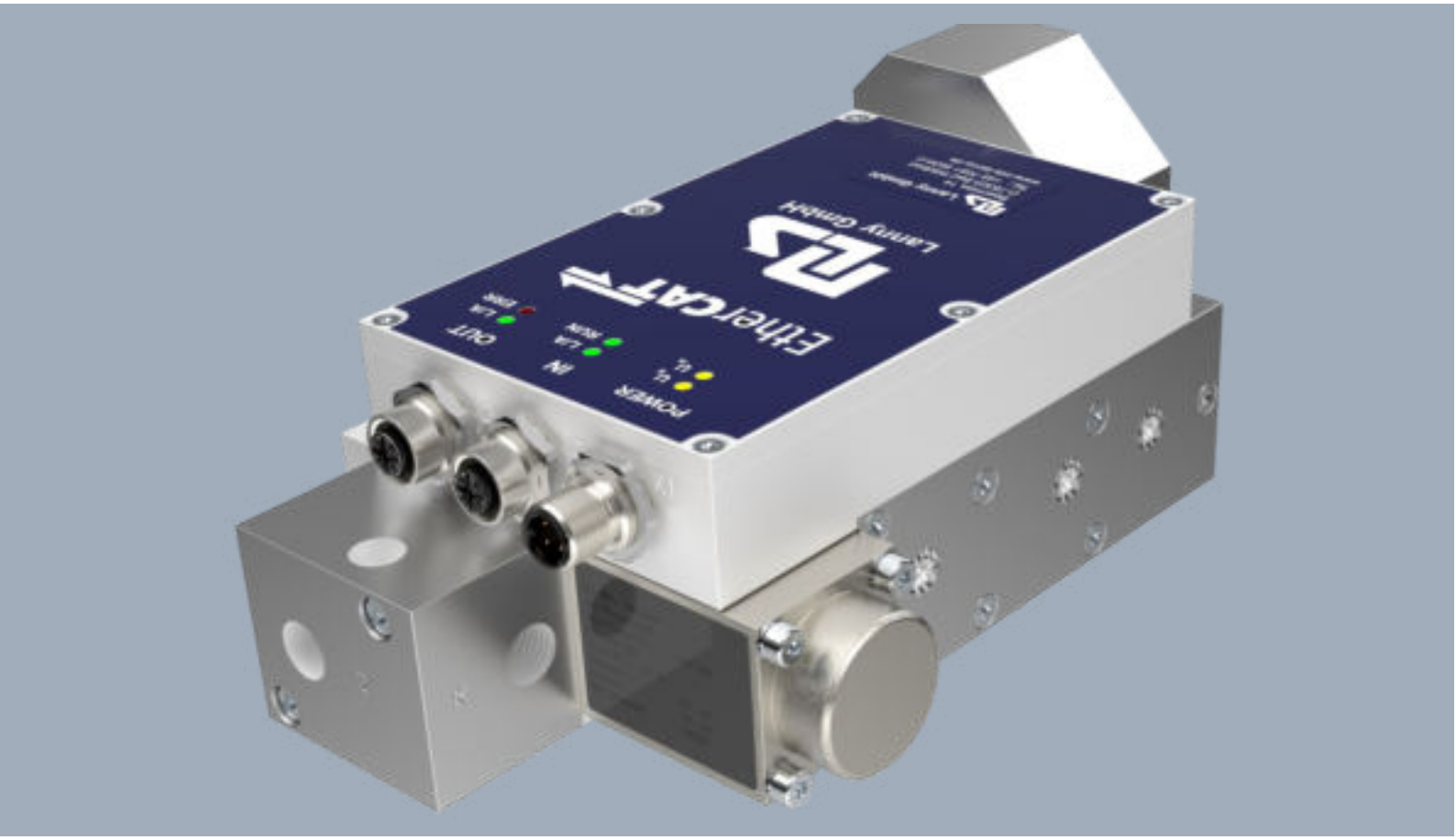
MLS Lanny GmbH

OPERATING INSTRUCTIONS

EtherCAT

CRV3ECB25M_STD



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

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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 the air supply unit 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 air supply unit 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.

2 Safety

2.1 Intended use

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

The valve block is intended solely for operation within the limits specified in the technical data (chapter5).

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 block 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 comissioning.
- 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

Optimum operation is only guaranteed if the valve is operated at a pressure within the specified pilot pressure range. Exceeding or falling below this pressure range may damage the valve.

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 compressed air supply system is equipped with filters for air quality according to the information in the technical data.
- Make sure that the compressed air supply system for the pilot valve is equipped with an air dryer, aftercooler, water separator, oil separator. Compressed air containing condensate can cause malfunction of the product.
- 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.

NOTICE

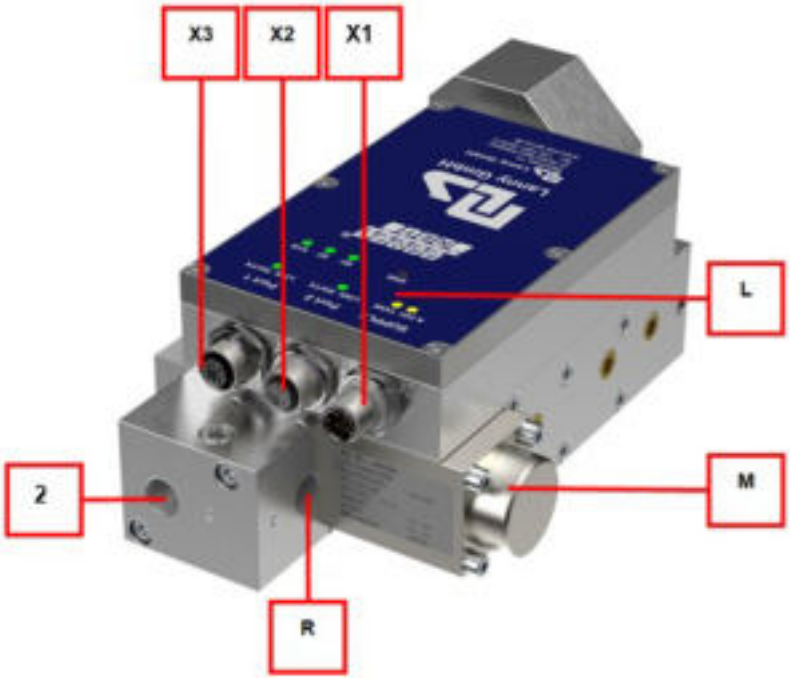
The warranty / guarantee expires immediately if the product is changed, not used as intended or if labels or serial numbers are altered, defaced or removed.

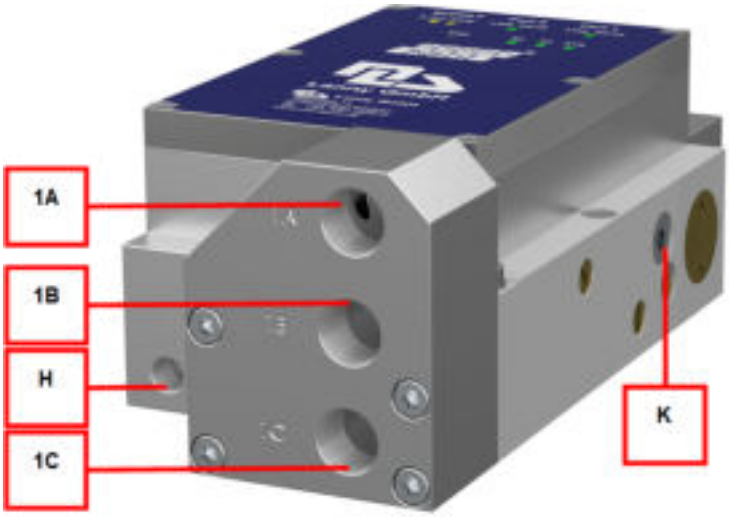
NOTICE

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.

3 Device description

3.1 Pneumatic connections and diagnostic elements





1A	Input gas 1	**L**	LED indicators
1B	Input gas 2	**M**	Solenoid
1C	Input gas 3	**R**	Exhaust
2	Ausgang	**X1**	Plug, M12, 4 pin for supply voltage
H	Input pilot pressure (M5)	**X2**	Socket, M12, 4 pin for EtherCAT input
K	Measuring connection (G1/8)	**X3**	Socket, M12, 4 pin for EtherCAT output

3.2 LED description

L/A (Link/Activity)			
LED	**Color**	**LED state**	**Description**
	-	Off	No link
	Green	Flickering	Link with data transfer
	Green	On	Link without data transfer (no activity)

RUN				
LED	**Color**	**LED state**	**Slave state**	**Description**
	-	Off	INITIALISATION	Valve is in the INIT state (initialisation)
	Green	Flickering	INITIALISATION or BOOTSTRAP	Valve is booting and has not reached INIT-state yet, or: valve is in BOOTSTRAP-state. Firmware download is running.
	Green	Blinking	PRE-OPERATIONAL	Valve is in the pre operational state.
	Green	Repeated blinking	SAFE-OPERATIONAL	Valve is in the safe operational state.
	Green	On	OPERATIONAL	Valve is in the operational state.

ERROR			
LED	**Color**	**LED state**	**Description**
	-	Off	No error
	Red	Blinking	Configuration error
	Red	Repeated blinking	Synchronization error
	Red	Double blinking	Watchdog timeout
	Red	On	Only in OPERATIONAL state. Error messages of the application: Undervoltage or Overtemperature

U_S			
LED	**Color**	**LED state**	**Description**
	-	Off	The electronics has no supply voltage
	Yellow	On	Supply voltage of the electronics available

U_A			
LED	**Color**	**LED state**	**Description**
	-	Off	The actuator has no supply voltage
	Yellow	On	Supply voltage of the actuator available

4 Technical specifications

Description	Unit	Value
Design		Regulating valve: Directly actuated seating valve (3/2 WV) Switching valve: Pneumatically preregulated seating valve
Materials		Aluminium anodized, brass, stainless steel
Seals		NBR and FKM with approval for oxygen BAM PTFE
Pneumatic ports		1A: Input gas 1 1B: Input gas 2 1C: Input gas 3 2: Output regulated gas H: Input pilot air G1/8 K: Measuring connection G1/8 R: Exhaust
Input pressure	[bar]	max. 20 (oxygen) max. 35 (nitrogen, air)
Pressure control range	[bar]	0 ... 20 (oxygen) 0 ... 25 (nitrogen, air)
Flow rate at 8 bar(a) input pressure / 7 bar(a) output pressure 20,05°C, 1,01325 bara	l/min	920 (air) 965 (oxygen)
Operating medium		Oxygen, nitrogen and air, free of oil and condensate-free, 50 µm filtered.
Operating conditions		Operating medium free of corrosive gases and dust
Pilot pressure range	[bar]	4 ... 10
Pilot pressure medium		Compressed air according to ISO 8573-1:2010 [4:3:3]
Input filter	[µm]	150 in A, B, C
Mounting position		Solenoid must not face downwards
Degree of protection		IP54
Weight	[g]	ca. 3100

Temperatures	Unit	Value
Ambient temperature	[°C]	0 ... 45
Temperature of medium	[°C]	0 ... 45
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

The content of this technical data is also available as a separate data sheet.

Further technical information:
The MLS valve blocks are available in design for 2, respectively 3 switched gases.
The valve blocks can be controlled by means of different interfaces such as:
Profibus, Profinet, Ethercat, IO-Link or analog.

4.1 Electrical data table

Supply voltage	Unit	Value
Supply voltage electronics	[V]	24 V DC (– 10 % … +20 %)
Current consumption electronics	[A]	typ. 50 mA
Supply voltage actuator	[V]	20 ... 30 (– 10 % … +20 %)
Current consumption actuator	[A]	max. 1,8 A
Protected against polarity reversal		

Potential separation	Value
Supply voltage | EtherCAT	1000 V
Supply voltage | PE	500 V
EtherCAT | PE	500 V
Insulation test	DIN EN 60204-1

4.2 Pin assignment

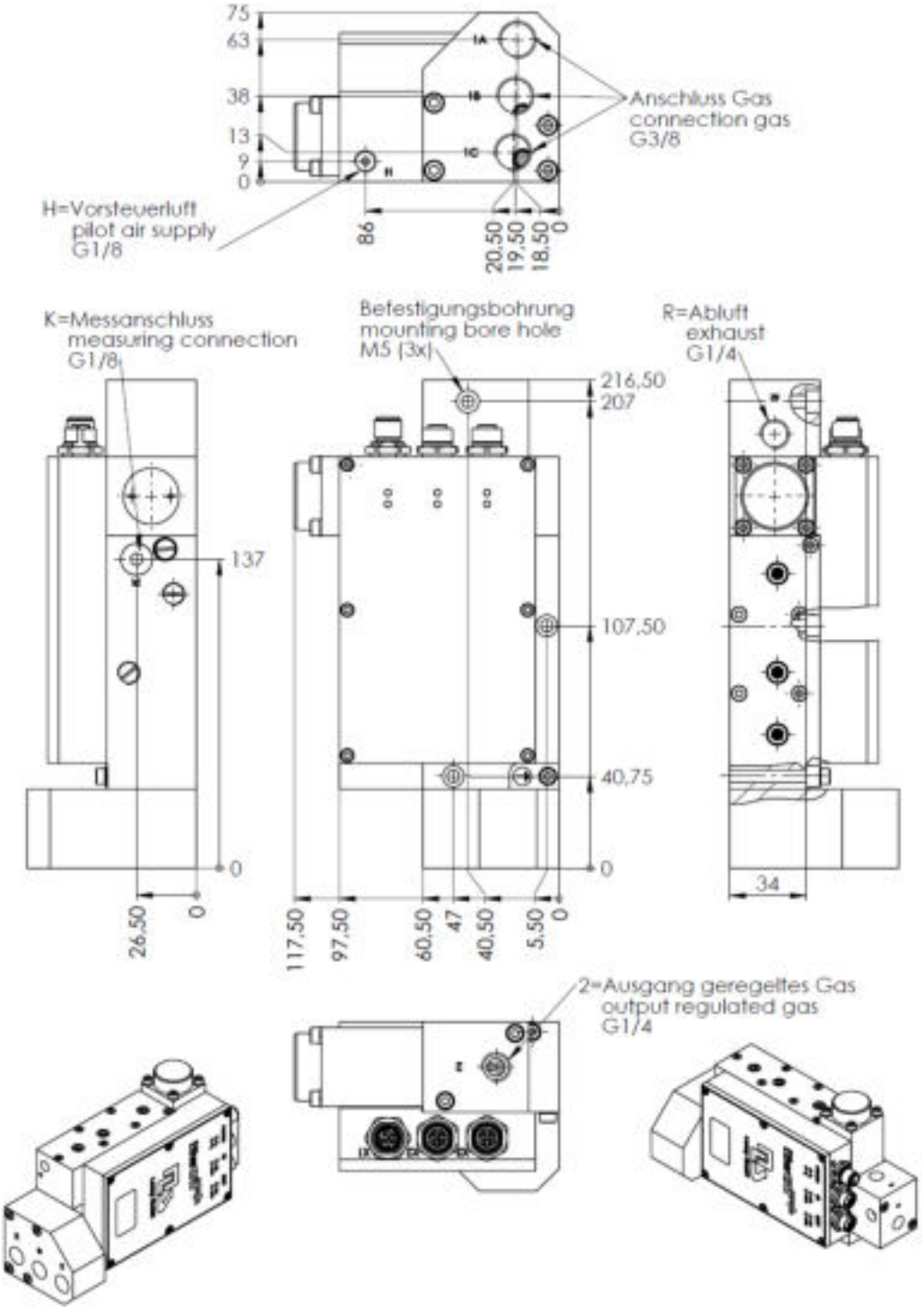
Plug	Pin	Value	Color
X1	Supply voltage – 4 pole A-coded M12-connector		
	 Pole diagram, contact side, plug		
	Pin 1	24 V DC V DC supply voltage electronics	brown
	Pin 2	20 ... 30 V DC supply voltage actuator	white
	Pin 3	GND	blue
	Pin 4	GND	black

Plug	Pin	Value
X2	EtherCAT input – 4 pole D-coded M12 coupling	
	 Pole diagram, contact side, coupling	
	Pin 1	Tx +
	Pin 2	Rx +
	Pin 3	Tx –
	Pin 4	Rx –

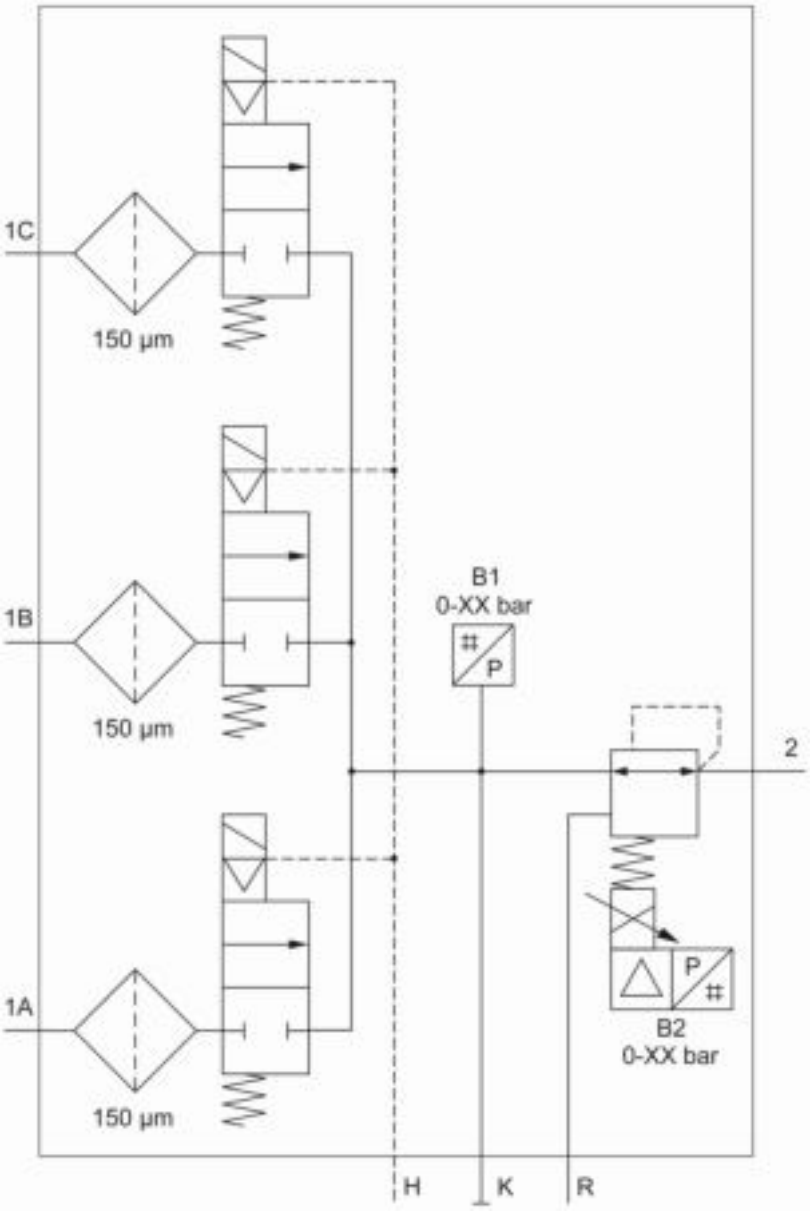
Plug	Pin	Value
X3	EtherCAT output – 4 pole D-coded M12 coupling	
	 Pole diagram, contact side, coupling	
	Pin 1	Tx +
	Pin 2	Rx +
	Pin 3	Tx –
	Pin 4	Rx –

4.3 Dimensions

Dimensions in mm

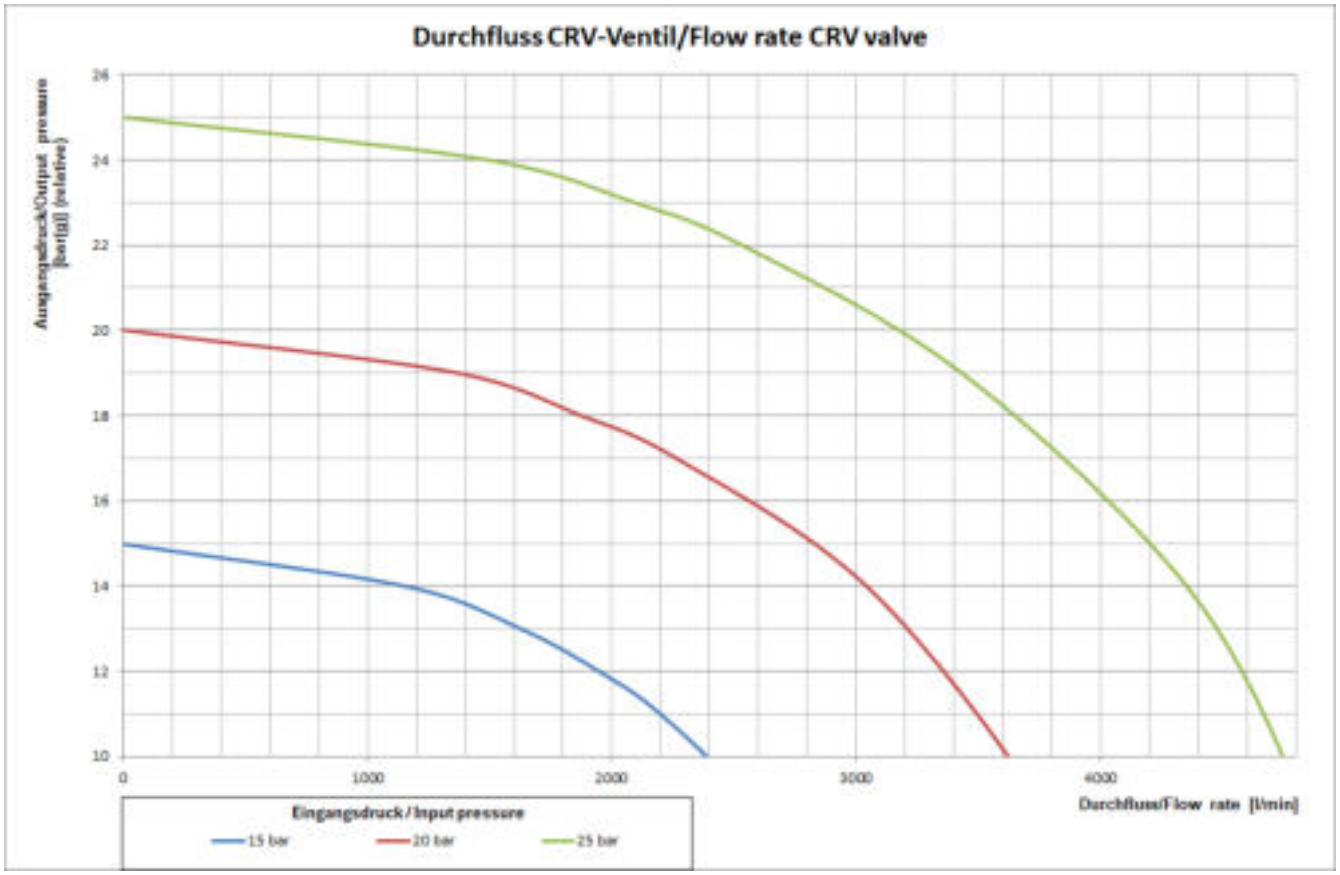


4.4 Pneumatics diagram



1A	Input gas 1 (G3/8)
1B	Input gas 2 (G3/8)
1C	Input gas 3 (G3/8)
2	Output (G1/4)
H	Input pilot pressure (G1/8)
K	Measuring connection (G1/8)
R	Exhaust (G1/4)
B1	Sensor input pressure enabled gas
B2	Sensor output pressure

4.5 Flow chart



Depending on the orientation and nature of the supply pressure line, the flow may vary.

5 Data transmission

5.1 Prozessdaten / Process data

Received data from the valve (inputs)

Inputs	Size
Status	**2 Byte**
Pressure switch	**BOOL (1 bit)**
1 if the selected output pressure value is reached, the signal is set:	
Tolerance: P_{OUT} > (P_{NOM} * 93.75%) – 150 mbar P_{OUT} < (P_{NOM} * 112.5%) + 150 mbar	
Gas A selected	**BOOL (1 bit)**
Gas B selected	**BOOL (1 bit)**
Gas C selected	**BOOL (1 bit)**
Undervoltage electronics	**BOOL (1 bit)**
1 if the supply voltage of the electronics falls below 17 V,	
the signal has a hysteresis to prevent flickering and resets:	
if the supply voltage of the electronics increases over 15 V,	
Undervoltage actuator	**BOOL (1 bit)**
1 if the actuator's supply voltage falls below 20 V.	
the signal has a hysteresis to prevent flickering and resets:	
0 if the supply voltage of the actuator increases over 19 V.	
Overtemperature	**BOOL (1 bit)**
1 if the PCB temperature exceeds 85°C,	
the signal has a hysteresis to prevent flickering and will be reset:	
0 if the PCB temperature falls below 82°C.	
Venting is running	**BOOL (1 bit)**
Automatic venting of the gas between the on – off – valves and the regulating valve is running.	
Character	**UINT8 (8 bit)**
Only the 4 lowest bits are used. See selection of characteristics: 4 bit.	

Feedback	**4 Byte**
Input pressure	**UINT16 (16 bit)**
Input pressure feedback in mbar (max. 40000 mbar)	
Output pressure (Actual value)	**UINT16 (16 bit)**
Output pressure feedback in mbar (max. 28000 mbar)	

Data sent to the valve (outputs)

Outputs	
Command	**2 Byte**
Enable	**BOOL (1 bit)**
This is a ‘release’ value used to enable the selected set value	
1 The pressure is regulated	
0 The valve is deactivated (independently of the set value)	
Select gas A	**BOOL (1 bit)**
Select gas B	**BOOL (1 bit)**
Select gas C	**BOOL (1 bit)**
Vent at gas change	**BOOL (1 bit)**
If, Enable = false and Select gas A + B + C = false, the gas between on-off valves and regulating valve will be vented.	
Character	**UINT8 (8bit)**
Characteristic curve selection. Only the 4 lowest bits are used. See selection of characteristics: 4 bit.	
Set value	**UINT16 (16 bit)**
Output pressure set value	
Set value in mbar (factory setting max. 25000 mbar) The maximum value can be read and written via “value settings” in the SDO’s	

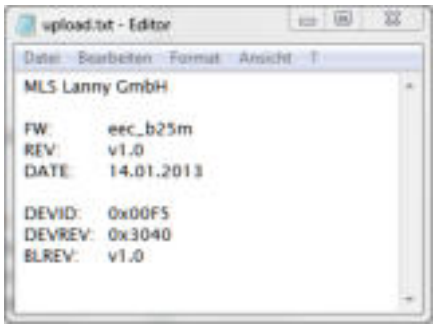
5.2 Selection of the characteristics: 4 bit

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

5.3 Firmware update

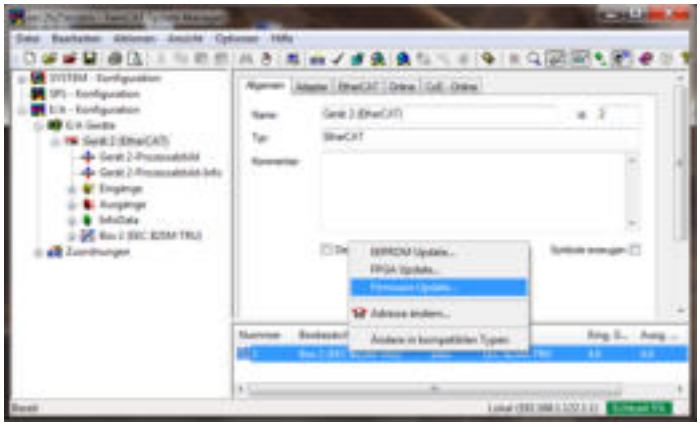
It is possible to update the firmware of this valve via EtherCAT. To check the hardware compatibility an upload of a text file with the crucial versions is intended. The file can be saved with a random name and opened with a text editor.

The file should look like the following:

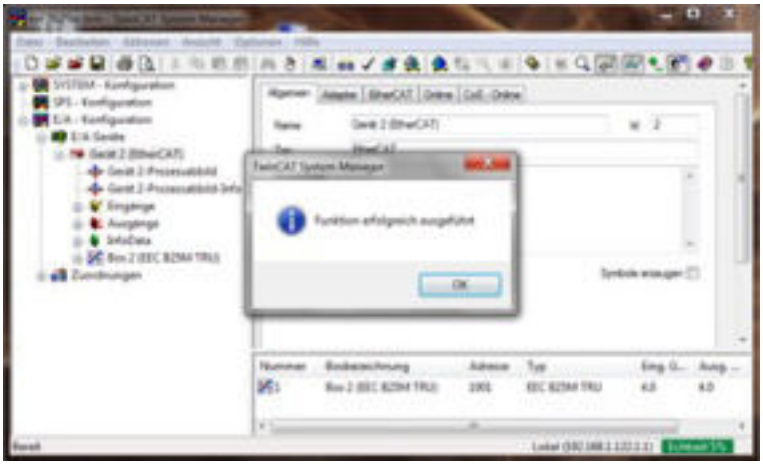


Name	Description
FW:	Firmware name. Only data with this description, e.g. “eec_b25m.efw” are accepted.
REV:	Version of the currently used firmware.
DATE:	Creation date of the currently used firmware.
DEVID:	ID of the micro controller, on which the new software should be written.
DEVREV:	Version of the micro controller, on which the new software should be written.
BLREV:	Version of the bootloader in the program of the micro controller. This is a small part of the program which is responsible for writing the new software in flash. Will not be overwritten in case of a firmware update. Can only be overwritten using a programming device.

Every new firmware it is determined with which hardware and software version this firmware update is possible. The firmware update may then be carried out using e.g. TwinCAT:



If the update was successful, the valve will reboot and be ready to use again. The successful update is signaled by TwinCAT.



If there are changes to the ESI description, it must also be updated in the EEPROM using the corresponding xml file.

ATTENTION

An uncomplete or incorrect update can cause the EtherCAT communication to stop working:

– Do not interrupt the update process.

– Do not interrupt the power supply of the valve or the EtherCAT conection.

5.4 SDO (Service Data Objects)

By means of “CANopen over EtherCAT“, you can access on SDOs

Object 0x1000 “Device Type“				
SubIndex	**Data type**	**Access**	**Default**	**Description**
0	UINT32	Read only	0x00001389 (5001)	Modular standard device

Object 0x1001 “Error register”				
SubIndex	**Data type**	**Access**	**Default**	**Description**
0	UINT8	Read only	0x00 (0)	Error register

Object 0x1008 “Device Name“				
SubIndex	**Data type**	**Access**	**Default**	**Description**
0	String	Read only	CRV3_EC_B25M_Z	Valve name

Object 0x1009 “Hardware Version“				
SubIndex	**Data type**	**Access**	**Default**	**Description**
0	String	Read only	Hardware version	Hardware version

Object 0x100A “Software Version“				
SubIndex	**Data type**	**Access**	**Default**	**Description**
0	String	Read only	Software version	Software version

Object 0x1018 “Identity”					
Name	**Sub-Index**	**Data type**	**Access**	**Default**	**Description**
Maximal SubIndex	0	UNIT8	Read only	4	Number of SubIndexes
Vendor ID	1	UNIT32	Read only	0x00001111 (4369)	MLS Lanny EtherCAT Vendor ID
Product code	2	UNIT32	Read only	0x0B2E2502 (185467440)	Number
Revision	3	UNIT32	Read only	Revision	Consecutive revision number
Serial number	4	UNIT32	Read only	0	Serial number is not supported

Object 0x10F1 “Error Settings”					
Name	**Sub-Index**	**Data type**	**Access**	**Default**	**Description**
Maximal SubIndex	0	UNIT8	Read only	2	Number of SubIndexes
Local Error Reaction	1	UNIT32	Read / write	0x00000001 (1)	Local error reaction
Sync Error Counter Limit	2	UNIT16	Read / write	0x0004 (4)	Maximum allowed synchronization errors

Object 0x10F3 “Diagnosis History”					
Name	**Sub-Index**	**Data type**	**Access**	**Default**	**Description**
Maximal SubIndex	0	UNIT8	Read only	5	Number of SubIndexes
Maximum Messages	1	UINT8	Read only	0x14 (20)	Maximum messages
Newest Message	2	UINT8	Read only	0x00 (0)	Newest message
Newest Acknowledged Message	3	UINT8	Read / write	0x00 (0)	Newest acknowledged message
New Message Available	4	BOOL	Read only	FALSE	New message available
Flags	5	UINT16	Read only	0x0000 (0)	Flags

Object 0x1600 “DO RxPDO-Map”					
Name	**Sub-Index**	**Data type**	**Access**	**Default**	**Description**
Maximal SubIndex	0	UNIT8	Read only	6	Number of SubIndexes
SubIndex 001	1	UINT32	Read only	0x7000:01, 1	RxPDO Mapping, Enable
SubIndex 002	2	UINT32	Read only	0x7000:02, 1	RxPDO Mapping, Select gas A
SubIndex 003	3	UINT32	Read only	0x7000:03, 1	RxPDO Mapping, Select gas B
SubIndex 004	4	UINT32	Read only	0x0000:00, 4	RxPDO Mapping, Select gas C
SubIndex 008	8	UINT32	Read only	0x7000:08, 1	RxPDO Mapping, Venting at gas change
SubIndex 009	9	UINT32	Read only	0x7000:09, 8	RxPDO Mapping, Character

Object 0x1602 “AO RxPDO-Map”					
Name	**Sub-Index**	**Data type**	**Access**	**Default**	**Description**
Maximal SubIndex	0	UNIT8	Read only	1	Number of SubIndexes
SubIndex 001	1	UNIT16	Read only	0x7020:01, 16	RxPDO Mapping, Output pressure (mBar)

Object 0x1A00 “DI TxPDO-Map”					
Name	**Sub-Index**	**Data type**	**Access**	**Default**	**Description**
Maximal SubIndex	0	UNIT8	Read only	9	Number of SubIndexes
SubIndex 001	1	UNIT32	Read only	0x6000:01, 1	TxPDO Mapping, Pressure switch
SubIndex 002	2	UNIT32	Read only	0x6000:02, 1	TxPDO Mapping, Gas A selected
SubIndex 003	3	UNIT32	Read only	0x6000:03, 1	TxPDO Mapping, Gas B selected
SubIndex 004	4	UNIT32	Read only	0x0000:00, 4	TxPDO Mapping, Gas C selected
SubIndex 005	5	UNIT32	Read only	0x6000:05, 1	TxPDO Mapping, Undervoltage electronics
SubIndex 006	6	UNIT32	Read only	0x6000:06, 1	TxPDO Mapping, Undervoltage actuator
SubIndex 007	7	UNIT32	Read only	0x6000:07, 1	TxPDO Mapping, Overtemperature
SubIndex 008	8	UNIT32	Read only	0x6000:08, 1	TxPDO Mapping, Venting is running
SubIndex 009	9	UNIT32	Read only	0x6000:09, 8	TxPDO Mapping, Character

Object 0x1A02 “AI TxPDO-Map”					
Name	**Sub-Index**	**Data type**	**Access**	**Default**	**Description**
Maximal SubIndex	0	UNIT8	Read only	1	Number of SubIndexes
SubIndex 001	1	UNIT32	Read only	0x6020:01, 16	TxPDO Mapping, feedback output pressure (mBar)
SubIndex 002	1	UNIT32	Read only	0x6020:02, 16	TxPDO Mapping, feedback input pressure (mBar)

Object 0x1C00 “Sync manager type”					
Name	**Sub-Index**	**Data type**	**Access**	**Default**	**Description**
Maximal SubIndex	0	UNIT8	Read only	4	Number of SubIndexes
SubIndex 001	1	UINT8	Read only	0x01 (1)	Sync manager 1: write mailbox
SubIndex 002	2	UINT8	Read only	0x02 (2)	Sync manager 2: read mailbox
SubIndex 003	3	UINT8	Read only	0x03 (3)	Sync manager 3: write process data
SubIndex 004	4	UINT8	Read only	0x04 (4)	Sync manager 4: read process data

Object 0x1C12 “RxPDO assign”					
Name	**Sub-Index**	**Data type**	**Access**	**Default**	**Description**
Maximal SubIndex	0	UNIT8	Read only	2	Number of SubIndexes
SubIndex 001	1	UINT16	Read only	0x1600 (5632)	Assign Object 0x1600 as PDO
SubIndex 002	2	UINT16	Read only	0x1602 (5634)	Assign Object 0x1602 as PDO

Object 0x1C13 “TxPDO assign”					
Name	**Sub-Index**	**Data type**	**Access**	**Default**	**Description**
Maximal SubIndex	0	UNIT8	Read only	1	Number of SubIndexes
SubIndex 001	1	UINT16	Read only	0x1A00 (6656)	Assign Object 0x1A00 as PDO
SubIndex 002	2	UINT16	Read only	0x1A02 (6658)	Assign Object 0x1A02 as PDO

Object 0x1C32 “SM output parameter”					
Name	**Sub-Index**	**Data type**	**Access**	**Default**	**Description**
Maximal SubIndex	0	UINT8	Read only	20	Number of SubIndexes
Sync Type	1	UINT16	Read / write	0x0001 (1)	Current Sync Type (1=synch with SM3)
Cycle Time	2	UINT32	Read only	0x00000000(0)	Cycle time in ns
Shift Time	3	UINT32	Read only	0x00000000(0)	Time shift (in ns) between Sync0 and outputs, set in DC-mode
Synchronization Types supported	4	UINT16	Read only	0x8007 (32775)	Supported synchronization types
Minimum Cycle Time	5	UINT32	Read only	0x00000000 (0)	Minimum slave cycle time 5000000 ns
Calc and Copy Time	6	UINT32	Read only	0x00000000 (0)	Minimum time difference (in ns) between SYNC0 and SYNC1 in DC-Mode
Get Cycle Time	8	UINT16	Read / write	0x0000 (0)	1 = start of the cycle time measurement
Delay Time	9	UINT32	Read only	0x00000000 (0)	Time difference (in ns) between SYNC1 and inputs set in DC-Mode
Sync Cycle Time	A (10)	UINT32	Read / write	0x00000000 (0)	Measuring the SYNC0 time in SYNC1-mode
SM-Event Missed	B (11)	UINT16	Read only	0x0000 (0)	Number of lost SM-events in the status „Operational“ (only in DC-mode)
Cycle Time Too Small	C (12)	UINT16	Read only	0x0000 (0)	Number of cycles with time exceedence in status „Operational“
Sync Error	20 (32)	BOOL	Read only	FALSE	TRUE, if the last synchronization has failed (only in DC-mode)

Object 0x1C33 “SM input parameter”					
Name	**Sub-Index**	**Data type**	**Access**	**Default**	**Description**
Maximal SubIndex	0	UINT8	Read only	20 (32)	Number of SubIndexes
Sync Type	1	UINT16	Read / write	0x0022 (34)	Current Sync Type (1=synch with SM3)
Cycle Time	2	UINT32	Read only	0x00000000 (0)	Cycle time in ns
Synchronization Types supported	4	UINT16	Read only	0x8007 (32775)	Supported synchronization types
Minimum Cycle Time	5	UINT32	Read only	0x0007A120 (5000000)	Minimum slave cycle time 5000000 ns
Calc and Copy Time	6	UINT32	Read only	0x00000000 (0)	Minimum time difference (in ns) between SYNC0 and SYNC1 in DC-Mode
Get Cycle Time	8	UINT16	Read / write	0x0000 (0)	1 = start of the cycle time measurement
Delay Time	9	UINT32	Read only	0x00000000 (0)	Time difference (in ns) between SYNC1 and inputs set in DC-Mode
Sync0 Cycle Time	A (10)	UINT32	Read / write	0x00000000 (0)	Measurement of the SYNC0 time in SYNC1-mode
SM-Event Missed	B (11)	UINT16	Read only	0x0000 (0)	Number of lost SM-Events in status OPERATIONAL (only in DC-Mode)
Cycle Time Too Small	C (12)	UINT16	Read only	0x0000 (0)	Number of cycles with timeout in status OPERATIONAL
Sync Error	20 (32)	BOOL	Read only	FALSE	TRUE, if the last synchonization was unsuccsessful (only in DC-Mode)

Object 0x6000 “Status”					
Name	**Sub-Index**	**Data type**	**Access**	**Default**	**Description**
Maximal SubIndex	0	UNIT8	Read only	9	Number of SubIndexes
Pressure switch	1	BOOL	Read only, process data	FALSE	See process data description
Gas A selected	2	BOOL	Read only, process data	FALSE	See process data description
Gas B selected	3	BOOL	Read only, process data	FALSE	See process data description
Under-voltage electronics	5	BOOL	Read only, process data	FALSE	See process data description
Under-voltage actuator	6	BOOL	Read only, process data	FALSE	See process data description
Over-temperature	7	BOOL	Read only, process data	FALSE	See process data description
Measurement is running	8	BOOL	Read only, process data	FALSE	See process data description
Character	9	UINT8	Read only, process data	0x00 (0)	See process data description

Object 0x6020 “Feedback”					
Name	**Sub-Index**	**Data type**	**Access**	**Default**	**Description**
Maximal SubIndex	0	UNIT8	Read only	1	Number of SubIndexes
Output pressure (mBar)	1	UINT16	Read only, process data	Actual output pressure	See process data description
Input pressure (mBar)	1	UINT16	Read only, process data	Actual input pressure	See process data description

Object 0x7000 “Command”					
Name	**Sub-Index**	**Data type**	**Access**	**Default**	**Description**
Maximal SubIndex	0	UNIT8	Read only	9	Number of SubIndexes
Enable	1	BOOL	Read only, process data	FALSE	See process data description
Select gas A	2	BOOL	Read only, process data	FALSE	See process data description
Select gas B	3	BOOL	Read only, process data	FALSE	See process data description
Select gas C	4	BOOL	Read only, process data	FALSE	See process data description
Vent at gas change	8	BOOL	Read only, process data	FALSE	See process data description
Character	9	UINT8	Read only, process data	0x00 (0)	See process data description

Object 0x7020 “Set value”					
Name	**Sub-Index**	**Data type**	**Access**	**Default**	**Description**
Maximal SubIndex	0	UNIT8	Read only	1	Number of SubIndexes
Output pressure (mBar)	1	UINT16	Read only, process data	Set value of the output pressure	See process data description

Object 0x8020 “Valve Settings”							
Name	**Sub-Index**	**Data type**	**Access**	**Default**	**Minimum**	**Maximum**	**Description**
Maximal SubIndex	0	UINT 8	Read only	4	-	-	Number of SubIndexes
Pressure minimum (mbar)	1	UINT 16	Read / write	0x0000 (0)	0x0000 (0)	0x03E8 (1000)	Minimal selectable output pressure. This value can be used so that even with a setpoint of 0 bar, the minimum pressure value is still output, e.g. to ensure a steady cooling.
Pressure maximum (mbar)	2	UINT 16	Read / write	0x61A8 (25000)	0x1338 (5000)	0x61A8 (25000)	Maximum selectable output pressure. This value limits the maximum output pressure. This value is permanently stored in the FW.
Pressure offset (mbar)	3	INT16	Read / write	0	-500	500	This value can be used to add a constant offset to the setpoint. This can e.g. be helpful to balance different designs or applications of machinery. Or to calibrate a valve, especially in the lower pressure range on the machine.
Test mode	4	UINT 16	Read / write	0x0000 (0)	0x5501 (21761)	0x5502 (21762)	By means of this value, the valve can be put into different test modes.

The high byte = 0x55 serves as key for the access of the function, the low byte selects the function:

Low byte = 0x00: normal operation

Low Byte = 0x01: Loop test 1: The valve reflects the process data Feedback = Command. No pressure control, the valve can be tested without pneumatics.

Low Byte = 0x02: Loops test 2: The valve reflects the process data Feedback = Command. Normal operation, the valve must be pneumatically operated.

Object 0x9020 “Valve Info”					
Name	**Sub-Index**	**Data type**	**Access**	**Default**	**Description**
Maximal SubIndex	0	UNIT8	Read only	4	Number of SubIndexes
Total operating hours (sec)	1	UINT32	Read only	0x00000000 (0)	Operating hours counter in seconds
Supply Voltage Elecronics (mV)	2	UINT16	Read only	0x5DC0 (24000)	Supply voltage electronics. Pin 1 M12 connector tolerance ±300 mV
Supply Voltage Actuator (mV)	3	UINT16	Read only	0x5DC0 (24000)	Supply voltage magnet. Pin 2 M12 connector, tolerance ±300 mV
Temperature electronics (°C)	4	INT16	Read only	0x0019 (19)	Temperature close to the micro controller. The temperature should not exceed 85°C. An excessively high temperature indicates a malfunction of the electronics or an improper operation (e.g. input pressure too low) of the valve. Tolerance ±2°C.

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

Optimum operation is only guaranteed if the valve is operated at a pressure within the specified pilot pressure range. Exceeding or falling below this pressure range may damage the valve.

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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These operating instructions correspond to the current technical state at the time of printing.