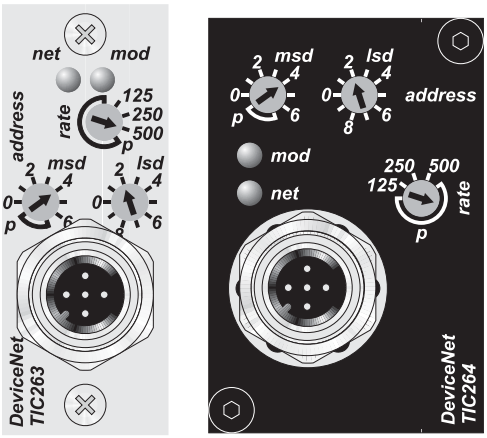
Betriebsanleitung • Operating Instructions

TIC 263

TIC 264



DeviceNet Adapter for TCP 350 and TCP/TM 3000

PT0149BE/A (0409)

PFEIFFER VACUUM

Inhalt

Hinweis! Aktuelle Betriebsanleitungen sind auch unter www.pfeiffer-vacuum.net verfügbar.

1. Safety Precautions

- ☞ Read and follow all the instructions in this manual.
- ☞ 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 263/264.
  – The protection type of the TIC 263/264 is IP20/IP 54 when assembling accurate.
- ☞ 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.

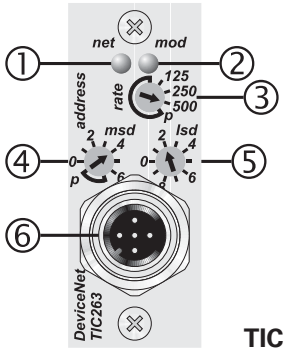
1.1 For Your Orientation

Operating Instructions In The Text

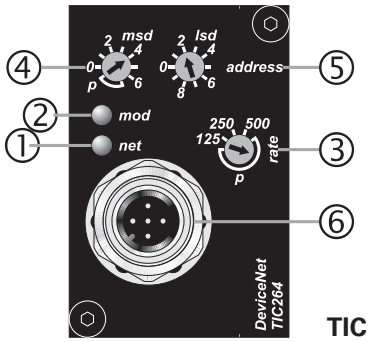
➡ Here, you have to do something!

2. Product Description

The TIC 263 respectively TIC 264 provides a connection for the bus system DeviceNet for the drive units TCP 350 and TCP 3000 respectively TM 3000. If not stated otherwise the designation "TIC" applies to the TIC 263 and also to the TIC 264.
The TIC corresponds to the profile of the „Turbomolecular Vacuum Pump Device“.



TIC 263



TIC 264

Abb. 2-1 Description of the front panel

① Indicator DeviceNet-Status (LED)
② Indicator unit status (LED)
③ Switch DeviceNet Baudrate
④ Switch DeviceNet-Adresse (msd)
⑤ Switch DeviceNet-Adresse (lsd)
⑥ DeviceNet connection

Connection options

The TIC offers connection options for the DeviceNet by means of a M12 connector (Micro Style Connector).

2.1 Delivery

Included with the delivery of the TIC 263/264 (installed in the electronic drive units) are the following items:

- CD with EDS file
- Operating Instructions

2.2 Proper Use

The TIC serves the purpose of connecting the aforementioned drive units to the DeviceNet. The type of protection stated for the TIC 264 can only be attained in the case of correctly fitted rubber stoppers to the address selector switches and the service connection as well as with connected DeviceNet connectors.

2.3 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

➡ Set the baud rate with the selector switch or via the DeviceNet.
➡ Set the address selector switch to the DeviceNet address intended for this instrument with the selector switch or via DeviceNet.
➡ TIC 264: fit the rubber stoppers to the address selector switches so as to attain the type of protection stated. The stoppers must be inserted straight and as deeply as possible into the holes.
➡ Connect the DeviceNet cable respective the T-piece to the TIC and secure it against inadvertent loosening by screwing it down. When doing so, note the applicable regulations and recommendations for installing a DeviceNet system..

3.2 DeviceNet-Anschluß

The DeviceNet is connected to this box. The pin arrangement is in accordance with the DeviceNet specification (Micro Style Connector).
➡ Tighten the securing screws of the plug to prevent unintentional disconnection of the plug.

DeviceNet	Pin	Function
	1	Shield
	2	Power supply V+
	3	Power supply V-
	4	CAN_H
	5	CAN_L

Tab. 3.2.a: Pin assignment Profibus connector

3.3 Adjusting Address and Baud Rate

Manual address set up

➡ Set up the DeviceNet address (00-63) through the switches marked „address“. The switch position marked „msd“ designates the tens decimals, „lsd“ denotes the ones decimals.

Address set up through DeviceNet

➡ In the switched off state, set the switch „address msd“ to „p“.
– After switching the instrument on, it will resume operation with the last valid address which was entered (factory default 63), which may be set up through the object „DeviceNet / Instance 1 / MAC ID“ (3 / 1 / 1).

Manual baud rate set up

➡ The DeviceNet baud rate is set up in the switched off state through the switch marked „rate“ .

Baud rate set up through DeviceNet

➡ In the switched off state, set the switch „rate“ to „p“.
– After switching the instrument on, it will operate using the last valid baud rate (factory default 500 k), which may be set up through the object „DeviceNet / Instance 1 / baud rate“ (3 / 1 / 2). Changes will only come into effect after having reset the instrument.

4. Operation

4.1 General

➡ Before operating the TIC, set up both baud rate and address.
  – In the case of the TCP 350 DN (TIC 263) the time taken from switching on the instrument until the DeviceNet is available may amount to approximately 15 seconds.
➡ Disable all other means of control (remote connection, keyboard, for example) so as to ensure that the equipment is exclusively under full control through the DeviceNet.
➡ In order to establish a connection apply the service „allocate master/slave connection set“ to the instance of the „DeviceNet“ object,
  – for this state the desired connection (Explicit / Poll I/O) and set the attribute „expected packet rate“ for the respective connection.

Indicators

Status	Meaning
Off	Device is not online
Green flashing	Device is online, but has no connections in the established state
Green illuminating	Device is online and has connections in the established state
Red flashing	One or more I/O connections are in the time-out state
Red illuminating	Failed communication device

Tab. 4.1.a: Network Status „net"

Status	Meaning
Off	There is no power applied to the device
Green illuminating	The device is operating in a normal condition
Red illuminating	The device has an unrecoverable fault
Red/Green flashing	The device is in selftest

Tab. 4.1.b: Module Status „mod"

4.2 DeviceNet Objects and Functions

The functions of the drive unit can be accessed through the TIC through the following DeviceNet objects based on the profile "Turbo Molecular Vacuum Pump Device":

Class	inst.	Comment	
1: identity	1	Unit attribute	
2: message router	1	-	
3: DeviceNet	1	Communication setup	
4: assembly	1	Input	Error bits, status of the pump (acceleration, "ON/OFF")
	2	Input	Error bits, status of the pump, pump rotation speed
	5	Output	Pump "ON/OFF"
	6	Output	Pump "ON/OFF", rotation speed control
	7	Output	Pump "ON/OFF", rotation speed control, target rotation speed
5: connection	1	Explicit (single access to functions)	
	2	Poll I/O (typically exchange of an assembly object)	
7: register	1	Configuration for venting valve	
8: discrete input point	1	Feedback signal, pump is started and running	
9: discrete output point	1	Pumping station "ON/OFF"	
	2	Heating "ON/OFF"	
42: AC/DC drive	1	Motor control	
48: s-device supervisor	1	Unit management	
49: s-analog sensor	5	TMS temperature actual value	
51: s-single stage controller	1	TMS temperature control	
100: specials	1	Processing of functions beyond the scope of this profile	

For the individual functions *see chap. 6., page 10* "DeviceNet Statement of Conformance"; the more important functions are described here in greater detail.

Switching the pump on and off

The attribute „Speed Control" of the ac/dc drive object (42 / 1 / 38, data type BYTE) contains different bits for controlling the pump

Bit	0	1
0	pumping station off	pumping station on
1	motor on	motor off
2	standby off	standby on

Acknowledgement of errors

Reset service (5) to the instance of the s-device supervisor object (48 / 1).

Venting

The venting characteristic can be changed through the register object:

Attribute	Function
data	Venting mode: 0: not venting, 1: venting on, 2: automatic venting
venting frequency	Venting frequency in % of the final rotation speed (valid for venting mode = automatic)
venting time	Venting time in s (valid for venting mode = automatic)

Actual/setpoint speed

The actual and setpoint speeds can be read and defined through the ac/dc drive object. Here note that all numbers must match the DeviceNet data type INT (i.e. ≤ 32767), if required it is necessary to scale with the attribute SpeedScale.

	Current speed in RPM	Setpoint speed in RPM
reading	Rotation speed = SpeedActual / $2^{SpeedScale}$	Rotation speed = SpeedRef / $2^{SpeedScale}$
writing	-	SpeedRef = $2^{SpeedScale}$. Rotation Speed (RPM)

Pump status

	Bit	Meaning if = 1
The status of the pump (relating to its speed) can be taken from the table on the right at the ac/dc drive object, attribute speed status.	0	on and rotation speed > 0
	1	motor off
	2	at stand by rotation speed
	4	stopped
	5	accelerates
	6	at target speed
	7	decelerates

Functions not contained in the profile

The TIC permits access to more functions than defined in the profile for this instrument. These functions can be accessed through the "Specials-Object":

1. Enter in the attribute „output data“ the string corresponding to the information provided, *see chap. 7, page 19*.
2. A valid response is present, when the bytes „Path“ of the attribute „input data“ corresponds to those of the attribute „output data“.

Byte	Meaning
0	Length of this string (n Byte)
1	Service
2	Path
3	
4	
5	If necessary additional data
...	
n<8	

For example:

	Output data				Input data				Comment
	Length	Service	Path	Add. Data	Length	Service	Path	Add. Data	
Read motor current	4	1	4, 1, 17	-	8	65	4, 1, 17	163, 112, 157, 63	=> 1,23 A
Configuration K2 -> 1	5	2	9, 5, 17	1	4	66	2, 9, 5	-	=> Ok

5. What To Do In Case Of Breakdowns?

Problem	Possible Reasons	Resolution
No communication through DeviceNet	No power supply through the DeviceNet connection	Check connection cable
		Check power supply

6. DeviceNet Statement of Conformance

General Device Data	
Conforms to DeviceNet Specification	Volume I, Release 2.0, Volume II, Release 2.0
Vendor Name	Pfeiffer Vacuum
Device Profile Name	Turbomolecular Vacuum Pump Device
Product Catalog Number	-
Product Revision	1.1

DeviceNet Physical Conformance Data	
Network Power Consumption (Max)	0.1 A @ 11 V DC (worst case)
Connector Style	Sealed-Micro
Isolated Physical Layer	Yes
LEDs supported	Module, Network
MAC ID Setting	BCD-Switch, Network Selectable
Default MAC ID	63
Communication Rate Setting	BCD-Switch, Network Selectable
Communication Rates Supported	125 k, 250 k, 500 k

DeviceNet Communication Data	
Predefined Master/Slave Connection Set	Group 2 Only Server
Fragmented Explicit Messaging Implemented	Yes
Transmission Time Out	1000 ms
Typical Target Address Class, Instance, Attribute	1, 1, 7

Identity Object 0x01					
ID	**Name**	**get**	**set**	**data type**	**comment**
1	revision	●		UINT	
2	max. instance	●		UINT	
3	number of instances	●		UINT	

Tab. 6.0.a: Class Attributes

ID	Name	comment
14	Get_Attribute_single	

Tab. 6.0.b: Class Services

ID	Name	get	set	data type	comment
1	vendor id	●		UINT	
2	device type	●		UINT	
3	product code	●		UINT	
4	revision	●		USINT, USINT	
5	status	●		WORD	
6	serial number	●		UDINT	
7	product name	●		SHORT STRING	
10	heartbeat interval	●	●	USINT	

Tab. 6.0.c: Instance 1 Attributes

ID	Name	comment
5	Reset	
14	Get_Attribute_Single	
16	Set_Attribute_Single	

Tab. 6.0.d: Instance Services

Message Router Object 0x02

- Class Attributes: None Supported
- Class Services: None Supported
- Instance Attributes:None Supported
- Instance Services: None Supported

DeviceNet Object 0x03

ID	Name	get	set	data type	comment
1	revision	●		UINT	

Tab. 6.0.e: Class Attributes

ID	Name	comment
14	Get_Attribute_single	

Tab. 6.0.f: Class Services

ID	Name	get	set	data type	comment
1	MAC ID	●	(●)	UINT	*see chap. 3.3, page 6*
2	baud rate	●	(●)	UINT	*see chap. 3.3, page 6*
5	allocation information	●		UINT	

Tab. 6.0.g: Instance 1 Attributes

ID	Name	comment
14	Get_Attribute_Single	
16	Set_Attribute_Single	
75	allocate master/slave connection set	
76	release master/slave connection set	

Tab. 6.0.h: Instance Services

Assembly Object 0x04

ID	Name	get	set	data type	comment
1	revision	●		UINT	
2	max instance	●		UINT	
3	number of instances	●		UINT	

Tab. 6.0.i: Class Attributes

ID	Name	comment
14	Get_Attribute_single	

Tab. 6.0.j: Class Services

ID	Name	get	set	data type	comment
3	data	●		Byte 0: BYTE	s-device supervisor / exception status
				Byte 1: BYTE	AC/DC drive / speed status
				Byte 2: BOOL	discrete input point / value

Tab. 6.0.k: Instance 1 Attributes (Default Input)

ID	Name	get	set	data type	comment
3	data	●		Byte 0: BYTE	s-device supervisor / exception status
				Byte 1: BYTE	AC/DC drive / speed status
				Byte 2: BOOL	discrete input point / value
				Byte 3-4: INT	AC/DC drive / SpeedActual

Tab. 6.0.l: Instance 2 Attributes

ID	Name	get	set	data type	comment
3	data	●	●	BOOL	discrete output point / 1 / value

Tab. 6.0.m: Instance 5 Attributes (Default Output)

ID	Name	get	set	data type	comment
3	data	●	●	Byte 0: BOOL	discrete output point / 1 / value
				Byte 1: BYTE	AC/DC drive / speed control

Tab. 6.0.n: Instance 6 Attributes

ID	Name	get	set	data type	comment
3	data	●	●	Byte 0: BOOL	discrete output point / 1 / value
				Byte 1: BYTE	AC/DC drive / speed control
				Byte 2-3: INT	AC/DC drive / speedRef

Tab. 6.0.o: Instance 7 Attributes

ID	Name	comment
14	Get_Attribute_Single	
16	Set_Attribute_Single	

Tab. 6.0.p: Instance Services

Connection Object 0x05

ID	Name	get	set	data type	comment
1	revision	●		UINT	

Tab. 6.0.q: Class Attributes

ID	Name	comment
14	Get_Attribute_single	

Tab. 6.0.r: Class Services

ID	Name	get	set	data type	comment
1	state	●		USINT	
2	instance type	●		USINT	
3	transport class trigger	●	●*	BYTE	
4	produced connection id	●		UINT	
5	consumed connection id	●		UINT	
6	initial comm characteristics	●		BYTE	
7	produced connection size	●	●*	UINT	
8	consumed connection size	●		UINT	
9	expected packet rate	●	●*	UINT	

Tab. 6.0.s: Instance 1 Attributes (Explicit Connection)

*see DeviceNet specifications for access rule limitations

12	watchdog timeout action	●	●	USINT	
13	produced connection path length	●		UINT	
14	produced connection path	●	●*	EPATH	
15	consumed connection path length	●		UINT	
16	consumed connection path	●	●*	EPATH	
17	production inhibit time	●	●*	UINT	

Tab. 6.0.s: Instance 1 Attributes (Explicit Connection)

*see DeviceNet specifications for access rule limitations

ID	Name	get	set	data type	comment
1	state	●		USINT	
2	instance type	●		USINT	
3	transport class trigger	●	●*	BYTE	
4	produced connection id	●		UINT	
5	consumed connection id	●		UINT	
6	initial comm characteristics	●		BYTE	
7	produced connection size	●	●*	UINT	
8	consumed connection size	●		UINT	
9	expected packet rate	●	●*	UINT	
12	watchdog timeout action	●	●	USINT	
13	produced connection path length	●		UINT	
14	produced connection path	●	●*	EPATH	default: 4, 1, 3
15	consumed connection path length	●		UINT	
16	consumed connection path	●	●*	EPATH	default: 4, 5, 3
17	production inhibit time	●	●*	UINT	

Tab. 6.0.t: Instance 2 Attributes (Poll I/O Connection)

*see DeviceNet specifications for access rule limitations

ID	Name	comment
5	Reset	
9	Delete	
14	Get_Attribute_Single	
16	Set_Attribute_Single	

Tab. 6.0.u: Instance Services

Register Object 0x07

ID	Name	get	set	data type	comment
1	revision	●		UINT	
2	max instance	●		UINT	
3	number of instances	●		UINT	

Tab. 6.0.v: Class Attributes

ID	Name	comment
14	Get_Attribute_single	

Tab. 6.0.w: Class Services

ID	Name	get	set	data type	comment	
1	bad flag	●		BOOL		
2	direction	●	●	BOOL		
3	size	●	●	UINT		
4	data	●	●	ARRAY OF BYTE	Byte 0	*siehe Kap. 4.2, Seite 8*
					Byte 1	0
100	venting frequency	●	●	USINT	*see chap. 4.2, page 8*	
101	venting time	●	●	UINT	*see chap. 4.2, page 8*	

Tab. 6.0.x: Instance 1 Attributes

ID	Name	comment
14	Get_Attribute_Single	
16	Set_Attribute_Single	

Tab. 6.0.y: Instance Services

Discrete Input Point Object 0x08

ID	Name	get	set	data type	comment
1	revision	●		UINT	
2	max instance	●		UINT	
3	number of instances	●		UINT	

Tab. 6.0.z: Class Attributes

ID	Name	comment
14	Get_Attribute_single	

Tab. 6.0.aa: Class Services

ID	Name	get	set	data type	comment
3	value	●		BOOL	⇨ AC/DC Drive Object / speed status, Bit 0

Tab. 6.0.ab: Instance 1 Attributes

ID	Name	comment
14	Get_Attribute_Single	

Tab. 6.0.ac: Instance Services

Discrete Output Point Object 0x09

ID	Name	get	set	data type	comment
1	revision	●		UINT	
2	max instance	●		UINT	
3	number of instances	●		UINT	

Tab. 6.0.ad: Class Attributes

ID	Name	comment
14	Get_Attribute_single	

Tab. 6.0.ae: Class Services

ID	Name	get	set	data type	comment
3	value	●	●	BOOL	⇨ AC/DC Drive Object / speed control, Bit 0

Tab. 6.0.af: Instance 1 Attributes (Pump / Pumpe)

ID	Name	get	set	data type	comment
3	value	●	●	BOOL	0 / 1 = TMS or heater off / on

Tab. 6.0.ag: Instance 2 Attributes (Heating / Heizung)

ID	Name	comment
14	Get_Attribute_Single	
16	Set_Attribute_Single	

Tab. 6.0.ah: Instance Services

AC/DC Drive Object 0x2A

ID	Name	get	set	data type	comment
1	revision	●		UINT	
2	max instance	●		UINT	
3	number of instances	●		UINT	

Tab. 6.0.ai: Class Attributes

ID	Name	comment
14	Get_Attribute_single	

Tab. 6.0.aj: Class Services

ID	Name	get	set	data type	comment
3	AtReference	●		BOOL	
4	NetRef	●		BOOL	
6	DriveMode	●		USINT	
7	SpeedActual	●		INT	*see chap. 4.2, page 8*
8	SpeedRef	●	●	INT	*see chap. 4.2, page 8*
15	PowerActual	●		INT	W
16	InputVoltage	●		INT	V
22	SpeedScale	●	●	SINT	Value Limit: {-3; -2; -1; 0}
38	Speed Control	●	●	BYTE	*see chap. 4.2, page 8*
39	speed status	●		BYTE	*see chap. 4.2, page 8*

Tab. 6.0.ak: Instance 1 Attributes

ID	Name	comment
14	Get_Attribute_Single	
16	Set_Attribute_Single	

Tab. 6.0.al: Instance Services

S-Device Supervisor Object 0x30

ID	Name	get	set	data type	comment
1	revision	●		UINT	
2	max instance	●		UINT	
3	number of instances	●		UINT	

Tab. 6.0.am: Class Attributes

ID	Name	comment
14	Get_Attribute_single	

Tab. 6.0.an: Class Services

ID	Name	get	set	data type	comment
3	device type	●		SHORT STRING	
4	SEMI standard rev. level	●		SHORT STRING	
5	manufacturer's name	●		SHORT STRING	
6	manufacturer's model #	●		SHORT STRING	
7	software revision level	●		SHORT STRING	
8	hardware revision level	●		SHORT STRING	
11	device status	●		USINT	0=undefined, 1=self testing, 2=idle 3=self test exception, 4=executing 5=abort, 6=critical fault
12	exception status	●		BYTE	Bit 0: device common alarm Bit 1: device specific alarm Bit 2: manufacturer specific alarm Bit 4: device common warning Bit 5: device specific warning Bit 6: manufacturer specific warning Bit 7: 1 (expanded method)
13	exception detail alarm	●		STRUCT	Byte 0 | 1-2 | 3 | 4-5 | 6 | 7-8 2 | (*1) | 2 | (*2) | 2 | (*3)
14	exception detail warning	●			(*1) 1.0 internal diag. 1.1 µC 1.2 prog. memory 1.3 NV memory 1.4 data memory 2.2 PS output volt. (*2) 4.0 Controller 4.1 TMS 4.3 overspeed 4.4 overcurrent 4.6 startup timeout 4.7 vibration 5.0 ovtemp motor 5.1 ovtemp case 5.3 ovtemp electr. 5.4 cable 5.5 bearing (*3) UINT PV error code
15	alarm enable	●	●	BOOL	
16	warning enable	●	●	BOOL	

Tab. 6.0.ao: Instance 1 Attributes

ID	Name	comment
5	Reset	
6	Start	device status ⇨ „executing“
7	Stop	device status ⇨ „idle“
14	Get_Attribute_Single	
16	Set_Attribute_Single	
75	Abort	device status ⇨ „abort“
76	Recover	device status ⇨ „idle“
78	Perform diagnostics	0 = standard

Tab. 6.0.ap: Instance Services

S-Analog Sensor Object 0x31					
ID	**Name**	**get**	**set**	**data type**	**comment**
1	revision	●		UINT	
2	max instance	●		UINT	
3	number of instances	●		UINT	

Tab. 6.0.aq: Class Attributes

ID	Name	comment
14	Get_Attribute_single	

Tab. 6.0.ar: Class Services

ID	Name	get	set	data type	comment
5	reading valid	●		BOOL	0=invald, 1=valid
6	value	●		INT	°C/10
7	status	●		BYTE	

Tab. 6.0.as: Instance 1 Attributes

ID	Name	comment
14	Get_Attribute_Single	

Tab. 6.0.at: Instance Services

S-Single Stage Controller Object 0x33					
ID	**Name**	**get**	**set**	**data type**	**comment**
1	revision	●		UINT	
2	max instance	●		UINT	
3	number of instances	●		UINT	

Tab. 6.0.au: Class Attributes

ID	Name	comment
14	Get_Attribute_single	

Tab. 6.0.av: Class Services

ID	Name	get	set	data type	comment
6	setpoint	●	●	INT	set temperature,°C/10
10	status	●		BYTE	bit 0: error heating bit 1: warning heating

Tab. 6.0.aw: Instance 1 Attributes

ID	Name	comment
14	Get_Attribute_Single	
16	Set_Attribute_Single	

Tab. 6.0.ax: Instance Services

Specials Object 0x64					
ID	**Name**	**get**	**set**	**data type**	**comment**
101	revision	●		UINT	

Tab. 6.0.ay: Class Attributes

102	max instance	●		UINT	
103	number of instances	●		UINT	

Tab. 6.0.ay: Class Attributes

ID	Name	comment
14	Get_Attribute_single	

Tab. 6.0.az: Class Services

ID	Name	get	set	data type	comment
100	output data	●	●	SHORT_STRING	*see chap. 4.2, page 8*
101	input data	●		SHORT_STRING	*see chap. 4.2, page 8*

Tab. 6.0.ba: Instance 1 Attributes

ID	Name	comment
14	Get_Attribute_Single	
16	Set_Attribute_Single	

Tab. 6.0.bb: Instance Services

7. Valid Parameters

#	Name	TCP 350	TCP 3000	TM 3000	Pos. in „input data“ and „output data“ (decimal)		
					Service	Path	Data format
1	Preselection Heating	●		●	❷	6, 2, 16	USINT
2	Standby	●	●	●	❷	4, 1, 28	USINT
4	Startup time monitoring	●	●	●	❷	5, 1, 20	USINT
8	Keyboard interlock	●	●		❷	9, 1, 16	USINT ❶
9	Error acknowledgement	●	●	●	6	3, 1, 0	-
10	Pumping station	●	●	●	❷	5, 1, 16	USINT
12	Venting release	●	●	●	❷	6, 4, 16	USINT
13	Preselection brake			●	❷	6, 3, 16	USINT
19	Configuration switch output K2	●	●	●	❷	9, 5, 17	USINT
23	Motor TMP	●	●	●	❷	4, 1, 30	USINT
24	Configuration switch output K1			●	❷	9, 4, 17	USINT
25	Operating mode BKP	●	●		❷	6, 1, 17	USINT
26	Operating mode TMP	●	●	●	❷	4, 1, 23	USINT
27	Gas mode	●	●	●	❷	4, 1, 21	USINT
28	Operating mode remote	●	●	●	❷	9, 2, 17	USINT
29	Operating mode drive unit		●		❷	4, 1, 19	USINT
30	Venting mode	●	●	●	❷	6, 4, 17	USINT
50	Direct Control seal gas valve			●	❷	6, 6, 16	USINT
52	Gas ballast valve		●		❷	6, 9, 17	USINT
55	Configuration analog output 1	●	●	●	❷	9, 10, 17	USINT
95	Factory setting	●	●	●	22	1, 1, 0	0
300	Unit remotely controlled	●	●	●	1	9, 2, 18	USINT
301	Oil deficiency TMP	●	●		1	3, 1, 17	WORD ❸
302	Rotation speed	●	●	●	1	5, 1, 18	USINT
303	Actual error code	●	●	●	1	3, 1, 18	UINT ❹
304	Over temperature drive unit	●	●	●	1	3, 1, 17	WORD ❸
305	Over temperature TMP/BKP	●	●	●	1	3, 1, 17	WORD ❸
306	Set rotation speed attained	●	●	●	1	4, 1, 25	USINT ❺
307	Pump accelerates	●	●	●	1	4, 1, 25	USINT ❺
308	Set rotation speed (Hz)	●	●	●	1	4, 1, 27	UDINT
309	Actual rotation speed (Hz)	●	●	●	1	4, 1, 22	UDINT
310	Motor current (10 mA)	●	●	●	1	4, 1, 17	REAL ❻
311	Operating hours pump (h)	●	●	●	1	4, 1, 31	UDINT
312	Software version drive unit	●	●	●	1	1, 1, 23	SHORT_STRING
313	Motor voltage (10 mV)	●	●	●	1	4, 1, 16	REAL ❻
314	Operating hours drive unit (h)	●	●	●	1	1, 1, 30	UDINT
315	Final rotation speed (Hz)	●	●	●	1	4, 1, 26	UDINT
316	Motor power (W)	●	●	●	1	4, 1, 18	REAL
319	Cycle counter	●	●	●	1	5, 1, 19	UDINT
323	Temperature cooling plate			●	1	1, 1, 31	INT ❹
329	Safety bearing wear			●	1	4, 1, 34	UINT
331	Heating TMS, actual value			●	1	6, 2, 19	UINT
333	TMS controller steady state			●	1	6, 2, 18	USINT
334	Max. TMS temperature occured			●	1	6, 2, 22	UINT
335	Heating type	●		●	1	6, 2, 23	USINT
346	Motor temperature		●	●	1	4, 1, 32	INT ❹
349	Unit type drive unit	●	●	●	1	1, 1, 17	SHORT_STRING
352	Software version motor controller	●	●	●	1	1, 2, 23	SHORT_STRING
354	Hardware version	●	●	●	1	1, 1, 22	SHORT_STRING
357	CPLD version			●	1	1, 2, 22	SHORT_STRING

358	Out-of-balance amplitude A			●	1	4, 1, 33	USINT ❹
359	Out-of-balance amplitude B			●			
360	Malfunction memory, position 1	●	●	●	1	3, 2, 18	UINT ❹
361	Malfunction memory, position 2	●	●	●	1	3, 3, 18	UINT ❹
362	Malfunction memory, position 3	●	●	●	1	3, 4, 18	UINT ❹
363	Malfunction memory, position 4	●	●	●	1	3, 5, 18	UINT ❹
364	Malfunction memory, position 5	●	●	●	1	3, 6, 18	UINT ❹
365	Malfunction memory, position 6	●	●	●	1	3, 7, 18	UINT ❹
366	Malfunction memory, position 7	●	●	●	1	3, 8, 18	UINT ❹
367	Malfunction memory, position 8	●	●	●	1	3, 9, 18	UINT ❹
368	Malfunction memory, position 9	●	●	●	1	3, 10, 18	UINT ❹
369	Malfunction memory, position 10	●	●	●	1	3, 11, 18	UINT ❹
700	Max. run-up time	●	●	●	❷	5, 1, 21	USINT
701	Switchpoint in % of final rotation speed	●	●	●	❷	5, 1, 17	USINT
704	TMS heating set value in °C			●	❷	6, 2, 20	UINT
707	Rotation speed set value in rotation speed setting mode	●	●	●	❷	4, 1, 24	REAL
710	P_{off} for VVP interval operation in W	●	●		❷	6, 1, 21	UINT
711	P_{on} for VVP interval operation in W	●	●		❷	6, 1, 22	UINT
717	Standby frequency	●	●	●	❷	4, 1, 29	REAL
720	Venting frequency	●	●	●	❷	6, 4, 22	UDINT
721	Venting time	●	●	●	❷	6, 4, 20	UINT
777	Set value max. pump rotation speed	●	●	●	24	4, 1, 26	UINT
794	Parameter set	●	●		❷	9, 11, 16	USINT
795	Service line	●	●		❷	9, 11, 17	UINT
797	Unit address	●	●	●	❷	9, 3, 19	USINT

7.1 Caption for List of Valid Parameters

❶	0: blocked, 1: released	
❷	1: read (data field in „output data“ not used), answer visible in „input data“ 2: write (data field *see chap. 7, page 19*)	
❸	Bit 5	1: insufficient oil, 0: sufficient oil
	Bit 3	1: over temperature, 0: no over temperature
❹	Field of the data type stated: first byte contains the number of subsequent elements, for example: p349 (field of USINT): 7, 84, 67, 80, 32, 51, 53, 48 => 7 elements: „TCP 350“ p360 (field of UINT): 1, 6, 0 => 1 element (UINT = 2 Byte): Wert 6	
❺	0:	stop
	1:	accelerating
	2:	at nominal speed
	3:	decelerating
❻	in A repectively V	

Tab. 7.1.a: Caption for List of Valid Parameters

The data appear left aligned in the corresponding data fields, excess digits are of no significance.

Vacuum is nothing, but everything to us!

Turbopumps

Rotary vane pumps

Roots pumps

Dry compressing pumps

Leak detectors

Valves

Components and feedthroughs

Vacuum measurement

Gas analysis

System engineering

Service

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