

# Valve island VM10 with PROFINET Interface 8, 10, 12 or 16 stations

# Operation & Service Manual





#### Change history:

The Change history reflects all changes of the User Guide, which were done after the initial release.

Index	Chapter	Change description	Date	Name
001	All	Set up initial version	30/05/2017	
002	2	New chapter added	31/05/2017	
003	All	Revision	11/08/2017	

This User Guide makes no claims of being complete as it doesn't cover all variants of the VM10 valve islands series at the moment.

Therefore this document is subject to extensions or changes.



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# **1** About this documentation

This User Guide contains the information to set up and operate the VM10 valve island with PROFINET-Interface and to detect and resolve problems.

Note:

In addition to the specific information for the PROFINET variants, all data sheets for the VM10 valve island series are applicable and remain valid.

Refer also to the data sheets on the following web links

http://cdn.norgren.com/pdf/en\_5\_1\_100\_VM10.pdf

Further information about PROFINET is available on PI website.

- http://www.profinet.com
- http://www.profibus.com/download/

Basic information about PROFINET could be found in the following document:

"PROFINET Technology and Application – System"

Installation Guidelines could be found in the following documents:

"PROFINET Guideline for Cabling and Assembly"

"PROFINET Guideline for Commissioning"

# 2 Important hints

### 2.1 Grounding and equipotential bonding

Proper grounding and equipotential bonding are very important to protect against electromagnetic interferences in PROFINET networks. In order to reduce potential impact, grounding of the PROFINET cable screen should be done at both ends of every cable (i.e. at each device). Equipotential bonding ensures that the ground potential is identical throughout the entire PROFINET network and is essential to avoid equipotential bonding currents, which could otherwise flow through the PROFINET cable screen. Please refer for further details to the "PROFINET Installation Guideline for Cabling and Assembly" provided by the PROFINET user organization (http://www.profinet.com ).

## 2.2 Power-up and initialization phase of the VM10 valve island

The valve island initializes automatically after power-up. During initialization the number of available valve stations is also evaluated, which requires that at this point also the power supply for the valves (VA) is already available during initialization start. Otherwise not all valve stations might be detected and initialization of the valve island fails. This failure case is indicated by the following permanent Status LED states:

- P1 off
- P2 off
- $\mathsf{BF}-\mathsf{off}$
- SF red
- VB green
- VA green



# **3** Electrical connections of the VM10 valve island



1. Port 1 bus connector for PROFINET

(4 pins M12 D-coded female connector)

2. Port 2 bus connector for PROFINET

(4 pins M12 D-coded female connector)

3. Power supply connector

(5-pins M12 A-coded male connector)

- 4. Terminal for functional earth (M4)
- 5. Status LEDs
- 6. Valve status LEDs

## 3.1 PROFINET Bus connectors PORT 1 & PORT 2



M12 / 4 pins / female connector / D-coded					
Pin no.	Function				
1	Transmission Data + (TD+)				
2	Receive Data + (RD+)				
3	Transmission Data - (TD -)				
4	Receive Data - (RD -)				
Earth screw	FE (functional earth)				

# 3.2 POWER supply connector



M12 / 5 pins / male connector / A-coded						
Pin no.	Function					
1	L1 (VB+) 24V electronics power supply					
2	N2 (VA-) 0V valves power supply					
3	N1 (VB-) 0V electronics power supply					
4	L2 (VA+) 24V valves power supply					
5	FE (functional earth)					

## 4 Commissioning

Note: The method of PROFINET module installation strongly depends on the configuration software. Please refer to the configuration software manual.

Note: All the examples in this document are made with Siemens TIA Portal V13.

### 4.1 **GSDML** file installation

A device description file (GSD-file) is needed for configuration of the valve island. The GSD-file is in XML Format (GSDML) and could be used for all variants VM10:

SSDML-V2.32-IMI\_Norgren-Vx\_IMI-JJJJMMDD.XML

Note: "JJJJMMDD"(JJJJ- year, MM-month, DD-day) is date of release

The GSDML file has to be installed inside the engineering tool of the PROFINET controller.

The symbol file is used to visualize the device in the engineering tool. XML files are provided by the device vendor and can be downloaded from:

https://www.imi-precision.com/us/en/technical-support/software

Open GSDML-file Import editor:

"Options" -> "Manage general station description files"

Manage general station description files				×
Source path: C:\Users\sieglej\Desktop\GSDI	ML			
Content of imported path				
File	Version	Langu	Status	Info
GSDML-V2.32-IMI_Norgren-Vx_IMI-201704	V2.32	Englis	Not yet installed	Bus Co
		1	Delete Install	Cancel

After the successful installation of the GSDML-file the VM10 is listed in the Hardware catalog.



### 4.2 Hardware configuration: Select valve island

After successful GSDML installation the valve island appears in category "Other field devices >...>  $Vx_IMI$ ".

Drag the Vx\_IMI valve island entry and drop it into the PROFINET-IO system.

Hardware catalog	<b>a</b> 10 🕨
Options	
✓ Catalog	
<search></search>	init init
🛃 Filter	
Controllers	
🕨 🛅 HMI	
PC systems	
Drives & starters	
Network components	
Detecting & Monitoring	
Distributed I/O	
Field devices	
<ul> <li>Other field devices</li> </ul>	
▼ 📑 PROFINET IO	
Drives	
Encoders	
🕨 🧾 Gateway	
I/O	
Ident Systems	
Sensors	
▼ III Valves	
▼ 🛄 IMI Norgren	
▼ 🛄 IMI Vx Series	
Vx_IM	
Vx_IMI_PN	
PROFIBUS DP	

Hardware catalogue after installation of the XML file

C 1	Vx-IMI
J 315F-2 PN/	
	PLC_1 Precision Engineering

View after adding the valve island

As a next step the valve module has to be assigned to slot 1. The following table shows which valve module has to be chosen for which physical configuration.

Please check the correct number of valve slices on the valve island. An empty slice is also counted as a valve slice.

Number of valve slices	Module Name
8	"VM10 with 08 slices"
10	"VM10 with 10 slices "
12	"VM10 with 12 slices "
16	"VM10 with 16 slices "

Table: Device name assignment



#### The device selection



Device overview				W.				
🙀 Module		Rack	Slot	I address	Q address	Туре	Article number	Firm.
▼ Vx-IMI		0	0	2042*		Vx_IMI	IMI Vx	V1.0
Interface	/	0	0 X1	2041*		Vx-IMI		
VM10 with 10 slices_1	•	0	1		02	VM10 with 10 slices		
		0	2					
		0	3					

View after adding VM10 device with 10 or 12 valve stations

### 4.3 Identifying devices in the network "Blink Test"

PROFINET devices are identified by using their MAC address and device type. Use the configuration tool to identify all PROFINET modules in the network.

"Online" -> "Accessible devices"

Accessible devices		Type of the PG/PC interfa PG/PC interfa	ce: 🖳 PN/IE ce: 🔝 ASIX	AX88178 USB2.0 to Gig	Jabit Ethernet Ad 🔻 🕐 🞑
	Accessible nodes of th	e selected interface:			
	Device	Device type	Туре	Address	MAC address
	Accessible device	SCALANCE X-200	ISO	-	00-1B-1B-CF-D3-69
	plc_1	CPU 315F-2 PN/DP	PN/IE	192.168.0.1	28-63-36-2F-D7-8C
	vx-imi	Vx_IMI	PN/IE	192.168.0.2	00-11-82-00-FF-30
Flash LED					
Online status informatio	n:				<u>S</u> tart search
Retrieving device in	formation				•
Scan and informatio	on retrieval completed.				~
Display only error m	essages				
					<u>Show</u> <u>Cancel</u>

Mark an available valve island and enable checkbox "Flash LED". This activates the LEDs: "BF", "SF", "VA", "VB "flashing in green color for 3 seconds



### 4.4 Assignment of device name

Before the PROFINET communication between PROFINET controller and valve island is able to start, a unique device name has to be assigned. The device name is stored on the valve island.

Note:

Several engineering- and service tools are able to assign PN device names (E.g. PROFINET Commander, PRONETA, TIA).

There are also different ways to assign the device name in TIA Portal.

Right Click on the valve island in the "Network View" of TIA opens its context menu in "Onlinemode". Press "Assign device name" item to open the "Assign PROFINET device name" dialog.

U: Vx-IMI	10.41	
VX_IMI PLC_1	Device configuration     Change device     Write IO-Device name to Micro N     Start device tool	lemory Card
	X Cut	Ctrl+X
	Сору	Ctrl+C
	Paste	Ctrl+V
	🗙 Delete	Del
	Rename	F2
	🚆 Go to topology view	
	Compile	ì
	Download to device	3
	💋 Go online	Ctrl+K
	🛃 Go offline	Ctrl+M
	<b>Q</b> Online & diagnostics	Ctrl+D
	🗱 Assign device name	
	Receive alarms	
	Update and display forced opera	ands
	Cross-reference information	Shift+F11
	🔯 Properties	Alt+Enter
	Export module labeling strips	

Enter a unique device name for the valve island in the "PROFINET device name" field. Push the "Assign name" button to assign the entered device name.



Assign PROFINET device	name.					
-		Configured PRO	FINET devi	ce		
		PROFINET devic	e name:	vx-imi		•
		Dev	vice type:	Vx_IMI		
		Online access				
		Type of the PG/PC i	nterface:	PN/IE		•
		PG/PC i	nterface:	ASIX AX88178 USB 🔊	2.0 to (	Gigabit Ethernet Ad 🔻 🕐 💁
طے		Device filter				
<b>2</b>		🔽 Only show	devices of th	e same type		
		Only show	devices with	bad parameter settin	gs	
		Only show	devices with	out names		
	A					
	IP address	MAC address	Device type	PROFINET device nam	e	Status
	0.0.0.0	00-11-82-00-FF-30	IMI Vx Ser	-	Δ	No device name assigned
	-					
	<				Undat	te list Assign name
					opua	Assign name
Online status information:						
<ol> <li>Search completed.</li> </ol>	1 of 3 devices we	ere <mark>f</mark> ound.				
<						>
						Close
-						

Assign PROFINET device name dialog

After successful name assignment the status of the valve island in the device list will change to OK.

	IP address	MAC address	Device type	PROFINET device name		Status	
	0.0.0.0	00-11-82-00-FF-30	IMI Vx Ser	vx-imi	0	ок	
- nash Leb	<			III			

List with accessible devices in the network

#### 4.5 Parameterization

During system startup a parameter set is loaded to the valve island by the PROFINET controller. The parameter set of the valve module is divided into the sections "General Parameters", "Valve Diagnostics" and "Substitute behavior".

Those parameters are accessible on the "Properties" page of the valve module using the "Device view" of TIA.

H Vx-IM			r 🔏 🗉	• 🖬		Devi	e overview			
				1		Y? 1	Module		Rack	Slot
				=		10.	• Vx-IMI		0	0
	t. the						Interface		0	0 X1
	,						VM10 with 10 slices_1		0	1
	=				•				0	2
					-				0	3
	-	IMI			•				0	4
	1000 C	Precision Engineering	:						0	5
								0	6	
								0	7	
									0	8
< .	> 75%					<			0	0
VM10 with	10 slices_1 [M	lodule]								
General	IO tags	System const	ants	Texts	]					
<ul> <li>General</li> <li>Catalog</li> </ul>	information	N	Aodule pa	rameters						
Module parameters			General Parameters							
I/O address	es									
							🗹 Enable voltage diagno	stics		

#### 4.5.1 General Parameters

It is possible to enable/disable the voltage monitor of the valve module.

If disabled, in case of over/under voltage no PROFINET diagnostic alarm appears and the relating LEDs on the valve island don't change from green to red color as well. Otherwise, a PROFINET module diagnostic alarm appears (error code see chapter 7) and the relating LEDs on the valve island change to red (see also chapter 6.5 and 6.6).

Default configuration: Voltage diagnostic is enabled

/x-IMI [Mod	lule]				
General	IO tags	System of	constants	Texts	
General Catalog information		Module	parameters		
PROFINET interface [X1]		Genera			
Identificatio	n & Maintenand	e			Enable voltage diagnostics
Diagnostics	addresses				
Shared Devi	ice				

#### 4.5.2 Valve Diagnostics

It is possible to enable/disable the valve diagnostics (channel diagnostic) in general or for each single solenoid. If disabled, in case of a wire break or a short circuit of a solenoid no PROFINET diagnostic alarm appears and the SF LED remains green as well. Otherwise a PROFINET channel diagnostic alarm appears (with error code and channel number) and the SF LED changes state (see also chapter 6.4).

Default configuration: Valve diagnostic is disabled

<	> 75%						
VS with 04	slices_1 [Mod	ule]					
General	IO tags	System cor	istants	Texts			
✓ General Catalog i	information		Module	parameters	i		
Module para	ameters		Gener	al Paramet	ers		
I/O address	es						
Hardware id	lentifier					Enable voltage diagnostics	
			Valve	Diagnostic	s		
						Enable valve diagnostics	
			Dia	gnostics valv	e 01 side 14:	Enabled	
			Dia	gnostics valv	e 01 side 12:	Disabled	•
			Dia	gnostics valv	e 02 side 14:	Disabled	•
			Dia	gnostics valv	e 02 side 12:	Disabled	•
			Dia	gnostics valv	e 03 side 14:	Disabled	•
		-	Dia	gnostics valv	e 03 side 12:	Disabled	•
		•	Dia	gnostics valv	e 04 side 14:	Disabled	•
			Dia	gnostics valv	e 04 side 12:	Disabled	

#### 4.5.3 Substitute behavior

It is possible to define the behavior of the outputs in case of "IOPS = Bad" (PLC stopped) or broken PROFINET communication. The following states could be defined by the outputs:

- Clear output
- Set output
- Freeze output

Default configuration: All valves off

General IO tags Syst	em constants Texts					
General     Catalog information	Diagnostics valve 04 side 12:	Disabled	▼			
Module parameters I/O addresses	Substitute behaviour					
	Reaction to CPU/Master STOP:	Switch to substitute value	-			
	Substitute value V01 side 14:	All valves off Switch to substitute value Frezze last value				
	Substitute value V01 side 12:					
	Substitute value V02 side 14:	Off	-			
	Substitute value V02 side 12:	Off	•			
	Substitute value V03 side 14:	Off	-			
	Substitute value V03 side 12:	Off	•			
	Substitute value V04 side 14:	On				
	Substitute value V04 side 12:	On				

### 4.6 Compilation and download

After finished configuration please compile the project and download it to the PROFINET controller (PLC).



# 5 Output data 5.1 Address assignment

To calculate the length of the used output data (in bytes) for the VM10 valve configuration please use the following formula:

$$B(Bytes) = \frac{V * 2 + ((V * 2)MOD8)}{8}$$

 $V \in \{8, 10, 12, 16\}.$ 

Whereby 'V'= number of valve slices and 'MOD' = Modulo-Operator

E.g. for a valve island with 10 valve slices  

$$B = \frac{10 * 2 + (10 * 2)MOD8}{8} = \frac{20 + 20MOD8}{8} = \frac{24}{8} = 3$$

$$There are 3 bytes reserved for 10 valve slices$$



The illustration below shows the assignment for maximum configuration of 16 valve slices. For every valve two bits will be reserved – one bit for solenoid 14 and one bit for solenoid 12

byte	Bit								tota nur	al va nber	lve	
byte	7	6	5	4	3	2	1	0	8	1 0	1 2	1 6
0	V 04		V 03		V 02		V 01		X	V	V	X
	S 12	S 14	Х	Х	X	X						
1	V 08		V 07		V 06		V 05		$\checkmark$	$\vee$	$\vee$	$\vee$
	S 12	S 14	^	^	^	~						
2	V 12		V 11		V 10		V 09			$\vee$	$\checkmark$	$\vee$
	S 12	S 14		^	^	^						
3	V 16		V 15		V 14		V 13					V
	S 12	S 14				~						

(V = Valve no., S = Solenoid side, X = Bytes reserved )

### 5.2 Output behavior at power up and in fault condition

At power up all outputs are cleared. The initialization phase of the valve island is indicated by a one by one activation of the status LEDs BF, SF, VA, VB and the status LEDs of the valve stations.

In case of fault condition (broken communication, "IOPS = bad") the outputs switch to those values which are configured in the "substitute behavior" parameter set (see also chapter 4.4.3).

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# 6 Diagnostics and LEDs

### 6.1 Status LEDs

#### 6.1.1 Status LEDs description



LED Name	Description
P1	Link Port 1 (TX/RX & Link)
P2	Link Port 2 (TX/RX & Link)
BF	Bus Error
SF	System Error
VB	Electronic Power Supply Status
VA	Valve Power Supply Status

#### 6.1.2 Link states for Port P1 and Port P2

Link Status	LED State
Link connection established	yellow
Link communication active	flashing yellow / green
Link connection not established	off

#### 6.1.3 Bus Error Status LED (BF)

Bus Status	LED State
No error	green
Device is offline	red
Hardware configuration and parameterization is not plausible	flashing, red
IOPS = BAD	tripple flashing, red
PROFINET Software is not initialized	off

### 6.1.4 Error Status LED (SF)

System-Status	LED State
No error	green
Solenoid, short circuit or open circuit	flashing, red
Error, internal communication	double flashing, red
Fatal error	tripple flashing, red
Hardware configuration is not plausible	red
Device is not initialized	off

#### 6.1.5 Electronics Power Supply Status, LED (VB)

Status	LED State
Voltage OK	green
Undervoltage	flashing red
Overvoltage	permanent red

#### 6.1.6 Valve Power Supply Status, LED (VA)

Status	LED State
Voltage OK	green
Undervoltage	flashing red
Overvoltage	red

### 6.2 Valve slice Status LEDs

<b>14 14 14 14</b>
12 12 12 12 12 1

Each valve slice has one or two separate status LEDs depending on its configuration, which indicate the control states "14" and "12" for the corresponding pilot valve solenoids.

Status	LED State
Valve not powered	off
Valve powered	yellow
Valve in error state	red

### 6.3 Online diagnostics with Siemens TIA Portal

Use the "Network View" or "Device View" and "Go online" for PROFINET diagnostics of the network or device.

:k... E

#### 6.3.1 Wrong module

In case of a mismatch between configured module and physically module on slot 1 the module is marked with a parameter error symbol in the "Device overview" of the "Device view".

dd Vx-IMI	🔽 🖽 🖽 🗮 🔍 ±		Gera	iteübersicht		
		^	*	Baugruppe	 Baugr	Ste
			6	▼ Vx-IMI	0	0
T. STAT			<b>~</b>	Interface	0	0 X
v			0101	VS mit 18 oder 20 Ventilstationen_1	0	1
	1.4				0	2
		-			0	3
	10.01	10			0	4
	IMI	<u>•</u>			0	5
	(And the state of				0	6
					0	7
					0	8
						120

Double click the symbol to change into diagnostics view of the module. Highlight the "Diagnostic status" line to get detailed information about the pending module diagnostics

<ul> <li>Diagnostics</li> </ul>							
General	Diagnostic status						
Diagnostic status	Status						
Channel diagnostics							
	Module exists. Input/output data not available.						
	Standard diagnostics						
	Message						
	Parameter error						
	Diagnostics in hexadecimal Show help						
	The module has detected a parameter assignment error.						

#### 6.3.2 Module diagnostics (e.g. under/overvoltage)

In case of pending module diagnostics of the valve island (e.g. under/overvoltage) the module is marked with a red symbol in the "Device overview" of the "Device view".



Double click the red symbol to change into diagnostics view of the module. Highlight the "Diagnostic status" line to get detailed information about the pending module diagnostics

Diagnostics	Diagnostic status
General	
Diagnostic status	Status
Channel diagnostics	
	Module exists. Error
	Standard diagnostics
	Message
	Overvoltage Valve Power Supply
	Overvoltage Power Supply
	Diagnostics in hexadecimal
	Overvoltage Valve Power Supply

#### 6.3.3 Channel diagnostics (e.g. wire break of solenoid)

In case of pending channel diagnostics of the valve island (e.g. wire break or short circuit of a solenoid) the module is marked with a red symbol in the "Device overview" of the "Device view".

			Devic		 		
		<u> </u>	<b>**</b>	Module	 Rack	Slot	la
		=	<b>~</b> •	▼ Vx-IMI	0	0	20
12.121		200020	<b>~</b>	Interface	0	0 X1	20
~		1		VM10 with 10 slices_1	0	1	
					0	2	
					0	3	
	10.01				0	4	
		10			0	5	
		-			0	6	
					0	7	
-		-			0	8	
		1			0	9	
		the second se					

Double click the red symbol to change into diagnostics view of the module. The channel number and the error reason are shown in the "Channel diagnostics" table.

<ul> <li>Diagnostics</li> <li>General</li> </ul>	Channel	diagnostics	
Diagnostic status			
Channel diagnostics			
		Channel no.	Error
		5	Wire break
		7	Short-circuit
	ŀ	<	

Valve 14	V04-12	V04-14	V03-12	V03-14	V02-12	V02-14	V01-12	V01-14
Channel number	8	7	6	5	4	3	2	1
Valve 58	V08-12	V08-14	V07-12	V07-14	V06-12	V06-14	V05-12	V05-14
Channel number	16	15	14	13	12	11	10	9
Valve 129	V12-12	V12-14	V11-12	V11-14	V10-12	V10-14	V09-12	V09-14
Channel number	24	23	22	21	20	19	18	17
Valve 1316	V16-12	V16-14	V15-12	V15-14	V14-12	V14-14	V13-12	V13-14
Channel number	32	31	30	29	28	27	26	25

The allocation between channel number and solenoid is shown in the following table:

# 7 **PROFINET error codes**

Error code (hexadecimal)	Error description	Associated LED
0x00	OK, no errors	"SF" LED, green
0x01	Solenoid, short circuit	"SF" LED, flashing red
0x06	Solenoid, open circuit	"SF" LED, flashing red
0x100	Undervoltage electronic supply	"VB" LED, flashing red
0x101	Overvoltage electronic supply	"VB" LED, red
0x102	Undervoltage valve supply	"VA" LED, flashing red
0x103	Overvoltage valve supply	"VA" LED, red

# 8 **Properties PROFINET interface**

Requ	Comments	
Number of ports	2	
Transfer speed	100Mbit/s	
Duplex mode	Full Duplex	
RT mode	supported	Real Time Protocol
IRT mode	supported	Isochronous Real Time Protocol
MRP mode	supported	Media Redundancy Protocol (possible to switch between redundant transmission paths)
PROFINET (certification by PNO)	Compliant to IEC61158, Conformance Class C according to IEC61784	
Adressing mode	DCP, LLDP + SNMP (Device exchange by the same topology)	
GSD Language	EN + DE	

# 9 Electrical data

Requirements		Comments
Valve voltage range (VA)	24VDC +/-10%	PELV
Electronics voltage range (VB)	24VDC +/-25%	PELV
Maximal currents:	VA: 150mA + n x 30mA VB: 400mA	n = number of activated valves
Voltages are galvanic decoupled	Yes	
Protection against polarity reversal	VA, VB	
Overcurrent protection VB, VA	irreversible	Protection against overload and short-circuit currents, fused with 2A slow-acting fuse
PE/FE/Ground connection	Earth screw	
Electrical power supply connection	M12/5-pin A-coded male connector	M12-1: L1 (VB+) M12-2: N2 (VA-) M12-3: N1 (VB-) M12-4: L2 (VA+) M12-5: FE
Bus connection	M12/4-pin D-coded female connector	M12-1: TD+ M12-2: RD+ M12-3: TD- M12-4: RD-

# 10 Technical data

#### Medium:

Compressed air, filtered, lubricated and non-lubricated

**Operational:** Solenoid pilot spool valve

Port sizes: Ø 1/8, 5/32, 1/4 (3 mm, 4 mm, 6 mm )

**Operating pressure:** Maximum 116 psig (max. 8 bar )

#### Flow:

Serie	Function	Cv	'C'	'A'	QN	kv
		[dm³ / s * bar]			[l/min]	
VM10*5	5/2 port 1 to 2 & 4	0.44	1.77	7.1	430	0.36
VM10*5	5/2 ports 2 to 3 & 4 to 5	0.41	1.65	6.61	400	0.34
VM10*(A,B,C)	3/2 ports 1 to 2 & 1 to 4	0.36	1.44	5.78	350	0.29
VM10*(A,B,C)	3/2 ports 2 to 3 & 4 to 5	0.36	1.44	5.78	350	0.29
VM10*6	5/3 ports 1 to 2 & 4	0.36	1.44	5.78	350	0.29
VM10*6	5/3 ports 2 to 3 & 4 to 5	0.36	1.44	5.78	350	0.29
VM10*5	5/2 port 1 to 2 & 4	0.44	1.77	7.1	430	0.36

#### Ambient Media temperature:

-5°... +50°C (+23...+122 °F)

Air supply must be dry enough to avoid ice formation at temperature +2°C (+35°F)

Degree of protection: NEMA 4 and IP65

#### Materials:

Body, end plates:Engineered PPA co-polymerSpool:Aluminium

Seals: NBR



### **Customer support**

Email contact: Anfragen.Ventilteam@imi-precision.com

#### **Norgren GmbH**

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The data specified above only serve to describe the product.

No statements concerning a certain condition or suitability for a certain application can be derived from our information. The information given does not release the user from the obligation of exercising judgment and verification. It must be remembered that our products are subject to a natural process of wear and ageing.

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