OPERATING INSTRUCTIONS

FLPS Multibarrier

Installation
Operation
Maintenance

SICK
Sensor Intelligence.

Document information

Product
Product name: FLPS Multibarrier

Document ID
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Original documents
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Legal information
Subject to change without notice.

Warning symbols


Hazard (general)


Voltage Hazard

Warning levels / Signal words

DANGER
Risk or hazardous situation which *will* result in severe personal injury or death.

WARNING
Risk or hazardous situation which *could* result in severe personal injury or death.

CAUTION
Hazard or unsafe practice which *could* result in less severe or minor injuries.

NOTICE
Hazard which *could* result in material damage.

Information symbols


Important technical information for this product

FLPS Multibarrier

1 About this document

Function of this document
Scope of application

1.1 Function of this document

These Operating Instructions describe:

- Device components
- Installation
- Operation
- Maintenance work required for reliable operation

Retention of documents

► Keep these Operating Instructions and all associated documents available for reference.

► Pass the documents on to a new owner.

1.2 Scope of application

These Operating Instructions cover standard applications which conform with the technical data specified. Additional information and assistance for special applications are available from your SICK representative. It is generally recommended to take advantage of qualified consulting services provided by SICK experts for your specific application.

FLPS Multibarrier

2 For your safety

Intended use
Basic safety information
Requirements on the personnel's qualification
Restrictions of use

2.1 Intended use

2.1.1 Purpose of the device

The FLPS Multibarrier is a multichannel feed and input isolator amplifier to provide intrinsically safe installation of FLOWSIC gas measuring devices.

2.1.2 Correct use

- ► Only use the FLPS Multibarrier as described in these Operating Instructions. The manufacturer bears no responsibility for any other use.
- ► Do not carry out any work or repairs on the FLPS Multibarrier not described in this manual.
- ► Do not remove, add or change any components in or on the FLPS Multibarrier unless such changes are officially allowed and specified by the manufacturer.

  Failure to observe these precautions could result in:
  - Any warranty by the manufacturer becomes void,
  - causing the device to become dangerous,
  - the approval for use in potentially explosive atmospheres is no longer valid.
- ► Do not use damaged components or parts.

Special local conditions

- ► Follow all local laws, regulations and company-internal operating directives applicable at the installation location.

2.2 Basic safety information

- ► Only put the FLPS Multibarrier into operation after reading the Operating Instructions.
- ► Observe all safety information.
- ► If you do not understand something: Please contact SICK Customer Service.

2.2.1 Hazards with electrical equipment

WARNING: Power voltage danger

- ► Disconnect the device from all effective power sources except the intrinsically safe power circuits to the gas flow meter for installation, maintenance and service work.
- ► Decommission the device when it is damaged, has been improperly loaded or stored, or shows malfunctions.

2.2.2 Operation in potentially explosive atmospheres

- ► Install the device outside of hazardous areas only.

WARNING: Risk of explosion

The FLPS Multibarrier is an [Ex ia] associated equipment that provides intinsically safe wiring with intinsicallay safe devices installed in Zone 1 or Zone 0.

- ► Substitution of components may impair Intrinsic Safety.

2.3 Requirements on the personnel's qualification

Designated users

The FLPS Multibarrier may only be installed and operated by skilled technicians who, based on their technical training and knowledge as well as knowledge of the relevant regulations, can assess the tasks given and recognize the hazards involved. Technicians must be skilled according to DIN VDE 0105 or IEC 364 or directly comparable standards.

The named persons must have exact knowledge of operational hazards caused e.g. by hot, toxic, explosive gases or gases under pressure, gas-liquid mixtures or other media as well as adequate knowledge of the measuring system gained through training.

Specific requirements for use of devices in hazardous areas

- ► Cabling /installation, device set-up, maintenance and check may be only carried out by experienced personnel which has knowledge about the rules and regulations for hazardous areas, in particular:
  - type of protection
  - installation rules
  - area definition
- ► Regulations to be applied:
  - EN/IEC 60079-11
  - EN/IEC 60079-14

  or comparable national regulations.

2.4 Restrictions of use

- ► The degree of protection IP20 (IEC 60529/EN 60529) of the device is designed for a clean and dry environment (degree of contamination 2 according to IEC 60664-1). Do not submit the device to mechanical and/or thermal stress which exceeds the described limits.
- ► The device meets the radio interference protection regulations (EMC) for the industrial area (EMC class A). Use in living areas can lead to radio interference.

FLPS Multibarrier

3 Product Description

Product Identification
Design and function
Device versions
Interfaces
Displays

3.1 Product Identification

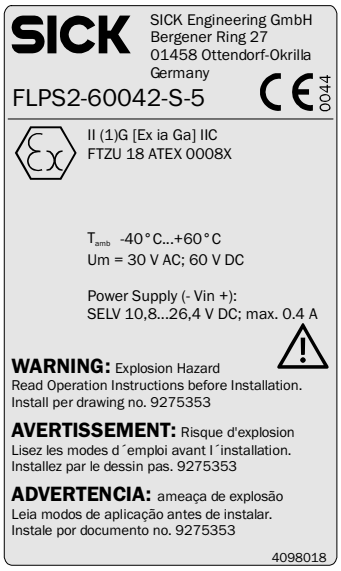
Product name:	FLPS Multibarrier
Manufacturer	SICK Engineering GmbH Bergener Ring 27 D-01458 Ottendorf-Okrilla Germany

Type plate

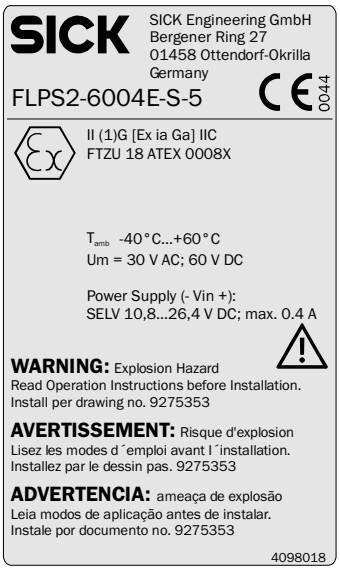
The type plates is located on the module enclosure for information on identification of the device.

Figure 1 Type plate (example)

FLPS2-60042-S-5



FLPS2-6004E-S-5



Model name

Figure 2 Model name

	FLPS	2	-	600	42	-	S	-	5
Product Name									
Product Name	FLPS								
Device Type									
Double Module		2							
Separation									
Device Family									
FLOWSIC600 / XT / DRU / 60				600					
Data interfaces									
4*DO, 2*RS485					42				
4*DO, 1*Ethernet, 1*RS485					4E				
Separation						-			
Ex classification									
Safe zone							S		
Separation								-	
Nominal supply voltage									
5…15 V DC									5

3.2 Design and function

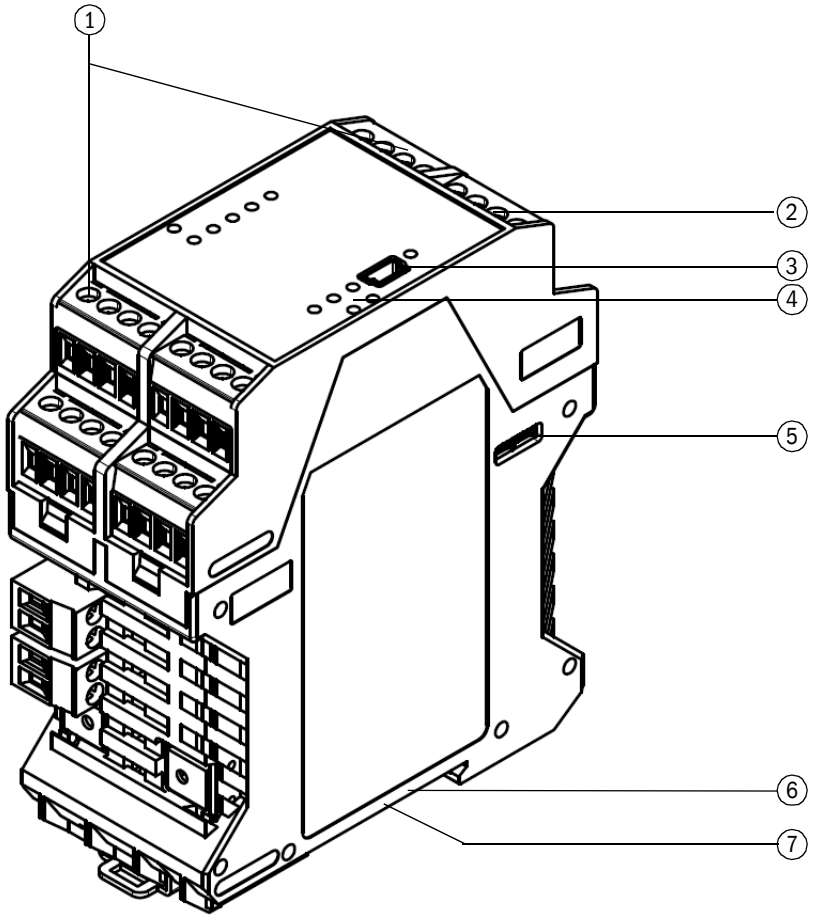
The FLPS Multibarrier is a multichannel feed and input isolator amplifier for the electrically isolated operation of FLOWSIC600-XT gas measuring devices and the power source (intrinsically safe supply).

The device supplies the gas measuring device with voltage and allows the connection via one or two serial as well as four digital interfaces, depending on the device version.

All interfaces are electrically isolated.

The serial interfaces are typically designed as RS485. Here, one can be used for connection to a volume converter and the second for connection to a higher level system or it can be used as service interface via integrated mini USB 2.0 interface.

Figure 3 Overview FLPS Multibarrier



1 Screw terminals
2 Ethernet connection (Model FLPS2-6004E-S-5)
3 USB connection
4 Marking with status LEDs
5 DIL switches
6 Latch foot for fitting on the mounting rail
7 Fuse

3.3 Device versions

The FLPS Multibarrier is available in two standard device versions:

Table 1 FLPS Multibarrier device versions

Part number	Model name	Description
2098122	FLPS2-60042-S-5	FLPS Multi Barrier FLPS2-60042-S-5 Multi-channel power and input isolating amplifier for intrinsically safe installation of FLOWSIC600/-XT family devices – DIN-rail housing NS35: 45x114.5x99mm – 4 digital I/O (puls/status) – 2 serial I/O (RS485) – 1 mini USB 2.0 Service I/O
2098136	FLPS2-6004E-S-5	FLPS Multi Barrier FLPS2-6004E-S-5 Multi-channel power and input isolating amplifier for intrinsically safe installation of FLOWSIC600/-XT family devices – DIN-rail housing NS35: 45x114.5x99mm – 4 digital I/O (puls/status) – 1 serial I/O (RS485) – 1 Ethernet I/O – 1 mini USB 2.0 Service I/O

3.4 Interfaces

3.4.1 Communication via Modbus TCP

The device version FLPS2-6004E-S-5 is equipped with an Ethernet interface with data protocol Modbus TCP.

3.4.2 Service access via USB

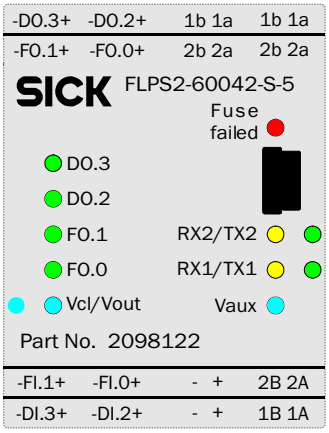
Both device versions FLPS2-60042-S-5 and FLPS2-6004E-S-55 are equipped with a mini USB 2.0 interface.

3.5 Displays

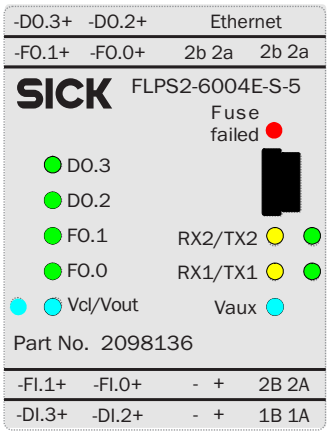
- LED –“red” signals an error of the power supply (failure of fuse)
- LED –“blue” for intrinsically safe supply of the flow meter
- LED –“blue” for intrinsically safe supply of the RS485, from the flow meter
- LED –“green” for RS485 TX
- LED –“yellow” for RS485 RX
- x LED –“green” digital outputs

Figure 4 Displays

FLPS2-60042-S-5



FLPS2-6004E-S-5



FLPS Multibarrier

4 Installation

Safety Information
Mounting
Electrical Installation

4.1 Safety Information

WARNING: Risk of explosion
When the device is used in non-intrinsically safe power circuits, it no longer may be used in intrinsically safe power circuits.
► Then, clearly mark the device as non-intrinsically safe.

- ► Disconnect the device from all effective power sources except the intrinsically safe power circuits to the gas flow meter for installation, maintenance and service work.
- ► Install the device outside of hazardous areas only.
- ► Provide a switch/circuit breaker near the device and mark it as disconnecting device for this device (or the whole control cabinet).
- ► Provide an overcurrent protective device (I ≤ 16 A) during assembly.
- ► The enclosure of the device provides an ingress protection degree of IP20 according to IEC/EN60529 and is suitable for indoor installation only. If required this device is to be installed in an addional enclosure suitable for the exicting environmental conditions. Outdoor installion requires IP54 or higher.
- ► In particular for interconnection with a device in Zone 0 the requirements in IEC/EN 60079-14 have to be observed.
- ► For safe operation connect the grounding terminal of the device with the potential equalization (PE). All intrinsically safe circuits of the FLPS Multibarrier must be considered as grounded circuits.
- ► Two (2) connectors with a cross-section of minimum 1.5 mm^2 up to maximum 2.5 mm^2 (stranded/ rigid) are recommended to connect the ground terminal. Alternatively a single stranded wire with a cross-section of 4 mm^2 only with a crimping cable lug may be used.
- ► Conductors with a minimum cross-section of 0.2 mm^2 and a maximum cross-section of 2.5 mm^2 (fine-stranded/rigid) may be connected to the connection terminals. The tightening torque is 0.5 – 0.8 Nm. In case of stranded wires use wire end ferrules.
- ► Connect the device only to equipment, which does not carry voltage higher than 30 V AC or 60 V DC peak. Use SELV power supplies and equipment that meets the rquirements of IEC/EN 60950 or IEC/EN 61010-1.
- ► The safety-related technical values of the connected field devices must be conform with the specifications of the Data Sheet and/or the EU Type Examination Certificate.
- ► Interconnection of several active operating resources in an intrinsically safe circuit may result in different safety-related technical values. This can endanger the intrinsic safety! The intrinsically safe RS485 interface of the FLPS Multibarrier is only permissible for point to point connections. Connection to a FISCO system is not permitted.
- ► Modifications and alterations on the device are not permitted.
- ► Only install and operate the device in an undamaged, dry and clean state.
- ► When the device is not used according to the documentation, the designated protection can be impaired.

4.2 Mounting

- ► DIL switches are installed on the side of the enclosure for setting the termination of the RS485 interface in the safe area . If required, set it prior to installation on the mounting rail as described in → p. 25, § 4.3.5. Termination to the gas flow meter is set fixed.
- ► Mount the FLPS Multibarrier on a 35 mm mounting rail (hat rail) according to EN 60715.

4.3 Electrical Installation

4.3.1 Cable specification

Cables and terminals

	Parameters
Conductor cross section	0.5 ... 2.5 mm^2 (20 ... 12 AWG)
Cable type	Conform with the requirements in the appropriate installation area
Maximum cable length to the gas flow meter (twisted pair)	200 ... 500 m (depending on the conductor cross-section)
Insulation stripping	7 mm
Tightening torque	0.5 ... 0.8 Nm
Ethernet cable type	Cat 5 or higher
Ethernet connector type	RJ45
Maximum cable length (Ethernet)	100 m
USB connection	Type mini USB 2.0

4.3.2 Connection parameters

Electrical isolation

- ► All connections to the safe area are isolated from the intrinsically safe connection and ground.
- ► All intrinsically safe connections are not isolated from ground and must be connected to the potential equalization (PE).

	Parameters
Input/output/supply Insulation voltage	500 V_{eff} (1 min.)
Max. allowable voltage of the connections in the safe area (rated voltage)	30 V AC, 60 V DC Connect the device only to equipment, which does not carry voltage higher than 30 V AC or 60 V DC peak. Use SELV power supplies and equipment that meets the requirements of IEC/EN 60950 or IEC/EN 61010-1.

Input data for device supply

Symbol	Parameters	Min	Type	Max	Unit
V_{in}	Input voltage	10.8	24	26.4	V DC
I_{in}	Input current			400	mA
P	Power input			5	W

Connections in the safe area

Symbol	Parameters	Min	Typical	Max	Unit
Switching outputs DO.1 ... DO.4 (not intrinsically safe)					
U_{out}	Output voltage DO	n/a	n/a	30	VDC
I_{out}	Output current DO	0.1	20	50	mA
Serial interfaces					
RS485.1 (Alternative: Ethernet)	Interface (not intrinsically safe)	In accordance with standard EIA485 (In accordance with standard IEEE 802.3)			
RS485.2	Interface (not intrinsically safe)	In accordance with standard EIA485			
	Service interface (not intrinsically safe) – designed as mini USB 2.0	In accordance with standard USB 2.0			

Connections for intrinsically safe supply of the gas flow meter

Parameter	IIA	IIB	IIC	Unit
Gas flow meter voltage supply (intrinsically safe), terminal -Vout+				
U_o	16.5	16.5	16.5	V
I_o	463	463	463	mA
P_o	1.3	1.3	1.3	W
C_o	2.2	2.45	0.415	µF
L_o	0.8	0.4	0.1	mH
L_o/R_o	148	74.4	18.6	µH/Ω
Current loop intrinsically safe power supply, terminal -Vcl+				
U_o	16.5	16.5	16.5	V
I_o	89	89	89	mA
P_o	368	368	368	mW
C_o	9.8	1.9	0.2	µF
L_o	32	16	2.3	mH
Switching inputs FI.0 (DI.0), FI.1 (DI.1), DO.2, DO.3 supply (intrinsically safe)				
U_o	16.5	16.5	16.5	V
I_o	9.7	9.7	9.7	mA
P_o	40	40	40	mW
C_o	9.8	2.45	0.41	µF
L_o	300	200	100	mH
U_i	16.5	16.5	16.5	V
C_i	0	0	0	µF
L_i	0	0	0	mH
Serial interfaces RS485 supply (intrinsically safe), terminals 1A, 1B, 2A, 2B including auxiliarxy power-				
U_o	7.14	7.14	7.14	V
$\sum I_o$	164	164	164	mA
$\sum P_o$	293	293	293	mW
$\sum C_o$	296	196	2.55	µF
$\sum L_o$	5	2.5	0.33	mH
U_i	7.14	7.14	7.14	V
$\sum C_i$	3.45	3.45	3.45	µF
L_i	n.s	n.s	n.s	mH

n.s. negligible small,

$\sum$ The values are valid as the sum for terminals Aux, 1A, 1B, 2A, 2B

4.3.3 Connecting the FLPS Multibarrier

The FLPS Multibarrier is equipped with screw terminals.

- ► If required, equip the conductors with crimp lead end sleeves. Observe the relevant approved line cross-sections in → p. 19, § 4.3.1.
- ► Lay the intrinsically-safe and non-intrinsically safe lines separately.
- ► Plugable connectors for the intrinsically-safe side are blue.
- ► Connect the lines into the connection terminals according to the marking.

Connection overview

Intrinsically safe (Ex ia) connections for gas flow meter, plug color “light blue”		**Safe area connections, plug color “grey”**			
Terminal designation	Function	Terminal designation		Function	
FI.0+ (DI.0+)	Pulse input FI.0+	FO.0+ (DO.0+)		Pulse Output FO.0+	
FI.0- (DI.0-)	Pulse input FI.0-	FO.0- (DO.0-)		Pulse Output FO.0-	
FI.1+ (DI.1+)	Pulse input FI.1+	FO.1+ (DO.1+)		Pulse Output FO.1+	
FI.1- (DI.1-)	Pulse input FI.1-	FO.1- (DO.1-)		Pulse Output FO.1-	
DI.2+	Status input DI.2+	DO.2+		Status Output DO.2+	
DI.2-	Status input DI.2-	DO.2-		Status Output DO.2-	
DI.3+	Status input DI.3+	DO.3+		Status Output DO.3+	
DI.3-	Status input DI.3-	DO.3-		Status Output DO.3-	
1A	RS485.1 Data A	1a	altern. RJ45	RS485.1 Data a output	altern. Ethernet
1B	RS485.1 Data B	1b		RS485.1 Data b output	
+	Auxiliary voltage RS485.1+	1a		RS485.1 Data a output	
-	Auxiliary voltage RS485.1-	1b		RS485.1 Data b output	
2A	RS485.2 Data A	2a		RS485.2 Data a output	
2B	RS485.2 Data B	2b		RS485.2 Data b output	
+	Auxiliary voltage RS485.2+	2a		RS485.2 Data a output	
		2b		RS485.2 Data b output	
-	Auxiliary voltage RS485.2-	Mini USB		Service interface USB 2.0	
Vcl+	Current loop power supply+	Vin+		Power supply input+	
Vcl-	Current loop power supply-				
Vout+	Flow meter power supply+	Vin-		Power supply input-	
Vout-	Flow meter power supply-				
⏚	Ground				

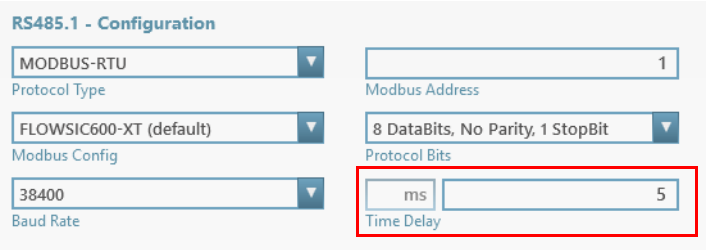
- ► Tighten terminal screws with a screwdriver and a tightening torque of 0.5 to 0.8 Nm.

- ► Set the desired settings “Open Collector” or “NAMUR” via the DIL switch on the enclosure of the device for the digital outputs FO.0 (DO.0), FO.1 (DO.1), DO.2, DO.3.
- ► Select the data communication speed (baud rate) on the gas flow meter between 19.2 kBaud and 57.6 kBaud. The FLPS Multibarrier automatically determines the selected baud rate and uses it for output on the non-intrinsically safe side.
- ► Make sure that the response delay of the serial interfaces (RS485) of the FLOWSIC600-XT is set to at least 5 ms.

  The delay can be adjusted via FLOWgate™: “Parameter modification/I/O configuration”

  For the selected RS485 interface, check the "Time Delay" and adjust if necessary.

Figure 5 Response delay



4.3.4 FO/DO configuration switches (Open Collector - Namur)

Figure 6 DIL switches

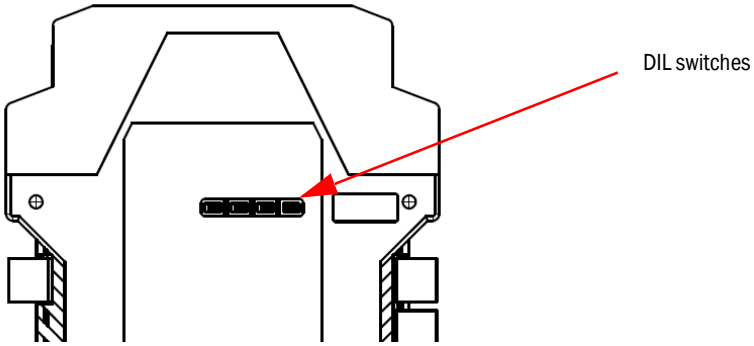
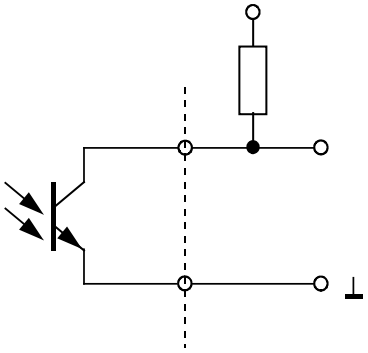
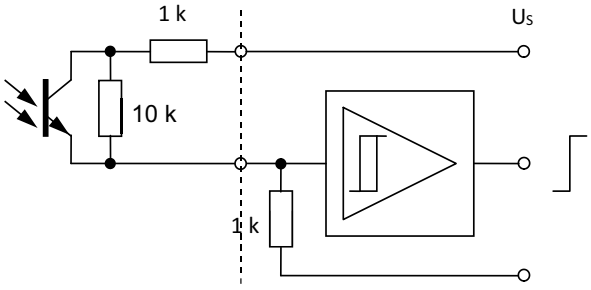


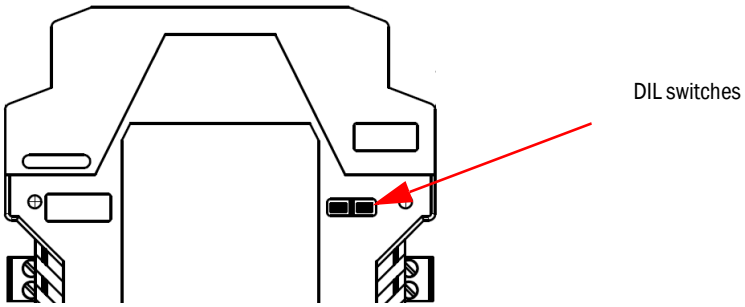
Figure 7 FO/DO switching

"OPEN COLLECTOR"	"NAMUR"
	
Max. impulse frequency: 10 kHz Max. configurable impulse duration: 0.05 s ... 1 s External supply: $U_S \leq 30V$ Switching states "ON": $0 \leq U_{CE} \leq 2V$; $2mA \leq I_{CE} \leq 20mA$ "OFF":$I_{CE} \leq 0.2$ mA (leakage flow) U_{max} = 30 V, electronic current limitation, resettable temperature fuse	Max. impulse frequency: 10 kHz Impulse duration: n/a External supply: U_S= 8.2V Switching states "On": I_O = 6.5 mA "OFF": I_O = 0.8 mA U_{max} = 30 V (no Namur device connected)

4.3.5 Termination of the RS485 interface

► Set the termination to „On“ per default.

Figure 8 DIL switches



4.3.6 Connecting the interfaces

Communication via Modbus TCP

The device version FLPS2-6004E-S-5 is equipped with an Ethernet interface with data protocol Modbus TCP.

Communication on the serial interface RS485.1 is converted in the FLPS Multibarrier via the integrated X -Ports from Modbus RTU or Modbus ASCII to Modbus TCP.

Connection is done via an Ethernet cable Cat 5 or higher with a RJ45 plug.

Standard settings

- Standard IP address for Ethernet module: 192.168.0.10
- Standard Subnet mask: 255.255.255.0
- Standard baud rate: 38,400 baud

Service access via USB

Both device versions FLPS2-60042-S-5 and FLPS2-6004E-S-5 are equipped with a mini USB 2.0 interface.

The serial interface RS485.2 can be used as direct service interface on the FLPS Multibarrier by using the mini USB 2.0 interface integrated in the module.

When the serial interface RS485.2 is used and e.g. included in a control system, it will be disconnected during access via the USB interface. Access via the USB interface has “priority” in this case.

After deactivation of the connection via the USB interface, activate the connection to the control system via the serial interface RS485.2 again.

4.3.7 Connection diagrams

Figure 9 Schematic diagram FLPS2-60042-S-5 (without Ethernet)

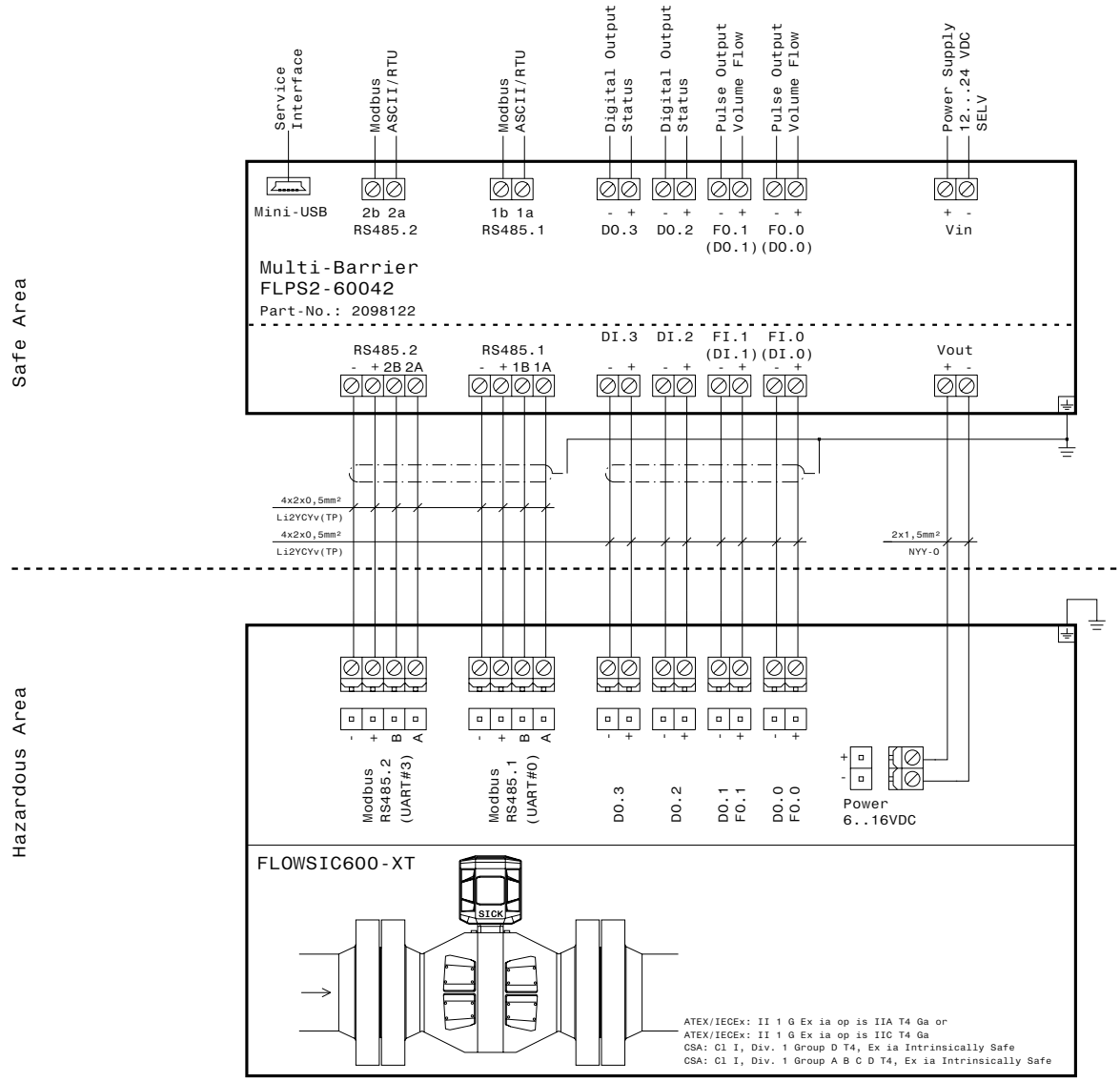
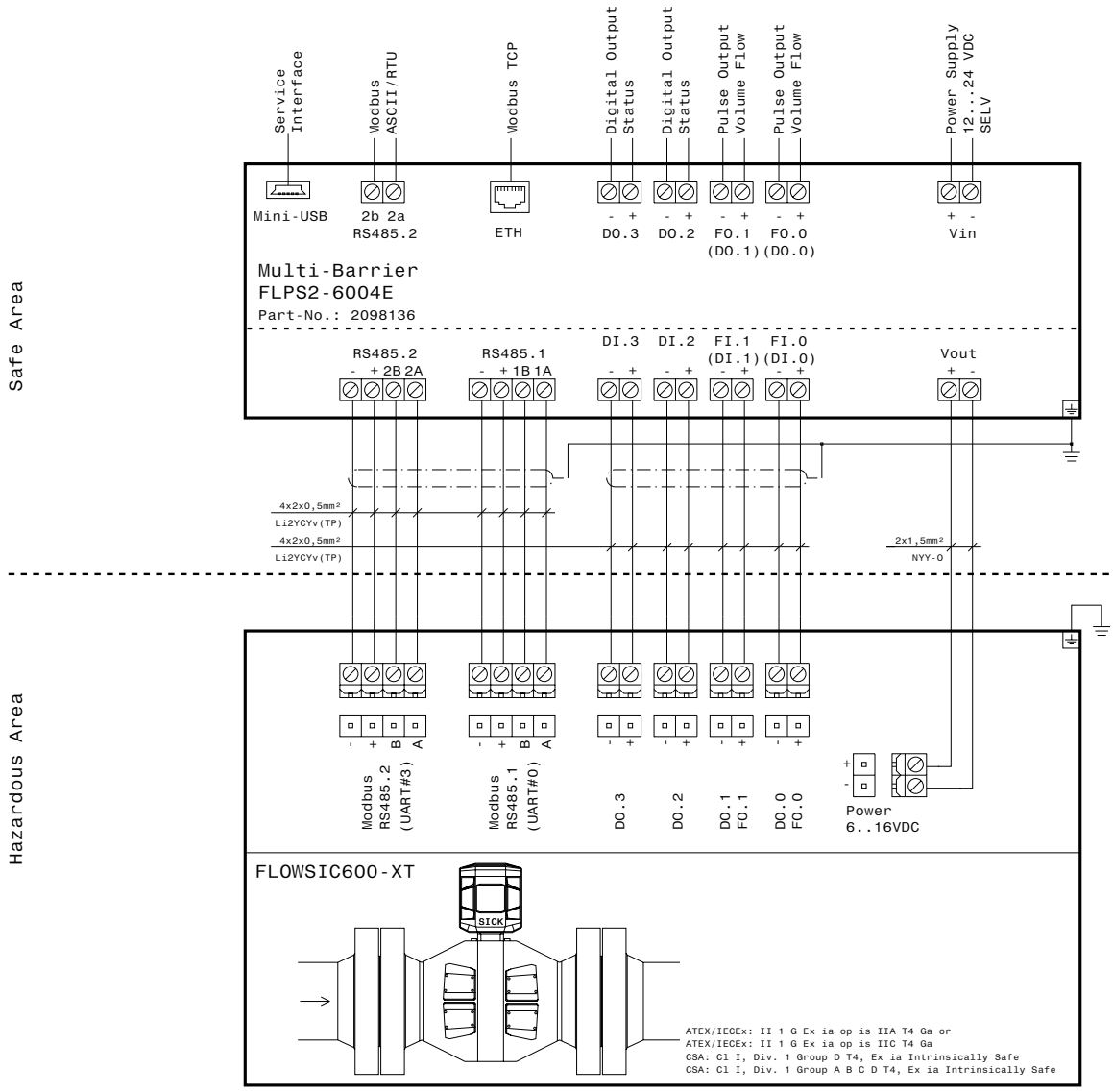


Figure 10 Schematic diagram FLPS2-6004E (with Ethernet)



Intrinsically Safe assesment for the interconnection of the FLPS Multibarrier with FLOWSIC600-XT.

4.4 Function check

> ***IMPORTANT:***
> Check for correct wiring and function of the FLPS Multibarrier prior to commissioning.

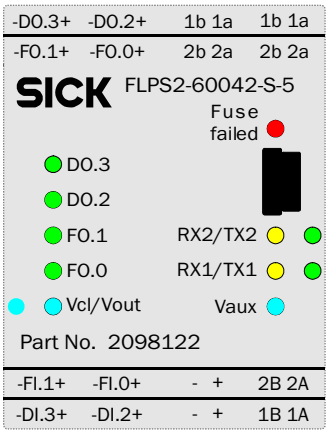
After finishing the installation work described in → p. 19, § 4.3, switch on the power supply to the device.

The blue, green and/or yellow LEDs are on and signal the correct power supply of the gas flow meter.

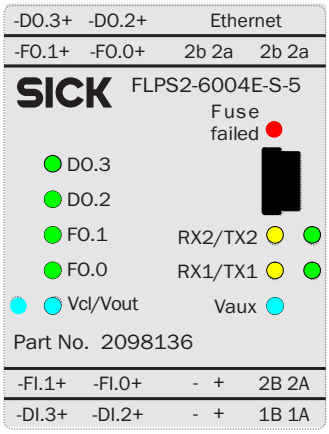
The red LED “Fuse failed” is off.

Figure 11 Function check

FLPS2-60042-S-5



FLPS2-6004E-S-5



FLPS Multibarrier

5 Troubleshooting

Replacing the fuse
Malfunction
Error rates

5.1 Replacing the fuse

The Multibarrier is maintenance-free. When the device is operated with too high voltage or connected to the wrong polarity, the interchangeable back-up fuse will be triggered and protect the internal circuit.

The fuse can be replaced without opening the enlcosure.

> ***IMPORTANT:***
> Before the fuse is replaced, clarification of the fail is recommended.

- ► In case of a defective fuse, the red LED “Fuse fail” lights permanently.
- ► Disconnect the FLPS Multibarrier from the supply voltage before replacing.
- ► If necessary, remove the wiring of the barrier.
- ► Remove the barrier from the 35 mm mounting rail.

> **WARNING: Danger due to wrong spare parts**
> ► Fuses may only be replaced with an original spare part; SICK order No. 2085302 (Littelfuse Type 0273.200 (200 mA, 125 V).

- ► Replace the fuse.

5.2 Malfunction

> **WARNING: Risk of explosion**
> The FLPS Multibarrier is an [Ex ia] associated equipment that provides intinsically safe wiring with intinsicallay safe devices installed in Zone 1 or Zone 0.
> ► Substitution of components may impair Intinsic Safety.

- ► Replace the device when the FLPS Multibarrier shows a malfunction which is not caused by a defective fusible cutout.
- ► Do not open or change the device.
- ► Do not repair the device by yourself, but replace it by an equivalent device.
- ► Repairs may only be performed by the manufacturer. The manufacturer is not liable for damages due to violation.

5.3 Error rates

100.000 operating hours are stated as service life of the FLPS Multibarrier.

FLPS Multibarrier

6 Specifications

Technical data
Dimensional drawings
Conformities

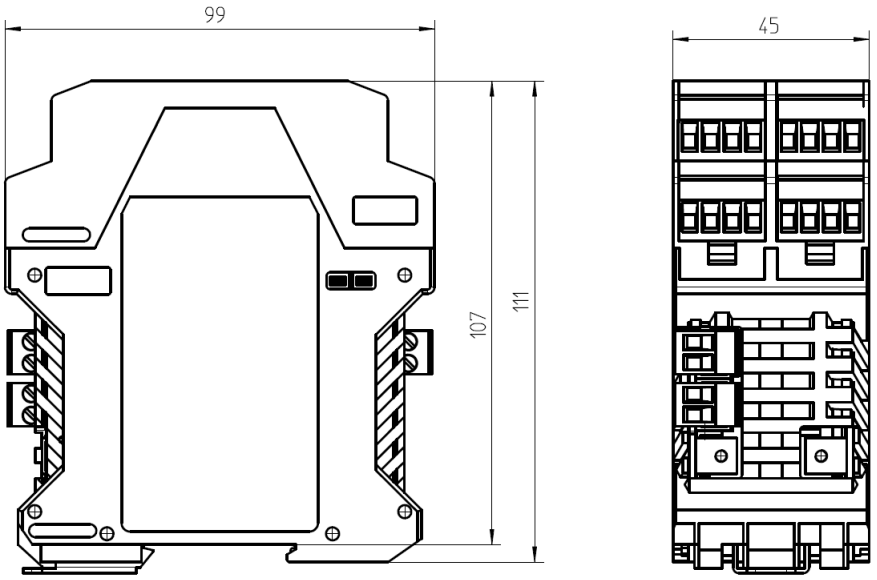
6.1 Technical data

Table 2 Technical data

Ambient temperature	-40 ... +60 °C
Storage temperature	-40 ... +80 °C
Ambient humidity	10 ... 95% Relative humidity in operation – no moisture condensation
Ambient pressure	0.8 ... 1.1 bar (a)
Enclosure rating	IP 20 Fit the devices in enclosures which meet the relevant requirements of the installation location.
Ex approvals	
ATEX	II (1)G [Ex ia Ga] IIC

6.2 Dimensional drawings

Figure 12 FLPS Multibarrier Dimensions



6.3 Conformities

CE	• CE compliant
Electrical safety/ EMC	• IEC 61010-1:2010-06 • IEC 60529 • 2014/30/EU – EMC Directive • DIN EN 61326-1:2013-07
ATEX	• RL 2014/34/EU • EN 60079-0:2012, EN 60079-11:2012
Climate	• IEC60068
Mechanical	• IEC 61010-1:2011-05, + Corrigendum 2: 2013-10
Other	• RoHS conformity 2011/65/EU • EN 50178:1997 • EN 60947-5-6 (NAMUR)

6.4 Disposal

The FLPS Multibarrier is mainly made of plastics and electronic components. It does not contain any poisonous, radioactive or environmentally hazardous substances.

Dispose of the FLPS Multibarrier as electronic component as electronic waste.

8021769/162M/1-1/2019-11

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