

OPERATING INSTRUCTIONS

FPROB25M



**The Lanny Valve –
Precision valve technology for high performance engineering.**

Summary

The FPROXxxM series is a high precise valve for the control of compressed air, oxygen and other gases for the laser industry as well as various other industrial applications.

It is optimized for laser cutting applications

It ensures consistent performance, even in demanding environments.

It is manufactured from high quality materials for a long service life.

Control via field bus Profibus.

Main features:

- Large control range and highly precise even at low pressure levels
- Control via field bus Profibus
- Large scale of variants and special versions e.g. pressure switches or inlet pressure monitoring
- Suitable gases: Oxygen, nitrogen and air
- Inlet pressure: Maximum 20 bar for oxygen, maximum 40 bar for nitrogen and air
- Pressure control range: 0 to 20 bar for oxygen, 0 to 40 bar for nitrogen and air
- Flow rate: 900 l/min (air) at 8 bar inlet pressure and 7 bar outlet pressure
- Inlet filter: 150 µm
- Ambient temperature: 0 to 40 °C
- Medium temperature: 0 to 40 °C
- Protection rating: IP40
- Ports: inlet and outlet (G3/8), vent (G1/4)

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Table of contents

1	Important notice regarding these operating instructions	4
1.1	About these operating instructions	4
1.2	Operator duty	4
1.3	Obligations of the operating personnel	4
1.4	Liability	4
1.5	Important notes on warranty / guarantee	4
2	Safety	5
2.1	Intended use	5
2.2	Not intended use	5
2.3	Explanation of the symbols	5
2.4	General safety instructions	6
3	Device description	8
3.1	Components, ports and diagnostic elements	8
3.2	LED description	9
3.3	Address switch	9
4	Technical specifications	10
4.1	Electrical data table	11
4.2	Pin Assignment	12
4.3	Dimensions	13
4.4	Circuit symbol	13
4.5	Flow chart	14
5	Data transmission	15
5.1	Data send to the valve	15
5.2	Data sent from the valve	15
5.3	Extended diagnosis: 10 Byte Diag	16
5.4	Selection of the characteristics: 4 bit	17
5.5	Special function	17
6	Packaging and transport	18
7	Installation and connection	18
7.1	Prior to installation	18
7.2	Mounting and pneumatic installation	19
7.3	Electrical installation	19
8	Commissioning, operation, malfunction	19
8.1	Failure	20
9	Maintenance and cleaning	20
9.1	Maintenance	20
9.2	Cleaning	20
10	Disassembly	21
11	End of life – EOL disposal	21
12	Imprint	21

1 Important notice regarding these operating instructions

1.1 About these operating instructions

IMPORTANT
READ CAREFULLY BEFORE OPERATING
KEEP FOR FUTURE USE

The operating instructions are intended exclusively for qualified specialists who have the appropriate qualifications to professionally install, commission and disassembly MLS valves.

Keep the operating instructions permanently and always accessible to qualified personnel. If the device is being handed over to third parties, make sure to hand over the operating instructions as well.

The accident prevention regulations and the general safety regulations must be adhered to when operating the device.

1.2 Operator duty

Duties of the operator include:

- Compliance with the Industrial Safety Ordinance
- Compliance with the valid national regulations for work safety
- Compliance with the intended use of the device
- Expert instruction of the operating personnel

1.3 Obligations of the operating personnel

All persons who are commissioned to work on this device have to

- comply with the general regulations for work safety and accident prevention.
- read and comply with all safety instructions in this manual.

1.4 Liability

The manufacturer assumes no liability for damage and malfunctions that occur as a result of non-compliance with the operating instructions.

If the device is misused, not used as intended, falsely operated, or not professionally installed, repaired and maintained, no liability can be granted.

1.5 Important notes on warranty / guarantee

NOTICE

The warranty / guarantee expires automatically if the type sticker or the serial number is changed, made illegible or removed.

NOTICE

Subject to technical changes without special notice. Design may differ from the actual product. Its design and technical data may change in the process of development without notification.

2 Safety

2.1 Intended use

The MLS valve serves exclusively as a unit for controlling compressed air, oxygen and other gases for industrial applications.

The valve is intended solely for operation within the limits specified in the technical data.

The valve may only be used in compliance with the instructions in this manual and the safety instructions

The device may not be converted or changed in any other way.

2.2 Not intended use

The MLS valve is only approved for the purpose as defined under the intended use.

- It must not be used with gases or pressure ranges other than those specified under the intended use.
- It is not approved for outdoor use.

2.3 Explanation of the symbols

Important notes, such as safety-relevant notes, are marked by corresponding symbols. Always comply with these notes, in order to avoid accidents and damage to the valve.

DANGER

DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

WARNING

WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

CAUTION indicates a hazardous situation which, if not avoided, may result in minor or moderate injury

NOTICE

NOTICE indicates a property damage message.

2.4 General safety instructions

Danger

Danger to life due to incorrect installation

Improperly fastened connections can come loose due to the high pressure and cause life-threatening injuries.

- The valve must be secured to all mounting holes on the machine structure.
- All connections must be made using lines designed for this pressure.
- Observe the correct tightening values of the parts manufacturer for fastening and connections.

WARNING

Operator errors or failure to comply with the safety instructions can result in serious injury or property damage.

- Read the operating instructions attentively and carefully before installing and commissioning.
- Observe the safety instructions at all times.
- Operate the product exclusively in the sense of its intended use.
- Operate the product only within the intended limits of the technical data as specified in this specification.

WARNING

Pressurized systems and facilities must be operated by qualified personnel only!

Assembly, installation, commissioning, maintenance and disassembly of compressed air systems may only be carried out by trained and experienced personnel.

WARNING

Pressurized systems!

- Note that the product is only designed for the highest permissible input pressure described in the technical data. This input pressure must not be exceeded.
- Pressure lines and screw connections must be adequately designed for the input pressure and output pressure of the valve. Permissible input and output pressure can be found in the technical data.
- Ensure that the pressure lines are connected properly to the input and output, before pressurizing the system.
- Make sure the screw connections between the compressed air supply lines and the product are tight to prevent unintentional loosening.
- Turn off the pressure supply, release the residual pressure, and remove all pressure connections before replacing or maintenance of the valve.

WARNING

Danger of explosion!

- Do not operate the valve in rooms with flammable gases, steams or dust.

WARNING

A product with malfunction or which cannot be used safely can cause injury!

Safe operation is no longer possible if:

- the product is damaged.
- the product is not fully functional.
- parts of the product are loose.
- the connection lines are damaged.

In these cases, the product must be put out of operation, considering all relevant safety instructions.

NOTICE

In order to operate the product EMC-compliant, the following conditions must be met:

- Use only shielded cables for the electrical connection of the product.
- Lay shield connection, plug and switch cabinet to earth in compliance with EMC.
- Lay the product body and housing electrically to ground (PE, machine ground).
- While under voltage, do not connect or disconnect the plug.
 - First connect the plug and then switch on the power supply.
 - Switch off the power supply first, then disconnect the plug.
- The maximum length of the connection cable must not exceed 30 m.

NOTICE

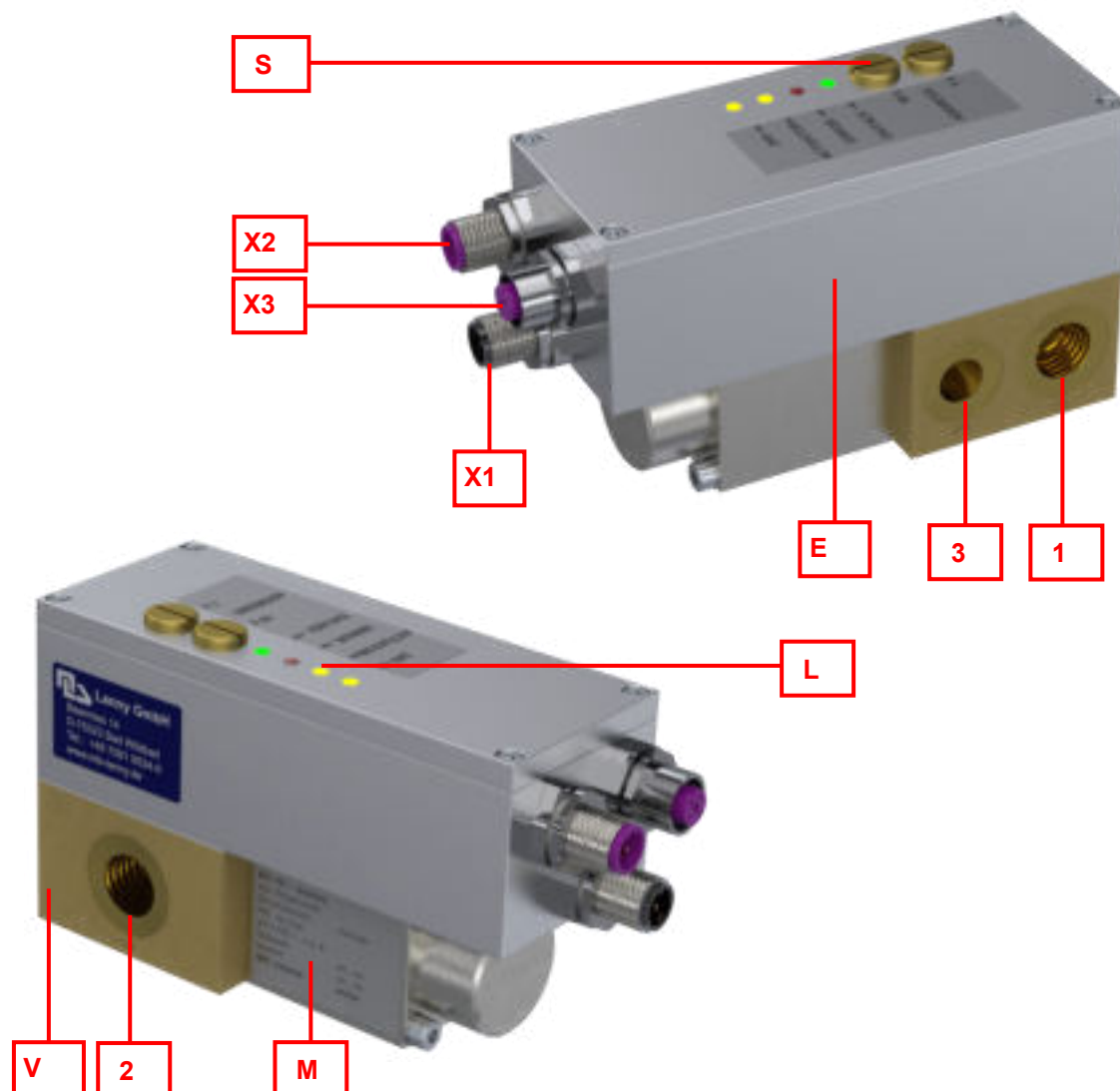
Risk of damage to the product

The following instructions must be observed to prevent damage:

- Make sure that the product is not contaminated during the assembly. Keep it free of dust, oil and grease.
- Make sure that the system is equipped with filters for air quality according to the information in the technical data.
- Operate the product only with the specified supply voltage.
- Overvoltage can destroy the electronics! Use a suitable fuse. Earth the product at the central grounding point (at the marked screw connection).
- Use shielded cables for the electrical connection.
- Do not lay control cables parallel to power cables or control lines of servomotors, otherwise the control signal may be disturbed.
- Do not operate the device in humid environments, max. 5 – 95%. The electronics must not come into contact with moisture or liquids.

3 Device description

3.1 Components, ports and diagnostic elements



1	Input
2	Output
3	Exhaust
E	Electronics housing
L	Diagnostic LEDs
M	Solenoid

S	Address switches
V	Mechanical housing
X1	Profibus supply voltage (M12 – 5 pin male)
X2	Profibus input (M12 – 5 pin male B-coded)
X3	Profibus output (M12 – 5 pin female B-coded)

3.2 LED description

LED		Color	LED state	Description
24 V		yellow	On	24 V DC Supply voltage of the electronics is active
		-	Off	The electronics has no sufficient supply voltage
Actuator		yellow	On	24 V DC Supply voltage of the actuator is active
		-	Off	The actuator has no sufficient supply voltage
Error		-	Off	No error
		red	On	The following errors may occur: The supply voltage of 24 VDC for the electronics is not available The supply voltage of 5 V for Profibus is not available Overtemperature of the device (>80°C)
DATAEX		green	On	Profibus is in state data exchange
		-	On	No data is exchanged

3.3 Address switch



Address switch	Description
S1	Address x 1
S2	Address x 10

Address range: 0 - 99

4 Technical specifications

Description	Unit	Value
Design		Directly actuated seating valve (3/2 WV)
Materials		aluminium, brass, stainless steel, nickel-plated steel
Seals		NBR and FKM with approval for oxygen
Pneumatic connections		(1) G3/8, max. thread depth 8 mm (2) G3/8, max. thread depth 12 mm (3) G1/4, max. thread depth 12 mm
Input pressure	[bar]	20 (oxygen) 40 (nitrogen, air)
Pressure regulating range	[bar]	0 ... 25
Flow rate at 8 bara input pressure 7 bara output pressure 20,05°C, 1,01325 bara	[l/min]	800
Operating medium		Oxygen and harmless, air, free of oil, condensate-free, 50 µm filtered
Inlet filter	[µm]	150
Mounting position		Solenoid must not face downwards
Degree of protection		IP40
Weight	[g]	1610

Temperatures	Unit	Value
Ambient temperature	[°C]	0 ... 40
Temperature of medium	[°C]	0 ... 40
Storage temperature	[°C]	-40 ... 85

Maximum Accuracy	Unit	Value
Hysteresis	[% FS]	< 0.5
Linearity	[% FS]	< 0.5
Response sensitivity	[% FS]	< 0.5
Repeatability	[% FS]	< 0.5
Temperature drift	[% /10K]	< 0.1
Long-term drift	[% FS/a]	< 0.5

4.1 Electrical data table

Supply voltage	Unit	Value
Electronics	U _E	24 V DC (– 10 % ... +20 %)
	I _E	0,11 A
Actuator	U _A	24 V DC (– 10 % ... +20 %)
	I _A	1,8 A

Protected against polarity reversal

Profibus	Unit	Value
Differential input voltage	U _{DIN}	max. ±12 V
	I _{DIN}	max. ± 500 µA
Differential output voltage		
Without load	U _{DOUT}	typ. ± 5 V
Load = 50 Ohm	U _{DOUT}	typ. ± 2,5 V
	I _{DOUT}	max. 60 mA
Transmission rate	[MBd]	max. 12 MBaud

Potential separation	Value
Supply voltage Profibus	1000 V
Supply voltage PE	500 V
Profibus PE	500 V

Insulation test	DIN EN 60204-1
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4.2 Pin Assignment

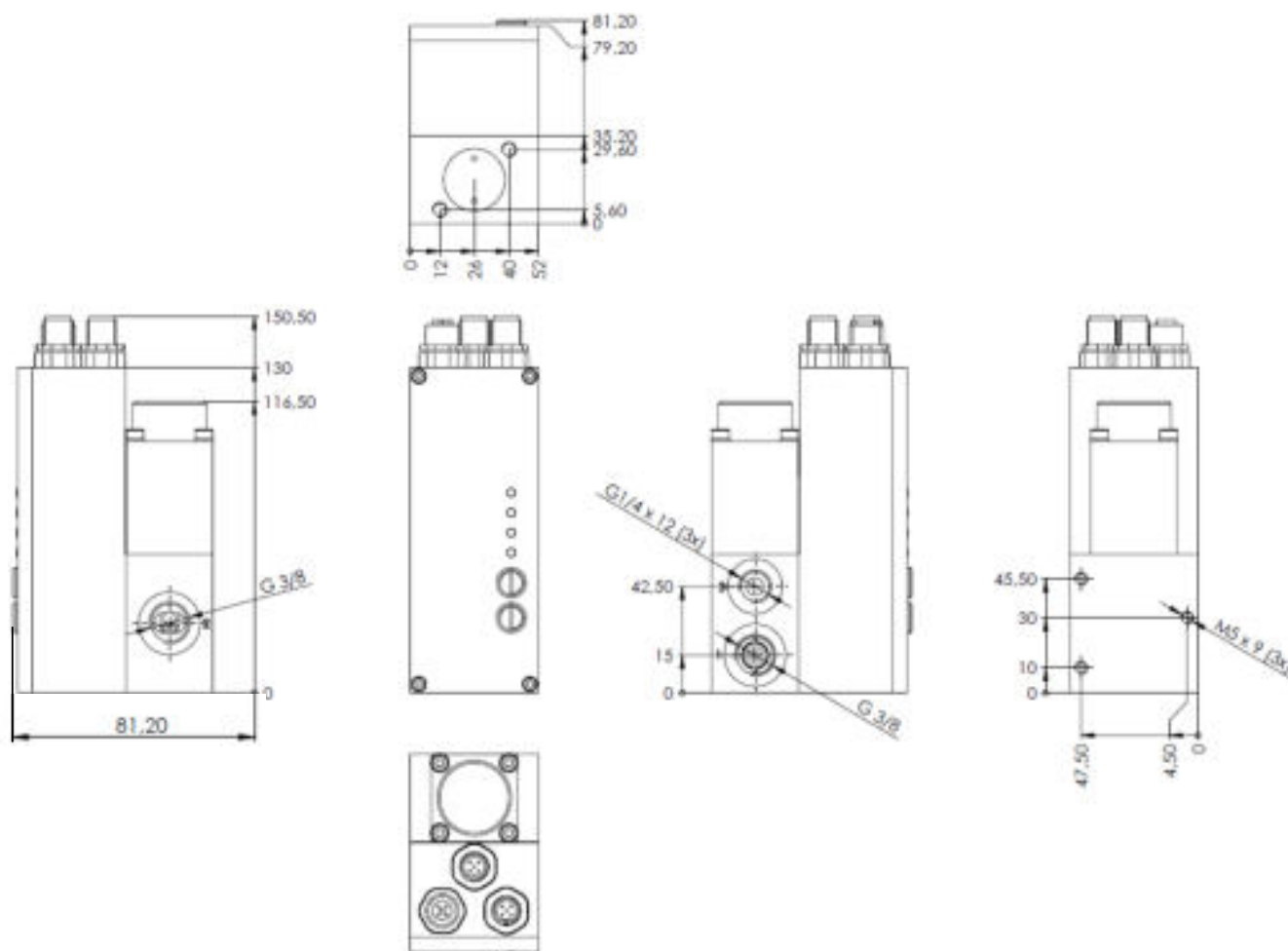
Protocol	Profibus DP
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Plug	Pin	Value	Color
X1	Supply voltage M12 connector 5 pin male		
	Pin 1	24 V electronics	Brown
	Pin 2	24 V actuator	White
	Pin 3	0 V electronics	Blue
	Pin 4	0 V actuator	Black
	Pin5	Not connected	-
X2	Profibus input M12 connector 5 pin male B-coded		
	Pin 1	Bus_5V	Brown
	Pin 2	A_wire	Green
	Pin 3	Bus_0V	Blue
	Pin 4	B_wire	Red
	Pin 5	Not connected	-
X3	Profibus output M12 connector 5 pin female B-coded		
	Pin 1	Bus_5V	Brown
	Pin 2	A_wire	Green
	Pin 3	Bus_0V	Blue
	Pin 4	B_wire	Red
	Pin 5	Not connected	-
The pins 1 to 4 of the bus connectors X2 and X3 are looped through. Bus_GND and Bus_5V can be used to connect a terminator. Bus_5V is protected by a T0.1A fuse.			

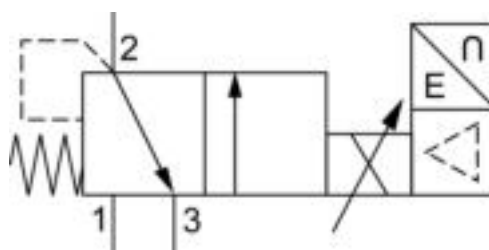
The housings of all three connectors are connected to each other by the valve housing electrically and to the earth conductor of the valve body.

4.3 Dimensions

Dimensions in mm

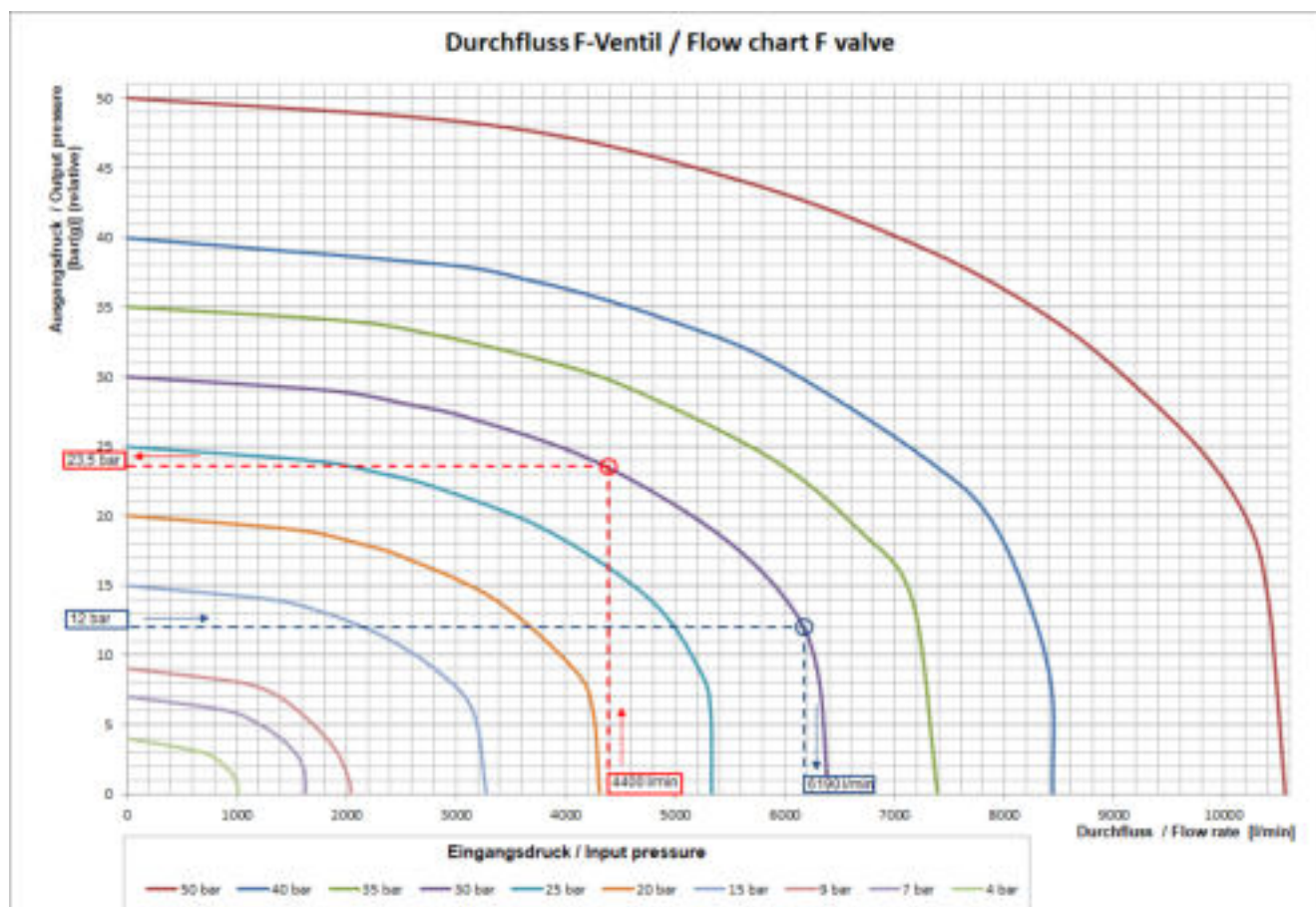


4.4 Circuit symbol



1	Input (A)
2	Output (B)
3	Exhaust (R)

4.5 Flow chart



Definitions:

Absolute pressure:	pressure in relation to absolute vacuum	value in bar(a)
Relative pressure:	pressure in relation to ambient pressure (in this case 1,01325 bar)	value in bar(g)
Flow rate:	air quantity at 20,05 °C and 1,01325 bar(a)	value in l/min (<u>not</u> NI/min)

Diagram parameters:

Temperature 20,05°C
 Relative pressure values, that means absolute values – 1,01325 bar(a)
 Medium: air

Reading examples for curve 30 bar input pressure:

Determining of the **maximum output pressure** at required flow

(red dashed line)

With a required flow of 4,400 l/min, a maximum of 23.5 bar output pressure can be regulated before the valve is fully opened and no further increase is possible.

Determining of the **maximum flow rate** at required output pressure

(blue dashed line)

With a required output pressure of 12 bar, a maximum flow of 6,190 l/min can be achieved before the valve is fully opened and no further increase is possible.

5 Data transmission

Model_Name	MLSProfiProp02
Module	EPROB25M
Identification	0x31 (2 Byte IO)
Profibus ID	0x0A46
GSD	MLS_0A46
Extended parameters	-

5.1 Data send to the valve

2 Byte D_{OUT} buffer

Byte 0 (buffer address)								Byte 1							
7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Set value (10 bit)								CZ				Char			

	Description	Value
CZ	Calibrate zeropoint	
Set value	Resolution	10 bit
	LSB	30 mbar
	Maximum 900 x 30 mbar	27 bar

5.2 Data sent from the valve

2 Byte D_{IN} buffer

Byte 0 (buffer address)								Byte 1							
7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Actual value (10 bit)								CR				P S	V A	T	

	Description	Value
CR	Zeropoint calibration ready	
VA	Pressure switch	
T	Overtemperature of the electronics housing	>80°C
Actual value	Resolution	10 bit
	LSB	30 mbar
	Maximum 1023 x 30 mbar	30,690 bar
Pressure switch signal (PS)	The pressure is reached at (actual value): $P_{act} > P_{set} - 150 \text{ mbar} - 12,5\% * P_{set}$ and $P_{act} < P_{set} + 150 \text{ mbar} + 12,5\% * P_{set}$	

5.3 Extended diagnosis: 10 Byte Diag

Byte	Description															
Byte 0	Error byte	Bit 0: overtemperature														
		Bit 1: no power supply for actuator														
Byte 1	SW index															
Byte 2	SW subindex															
Byte 3	Operating time overall MS-Byte															
Byte 4	Operating time overall															
Byte 5																
Byte 6	Operating time overall LS-Byte Resolution 1 second															
Byte 7	Production date HighByte															
Byte 8	Production date Low Byte															
	Byte 7								Byte 8							
	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
	Year								Month				Day			
Byte 9	Valve ID: 0x03												FPROB25M			

5.4 Selection of the characteristics: 4 bit

Value	Notation	Description
0x0	Optimum	Factory-made optimum: maximal speed without over-oscillation and minimal under-oscillation.
0x1	Quality +1	Transient oscillation smoother +1 (referring to the optimum)
0x2	Quality +2	Transient oscillation smoother +2 (referring to the optimum)
0x3	Quality +3	Transient oscillation smoother +3 (referring to the optimum)
0x4	Quality +4	Transient oscillation smoother +4 (referring to the optimum)
0x5	Quality +5	Transient oscillation smoother +5 (referring to the optimum)
0x6	Quality +6	Transient oscillation smoother +6 (referring to the optimum)
0x7	Quality +7	Transient oscillation smoother +7 (referring to the optimum)
0x8	Speed +1	Pressure increase faster +1 (referring to the optimum)
0x9	Speed +2	Pressure increase faster +2 (referring to the optimum)
0xA	Speed +3	Pressure increase faster +3 (referring to the optimum)
0xB	Speed +4	Pressure increase faster +4 (referring to the optimum)
0xC	Speed +5	Pressure increase faster +5 (referring to the optimum)
0xD	Speed +6	Pressure increase faster +6 (referring to the optimum)
0xE	Speed +7	Pressure increase faster +7 (referring to the optimum)
0xF	Maximum speed	Set value filter off

5.5 Special function

Automatic zeropoint calibration

If the bit CZ (Calibrate Zeropoint) is set, and the set pressure Value is Zero, the electronic automatically adjusts the Zeropoint of the pressure sensor.

The bit CR (Zeropoint calibration ready) shows the end of the calibration, typ. time: 1 second.

This is the answer for high precision pressure values especially for low pressure values.

6 Packaging and transport

NOTICE

Only use original packaging materials.

Only original packaging materials ensure clear identification, a safe storage and an easy handling.

- Keep the device in original packaging just before installation.
- For the disposal of the packaging, see the disposal chapter.
- Only remove the sealing plugs or adhesive films before installation

7 Installation and connection

Danger

Danger to life due to incorrect installation

Improperly fastened connections can come loose due to the high pressure and cause life-threatening injuries.

- The valve must be secured to all mounting holes on the machine structure.
- All connections must be made using lines designed for this pressure.
- Observe the correct tightening values of the parts manufacturer for fastening and connections.

WARNING

Pressurized systems and facilities must be operated by qualified personnel only!

Assembly, installation, commissioning, maintenance and disassembly of compressed air systems may only be carried out by trained and experienced personnel.

WARNING

Observe all safety instructions of chapter 2

Failure to observe the safety instructions may result in injury to personnel or damage to the equipment.

7.1 Prior to installation

Before installing the valve make sure that

- the stationary pipe system is depressurized and vented.
- the pipes are clean and free from particles.
- the shut-off valves are connected to the pressure pipe system of the plant.

7.2 Mounting and pneumatic installation

WARNING

Pressurized systems and facilities must be operated by qualified personnel only!

Assembly, installation, commissioning, maintenance and disassembly of compressed air systems may only be carried out by trained and experienced personnel.

The valve must be fastened to the system with screws at all mounting holes acc. to the dimension drawing

The valve must be installed in accordance with the connection markings and specifications in the technical data and device description.

7.3 Electrical installation

WARNING

- Electrical connections and systems must be installed and operated by trained and experienced personnel only.
- Use a power supply with electrically protective separation, according to DIN EN 60204-1.
- Comply with the requirements for PELV circuits, as specified in DIN EN 60204-1.

Always connect the valve to the protective earth. The connection point is shown in the device description.

The valve must be installed in accordance with the connection markings and specifications in the technical data and device description.

8 Commissioning, operation, malfunction

WARNING

Pressurized systems and facilities must be operated by qualified personnel only!

Assembly, installation, commissioning, maintenance and disassembly of compressed air systems may only be carried out by trained and experienced personnel.

NOTICE

The device only works properly within the defined pilot pressure range.

NOTICE

If a set value is given without pressurizing the device or if the operating pressure is smaller than or equal to the set value, an exceeded warming of the solenoid will be the consequence. This can result in a reduced accuracy of the sensor system as well as a shortened service lifetime of the sensitive electronic components.

- Ensure that the operating pressure is always at least 1 bar greater than the maximum regulated output pressure or maximum set value.

Comply with the operating conditions and permissible limit values (→ Technical specifications).

- Keep high-frequency electromagnetic radiation sources (e. g. radio equipment, mobile phones, other jamming transmitters) and strong magnetic fields away from the device in order to avoid disturbances of the set value signal.

8.1 Failure

WARNING

- If the device can no longer be operated safely, it must be taken out of operation and secured against unintentional operation.
- A safe operation is no longer possible if:
 - The device is damaged
 - The device is no longer working
 - Parts of the device are loose
 - The connection lines are damaged

Dear customer, our products are subject to a strict quality control. If this product is still not working properly, we regret it very much.

If you have not been able to eliminate the error yourself, please contact our

Service-Hotline +49(0)7081 9534-0

E-Mail: info@mls-lanny.de

NOTE

The warranty / guarantee expels automatically if any label or serial number is changed, made illegible or removed.

9 Maintenance and cleaning

WARNING

Improper maintenance may result in injury!

- Repairs and maintenance must only be carried out by the manufacturer or by specialists commissioned by the manufacturer.
- Inspection or maintenance of products and equipment may only be carried out once it has been verified that they are in safe and locked switching state.
- The housing of the device may only be opened by the manufacturer or by a specialist assigned by him.
- If components should be removed, all relevant safety instructions must be observed. Then disconnect the compressed air and power supply and drain all residual air from the system.

9.1 Maintenance

Apart from regular cleaning, there are no maintenance activities for the end user.

In the event of a repair, the appliance must be sent to the manufacturer.

9.2 Cleaning

Regularly clean the device with a soft cloth.

The permissible detergent is water or soap solution (max. 50 °C).

10 Disassembly

WARNING

Pressurized systems and equipment are dangerous for laymen!

Pressurized systems and equipment may only be mounted, installed, commissioned, maintained, repaired, decommissioned and disassembled by qualified personnel.

Follow these steps to disassemble the device:

1. Turn off all power sources:
 - 1.1. Power supply
 - 1.2. Air supply
2. Depressurize the system.
3. Remove all electrical and pneumatic connections.
4. Loosen the mounting screws and remove the device.

11 End of life – EOL disposal



Dispose the device in accordance with the applicable environmental regulations of your country.

The electrical equipment should not be disposed with other household wastes. Hand over the device to a central recycling facility for electronic waste.



The device packaging is made of recyclable materials. Sort the packaging materials and recycle them accordingly.

For more information on recycling, please contact your local authorities or the manufacturer.



The device is lead-free and contains only RoHS-compliant components.

12 Imprint

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