

# SIL



## Functional Safety Certificate

**No. 2X210111.FII0U27**

Technical Construction File no. SIL-FUYI-2021-A3

**Certificate's Holder:** FUYI Intelligent Instrument (Shanghai) Co., Ltd.  
 3F, Building 1, No.205, Jianding Road, Fengjing Town, Jinshan District, Shanghai, China

**Product:** Electromagnetic Flowmeter  
**Model(s):** FMF90 Series

**Standard:** Has been assessed per the relevant requirements of:  
 IEC 61508:2010 Parts 1-7  
 And meets requirements providing a level of integrity to:  
 Systematic Capability: SC 3 (SIL 3 Capable)  
 Random Capability: Type B Element  
 SIL 2 @ HFT=0; SIL 3 @ HFT=1, Route 1<sub>H</sub>  
 PFD<sub>avg</sub> and Architecture Constraints must be verified each application

**\* Safety Function:**

The electromagnetic flowmeter works safely in the specified environment, and can measure accurately, output a 4-20mA signal, it has no deviation from the error value within the accuracy range. Report the process variables during operation within the environmental limits and specifications specified in the product manual.

**\* Application Restrictions:**

The unit must be properly designed into a safety instrumented function per the safety manual requirements.

\* Is suitable to be safety function according to the description and the configuration defined in Annex I.

**Verification Mark:**



The Verification Mark can be affixed on the product. It is NOT permitted to alter the Verification Mark in any way

**Remark:** This SIL Verification of Compliance has been issued on a voluntary basis. ECM confirms that a Test Report is existent for the above listed product(s) and found to meet the requirements of above standards for application in safety related system up to Safety Level of **SIL 3**.

The unit must be properly designed into a Safety Instrument Function as per the requirements in the Safety Manual. The Verification Mark shown above can be affixed on the product. It is NOT permitted to alter the Verification Mark in any way. In addition the Verification's Holder is NOT allowed to transfer the Verification to third parties. This certificate can be checked for validity at [www.entecerma.it](http://www.entecerma.it)

**Date of issue 06 January 2021**

**Expiry date 05 January 2026**

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**Luca Bedonni**



**Deputy Manager**  
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# Annex I

**No. 2X210111.FII0U27**

Technical Construction File no. SIL-FUYI-2021-A3

- The use of the product must obey the required rules to maintain the SIL 3 Capable properties. These rules are stated in the Assessment Report, reference No.: [SIL Capability assessment report].
- The product version of hardware components used for assessment are the following:

Product Type	Model
Electromagnetic Flowmeter	FMF90 Series

- Assessed documents for the present certification are defined in the Assessment Report [SIL Capability assessment report].
- Acceptable environmental constraints for the system are stated in the safety manual (Ref: [SIL-FUYI.03-03]). These elements must be checked for each integration of the product.
- The product has met manufacturer design process requirements of Safety Integrity Level (SIL) 3. They are intended to achieve sufficient integrity against systematic errors of design by the manufacturer. A safety instrumented function (SIF) designed with this product must not be used at a SIL level higher than stated. The SIL limit imposed by the Architectural Constraints must be met for each element
- The SIL capable certified of the product is the following:
  - Safety function: measures flow and output a 4-20mA signal.
- The fail rates in FIT (FIT=1 failure/10<sup>9</sup> hours) is the following:

Power supply	Fail safe detected $\lambda_{SD}$	Fail safe undetected $\lambda_{SU}$	Fail dangerous detected $\lambda_{DD}$	Fail dangerous undetected $\lambda_{DU}$	SFF
DC power	0	102	794	71	92.7%
AC power	0	78	794	95	90.2%

SIL Verification:

IEC 61508-2 Type B safe failure fraction chart (Route 1<sub>H</sub>)

Safe failure fraction (SFF)	Hardware fault tolerance (see Note 1)		
	0	1	2
≤60%	Not allowed	SIL 1	SIL 2
60% < SFF < 90%	SIL 1	SIL 2	SIL 3
90% ≤ SFF < 99%	SIL 2	SIL 3	SIL 4
SFF ≥ 99%	SIL 3	SIL 4	SIL 4
<b>Note 1:</b>	A hardware fault tolerance of N means that N+1 faults could cause a loss of the safety function.		

Conclusion: Type B element, SIL 2 @ HFT=0, SIL 3@ HFT=1, Route 1<sub>H</sub>

- The safety integrity level (SIL) of the entire Safety Instrument Function (SIF) must be verified via a calculation of PFD<sub>avg</sub> considering redundant architectures, proof test interval, proof test effectiveness, any automatic diagnostics, average repair time and the specific failure rates of all products included in the SIF. Each element must be checked to assure compliance with minimum hardware fault tolerance (HFT) requirements.



# SIL



## Functional Safety Certificate

**No. 2X210115.FI10D03**

Technical Construction File no. SIL-FUYI-2021-A5

**Certificate's Holder:** FUYI Intelligent Instrument (Shanghai) Co., Ltd.  
3F, Building 1, No.205, Jianding Road, Fengjing Town, Jinshan District, Shanghai, China

**Product:** Radar Level Meter  
**Model(s):** FRL21 Series

**Standard:** Has been assessed per the relevant requirements of:  
IEC 61508:2010 Parts 1-7  
And meets requirements providing a level of integrity to:  
Systematic Capability: SC 3 (SIL 3 Capable)  
Random Capability: Type B Element  
SIL 2 @ HFT=0; SIL 3 @ HFT=1, Route 1H  
PFD<sub>avg</sub> and Architecture Constraints must be verified each application

**\* Safety Function:**

The radar level meter works safely in the specified environment, and can measure accurately, output a 4-20mA signal, it has no deviation from the error value within the accuracy range. Report the process variables during operation within the environmental limits and specifications specified in the product manual.

**\* Application Restrictions:**

The unit must be properly designed into a safety instrumented function per the safety manual requirements.

\* Is suitable to be safety function according to the description and the configuration defined in Annex I.

**Verification Mark:**



The Verification Mark can be affixed on the product. It is NOT permitted to alter the Verification Mark in any way

**Remark:** This SIL Verification of Compliance has been issued on a voluntary basis. ECM confirms that a Test Report is existent for the above listed product(s) and found to meet the requirements of above standards for application in safety related system up to Safety Level of **SIL 3**.

The unit must be properly designed into a Safety Instrument Function as per the requirements in the Safety Manual. The Verification Mark shown above can be affixed on the product. It is NOT permitted to alter the Verification Mark in any way. In addition the Verification's Holder is NOT allowed to transfer the Verification to third parties. This certificate can be checked for validity at [www.entecerma.it](http://www.entecerma.it)

**Date of issue 15 January 2021**

**Expiry date 14 January 2026**

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# Annex I

**No. 2X210115.FIIO03**

Technical Construction File no. SIL-FUYI-2021-A5

- The use of the product must obey the required rules to maintain the SIL 3 Capable properties. These rules are stated in the Assessment Report, reference No.: [SIL Capability assessment report].
- The product version of hardware components used for assessment are the following:

Product Type	Model
Radar Level Meter	FRL21 Series

- Assessed documents for the present certification are defined in the Assessment Report [SIL Capability assessment report].
- Acceptable environmental constraints for the system are stated in the safety manual (Ref: [SIL-FUYI.05-03]). These elements must be checked for each integration of the product.
- The product has met manufacturer design process requirements of Safety Integrity Level (SIL) 3. They are intended to achieve sufficient integrity against systematic errors of design by the manufacturer. A safety instrumented function (SIF) designed with this product must not be used at a SIL level higher than stated. The SIL limit imposed by the Architectural Constraints must be met for each element
- The SIL capable certified of the product is the following:
  - Safety function: The radar level meter is a radio wave ranging system based on the principle of time travel, it measures level within the stated safety accuracy.
- The fail rates in FIT (FIT=1 failure/10<sup>9</sup> hours) is the following:

Device, Route	Fail safe detected $\lambda_{SD}$	Fail safe undetected $\lambda_{SU}$	Fail dangerous detected $\lambda_{DD}$	Fail dangerous undetected $\lambda_{DU}$	SFF
Radar Level Meter	0	62	852	87	91.3%

SIL Verification:

IEC 61508-2 Type B safe failure fraction chart (Route 1<sub>H</sub>)

Safe failure fraction (SFF)	Hardware fault tolerance (see Note 1)		
	0	1	2
≤60%	Not allowed	SIL 1	SIL 2
60% < SFF < 90%	SIL 1	SIL 2	SIL 3
90% ≤ SFF < 99%	SIL 2	SIL 3	SIL 4
SFF ≥ 99%	SIL 3	SIL 4	SIL 4
<b>Note 1:</b>	A hardware fault tolerance of N means that N+1 faults could cause a loss of the safety function.		

Conclusion: Type B element, SIL 2 @ HFT=0, SIL 3 @ HFT=1, Route 1<sub>H</sub>

- The safety integrity level (SIL) of the entire Safety Instrument Function (SIF) must be verified via a calculation of PFD<sub>avg</sub> considering redundant architectures, proof test interval, proof test effectiveness, any automatic diagnostics, average repair time and the specific failure rates of all products included in the SIF. Each element must be checked to assure compliance with minimum hardware fault tolerance (HFT) requirements.



# SIL



## Functional Safety Certificate

**No. 2X210112.FII0U31**

Technical Construction File no. SIL-FUYI-2021-A1

**Certificate's Holder:** FUYI Intelligent Instrument (Shanghai) Co., Ltd.  
3F, Building 1, No.205, Jianding Road, Fengjing Town, Jinshan District, Shanghai, China

**Product:** Intelligent Temp Transmitter  
**Model(s):** FT100 Series

**Standard:** Has been assessed per the relevant requirements of:  
IEC 61508:2010 Parts 1-7  
And meets requirements providing a level of integrity to:  
Systematic Capability: SC 3 (SIL 3 Capable)  
Random Capability: Type B Element  
SIL 2 @ HFT=0; SIL 3 @ HFT=1, Route 1<sub>H</sub>  
PFD<sub>avg</sub> and Architecture Constraints must be verified each application

**\* Safety Function:**

The Intelligent Temp Transmitter works safely in the specified environment, and can measure accurately, output a 4-20mA signal, it has no deviation from the error value within the accuracy range. Report the process variables during operation within the environmental limits and specifications specified in the product manual.

**\* Application Restrictions:**

The unit must be properly designed into a safety instrumented function per the safety manual requirements.

\* Is suitable to be safety function according to the description and the configuration defined in Annex I.

**Verification Mark:**



The Verification Mark can be affixed on the product. It is NOT permitted to alter the Verification Mark in any way

**Remark:** This SIL Verification of Compliance has been issued on a voluntary basis. ECM confirms that a Test Report is existent for the above listed product(s) and found to meet the requirements of above standards for application in safety related system up to Safety Level of **SIL 3**.

The unit must be properly designed into a Safety Instrument Function as per the requirements in the Safety Manual. The Verification Mark shown above can be affixed on the product. It is NOT permitted to alter the Verification Mark in any way. In addition the Verification's Holder is NOT allowed to transfer the Verification to third parties. This certificate can be checked for validity at [www.entecerma.it](http://www.entecerma.it)

**Date of issue 12 January 2021**

**Expiry date 11 January 2026**

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# Annex I

**No. 2X210112.FII0U31**

Technical Construction File no. SIL-FUYI-2021-A1

- The use of the product must obey the required rules to maintain the SIL 3 Capable properties. These rules are stated in the Assessment Report, reference No.: [SIL Capability assessment report].
- The product version of hardware components used for assessment are the following:

Product Type	Model
Intelligent Temp Transmitter	FT100 Series

- Assessed documents for the present certification are defined in the Assessment Report [SIL Capability assessment report].
- Acceptable environmental constraints for the system are stated in the safety manual (Ref: [SIL-FUYI.01-03]). These elements must be checked for each integration of the product.
- The product has met manufacturer design process requirements of Safety Integrity Level (SIL) 3. They are intended to achieve sufficient integrity against systematic errors of design by the manufacturer. A safety instrumented function (SIF) designed with this product must not be used at a SIL level higher than stated. The SIL limit imposed by the Architectural Constraints must be met for each element
- The SIL capable certified of the product is the following:
  - Safety function: measure temperature within the stated safety accuracy.
- The fail rates in FIT (FIT=1 failure/10<sup>9</sup> hours) is the following:

Device, Route 1 <sub>H</sub>	Fail safe detected $\lambda_{SD}$	Fail safe undetected $\lambda_{SU}$	Fail dangerous detected $\lambda_{DD}$	Fail dangerous undetected $\lambda_{DU}$	SFF
Intelligent Temp Transmitter	0	76	252	35	90.4%

SIL Verification:

IEC 61508-2 Type B safe failure fraction chart (Route 1<sub>H</sub>)

Safe failure fraction (SFF)	Hardware fault tolerance (see Note 1)		
	0	1	2
≤60%	Not allowed	SIL 1	SIL 2
60% < SFF < 90%	SIL 1	SIL 2	SIL 3
90% ≤ SFF < 99%	SIL 2	SIL 3	SIL 4
SFF ≥ 99%	SIL 3	SIL 4	SIL 4
<b>Note 1:</b>	A hardware fault tolerance of N means that N+1 faults could cause a loss of the safety function.		

Conclusion: Type B element, SIL 2 @ HFT=0, SIL 3@ HFT=1, Route 1<sub>H</sub>

- The safety integrity level (SIL) of the entire Safety Instrument Function (SIF) must be verified via a calculation of PFD<sub>avg</sub> considering redundant architectures, proof test interval, proof test effectiveness, any automatic diagnostics, average repair time and the specific failure rates of all products included in the SIF. Each element must be checked to assure compliance with minimum hardware fault tolerance (HFT) requirements.



# SIL



## Functional Safety Certificate

**No. 2X210111.FII0U26**

Technical Construction File no. SIL-FUYI-2021-A2

**Certificate's Holder:** FUYI Intelligent Instrument (Shanghai) Co., Ltd.  
3F, Building 1, No.205, Jianding Road, Fengjing Town, Jinshan District, Shanghai, China

**Product:** Intelligent Pressure Transmitter  
**Model(s):** FDP3000 Series

**Standard:** Has been assessed per the relevant requirements of:  
IEC 61508:2010 Parts 1-7  
And meets requirements providing a level of integrity to:  
Systematic Capability: SC 3 (SIL 3 Capable)  
Random Capability: Type B Element  
SIL 2 @ HFT=0; SIL 3 @ HFT=1, Route 1H  
PFD<sub>avg</sub> and Architecture Constraints must be verified each application

**\* Safety Function:**

The Intelligent Pressure Transmitter works safely in the specified environment, and can measure accurately, output a 4-20mA signal, it has no deviation from the error value within the accuracy range. Report the process variables during operation within the environmental limits and specifications specified in the product manual.

**\* Application Restrictions:**

The unit must be properly designed into a safety instrumented function per the safety manual requirements.

\* Is suitable to be safety function according to the description and the configuration defined in Annex I.

**Verification Mark:**



The Verification Mark can be affixed on the product. It is NOT permitted to alter the Verification Mark in any way

**Remark:** This SIL Verification of Compliance has been issued on a voluntary basis. ECM confirms that a Test Report is existent for the above listed product(s) and found to meet the requirements of above standards for application in safety related system up to Safety Level of **SIL 3**.

The unit must be properly designed into a Safety Instrument Function as per the requirements in the Safety Manual. The Verification Mark shown above can be affixed on the product. It is NOT permitted to alter the Verification Mark in any way. In addition the Verification's Holder is NOT allowed to transfer the Verification to third parties. This certificate can be checked for validity at [www.entecerma.it](http://www.entecerma.it)

**Date of issue 12 December 2020**

**Expiry date 11 December 2025**

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# Annex I



**No. 2X210111.FII0U26**

Technical Construction File no. SIL-FUYI-2021-A2

- The use of the product must obey the required rules to maintain the SIL 3 Capable properties. These rules are stated in the Assessment Report, reference No.: [SIL Capability assessment report].
- The product version of hardware components used for assessment are the following:

Product Type	Model
Intelligent Pressure Transmitter	FDP3000 Series

- Assessed documents for the present certification are defined in the Assessment Report [SIL Capability assessment report].
- Acceptable environmental constraints for the system are stated in the safety manual (Ref: [SIL-FUYI.02-03]). These elements must be checked for each integration of the product.
- The product has met manufacturer design process requirements of Safety Integrity Level (SIL) 3. They are intended to achieve sufficient integrity against systematic errors of design by the manufacturer. A safety instrumented function (SIF) designed with this product must not be used at a SIL level higher than stated. The SIL limit imposed by the Architectural Constraints must be met for each element
- The SIL capable certified of the product is the following:
  - Safety function: measures pressure within the stated performance specifications.
- The fail rates in FIT (FIT=1 failure/10<sup>9</sup> hours) is the following:

Device, Route 1 <sub>H</sub>	Fail safe detected $\lambda_{SD}$	Fail safe undetected $\lambda_{SU}$	Fail dangerous detected $\lambda_{DD}$	Fail dangerous undetected $\lambda_{DU}$	SFF
Intelligent Pressure Transmitter	0	113	596	73	90.7%

SIL Verification:

IEC 61508-2 Type B safe failure fraction chart (Route 1<sub>H</sub>)

Safe failure fraction (SFF)	Hardware fault tolerance (see Note 1)		
	0	1	2
$\leq 60\%$	Not allowed	SIL 1	SIL 2
$60\% < SFF < 90\%$	SIL 1	SIL 2	SIL 3
$90\% \leq SFF < 99\%$	SIL 2	SIL 3	SIL 4
$SFF \geq 99\%$	SIL 3	SIL 4	SIL 4
<b>Note 1:</b>	A hardware fault tolerance of N means that N+1 faults could cause a loss of the safety function.		

Conclusion: Type B element, SIL 2 @ HFT=0, SIL 3@ HFT=1, Route 1<sub>H</sub>

- The safety integrity level (SIL) of the entire Safety Instrument Function (SIF) must be verified via a calculation of  $PFD_{avg}$  considering redundant architectures, proof test interval, proof test effectiveness, any automatic diagnostics, average repair time and the specific failure rates of all products included in the SIF. Each element must be checked to assure compliance with minimum hardware fault tolerance (HFT) requirements.