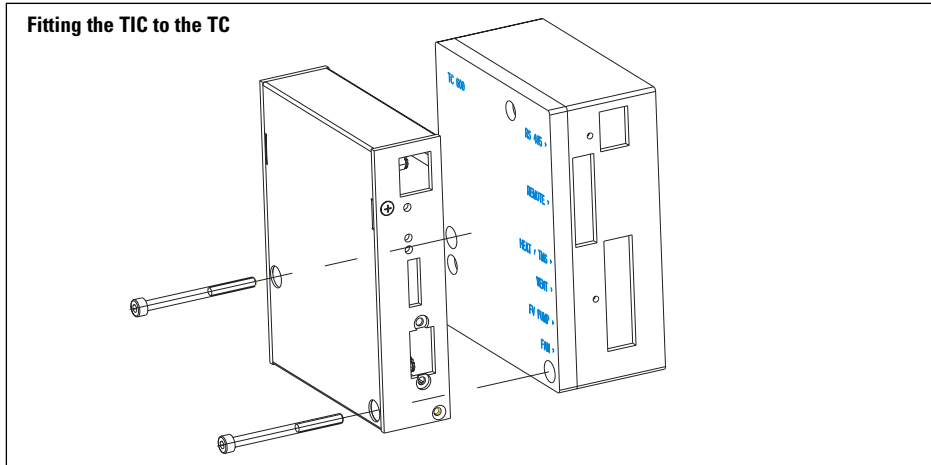
- ➔ Loosen both screws in the middle of the rear panel.
- ➔ Use these screws to bring the two top hat rail fasteners parallel to the unit.
- ➔ Secure the TIC250 to the top hat rail.
- ➔ Connect the RS485 Serial Interface electronic drive unit with the TIC250 using a short, well shielded cable (8 pole Western-cable, 1:1; see accessories, chapter 12). The TIC250 is supplied with voltage as soon as the electronic drive unit is switched on.
- ➔ Connect the Profibus to the Sub-D Box. Take account of the relevant regulations.

3.3. Fitting Directly To The TC600

The TIC250 is not protected against the ingress of dust or moisture (for example, condensation water from pump cooling). In case of doubt the TIC250 should not be fitted to the pump. (Alternative, fitting to the top hat rail).

- ➔ Switch off turbopump and bring to rest.
- ➔ Switch off current supply to the TC600 (both LEDs on the front panel of the TC600 "OFF") and secure against accidental re-switching on.
- ➔ Loosen the two internal Allen screws on the TC 600 (see drawing, page 7). Hold the TC600 firmly when loosening the screws.
- ➔ The TC600 remains on the pump. If the electronic drive unit should have been unintentionally disconnected, make sure that heat conducting material can be located between the pump and the TC600. This must not be damaged or contaminated. When connecting the TC600 take care not to damage the connecting plug.
- ➔ Use the two TIC250 screws M4x65 to fix the TIC250 and the TC600 to the pump. The boxes "RS485" of both units must be at the same height.(see drawing, page 7).

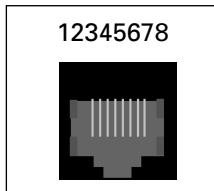
Fitting the TIC to the TC



- Using the delivered cable connect the two "RS485" boxes. The TIC250 is supplied with voltage as soon as the electronic drive unit is switched on.
- Connect the Profibus to the Sub-D Box with the inscription "Profibus". Please take account of the relevant regulations and recommendations with respect to the installation of a Profibus System.

RS485-Serial Interface

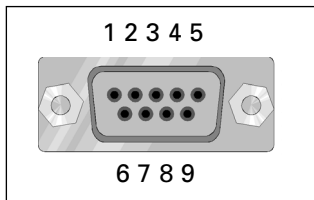
The voltage supply and the communication with the electronic drive unit are made via this RJ-45 Box.



Pin	Function
1	not connected
2	+Vin
3	not connected
4	not connected
5	RS485 D+
6	Gnd
7	RS485 D-
8	not connected

Profibus Connection

The Profibus is connected to this box. The pin arrangement is in accordance with the Profibus standard. Thereby the functions are supported in accordance with Tab., chapter 7. It is recommended to tighten the securing screws of the plug to prevent unintentional disconnection of the plug.



pin	Funktion
1	Shield
2	not connected
3	RxD/TxD-P
4	CNTR-P
5	DGND
6	VP
7	not connected
8	RxD/TxD-N
9	not connected

4. Operations

4.1. General

Before operating the TIC 250 for the first time the valid and unique serial interface address has to be set by means of the profibus address selection switch. Alterations to the address during operations are not permissible.

4.2. Switching On The TIC 250

The TIC switches itself on automatically as soon as the connected drive unit is switched on and the connection is in order. Each time the unit is switched on it has to be configured and parametered. Instructions in this respect can be found with your profibus configuration tool.

Providing no malfunction occurs, the TIC 250 is ready to operate.

4.3. Illuminating Displays

RS485 Status LED

This LED provides information on the general unit status and the communication with the drive unit. The following displays are possible:

Display	Meaning
Off	Unit is not supplied with adequate voltage
Green illuminating	Communication with the electronic drive unit running
Red/green flashing	Service mode
Red flashing	Communication with the electronic drive unit is defective
Red illuminating	Insoluble component error
Red 1 x short, 1 x long flashing	An invalid electronic drive unit is connected

When switching on, this LED undergoes a test phase of approx. 1s during which the status green, red and "off" are run through.

Profibus Status LED

This LED provides information on the status of the Profibus. The following displays are possible:

Display	Meaning
Off	Unit is not supplied with adequate voltage
Green illuminating	Unit is correctly parametered and configured
Green flashing	Unit is not yet parametered and configured
Green 1xshort, 1xlong flashing	The set address is not the one with which the unit is currently working
Red illuminating	The set address is invalid (>125)
Red flashing	No transmission rate recognized or no running transmission
Red 1 x short, 1 x long flashing	Current parameter data are erroneous
Red 2 x short, 1 x long flashing	Current configuration data are erroneous

When switching on, this LED undergoes a test phase of approx. 1s during which the status green, red and "off" are run through.

Data Exchange LED

This LED provides information on the condition "data exchange" of the TIC250. The definition of this condition can be found in the appropriate Profibus literature. The following displays are possible:

Display	Meaning
Off	The unit is not in the "data exchange" mode
Green illuminating	The unit is in the "data exchange" mode

Address Selection Switch

The Profibus address is set with this switch. The address is binary coded. At the position "lsb" is the lowest value bit ($2^0=1$), at the position "msb" the highest value bit ($2^7=127$). Valid addresses are from 0 to 125. The address must be set when the unit is switched off and may not be altered during operations.

5. Modules

The TIC250 supports several connection slots; this means that several modules can be used simultaneously. The required modules are distributed next to each other, without spaces, on the connection slots. Each module relates to one or several parameters on the Pfeiffer serial interface. Please refer to the operating instructions of the respective electronic drive unit for more detailed information on these parameters. The following modules are available for selection:

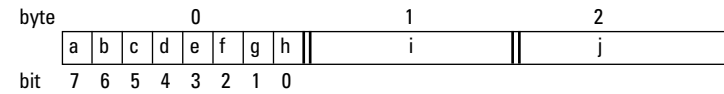
#	Name	Description	Parametering data	Input data	Output data
1	STANDARD ¹⁾	Standard functions	None	4byte	3byte
2	POWER ¹⁾	Current and voltage	None	4byte	None
3	OPHRS_PUMP ¹⁾	Operating hours pump	None	4byte	None
4	OPHRS_DRV ¹⁾	Operating hours drive	None	4byte	None
5	TMS ¹⁾	TMS heating	None	1byte	1byte
6	VENTING ¹⁾	Venting	None	None	3byte
7	FIXED_VALUE_OUT ²⁾	1 Parameter value output	Parameter number	None	2byte
8	FIXED_VALUE_IN ²⁾	1 Parameter value input	Parameter number	2byte	None
9	FIXED_STRING_OUT ²⁾	1 string output	Parameter number	None	6byte
10	FIXED_STRING_IN ²⁾	1 string input	Parameter number	6byte	None
11	RANDOM_VALUE_OUT ³⁾	1 Parameter output	None	4byte	4byte
12	RANDOM_VALUE_IN ³⁾	1 Parameter input	None	4byte	2byte
13	FAIL_SAFE ⁴⁾	Def. "safe condition"	Parameter number and value	None	None

- 1) Classic profibus module
 2) Pre-defined parameter access
 3) Freely selectable parameter access
 4) Fail-safe-data

5.1. "STANDARD" (module number 1)

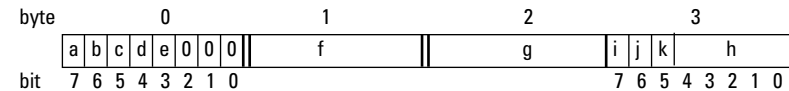
This module combines the functions which may be necessary in general operations. This module must always be used and plugged into the first connection slot.

Output data: 3byte not consistent



- a: Pre-selection heating (corresponds to Parameter 001): 0 - OFF, 1 - ON.
 b: Standby (corresponds to Parameter 002): 0 - OFF, 1 - ON.
 c: Error acknowledgment (corresponds to Parameter 009): 0 - Error is not acknowledged, 1 - Error is acknowledged (only when a malfunction is present to 1; then reset to 0).
 d: Pumping station (corresponds to Parameter 010): 0 - OFF, 1 - ON.
 e: Motor TMP (corresponds to Parameter 023): 0 - OFF, 1 - ON.
 f: Operating mode TMP (corresponds to Parameter 026): 0 - final rotation speed mode, 1 - rotation speed setting mode. In final rotation speed mode the final rotation speed of the pump is valid, in rotation speed setting mode, the set rotation speed (see also the operating instructions for the respective electronic drive unit).
 g: Run-up time monitoring (corresponds to Parameter 004): 0 - OFF, 1 - ON.
 h: Is not evaluated.
 i: Set rotation speed as a % of the final rotation speed (corresponds to Parameter 707 rounded up to a whole number). The set rotation speed is only then valid, if the operations mode TMP (f) is switched to rotation speed setting mode, otherwise the final rotation speed of the pump is valid. Valid values in principle are 0...100, further limitations are imposed by the connected electronic drive unit (please refer to the respective operating instructions).
 j: Switchpoint as a % (corresponds to Parameter 701). Valid values in principle 0...100, further limitations are imposed by the connected electronic drive unit (please refer to the respective operating instructions).

Input data: 4 byte consistent



- a: Unit remote controlled (corresponds to Parameter 300): 0 - no, 1 - yes.
 b: Switchpoint attained (corresponds to Parameter 302): 0 - no, 1 - yes.
 c: Set rotation speed attained (corresponds to Parameter 306): 0 - no, 1 - yes.
 d: Pump accelerates (corresponds to Parameter 307): 0 - no, 1 - yes.
 e: TMS regulator responded (corresponds to Parameter 333): 0 - no, 1 - yes.
 f: Actual rotation speed as a % of the final rotation speed (corresponds to whole numbers, to parameter 315 related parameter 309).
 g: Error/Warning number of the electronic drive unit, low byte (0 - no error, 1...999 - error 1...999 has occurred, 1001...1999 - Warning 1...999 has occurred).
 h: Error/Warning number of the electronic drive unit, high byte.
 i: Oil deficiency (corresponds to Parameter 301): 0 - no, 1 - yes.
 j: Excess temperature pump (corresponds to Parameter 305): 0 - no, 1 - yes.
 k: Excess temperature electronic drive unit (corresponds to Parameter 304): 0 - no, 1 - yes.

Configuration data: 0xC1 0x02 0x83 0x01*

Parametering data: none

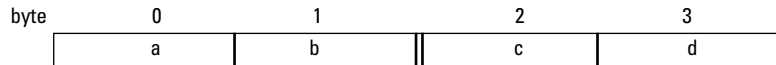
*Format of numbers see chapter 13.

5.2. "POWER" (module number 2)

This module contains the actual voltage and the current of the electronic drive unit. The values are printed out in 10mA/10mV ; in order to obtain the value in A/V, you have to divide by 100.

Output data: none

Input data: 2 Words consistent



- a: Motor current in 10mA, low byte (corresponds to Parameter 310).
- b: Motor current in 10mA, high byte.
- c: Intermediate circuit voltage in 10mV, low byte (corresponds to Parameter 313).
- d: Intermediate circuit voltage in 10mV, high byte.

Configuration data: 0x41 0x41 0x02*

Parametering data: none

5.3. "OPHRS_PUMP" (module number 3)

This module contains the operating hours of the pump. The maximum value is 999999.

Output data: none

Input data: 4 Bytes consistent



- a: Operating hours pump, low word, low byte (corresponds to Parameter 311).
- b: Operating hours pump, low word, high byte.
- c: Operating hours pump, high word, low byte.
- d: Operating hours pump, high word, high byte.

Configuration data: 0x41 0x83 0x03*

Parametering data: none

*Format of numbers see chapter 13.

5.4. "OPHRS_DRV" (module number 4)

This module contains the operating hours of the electronic drive unit. The maximum value is 999999.

Output data: none

Input data: 4 Byte consistent



- a: Operating hours electronic drive unit, low word, low byte (corresponds to Parameter 314).
- b: Operating hours electronic drive unit, low word, high byte.
- c: Operating hours electronic drive unit, high word, low byte.
- d: Operating hours electronic drive unit, high word, high byte.

Configuration data: 0x41 0x83 0x04*

Parametering data: none

5.5. "TMS" (module number 5)

The values which are important for the operation of the TMS heating are contained in this module. In addition the status of the TMS controller is displayed in the standard module; this module must be plugged in at all times.

Output data: 1 Byte



- a: Set value TMS heating in °C (corresponds to Parameter 704).

Input data: 1 Byte



- a: Actual value TMS heating in °C (corresponds to Parameter 331).

Configuration data: 0xC1 0x00 0x00 0x05*

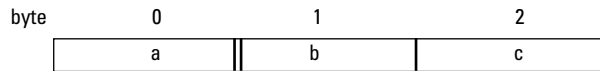
Parametering data: none

*Format of numbers see chapter 13.

5.6. "VENTING" (module number 6)

This module contains the settings for the venting operations of the pump.

Output data: 3byte not consistent



a: Venting frequency as a % of the final rotation speed (corresponds to Parameter 720).

b: Venting time in s, low byte (corresponds to Parameter 721).

c: Venting time in s, high byte.

Input data: none

Configuration data: 0x81 0x82 0x06*

Parametering data: none

5.7. "FIXED_VALUE_OUT" (module number 7)

With each of these modules it is possible to write a value onto a parameter previously defined. In this process and as a matter of principle only parameters can be used whose value is between 0 and 65535 (please also refer to table, chapter 7). The parameter number is stated in the parametering data. In this module and during operations the actual value of the parameters is constantly being transmitted from the master to the slave.

Output data: 1 Word consistent



a: Parameter value, low byte.

b: Parameter value, high byte.

Input data: none

Configuration data: 0x81 0xC0 0x07*

Parametering data: 1 Word parameter number



c: Parameter number, low byte.

d: Parameter number, high byte.

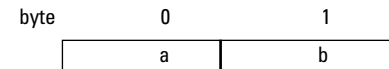
*Format of numbers see chapter 13.

5.8. "FIXED_VALUE_IN" (module number 8)

With each of these modules it is possible to read a value from a parameter previously defined. In this process and as a matter of principle only parameters can be used whose value is between 0 and 65535 (please also refer to chapter 7). The parameter number is stated in the parametering data. In this module and during operations the actual value of the parameters is constantly being transmitted from the slave.

Output data: none

Input data: 1 word consistent

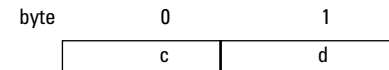


a: Parameter value, low byte.

b: Parameter value, high byte.

Configuration data: 0x41 0xC0 0x08*

Parametering data: 1 word parameter number



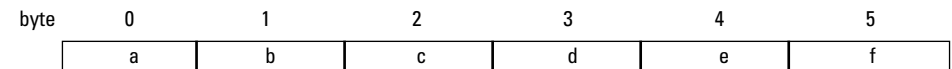
c: Parameter number, low byte.

d: Parameter number, high byte.

5.9. "FIXED_STRING_OUT" (module number 9)

With each of these modules it is possible to send a string to a parameter previously defined. The string corresponds to the data field which is in the telegram of the Pfeiffer serial interface (please also refer to table, chapter 7). The parameter number is stated in the parametering data. In this module and during operations the actual value of the parameters is constantly being transmitted from master to the slave.

Output data: 6 Byte consistent

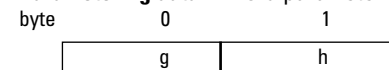


a-f: string, as transmitted in the Pfeiffer telegram.

Input data: none

Configuration data: 0x81 0x85 0x09*

Parametering data: 1 word parameter number



g: Parameter number, low byte.

h: Parameter number, high byte.

*Format of numbers see chapter 13.

5.10. "FIXED_STRING_IN" (module number 10)

With each of these modules it is possible to read a string from a parameter previously defined. The string corresponds to the data field which is in the telegram of the Pfeiffer serial interface (please also refer to table, chapter 7). The parameter number is stated in the parametering data. In this module and during operations the actual value of the parameters is constantly being transmitted from the slave.

Output data: none

Input data: 6 Byte consistent



a-f: string, as transmitted in the Pfeiffer telegram.

Configuration data: 0x41 0x85 0x0A*

Parametering data: 1 word parameter number

*Format of numbers see chapter 13.



g: Parameter number, low byte.

h: Parameter number, high byte.

5.11. "RANDOM_VALUE_OUT" (module number 11)

With the help of this module it is possible to write on a parameter whose number can change during operations. In this process and as a matter of principle only parameters can be used whose value is between 0 and 65535 (please also refer to table, chapter 7). The parameter number and value are written from the master to the output data. The slave checks the parameter for validity and writes, as soon as confirmation is received from the electronic drive unit, the same parameter number and the value in the input data, this means the write command can be regarded as valid, if the input data is identical to the output data. If errors arise when accessing the parameter (for example invalid parameter value), these are also displayed in the input data. With the help of this module there is also the possibility to access parameters which are not included in table, chapter 7, but which as a result of software changes on the electronic drive unit have been added. However, these parameters are subject to special conditions. More information is available on request.

Output data: 2 words consistent



a: Parameter number, low byte.

b: Parameter number, high byte.

c: Parameter value, low byte.

d: Parameter value, high byte.

Input data: 2 words consistent



a: Parameter number, low byte.

b: Parameter number, high byte.

c: Parameter value, low byte.

d: Parameter value, high byte.

e: Status value: 0 - no error ascertained.

1 - addressed parameter does not exist.

2 - parameter value is outside the permissible limits.

3 - logic access error (attempt to write on a readable only parameter or attempt to read on a writeable only parameter).

4 - access to the parameter denied owing to an invalid data type.

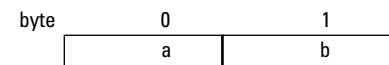
Configuration data: 0xC1 0xC1 0xC1 0x0B*

Parametering data: none

5.12. "RANDOM_VALUE_IN" (modul number 12)

With the help of this module it is possible to read a parameter whose number can change during operations. In this respect and as a matter of principle, only those parameters can be used whose value is between 0 und 65535 (please also refer to table, chapter 7). The parameter number is written from the master into the output data. The slave checks the parameter for validity and, as soon as confirmation and the parameter value is received from the electronic drive unit is received, writes the same parameter number and value in the input data, this means that the read command can be regarded as valid if the parameter number in the input data is identical to that in the output data. If an error occurs when accessing the parameter (for example, invalid parameter value), this will also be displayed in the input data. With the help of this module there is also the possibility to access parameters which are not included in table, chapter 7, but which as a result of software changes on the electronic drive unit have been added. However, these parameters are subject to special conditions. More information is available on request.

Output data: 1 word consistent



a: Parameter number, low byte.

b: Parameter number, high byte.

Input data: 2 words consistent



*Format of numbers see chapter 13.

- a: Parameter number, low byte.
- b: Parameter number, high byte.
- c: Parameter value, low byte.
- d: Parameter value, high byte.
- e: Status value: 0 - no error ascertained.
 - 1 - addressed parameter does not exist.
 - 2 - parameter value is outside the permissible limits.
 - 3 - logic access error (attempt to write on a readable only parameter or attempt to read on a writeable only parameter).
 - 4 - access to the parameter denied owing to an invalid data type.

Configuration data: 0xC1 0x40 0xC1 0x0C*

Parameter data: none

5.13. "FAIL_SAFE" (modul number 13)

The "safe condition" of the pump is defined with this module. In the event of an error (signalled by the master or caused by defective Profibus communication) the parameter values defined with this module are written to the relevant parameter numbers. Parameter number and value are laid down in the parametering data.

Output data: none

Input data: none

Configuration data: 0x00

Parametering data: 1 word parameter number, 1 word parameter value

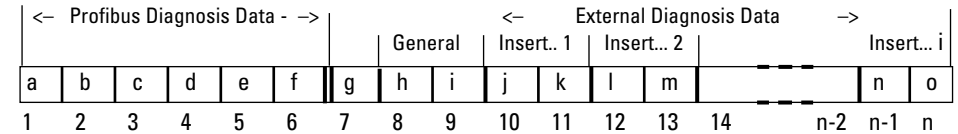
byte	0	1	2	3
	a	b	c	d

- a: Parameter number, low byte.
- b: Parameter number, high byte.
- c: Parameter value, low byte.
- d: Parameter value, high byte.

*Format of numbers see chapter 13.

6. Extended Diagnosis Data

In addition to the diagnosis data described in the Profibus standard, further diagnosis data are transmitted via the Profibus diagnosis telegram to provide information on the general condition of the unit and error messages in relation to the modules located in the respective connection slots. The module number and the module status is transmitted for each module. The data field of a diagnosis telegram will, as an example, appear as follows:



In this example the i modules are plugged in, the data in the diagnosis telegram have the length n. The individual fields have the following meaning:

- a - f: laid down via the Profibus standard.
- g: Length of the external diagnosis data including this field (in this example n-6).
- h: General status of the TIC250, low byte.
- i: General status of the TIC250, high byte.
- j: Module number of the module located in the first connection slot.
- k: Status of the module located in the first connection slot.
- l: Module number of the module located in the second connection slot.
- m: Status of the module located in the second connection slot.
- n: Module number of the module located in the last occupied connection slot.
- o: Status of the module located in the last occupied connection slot.

The following values can appear with regard to the general condition (in the example Byte h and i):

Status value	Meaning
0	Unit status OK
1	Communication with the electronic drive unit is defective
2	Insoluble unit error
3	Insoluble unit error
4	Invalid electronic drive unit connected

The following values can appear with regard to the module status (in the example Bytes k, m and o):

Status value	Meaning
0	No module assigned
1	Module status OK
2	At least one parameter which is assigned to this module is not supported by the connected electronic drive unit. Please refer to the operating instructions for the respective component.
3	The parameter number selected in this module does not exist.
4	The transmitted parameter value in this module is outside the valid range.
5	An access logic error has occurred in this module: it has been attempted to write to a parameter which is only readable or a parameter value to read which is only writeable.
6	This module does not support the data type of the addressed parameter.
7	The "standard module" is not located in this connection slot. The "standard module" must be located in the first connection slot as a matter of principle.
8	An error has been acknowledged although no error has occurred. As a matter of principle, errors should only then be acknowledged when it is necessary because this command is only executed, once per error. With static acknowledgments an error message can remain unnoticed.
9	The maximum number of permissible "fail_safe modules" has been exceeded.
10	An unknown module has been assigned to this connection slot.
11	More than one module "random_value_in" has been used.
12	More than one module "random_value_out" has been used.
13	The maximum permissible number of to be requested parameter numbers has been exceeded.
14	More than one of the modules "standard", "power", "ophrs_pump", "ophrs_drv", "tms" or "venting" has been used.

7. Useable Parameters For The Pfeiffer Protocol

The parameters in this table can be accessed via the Profibus.

• suitable - not suitable

#	TCM1601	TC600	Data typ ⁴⁾	Name	Already contained in module			Suitable for module					
					1-6	7	8	9	10	11	12	13	
001	•	•	boolean_old	Pre-selection heating	•	•	•	•	•	•	•	•	
002	•	•	boolean_old	Standby	•	•	•	•	•	•	•	•	
004	•	•	boolean_old	Run-up time monitoring on/off	•	•	•	•	•	•	•	•	
009	•	•	boolean_old	Errors acknowledgment	•	•	-	•	-	•	-	•	
010	•	•	boolean_old	Pumping station on/off	•	•	•	•	•	•	•	•	
012	-	•	boolean_old	Venting release TMP on/off	-	•	•	•	•	•	•	•	
013	•	-	boolean_old	Pre-selection brake	-	•	•	•	•	•	•	•	
023	•	•	boolean_old	Motor TMP on/off	•	•	•	•	•	•	•	•	
024	•	•	u_short_int	Configuration switch output 1	-	•	•	-	-	•	•	•	
025	•	•	u_short_int	Operating mode backing pump	-	•	•	-	-	•	•	•	
026	•	•	u_short_int	Operating mode TMP	•	•	•	-	-	•	•	•	
027	•	•	u_short_int	Gas type	-	•	•	-	-	•	•	•	
028	•	•	u_short_int	Operating mode remote	-	•	•	-	-	•	•	•	
029	-	•	boolean_new	Operating mode drive (power)	-	•	•	-	-	•	•	•	
030	•	•	u_short_int	Venting mode	-	•	•	-	-	•	•	•	
300	•	•	boolean_old	Unit remote controlled	•	-	•	-	•	-	•	-	
301	-	•	boolean_old	Oil deficiency	•	-	•	-	•	-	•	-	
302	•	•	boolean_old	Switchpoint attained	•	-	•	-	•	-	•	-	
303	•	•	string	Actual error code	•	-	•	-	•	-	-	-	
304	•	•	boolean_old	Excess temperature drive	•	-	•	-	•	-	•	-	
305	•	•	boolean_old	Excess temperature pump	•	-	•	-	•	-	•	-	
306	•	•	boolean_old	Set rotation speed attained	•	-	•	-	•	-	•	-	
307	•	•	boolean_old	Pump accelerates	•	-	•	-	•	-	•	-	
308	•	•	u_integer	Set rotation speed in Hz	-	-	•	-	•	-	•	-	
309	•	•	u_integer	Actual rotation speed in Hz	• ²⁾	-	•	-	•	-	•	-	
310	•	•	u_real	Motor current in A	•	-	•	-	•	-	•	-	
311	•	•	u_integer	Operating hours pump in h	•	-	• ³⁾	-	•	-	• ³⁾	-	
312	•	•	string	Software version drive	-	-	-	-	-	-	-	-	
313	•	•	u_real	Motor voltage in V	•	-	•	-	•	-	•	-	
314	-	•	u_integer	Operating hours drive in h	•	-	• ³⁾	-	•	-	• ³⁾	-	
315	•	•	u_integer	Final rotation speed pump in Hz	-	-	•	-	•	-	•	-	
316	•	•	u_integer	Motor power in W	-	-	•	-	•	-	•	-	
319	-	•	u_integer	Cycle counter	-	-	• ³⁾	-	•	-	• ³⁾	-	
331	•	•	u_integer	TMS heating actual value in °C	•	-	•	-	•	-	•	-	
333	•	•	boolean_old	TMS controller responded	•	-	•	-	•	-	•	-	
334	•	•	u_integer	max. occurred TMS temp. in °C	-	-	•	-	•	-	•	-	
335	•	•	u_short_int	Heating type	-	-	•	-	-	-	•	-	
340	•	-	u_expo	Actual pressure value in mbar	-	-	-	-	-	-	-	-	
349	•	•	string	Unit name	-	-	-	-	•	-	-	-	
360	•	•	string	Error memory, Position 1	-	-	•	-	•	-	-	-	
361	•	•	string	Error memory, Position 2	-	-	•	-	•	-	-	-	
362	•	•	string	Error memory, Position 3	-	-	•	-	•	-	-	-	
363	•	•	string	Error memory, Position 4	-	-	•	-	•	-	-	-	
364	•	•	string	Error memory, Position 5	-	-	•	-	•	-	-	-	
365	•	•	string	Error memory, Position 6	-	-	•	-	•	-	-	-	
366	•	•	string	Error memory, Position 7	-	-	•	-	•	-	-	-	
367	•	•	string	Error memory, Position 8	-	-	•	-	•	-	-	-	
368	•	•	string	Error memory, Position 9	-	-	•	-	•	-	-	-	
369	•	•	string	Error memory, Position 10	-	-	•	-	•	-	-	-	
700	•	•	u_integer	Maximum run-up time in min	-	•	•	•	•	•	•	•	
701	•	•	u_integer	Switchpoint as a %	•	•	•	•	•	•	•	•	
703	•	-	u_expo	HVV pressure switchpoint in mbar	•	-	-	-	-	-	-	-	
704	•	•	u_integer	TMS heating temp. Set value in °C	•	•	•	•	•	•	•	•	
707	•	•	u_real	Rotation speed setting as a %	• ¹⁾	•	•	•	•	•	•	•	
708	-	•	u_short_int	Set power as a %	-	•	•	-	-	•	•	•	
720	•	•	u_short_int	Venting frequency as a %	•	•	•	-	-	•	•	•	
721	•	•	u_integer	Venting time in s	•	•	•	•	•	•	•	•	
738	•	-	string	Pressure gauge type	-	•	-	•	-	-	-	-	
797	•	•	u_integer	Unit address	-	-	•	•	•	•	•	•	

¹⁾ rounded up to whole numbers; ²⁾ whole numbers as a % related to parameter 315; ³⁾ only up to 65535; ⁴⁾ please refer to the explanations which follow. Please contact us if access is required to parameters which are not included in this table.

7.1. Data Typs

See Operating Instructions "Pfeiffer" Protocol RS 232/485", PM 800 488 BE.

8. Configuring And Parametering The TIC250

Before configuring and parametering it must be decided what data is to be exchanged cyclically between master and slave. The selection of the necessary module is dependent on this decision.

8.1. Limitations

Where several limitations arise together, valid is the first which arises.

1. A maximum of 38 modules can be plugged in.
2. The "STANDARD" module must be plugged into the first connection slot.
3. The parameters contained in the input data of the used modules must not exceed 42.
4. A maximum of 4 "FAIL_SAFE"-modules can be used simultaneously.
5. The modules "STANDARD", "POWER", "OPHRS_PUMP", "OPHRS_DRV", "TMS", "VENTING", "RANDOM_VALUE_OUT" and "RANDOM_VALUE_IN" may only be inserted a maximum of once.
6. The "FAIL_SAFE"-modules may only occur as last in the occupied connection slots.
7. If you set an invalid Profibus address, then the slave has the address 42.

8.2. Tips

1. Only use modules which are really necessary. The more modules which are used have the effect of slowing down the actualization of the input data and the handling of the output data.
2. The access to parameters (that is, the functions of all modules) can be influenced by the external switching of the electronic drive unit. The switching must enable access to all relevant parameters via the serial interface (please also refer to the respective operating instructions for the electronic drive unit).
3. Do not use parameter numbers in modules already covered by other modules in order to shorten the reaction times of the electronic drive unit.
4. Ensure that that the electronic drive unit has no parameters with default settings which you do not require. If necessary, these parameters must also be controlled via modules.

9. What To Do In Case Of Breakdowns ?

→The RS 485 status LED illuminates red:

➔ The unit is defective; exchange.

→The profibus configuration tool cannot read the GSD file.

→It is possible that the tool will only support older Profibus standards.

➔ Please contact the manufacturer of the tool.

10. Maintenance And Service

The unit requires no maintenance. A damp cloth can be used to wipe away any dirt which has collected on the front panel. Ensure that the unit is first disconnected from the mains power supply.

Do Make Use Of Our Service Facilities

In the event that repairs are necessary a number of options are available to you to ensure any system down time is kept to a minimum:

- Return the unit to the manufacturer for repairs;
- Replace with a new value unit.

Local PFEIFFER representatives can provide full details.



When carrying out their own repairs customers must bear in mind that dangerous voltage levels are present.

Please note:

Units returned to us for repair or maintenance are covered by our general conditions of sale and supply.

Contact addresses and telephone hotline:

Please refer to the back cover of this manual for contact addresses and telephone hotline numbers.

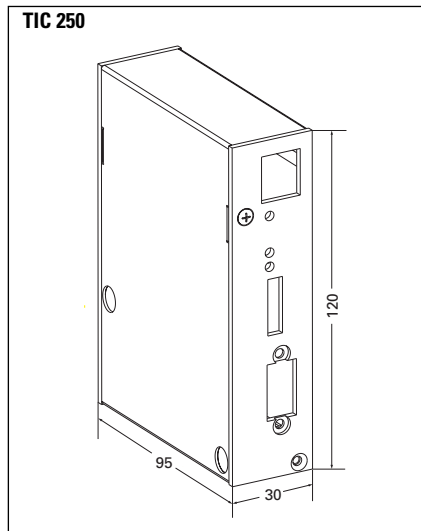
11. Technical Data

11.1. Data List

Description	Unit	TIC 250	Comments
Connection voltage	V DC	15 - 24	From the drive unit
Permiss. amb. temperature:	°C	5 - 40	
Max. relative humidity. ¹⁾	% (bei 5-40°C)	5 - 85	
Air pressure:		86kPa - 106 kPa	
Protection type:		IP 20	
Weight:	kg	0,27	

¹⁾ non condensing

11.2. Dimensions



12. Accessories

Description	Size	Piece	Number	Comments
Verbindungskabel TIC 250 - TC	0,13 m	1	P0 994 848	
Verbindungskabel TC - DCU	3 m	1	P0 993 595	
Verbindungskabel TC - DCU	5 m	1	P0 993 596	

13. Supplementary Information

The TIC250 is a gateway, which enables connection of the Electronic Drive Unit TC 600 and TCM1601 to the Profibus DP.

Depending on the configuration of your components further operating instructions are included in the delivery consignment (please see the table). If, despite every effort by us, information on your products is missing please get in touch with your local Pfeiffer representatives or call us on the hotline shown on the back cover page. All operating instructions are also available as PDF files.

The following operating instructions are available for the range of pumps which come with DCU control units:

Product	Definition	Nr. Operating Instruction
Vacuum pump	Description of the Pump	dependend to the pump typ ¹⁾
DCU 001, 100-600	Description of the controller	PM 800 477 BD
Operating turbo pump with DCU	Operating definition/parameter	PM 800 547 BD
TPS 100, 200, 300, 600	Description of the mains power unit	PM 800 521 BD
Housing heating turbo pump	Description of the housing heating	PM 800 542 BD
Air cooling turbo pump	Description of the air cooling	PM 800 543 BD
Water cooling turbopump	Description of the water cooling	PM 800 546 BD
Backing pump relay box ²⁾	Description monitoring of the backing p.	PM 800 544 BD
Temperature Management System TMS	Description of the heating of the pre vacuum section of the turbo pump	PM 800 468 BD
RS 232/RS 485	Description of the interface	PM 800 488 BD
Level converter RS 232/RS 485	Pump monitoring via RS 232	PM 800 549 BD
TVF 005	Description of the vent valve	PM 800 507 BD

¹⁾ Numbers can be supplied by PFEIFFER Service.
²⁾ Only for rotary vane vacuum pumps.

14. Terminology Explanations, Abbreviations

0x	Hexadecimal representation, for example 0x2A for 42 decimal.
Electronic drive unit	Electronics which drive the pump, for example TC600 or TCM1601.
Output data	Data provided by the master and transmitted to the slave (for example, rotation speed setting).
Byte default	A number between 0 und 255 (0h - FFh and/or 0x00 - 0xFF).
Input data	Setting on delivery. Data provided by the slave and transmitted to the master (for example, actual rotation speed).
gateway	Unit which translates between two bus systems, for example, between Profibus DP and RS485 with Pfeiffer Protocol.
GSD	Basic unit data. This data – usually electronic data with the name *.gsd – contains the description of the slave which is necessary for the configuration and parametering.
h	Hexadecimal representation, for example, 42h for 66 decimal.
Configuration tool	PC program with which the configuration and parametering for the slave of a Profibus-network can be undertaken.
Configuring Consistence	Definition of the amount and the format of the input and output data. Correlation. Are for example two bytes consistent, their content can only be changed simultaneously since they have a relation to each other.
LED master	Light emitting diode. Unit from which control is exercised via the bus. One master normally polls cyclical input data from slaves and transmits output data to them. Only one master can parameter and configure slaves.
Module	Selectable, functional unit of the slaves. In the TIC250 each module contains one or more parameters of the Pfeiffer serial interface.
Parametering	Definition of the bus parameters as well as the application specific data necessary for the communication. The parametering has nothing directly to do with the parameters of the Pfeiffer serial interface.
Pfeiffer serial interface	The RS 485 Serial Interface used in the electronic drive units TC600 and TCM1601 with a company specific protocol.
polling RS485	Requests for values. Serial interface standard. Both the Profibus DP and the Pfeiffer serial interface of the TIC250 use the RS485, but with differing protocols and speeds. In this document the RS485 means exclusively the Pfeiffer serial interface.
slave	Bus participant which as a rule cannot, in itself, take up any communication but first responds when required to do so by the master.
Connection slot	A location where a module can be inserted (plugged in). With the TIC250, modules must be inserted without spaces in between and assigned beginning from the first connection slot.
Word	Number between 0 und 65535 (0h - FFFFh and/or 0x0000 - 0xFFFF).

Manufacturer´s declaration pursuant to the following EU directives:

- Machinery Directive 89/392/EEC
- Electromagnetic Compatibility Directive 89/336/EEC
- Low Voltage Directive 73/23/EEC

We hereby certify that the product specified below is intended for installation in a machine which is forbidden to be put into operation until such time as it has been determined that the end product is in accordance with the provision of EU Directive 89/392/EEC, Annex II B.

We certify conformity with EU Electromagnetic Compatibility Directive 89/336/EEC and EU Low Voltage Directive 73/23/EEC.

The guidelines, harmonized standards, national standards and specifications which have been applied are listed below.

Product:

Profibus DP-gateway TIC 250

Guidelines, harmonised standards, national standards in languages and specifications which have been applied:

EN 61010, EN 55011, EN 50081-1, EN 50082-2, IEC 801 1-4, VDE 0843-6

Signatures::



Managing Director (W. Dondorf)



Zentrale/Headquarters

Pfeiffer Vacuum GmbH

Emmeliusstrasse 33
D-35614 Asslar

Telefon 06441/802-0

Telefax 06441/802-202

Hotline 06441/802-333

Internet:

<http://www.pfeiffer-vacuum.de>