



Smartline Vacuum Transmitter Profinet Communication Manual



VSR/VSP/VCP



VSM/VS1



VSH

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1 Introduction / Product description

1.1 Validity

This supplementary information describes important variations to the standard product and is only valid together with its main operation manual.

1.2 Function

The electrically isolated Profinet IO device interface is equipped with an integrated 2 port switch and supports 100 Mbit/s full duplex communication. The connection to a Profinet system is possible via connections designated "PN P1" and "PN P2" (2 x M12, D-coded, 4pin, female).

1.3 Installation

1.3.1 Profinet address assignment

Note: on delivery, the Gateway has no IP address!

During normal operation (data exchange mode) the IP address is assigned to the device by the Profinet-IO-controller (PLC). For it the device has a device name on which it is addressed (see chapter 1.3.2).

The IP address can be assigned manually or via a DHCP server.

1.3.2 Profinet device name

Note: on delivery, the Gateway has no device name!

The device name is assigned via the configuration software of the device.

1.3.3 Projecting

Use any project planning tool for project planning. You can download the GSDML file from the Thyracont webpage www.thyracont-vacuum.com

1.3.4 Powering / Cabling

Power is always supplied to the transmitter via the RS-485 connector (see operating instruction of the standard version). Make cabling in compliance with the valid regulations.

1.4 Communication

The device is parameterized and configured by the PROFINET-IO-controller during the startup phase. Only after a correct termination of the startup phase the data exchange with external devices will take place. Communication is only via cyclic data exchange.

Input Data

- Input Modules

Commands

- Output Modules

2 Modules

2.1 Input Modules

2.1.1 Actual Pressure

Module ID=IDM_1: Actual Pressure

Module Ident Number	0x00040000			
Information	Contains the actual pressure value.			
Category	Input modules			
Submodule ID=IDS_1: Actual Pressure				
Submodule Ident Number	0x00000001			
I&M 5 Supported	No			
Cyclic Input Data				Item consistency
Name	Data Type	Display as Bits	Subordinate	Length [Bytes]
Actual Pressure	Float32	No	No	

2.1.2 Actual GCF 1

Module ID=IDM_2: Actual GCF 1

Module Ident Number	0x00020000			
Category	Input modules			
Submodule ID=IDS_2: Actual GCF 1				
Submodule Ident Number	0x00000002			
Information	For more information see Smartline Vacuum Transducer Profinet Communication Manual.			
I&M 5 Supported	No			
Cyclic Input Data				Item consistency
Name	Data Type	Display as Bits	Subordinate	Length [Bytes]
Actual GCF 1	Unsigned16	No	No	

Actual GCF 1: Contains the actual Gas Correction Factor (GCF) for Pirani sensor of all Smartline transmitters.

Type	Data Range
VSR	0x0014 – 0x0320 (20 – 800)
VSP/VCP	0x0014 – 0x0320 (20 – 800)
VSM/VSI	0x0014 – 0x0320 (20 – 800)
VSH	0x0014 – 0x0320 (20 – 800)

2.1.3 Actual GCF 2

Module ID=IDM_3: Actual GCF 2

Module Ident Number	0x00020000			
Information	Contains the actual Gas Correction Factor (GCF) for hot or cold cathode (0 if sensor not installed).			
Category	Input modules			
Submodule ID=IDS_3: Actual GCF 2				

Submodule Ident Number	0x00000003			
I&M 5 Supported	No			
Cyclic Input Data				Item consistency
Name	Data Type	Display as Bits	Subordinate	Length [Bytes]
Actual GCF 2	Unsigned16	No	No	

Actual GCF 2: Contains the actual Gas Correction Factor (GCF) for hot or cold cathode for Smartline transmitters.

Type	Data Range
VSR	0x0000 (0), fixed
VSP/VCP	0x0000 (0), fixed
VSM/VS1	0x0014 – 0x0320 (20 – 800) for cold cathode
VSH	0x0014 – 0x0320 (20 – 800) for hot cathode

2.1.4 Transmitter Status and Type

Module ID=IDM_4: Transmitter Status and Type

Module Ident Number	0x00010000		
Information	Contains information about Status and Type of the Transmitter.		
Category	Input modules		

Submodule ID=IDS_4: Transmitter Status and Type

Submodule Ident Number	0x00000004			
I&M 5 Supported	No			
Cyclic Input Data				Item consistency
Name	Data Type	Display as Bits	Subordinate	Length [Bytes]
Transmitter Status and Type	OctetString	Bit 0: Sensor Type Bit 1: Sensor Type Bit 2: Sensor Type Bit 3: DeGas active Bit 4: High vacuum cathode inactive Bit 5: Spare Filament Bit 6: Sensor Switch Mode Bit 7: Sensor Switch Mode	No	1

Bit 0-2: Sensor Type: Contains the Smartline Transmitter Type

Type	Data
VSR	0x1 (1)
VSP	0x2 (2)
VSM	0x3 (3)
VSH	0x4 (4)
VCP	0x5 (5)
VSI	0x6 (6)

Bit 3: DeGas active: Indicates the status of DeGas.

Type	Data	Description
VSR VSP/VCP VSM/VSJ	0x0 (0)	fixed
VSH	0x0 (0)	Degas is inactive (default)
	0x1 (1)	Degas is active

Bit 4: High vacuum cathode inactive: For certain vacuum processes it may be favored to suppress the start of the hot cathode (VSH) or cold cathode (VSM) sensor, which is automatically controlled by the transducer electronics.

Type	Data	Description
VSR VSP/VCP	0x0 (0)	fixed
VSM/VSJ	0x0 (0)	cold cathode is active (default)
	0x1 (1)	cold cathode is inactive
VSH	0x0 (0)	hot cathode is active (default)
	0x1 (1)	hot cathode is inactive

Bit 5: Spare Filament: VSH transmitters have two filaments. This bit indicates that the VSH transmitter has switched to the spare filament, filament 1 is depleted.

Type	Data	Description
VSR VSP/VCP VSM/VSJ	0x0 (0)	fixed
VSH	0x0 (0)	Filament 1 is active, CoE Objekt is FALSE
	0x1 (1)	Filament 2 (spare Filament) is active, CoE Object is TRUE

Bit 6-7: Sensor Switch Mode: By default the VSR, VSM and VSH transmitter performs a continuous transition between their sensors principles over a pressure range whereupon an assimilation of the sensor signals is carried out. The Sensor Switch Mode contains the actual mode.

Type	Data	Description
VSR	0x0 (0)	no transition, direct switch at 1 mbar
	0x1 (1)	continuous transition between 5 mbar and 15 mbar (default)
VSP/VCP /VSJ	0x0 (0)	fixed
VSM	0x0 (0)	no transition, direct switch at 1E-3 mbar
	0x1 (1)	continuous transition between 1E-3 mbar and 2E-3 mbar (default)
VSH	0x0 (0)	no transition, direct switch at 4E-4 mbar
	0x1 (1)	continuous transition between 1E-3 mbar and 2E-3 mbar (default)
	0x2 (2)	continuous transition between 2E-3 mbar and 5E-3 mbar

2.1.5 Transmitter Warnings and Errors

Module ID=IDM_5: Transmitter Warnings and Errors

Module Ident Number	0x00010000
Information	Contains Information about Warnings and Errors of the Transmitter.
Category	Input modules

Submodule ID=IDS_5: Transmitter Warnings and Errors

Submodule Ident Number	0x00000005
I&M 5 Supported	No

Cyclic Input Data				Item consistency
Name	Data Type	Display as Bits	Subordinate	Length [Bytes]
Transmitter Warnings and Errors	OctetString	Bit 0: Warning - Overrange Bit 1: Warning - Underrange Bit 3: Error - Filament 1 defect Bit 4: Error - Filament 2 defect Bit 5: Error - Internal Communication Bit 6: Error - EEPROM failure Bit 7: Error - Sensor defect/stacked out	No	1

Bit 0: Warning – Overrange

Type	Data	Description
all	0x0 (0)	no error
	0x1 (1)	overrange detected, pressure level exceeds the measurement range

Bit 1: Warning – Underrange

Type	Data	Description
all	0x0 (0)	no error
	0x1 (1)	underrange detected, pressure level is lower than the measurement range. The Actual Pressure will be fixed to the minimum measurement value of the transmitter.

Bit 3: Error – Filament 1 defect

Type	Data	Description
VSR VSP/VCP VSM/VSJ	0x0 (0)	fixed
VSH	0x0 (0)	no error
	0x1 (1)	Filament 1 is defect

Bit 4: Error – Filament 2 defect

Type	Data	Description
VSR VSP/VCP VSM/VSJ	0x0 (0)	fixed
VSH	0x0 (0)	no error
	0x1 (1)	Filament 2 (spare filament) is defect

Bit 5: Error – Internal Communication

Type	Data	Description
all	0x0 (0)	no error
	0x1 (1)	internal communication error of the transmitter electronics

Bit 6: Error – EEPROM failure

Type	Data	Description
all	0x0 (0)	no error
	0x1 (1)	failure on EEPROM

Bit 7: Error – Sensor defect/stacked out

Type	Data	Description
all	0x0 (0)	no error
	0x1 (1)	sensor head is stacked out or sensor head is defect

2.1.6 Syntax Error

Module ID=IDM_6: Syntax Error				
Module Ident Number	0x00010000			
Information	Contains syntax error information for the last executed command.			
Category	Input modules			
Submodule ID=IDS_6: Syntax Error				
Submodule Ident Number	0x00000006			
I&M 5 Supported	No			
Cyclic Input Data				Item consistency
Name	Data Type	Display as Bits	Subordinate	Length [Bytes]
Syntax Error	OctetString	Bit 2: Error - Sensor Switch Mode, Value mismatch Bit 3: Error - GCF 1, Value mismatch Bit 4: Error - GCF 2, Value mismatch Bit 5: Error - Pressure Adjust, Value mismatch Bit 6: Error - Command supported Bit 7: Error - Command invalid	No	1

Bit 2: Error – Sensor Switch Mode, Value mismatch

Type	Data	Description
VSP/VCP /VSI	0x0 (0)	fixed
VSR	0x0 (0)	no error
VSH VSM	0x1 (1)	The value in Data Sensor Switch Mode is wrong or out of range

Bit 3: Error – GCF 1, Value mismatch

Type	Data	Description
all	0x0 (0)	no error
	0x1 (1)	The value in Data GCF 1 is wrong or out of range

Bit 4: Error – GCF 2, Value mismatch

Type	Data	Description
VSR VSP/VCP	0x0 (0)	fixed
VSH	0x0 (0)	no error
VSM/VSI	0x1 (1)	The value in Data GCF 2 is wrong or out of range

Bit 5: Error – Pressure Adjust, Value mismatch

Type	Data	Description
all	0x0 (0)	no error
	0x1 (1)	The value in Data Pressure is wrong (or) out of range

Bit 6: Error – Command supported

Type	Data	Description
all	0x0 (0)	Command not supported
	0x1 (1)	no error

Bit 7: Error – Command invalid

Type	Data	Description
all	0x0 (0)	no error
	0x1 (1)	Command is invalid and can't be executed

2.1.7 Command executed

Module ID=IDM_7: Command executed

Module Ident Number	0x00010000			
Information	Contains the value of the last executed command.			
Category	Input modules			

Submodule ID=IDS_7: Command executed

Submodule Ident Number	0x00000007			
I&M 5 Supported	No			
Cyclic Input Data				Item consistency
Name	Data Type	Display as Bits	Subordinate	Length [Bytes]
Command executed	Unsigned8	No	No	

Command executed

Type	Data	Description
all		Contains the value of the last executed command that was written in Command

2.2 Output Modules

2.2.1 Adjust Value Pressure

Module ID=IDM_8: Adjust Value Pressure

Module Ident Number	0x00000004			
Information	Reference pressure for readjustment.			
Category	Output modules			

Submodule ID=IDS_8: Adjust Value Pressure

Submodule Ident Number	0x00000008			
I&M 5 Supported	No			
Cyclic Output Data				Item consistency
Name	Data Type	Display as Bits	Subordinate	Length [Bytes]
Adjust Value Pressure	Float32	No	No	

Adjust Value Pressure

Type	Data	Description
all	Var.	Contains a Pressure value as 32bit Real

2.2.2 Command

Module ID=IDM_9: Command

Module Ident Number	0x00000001			
Information	Command to be executed.			

Category	Output modules			
Submodule ID=IDS_9: Command				
Submodule Ident Number	0x00000009			
I&M 5 Supported	<input type="checkbox"/> No			
Cyclic Output Data				Item consistency
Name	Data Type	Display as Bits	Subordinate	Length [Bytes]
Command	Unsigned8	<input type="checkbox"/> No	<input type="checkbox"/> No	

Command

Type	Data	Description
all	0x00 (0)	Zero Command
	0x01 (1)	Adjust High Vacuum
	0x02 (2)	Adjust Atmospheric Pressure
	0x03 (3)	Set Gas Correction Factors (GCF)
VSR	0x39 (57)	Set Sensor Switch Mode
VSP/VCP	-	no special VSP/VCP commands
VSM/VS1	0x46 (70)	Activate Cold Cathode
	0x47 (71)	Deactivate Cold Cathode
VSM	0x4D (77)	Set Sensor Switch Mode
VSH	0x50 (80)	Active Hot Cathode
	0x51 (81)	Deactivate Hot Cathode
	0x55 (85)	Activate DeGas
	0x56 (86)	Deactivate DeGas
	0x57 (87)	Set Sensor Switch Mode

2.2.3 SetData GCF 1

Module ID=IDM_10: SetData GCF 1				
Module Ident Number	0x00000002			
Information	New value for the Gas Correction Factor (GCF), used for Pirani sensor (ignored if sensor not installed).			
Category	Output modules			
Submodule ID=IDS_10: SetData GCF 1				
Submodule Ident Number	0x0000000A			
I&M 5 Supported	<input type="checkbox"/> No			
Cyclic Output Data				Item consistency
Name	Data Type	Display as Bits	Subordinate	Length [Bytes]
SetData GCF 1	Unsigned16	<input type="checkbox"/> No	<input type="checkbox"/> No	

SetData GCF 1

Type	Data	Description
all	0x0014 – 0x0320 (20 – 800)	New value for the GCF 1, used for Pirani sensor

2.2.4 SetData GCF 2

Module ID=IDM_11: SetData GCF 2

Module Ident Number	0x00000002			
Information	New value for the Gas Correction Factor (GCF), used for hot cathode or cold cathode (ignored if sensor not installed).			
Category	Output modules			

Submodule ID=IDS_11: SetData GCF 2

Submodule Ident Number	0x0000000B			
I&M 5 Supported	<input type="checkbox"/> No			
Cyclic Output Data				Item consistency
Name	Data Type	Display as Bits	Subordinate	Length [Bytes]
SetData GCF 2	Unsigned16	<input type="checkbox"/> No	<input type="checkbox"/> No	

SetData GCF 2

Type	Data	Description
VSR VSP/VCP		all data values will be ignored
VSH VSM/VS1	0x0014 – 0x0320 (20 – 800)	New value for the GCF 2, used for hot cathode and cold cathode

2.2.5 SetData Sensor Switch Mode

Module ID=IDM_12: SetData Sensor Switch Mode

Module Ident Number	0x00000001			
Information	The set value determines the mode of the sensor transition.			
Category	Output modules			

Submodule ID=IDS_12: SetData Sensor Switch Mode

Submodule Ident Number	0x0000000C			
I&M 5 Supported	<input type="checkbox"/> No			
Cyclic Output Data				Item consistency
Name	Data Type	Display as Bits	Subordinate	Length [Bytes]
SetData Sensor Switch Mode	Unsigned8	<input type="checkbox"/> No	<input type="checkbox"/> No	

SetData Sensor Switch Mode

Type	Data	Description
VSR	0x0 (0)	no transition, direct switch at 1 mbar
	0x1 (1)	continuous transition between 5 mbar and 15 mbar (default)
VSP/VCP/VSI	-	VSP/VCP/VSI has no transition
VSM	0x0 (0)	no transition, direct switch at 1E-3 mbar
	0x1 (1)	continuous transition between 1E-3 mbar and 2E-3 mbar (default)
VSH	0x0 (0)	no transition, direct switch at 4E-4 mbar
	0x1 (1)	continuous transition between 1E-3 mbar and 2E-3 mbar (default)
	0x2 (2)	continuous transition between 2E-3 mbar and 5E-3 mbar

3 Commands

3.1 Command List

All commands are separated into two groups:

- General Commands, that are valid for all Smartline transmitter
- Commands, that are valid only for a specific transmitter

Rules for commands:

- Each command will be executed only once.
- Always the last executed command will be written into Command executed

Type	Data	Name
all	0x00 (0)	Zero Command
	0x01 (1)	Adjust High Vacuum
	0x02 (2)	Adjust Atmospheric Pressure
	0x03 (3)	Set Gas Correction Factors (GCF)
VSR	0x39 (57)	Set Sensor Switch Mode
VSP/VCP	-	No special VSP commands
VSM/VSI	0x46 (70)	Activate Cold Cathode
	0x47 (71)	Deactivate Cold Cathode
VSM	0x4D (77)	Set Sensor Switch Mode
VSH	0x50 (80)	Active Hot Cathode
	0x51 (81)	Deactivate Hot Cathode
	0x55 (85)	Activate DeGas
	0x56 (86)	Deactivate DeGas
	0x57 (87)	Set Sensor Switch Mode

3.2 General Commands for all Smartline Transmitter

3.2.1 0x00 (0) – Zero Command

Type	Chain	Name	Data	Description
all	1.	Zero Command	0x00 (0)	clear Command executed

3.2.2 0x01 (1) – Adjust High Vacuum

Type	Chain	Name	Data	Description
all	1.	Zero Command	0x00 (0)	mandatory if Command executed is 0x01 (1)
	2.	Adjust Value Pressure	0x00 (0)	mandatory
	3.	Command	0x01 (1)	adjust high vacuum

3.2.3 0x02 (2) – Adjust Atmospheric Pressure

Type	Chain	Name	Data	Description
VSR	1.	Zero Command	0x00 (0)	mandatory if Command executed is 0x02 (2)
	2.	Adjust Value Pressure	variable	actual atmospheric pressure
	3.	Command	0x02 (2)	adjust atmospheric pressure
VSP VCP VSM VSH	1.	Zero Command	0x00 (0)	mandatory if Command executed is 0x02 (2)
	2.	Adjust Value Pressure	0x03E8 (1000)	1000 mbar
	3.	Command	0x02 (2)	adjust atmospheric pressure

3.2.4 0x03 (3) – Set Gas Correction Factors

Type	Chain	Name	Data	Description
VSR VSP VCP	1.	Zero Command	0x00 (0)	mandatory if Command executed is 0x03 (3)
	2.	SetData GCF 1	0x0014 (20) – 0x0320 (800)	Gas Correction Factor for Pirani
	3.	SetData GCF 2	d.c.	will be ignored, value
	4.	Command	0x03 (3)	set GCF factors
VSM VSI VSH	1.	Zero Command	0x00 (0)	mandatory if Command executed is 0x03 (3)
	2.	SetData GCF 1	0x0014 (20) – 0x0320 (800)	Gas Correction Factor for Pirani
	3.	SetData GCF 2	0x0014 (20) – 0x0320 (800)	Gas Correction Factor for Hot Cathode (BA) or Cold Cathode (CC)
	4.	Command	0x03 (3)	set GCF factors

3.3 VSR Commands

3.3.1 0x39 (57) – Set Sensor Switch Mode

Chain	Name	Data	Description
1.	Zero Command	0x00 (0)	mandatory if Command executed is 0x39 (57)
2.	SetData Sensor Switch Mode	0x0 (0) or 0x1 (1)	
3.	Command	0x39 (57)	set sensor switch mode

3.4 VSM/VSJ Commands

3.4.1 0x46 (70) – Activate Cold Cathode

Chain	Name	Data	Description
1.	Zero Command	0x00 (0)	mandatory if Command executed is 0x46 (70)
2.	Command	0x46 (70)	activate cold cathode

3.4.2 0x47 (71) – Deactivate Cold Cathode

Chain	Name	Data	Description
1.	Zero Command	0x00 (0)	mandatory if Command executed is 0x47 (71)
2.	Command	0x47 (71)	deactivate cold cathode

3.4.3 0x4D (77) – Set Sensor Switch Mode (VSM only)

Chain	Name	Data	Description
1.	Zero Command	0x00 (0)	mandatory if Command executed is 0x4D (77)
2.	SetData Sensor Switch Mode	0x0 (0) or 0x1 (1)	
3.	Command	0x4D (77)	set sensor switch mode

3.5 VSH Commands

3.5.1 0x50 (80) – Activate Hot Cathode

Chain	Name	Data	Description
1.	Zero Command	0x00 (0)	mandatory if Command executed is 0x50 (80)
2.	Command	0x50 (80)	activate hot cathode

3.5.2 0x51 (81) – Deactivate Cold Cathode

Chain	Name	Data	Description
1.	Zero Command	0x00 (0)	mandatory if Command executed is 0x51 (81)
2.	Command	0x51 (81)	deactivate hot cathode

3.5.3 0x55 (85) – Activate DeGas

Chain	Name	Data	Description
1.	Zero Command	0x00 (0)	mandatory if Command executed is 0x55 (85)
2.	Command	0x55 (85)	activate DeGas

3.5.4 0x56 (86) – Deactivate DeGas

Chain	Name	Data	Description
1.	Zero Command	0x00 (0)	mandatory if Command executed is 0x56 (86)
2.	Command	0x56 (86)	deactivate DeGas

3.5.5 0x57 (87) – Set Sensor Switch Mode

Chain	Name	Data	Description
1.	Zero Command	0x00 (0)	mandatory if Command executed is 0x57 (87)
2.	SetData Sensor Switch Mode	0x0 (0), 0x1 (1) or 0x2 (2)	Data value depends on transmitter
3.	Command	0x57 (87)	set sensor switch mode

4 Device diagnostics

4.1 Manufacturer Specific Diagnosis

User Structure Identifier: 218				
Name	System Error			
Field Name	Data Type	Byte Offset	Bit Offset	Bit Length
Error Code: (Param: DiagSysError)	Unsigned8	0		
Detail Error Code:	Unsigned16	1		

4.1.1 Parameter: DiagSysError

Parameter ID=DiagSysError	
Value	Content
0	No error
1	Hardware fault
2	EEROM error
3	Internal memory error
4	PROFINET hardware error
5	Script error
7	RS send buffer overflow
8	RS receive buffer overflow
9	RS timeout
10	General PROFINET error
11	RS parity or frame check error
13	PROFINET configuration error
14	PROFINET buffer overflow

A distinction can be made between two categories of system-errors:

Serious errors (1-4): In this case, the device must be switched off and switched back on again. If the error occurs again, the device must be exchanged and returned for repair.

Warnings (6-15): These warnings are displayed for one minute simply for information purposes and are then automatically reset. If such warnings occur frequently, please inform Service.

5 GSDML File

You can download the GSDML file and this document from the Thyracont webpage:

1. Open Thyracont webpage www.thyracont-vacuum.com
2. Browse to Support → [Download Center](#)
3. Section “Smartline - Intelligent Vacuum Measurement”

The ZIP File contains:

1. GSDML File

6 Document History

Date	Version	Comment	Script-Revision Number	Firmware Version
2019-01-09	1.0	Initial Release v1.0	V 3.1.2_0615_1	3.1.3

7 License

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