

ABB Ability™ Symphony® Plus

Multi Fuel Safe Flame Scanner Uvisor™ SF810 Series



Figure 1. SF810.



Figure 2. SF810-PYRO.

The SF810 product portfolio includes a set of advanced multi-fuel flame scanners designed to provide accurate, reliable information regarding the presence or absence of a burner flame (the primary purpose of a flame scanner), and at the same time continuously monitors the burner flame quality to provide additional operating information to plant personnel (Figure 1).

The SF810-PYRO flame scanner builds on the SF810 basic design by adding a sensing element for the FAU810 analysis unit to compute the Flame Temperature measurement in real time. It delivers an innovative approach to meet the stringent requirement of safety and the challenging demand of qualitative information for a combustion monitoring system.

The SF810-PYRO flame scanner bases on the proven rock-solid technology of the standard SF810 flame scanner series and it features the

ABB has combined the two highly successful flame scanner product lines, Uvisor™ and Safe Flame DFS, into a new advanced Flame Scanner, the Uvisor SF810 Series.

sensing element for the FAU810 analysis unit to compute the Flame Temperature measurement in real time (Figure 2). Specifically, the “Flame Temperature” reading offers a valuable input to improve burner combustion efficiency and support tighter control of combustion process dynamics such as fuel-air ratio and NOx emissions.

In rugged housing, the SF810 embeds solid-state sensor modules that cover the complete flame radiant spectrum (UV-to-IR including a dual sensor UVIR). Terminations are available as screw type removable connectors; including quick release connector for IP66/67 or as quick release connector for II 2GD Ex d IIC T 6 hazardous areas.

The SF810 flame scanner is available with accessories for the following installations:

- Line of sight (LOS) for wall fired burners’ boilers
- Fiber optic cable (FOC) with outer guide pipe, for corner fired tilting burners’ boilers

Multi Fuel Safe Flame Scanner Uvisor SF810 Series

Application:

Utility and industrial boilers

- Wall fired, corner fired, WHRB, down-shot and cyclone burner types

Multifuel:

- Natural gas, coke oven gas
- Light and heavy fuel oil, orimulsion
- Pulverized coal
- Sulphur gas

Features:

Operation

- UV, IR solid state sensors
- Dual sensor UVIR and dual sensor IRIR (SF810-PYRO only)
- Continuous self-check
- F-FFRT Fast Flame Failure Response Time

- Line of sight with accessories to give precise alignment with the flame
- Rigid fiber optic cable to improve discrimination performance for deep wind boxes
- Flexible fiber optic cable to maintain flame alignment for tilting burner

Environment

- ATEX
 - II 2 G Ex db op pr IIC T6 Gb
 - II 2 D Ex tb IIIC T85°C Db
 - IP66/67
- IECEx
 - Ex db op pr IIC T6 Gb
 - Ex tb IIIC T85°C Db
 - IP66/67

Table 1. Features and details.

Technical specifications			
Property	Value		
Optical sensor technology	IR versions: UV versions: UVIR version: PYRO (IRIR version):	Si photodiode SiC photodiode Si + SiC photodiode ¹ Si-Si dual IR color photodiode ²	Spectral response peak @ 920nm Spectral response peak @ 280nm Spectral response peak @280nm and 920nm
	¹ Si and SiC photodiodes signals can be processed individually or both combined as per burner operation ² Only SF810-PYRO contains dual IR sensor		
Measured temperature range	800°C to 1800°C (1472° F to 3272°F) @ +/-1% absolute accuracy ¹ ¹ SF810-PYRO only		
Power supply voltage	Flame Analysis Unit FAU810 Powered		
Power consumption	Max 300 mW/600 mW (Dual Sensor)		
Local configuration	No		
Air source for lens cleaning	From clean ambient air		
Air flow for lens cleaning	LOS (Line Of Sight) versions: 115 l/min (4 SCFM) Excessive contaminants might require a flow up to 400 l/min (14 SCFM) FOC (Fiber Optic Cable) versions: 400 l/min (14 SCFM)		
Minimum cleaning air pressure	LOS (Line Of Sight) versions: 20mm H ₂ O (1" W.C.) above the max wind box pressure measured at the "Y" connection inlet. FOC (Fiber Optic Cable) versions: 300mm H ₂ O (12" W.C.) above the max wind box pressure measured		
Maximum fiber optic continuous operating temperature	482° C (900° F) for VL and IR fiber optic cables 350° C (662° F) for UV and dual sensor UVIR fiber optic cable		
Housing mounting thread	1" NPT male		
Cable entry thread	– 3/4 "NPT female tread (Scanner models "T" and "TL") – 16 contacts quick release connector type CVB-EX. Protection mode: Ex d IIC T6 tD A21 IP66/IP67 T85°C (Scanner models "QC") – 16 contacts quick release connector. Protection mode: IP66/IP67 (Scanner models "Q")		
Electrical connections (terminal versions)	Removable terminals with screws Allowable cable section: AWG 28-AWG16, 0.08-1.5mm ² Recommended ABB standard cable: – Single Sensor scanner drawing no. EC-DWG-G041ELE803 – Dual Sensor scanner drawing no. EC-DWG-GO41ELE802		
Compatible Control Unit	The SF810-PYRO flame scanner is compatible only with the Flame Analysis Unit FAU810 (FW Vers. =/> 3.13) Refer to the table below for the compatibility of the SF810 flame scanner with the associated Analysis Unit		

Multi Fuel Safe Flame Scanner Uvisor SF810 Series

Table 1. Features and details (continued).

Scanner models	Analysis Units		
	DFS	FAU800	FAU810
SF810-IR Series (>=> Rev.E)	X	X	X
SF810-IR Series (< Rev.E)	X	X	X
SF810-UV Series (>=> Rev.E)			X
SF810-UV Series (< Rev.E)	X	X	X
SF810-UVIR Series (>=> Rev.E)			X
SF810-UVIR Series (< Rev.E)		X	X
SF810-PYRO Series (> Rev.G)			X ¹
Safe FlameIR assembly round board (C10-24113)	X	X	X
Safe Flame Full Spectrum assembly round board (c10-24114)	X	X	X
1.5 Deg. PC board (C87-97308)	X	X	X
4 Deg. PC board (C87-97342)	X	X	X
IFM (Ionization Flame Rod)		X	X

¹ FAU810 FW ≥ C3.16.

Environmental specification	
Property	Value
Safety specifications	EN 61010-1 (IEC 61010-1)
Class of installation	I
Over voltage category	I
Pollution degree	2
Protection (EN 60529)	IP66 - IP67
Ambient operating temperature (EN/IEC 60068-2-1/2/14)	- 40° to 70°C (-40° to 158 °F) in ATEX T6 classified zones - 60° to 80°C (-40° to 176 °F) NO Ex zones - 60° to 105°C (-76° to 221 °F) w/air cooler
Ambient storage and transportation temperature (EN/IEC 60068-2-1/2/14)	-40°C to 85°C (-40°F to 185°F)
Relative humidity (EN/IEC 60068-2-78)	40°C, RH 95%
Vibration sinusoidal operating (IEC 654-3 Severity Class VH4) (IEC 60068-2-6)	Frequency range: 5 to 200 Hz, Acceleration: 20m/s ² peak (2 G) Displacement: 0.15 mm peak
Shock operating (IEC 60068-2-27)	Acceleration: 15G – Duration of pulses: 11 ms duration (half sine wave) – Three shocks in each direction (6 pulses in each axis)

Mechanical specification	
Property	Value
Dimensions	Diameter 95 mm max (3,7") Overall length: 180mm approx. (7")
Weight	1 kg approx. (2.2 lb)
Degree of protection	IP66 – IP67 (CEI EN 60529) Equivalent NEMA 4x

Line of Sight (LOS)

Standard assembly



Figure 3. SF810 standard assembly.

Line of Sight installation is recommended on those applications where the target burner flame is visible and unobstructed from the burner mounting front plate through the air vane.

Typical application:

- Front and opposite wall fired boiler
- Single and multiple burners

Wiring options

SF810 Line of Sight Flame Scanners are available with the following wiring options as described in Figure 4 and 5 below.

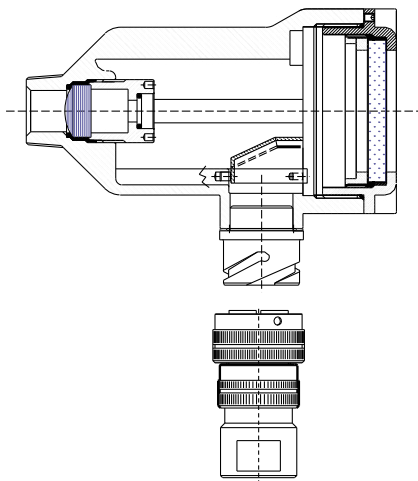


Figure 4. SF810 model LOS with "Quick Release" multi-pin connector.

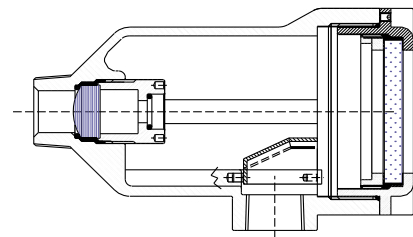


Figure 5. SF810 model LOS with 3/4" NPTF cable entry and terminal strip.

Line of Sight standard assembly layout and parts

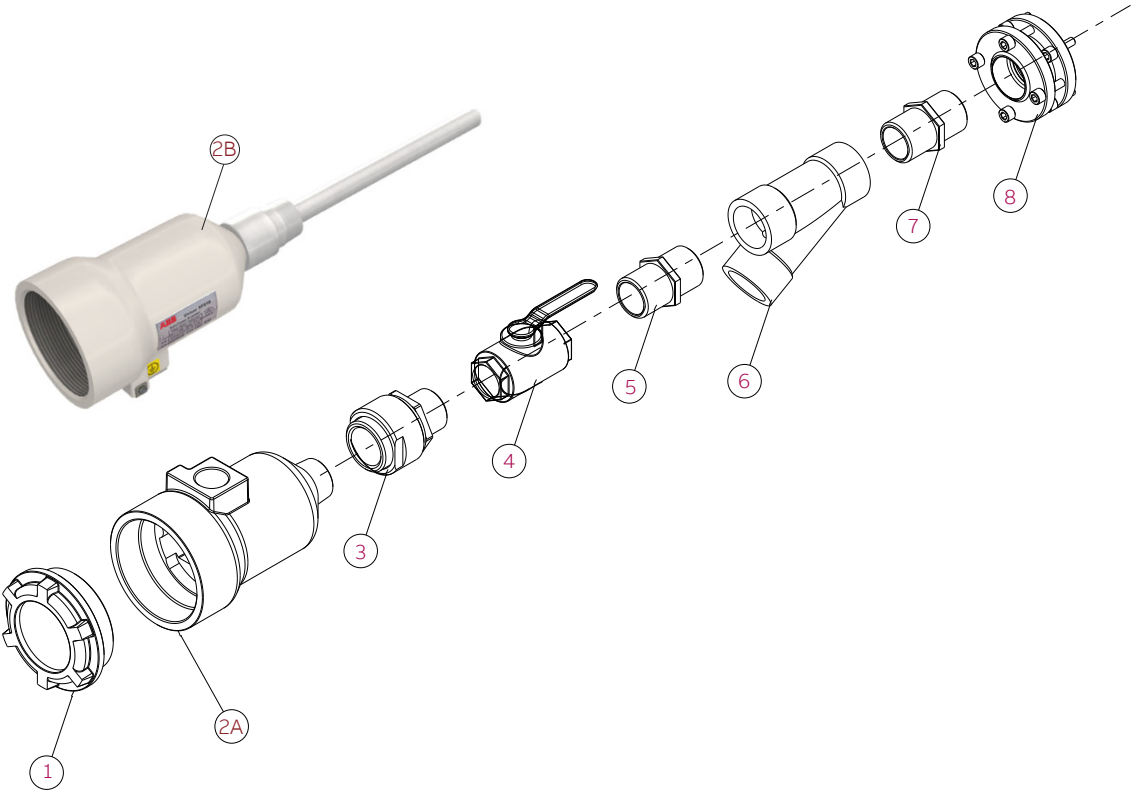


Figure 6. SF810 assembly layout with fitting.

Table 2. SF810 assembly layout with fitting details.

Item	Description	Detailed drawing number	Note	Qty
1	SF810 Flame Scanner		Windowed cover	1
2A	SF810 Flame Scanner	Ref. SF810/SF810INT codes	Housing	1
2B	SF810-PYRO Flame Scanner	Ref. SF810/SF810INT codes	Housing	1
3	Thermal union	EC-DWG-G041MEC011-A		1
4	Isolation valve	EC-DWG-G041MEC108-A		1
5	Nipple 1" NPTM/1" NPTM	EC-DWG-G041MEC405-A		1
6	Cooling air manifold 1" NPTF	EC-DWG-G041MEC010-A		1
7	Nipple 1" NPTM/1" NPTM	EC-DWG-G041MEC406-A		1
8	Swivel mounting flange	EC-DWG-G041MEC0101-A		1

Line of Sight standard assembly with cooling cylinder and fitting parts

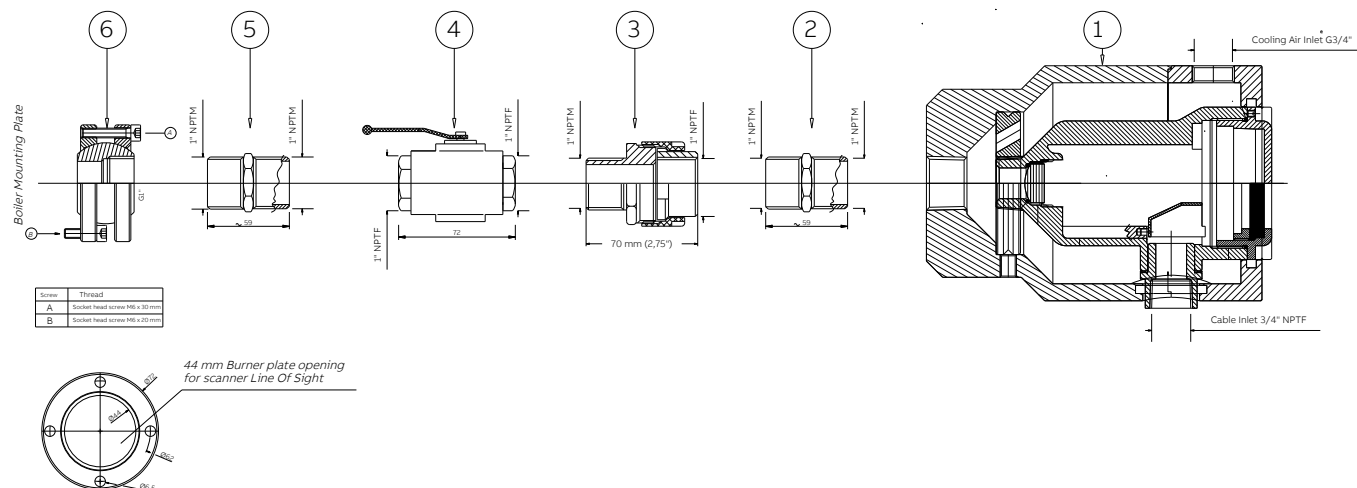


Figure 7. SF810 assembly layout with cooling cylinder and fitting.

Table 3. SF810 assembly with cooling cylinder and fitting part details.

Item	Description	Material	Part Number
1	SF810/SF810i-LOS with Air Cooler	Die cast aluminum/nylon	SF810 / SF810INT-LOS-XXXX-X-X-X X= Any SF810/ SF810INT series model EC-DWG-G041-MEC111-A SF810 AIR COOLING CYLINDER
2	1" NPTM/1" NPTM Nipple	Galvanized steel A37 yellow FZN 12 III UNI4721	EC-DWG-G041MEC405
3	Thermal union	Poliamide zellamind 1100 PA-8F	EC-DWG-G018MEC779
4	Ball valve	Body and ball:Brass 58UNI 5705/65 nickel	EC-DWG-G041MEC108
5	1" NPTM/1" NPTM Nipple	Galvanized steel A37 yellow FZN 12 III UNI4721	EC-DWG-G041MEC406
6	Swivel mounting flange	"Free-cutting leaded steel" galvanized	EC-DWG-G041MEC101

Fiber Optic Cable (FOC) standard assembly

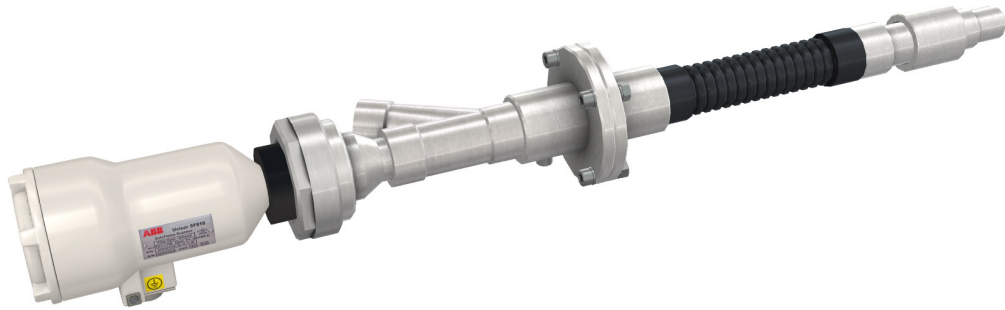


Figure 8. Fiber optic (FOC) standard assembly.

Flexible Fiber Optic installation is recommended on those application where the target burner flame is not visible from the burner mounting front plate. Flexible fiber optic is also the preferred solution to relocate the sensor unit wherever heat, dust and vibration of the burner deck are particularly severe.

Typical application:

- Tilting burner boilers
- Gas turbine (SF810 only)

Flexible assembly layout and parts

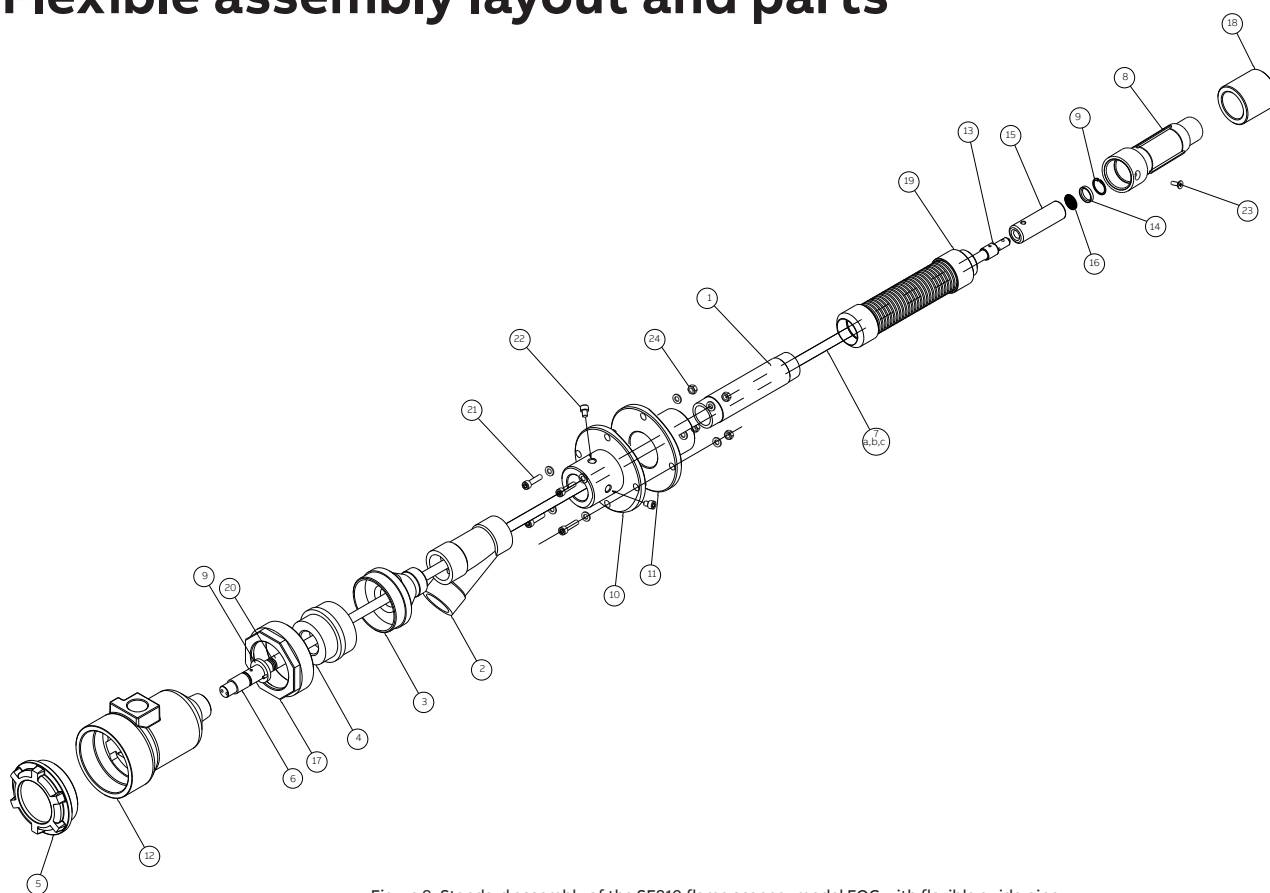


Figure 9. Standard assembly of the SF810 flame scanner model FOC with flexible guide pipe.

Table 4. SF810 flame scanner model FOC flexible assembly part details.

Item	Description	Part number	Material	Note	Quantity
1	1" Rigid main pipe	EC-DWG-G041MEC019-A	Steel UNI EN 10240		1
2	Cooling air manifold 1" NPTF	EC-DWG-G041MEC010-A	Cast aluminum alloy		1
3	Manifold adapter	EC-DWG-G041MEC011-A	Aluminum alloy		1
4	Thermal isolator	EC-DWG-G018MEC761-B	AISI 321		1
5	Uvisor SF810/SF810i flame scanner		Cast aluminum alloy	Windowed housing cover	1
6	Fiber optic terminal-cold side				1
7A	Fiber optic cable	EC-DWG-G041MEC020-C	AISI 321	Single sensor IR	1
7B	Fiber optic cable	EC-DWG-G041MEC021-C	AISI 321	Single sensor UV	1
7C	Fiber optic cable	EC-DWG-G041MEC022-C	AISI 321	Dual sensor UVIR	1
8	External guide pipe terminal	EC-DWG-G041MEC012-B	AISI 304		1
9	Seeger ring			Inner 20MM UNI3654-7437	1
10	Boiler mounting flange	EC-DWG-G041MEC015-A	FE 360 galvanized		1
11	Boiler mounting counter flange	EC-DWG-G041MEC014-A	FE 360 galvanized		1
12	Uvisor SF810/SF810i flame scanner		Cast aluminum alloy	Scanner housing	1
13	Fiber optic terminal - hot side	EC-DWG-G041MEC017-B	AISI 304		1
14	Lens retainer	EC-DWG-G041MEC008-A			1
15	Lens holder	EC-DWG-G041MEC005-C	AISI 304		1
16	Lens	EC-DWG-G041MEC006-A			1
17	Locking ring nut	EC-DWG-G041MEC024-A	Aluminum alloy anticorodal		1
18	Guide collar	EC-DWG-G041MEC016-B	AISI 304		1
19	Flexible hose	EC-DWG-G041MEC013-B	AISI 321	Standard length = 1100MM (43.3")	1
20	Loading spring	EC-DWG-G018MEC771-B			1
21	VEI_M8x35			Screw hexagon socket.M8 X 35	4
22	VEI_M8x10			Screw hexagon socket.M8 X 10	2
23	V5-8--_U7688_PZ			Screw TSP.CR PZ UNI 7688 M 5X8	1
24	NUT_M8-Z			Nut M8 UNI 5588	4

Fiber Optic Cable (FOC): Rigid assembly layout and parts

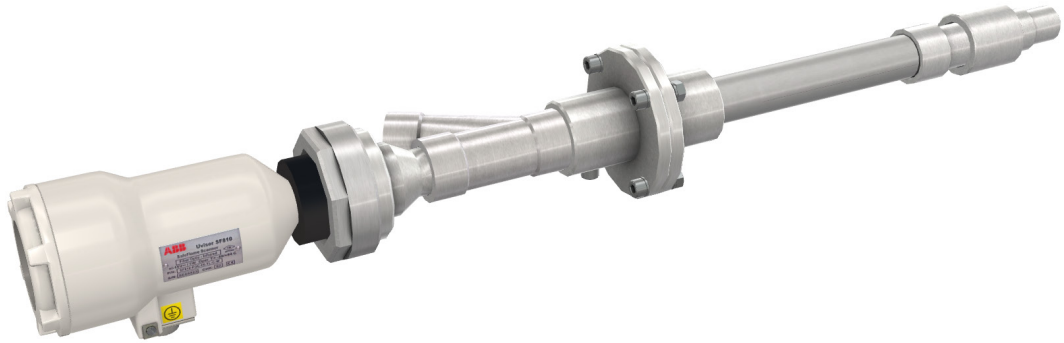


Figure 10. SF810 rigid assembly.

Rigid Fiber Optic installation is typically recommended on those application where the very large windbox prevent a reliable alignment with the standard Line Of Sight assembly from the burner mounting plate.

Typical application:

- Opposite wall fired boiler
- Downshot boiler

Fiber Optic Cable (FOC): Rigid assembly layout and parts

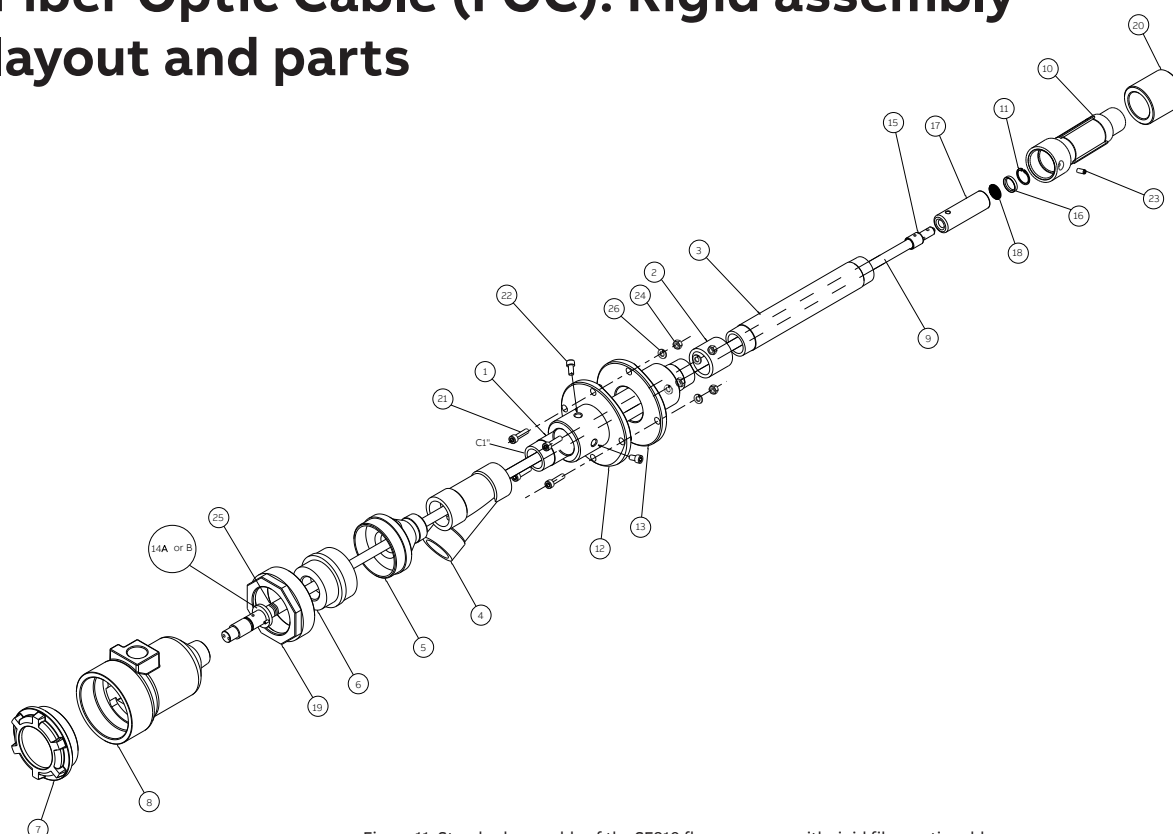


Figure 11. Standard assembly of the SF810 flame scanner with rigid fiber optic cable.

Table 5. SF810 flame scanner model FOC rigid assembly part details.

Item	Description	Part number	Material	Note	Quantity
1	1" Rigid guide pipe	EC-DWG-G041MEC019-B	Steel UNI EN 10240	Ref: EC-DWG-G041MEC019-B for assembly details	1
2	1" Rigid pipe joint	EC-DWG-G041MEC026-A	Steel UNI EN 10241	Ref: EC-DWG-G041MEC019-B for assembly details	1
3	1" Rigid guide pipe extension	EC-DWG-G041MEC027-A	Steel UNI EN 10240	Ref: EC-DWG-G041MEC019-B for assembly details	1
4	Cooling air manifold 1" NPTF	EC-DWG-G041MEC010-A	Cast aluminum alloy		1
5	Manifold adapter	EC-DWG-G041MEC011-A	Aluminum alloy anticorodal		1
6	Thermal isolator	EC-DWG-G018MEC761-B	AISI 321		1
7	Uvisor SF810/SF810i flame scanner		Cast aluminum alloy	Windowed housing cover	1
8	Uvisor SF810/SF810i flame scanner		Cast aluminum alloy	Scanner housing	1
9	Fiber optic cable	EC-DWG-G041MEC020/022	AISI 321		
10	External guide pipe terminal	EC-DWG-G041MEC012-B	AISI 304		1
11	Seeger ring		UNI X35CRM017	Inner 20MM UNI3654-7437	1
12	Boiler mounting flange	EC-DWG-G041MEC015-A	FE 360 galvanized		1
13	Boiler mounting counter flange	EC-DWG-G041MEC014-A	FE 360 galvanized		1
14A	Fiber optic terminal - cold side	EC-DWG-G041MEC023-D	Brass UNI EN 12164	Single sensor (IR or UV)	1
14B	Fiber optic terminal - cold side	EC-DWG-G041MEC787-D	Brass UNI EN 12164	Dual sensor (UVIR)	1
15	Fiber optic terminal - hot side	EC-DWG-G041MEC017-B	AISI 304		1
16	Lens retainer	EC-DWG-G041MEC008-A	AISI 304		1
17	Lens holder	EC-DWG-G041MEC005-C	AISI 304		1
18	Lens	EC-DWG-G041MEC006-A	Suprasil		1
19	Locking ring nut	EC-DWG-G041MEC024-A	Aluminum alloy anticorodal		1
20	Guide collar	EC-DWG-G041MEC016-B	AISI 304		1
21	VEI_M8x30			Bolt or socket hex. screw M8x30	4
22	VEI_M8x16			Bolt or socket hex. screw M8x16	2
23	V5-5			Hex. set screw M5x5	1
24	NUT_M8-Z			Nut M8 UNI 5588	4
25	Loading spring	EC-DWG-G041MEC771-B	Steel		1
26	Grower (UNI 1751 B) for MB				4

Fiber Optic Cable (FOC) scanners: Wiring options

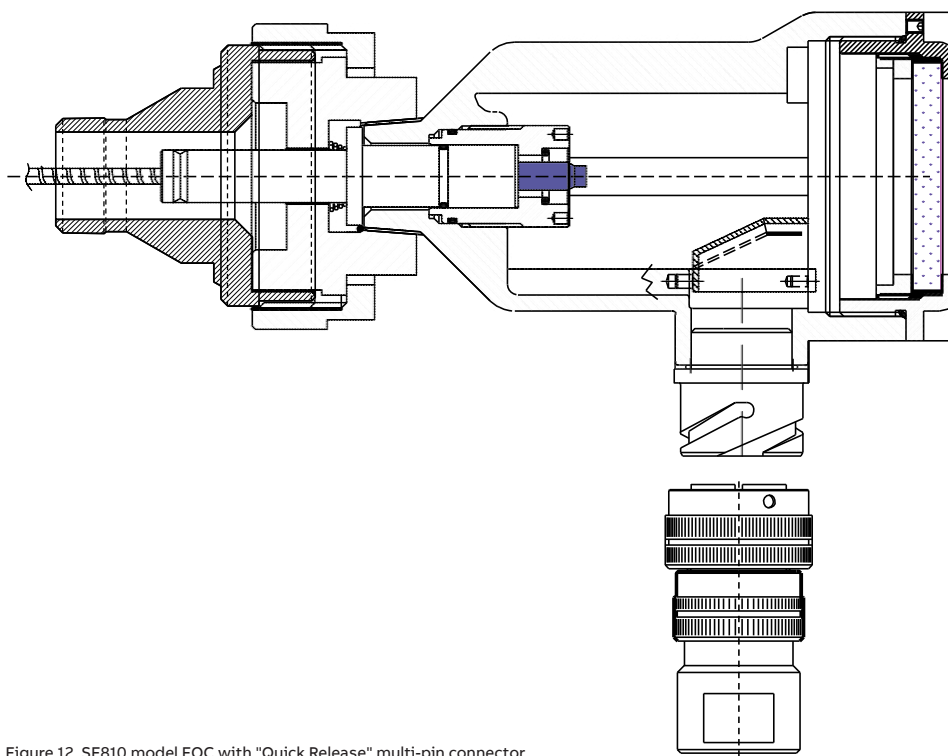


Figure 12. SF810 model FOC with "Quick Release" multi-pin connector.

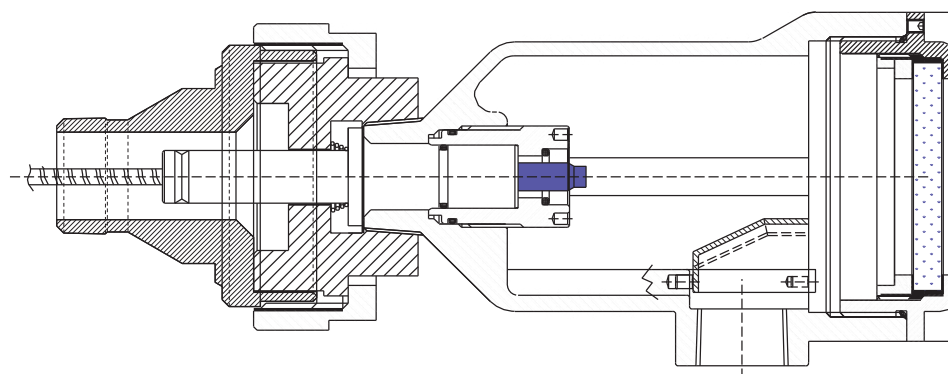


Figure 13. SF810 model FOC with 3/4 in. cable entry and terminal strip.

SF810 electrical connections

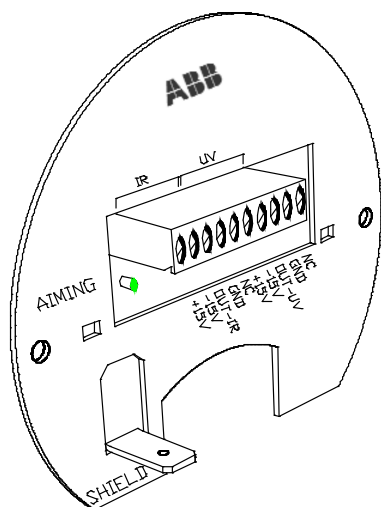


Figure 14. SF810 Dual sensor faceplate.

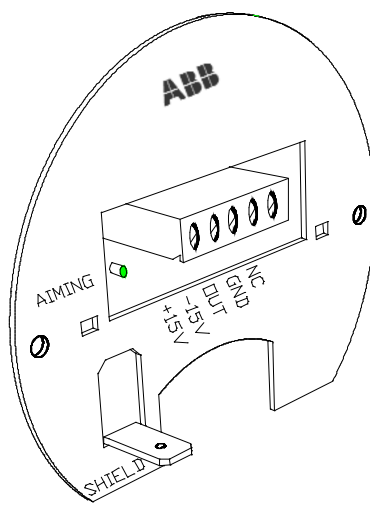


Figure 15. SF810 Single sensor faceplate.

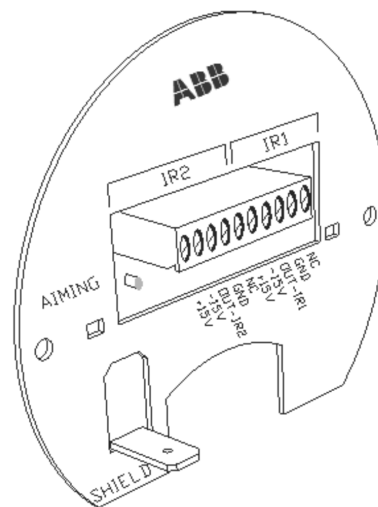


Figure 16. SF810-PYRO faceplate.

Table 6. SF810 dual and single sensor terminal board details.

Connector/Terminal	Signal name	Description
+15V	+15V	Power supply positive input from FAU810/DFS Sensor 1 / Sensor 2
-15V	-15V	Power supply negative input from FAU810/DFS Sensor 1 / Sensor 2
GND	GND	Return of power supply, ground ref. for all internal electronics. Sensor 1 / Sensor 2
OUT	Signal	Live flame signal (Single Sensor)
OUT-IR	Signal	IR Live flame signal (Dual Sensor)
OUT-UV	Signal	UV Live flame signal (Dual Sensor)
NC	NC	(Not used)
SHIELD	Shield	Earth connection point for the shields of the cable(s)
	AIMING	Green light blinks faster when flame Intensity signal increases

Table 7. SF810-PYRO terminal board details.

Connector/Terminal	Signal name	Description
+15V	+15V	Power supply positive input from FAU810
-15V	-15V	Power supply negative input from FAU810
GND	GND	Return of power supply, ground ref. for all internal electronics
OUT-IR1	Signal	Live flame signal from IR1
OUT-IR2	Signal	Live flame signal from IR2
NC	NC	(Not used)
SHIELD	Shield	Earth connection point for the shields of the cable(s)
	AIMING	Green light blinks faster when flame intensity signal increases

Quick release connector wiring and pin assignment

Applicable to SF810 flame scanner models “Q” and “QC”. (Refer to “SF810 Versions and Ordering Code,” page 19). For the tail cable refer to Doc. EC-DWG-G041ELE805 UVISOR SF810i Quick Connector Tail Cable Wiring.

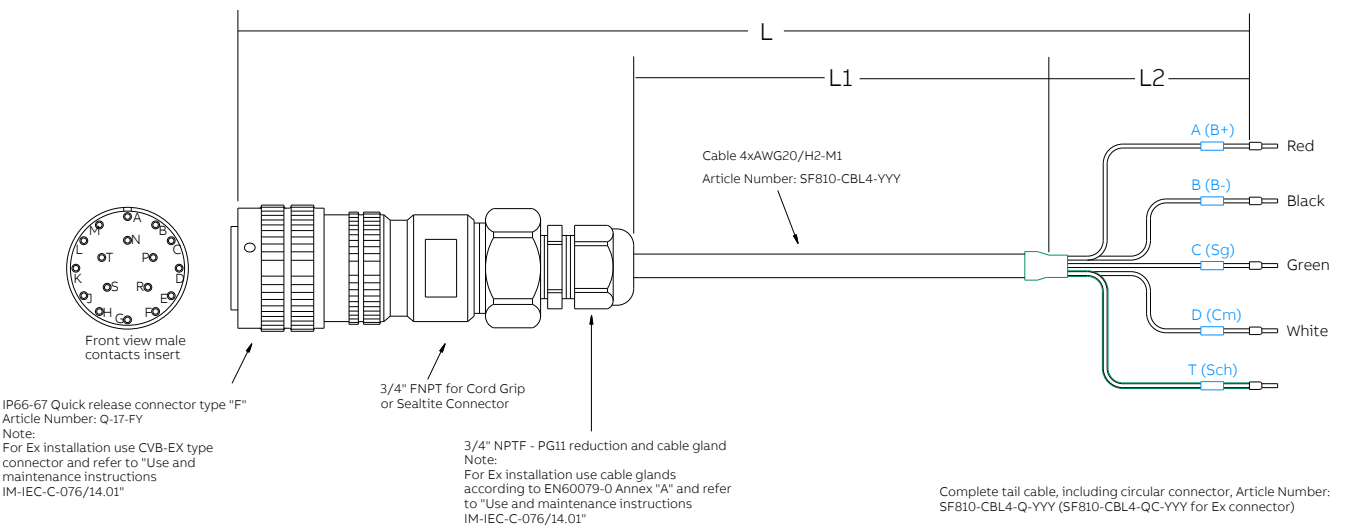


Figure 17. Single sensor connector pin assignment with standard ABB cable.

Table 8. Single sensor connector pin assignment details.

Tail cable connector pin out (Female)	SF810 T.B. Signal name	Tail cable wire color	Pig tail fly end label	Functional description
A	+15V	Red	A (+B)	Power supply +15V from FAU810/DFS
B	-15V	Black	B (-B)	Power supply -15V from FAU810/ DFS
C	SIG	Green	C (SIG)	Live flame signal
D	GND	White	D (Comm)	Power supply return Ground reference
E				Not used
F				Not used
G				Not used
H				Not used
J				Not used
K				Not used
L				Not used
M				Not used
N				Not used
P				Not used
R				Not used
S				Not used
T	Shield	Grey	T (Sh)	Cable screen grounding

Quick release connector wiring and pin assignment

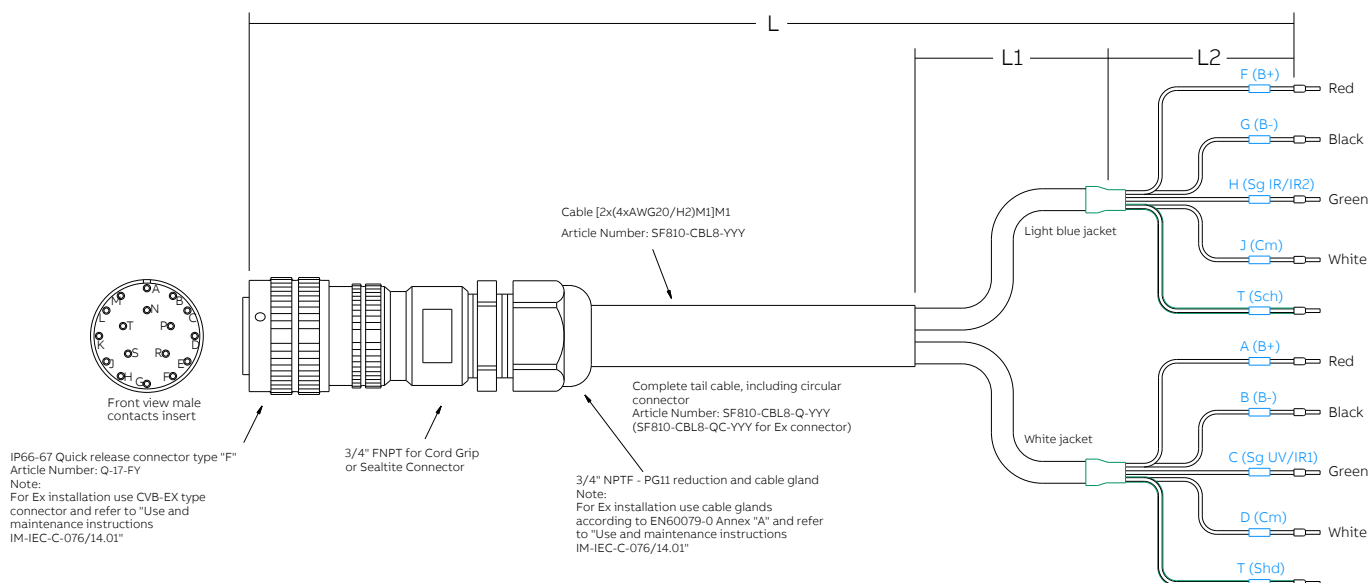


Figure 18. Dual sensor connector pin assignment with standard ABB cable.

Table 9. Dual sensor connector pin assignment details.

Quick connect pin	SF810 UVIR Term. Board	Signal name	Wires color	Pig tail fly end label	Functional description
F	1	+15V	Red	F (+B)	Power supply +15V from FAU810/DFS
G	2	-15V	Black	G (-B)	Power supply -15V from FAU810/DFS
H	3	IR SIG	Green	H (SIG.IR)	Live flame signal IR
J	4	GND	White	J (Comm)	Power supply return Ground reference
E	5				Not used
A	6	+15V	Red	A (+B)	Power supply +15V from FAU810/DFS
B	7	-15V	Black	B (-B)	Power supply -15V from FAU810/DFS
C	8	UV SIG	Green	C (SIG.UV)	Live flame signal UV
D	9	GND	White	D (Comm)	Power supply return Ground reference
K	10				Not used
L					Not used
M					Not used
N					Not used
P					Not used
R					Not used
S					Not used
T		Shield	Grey	T (Sh)	Cable screen grounding

SF810 quick release connection specification

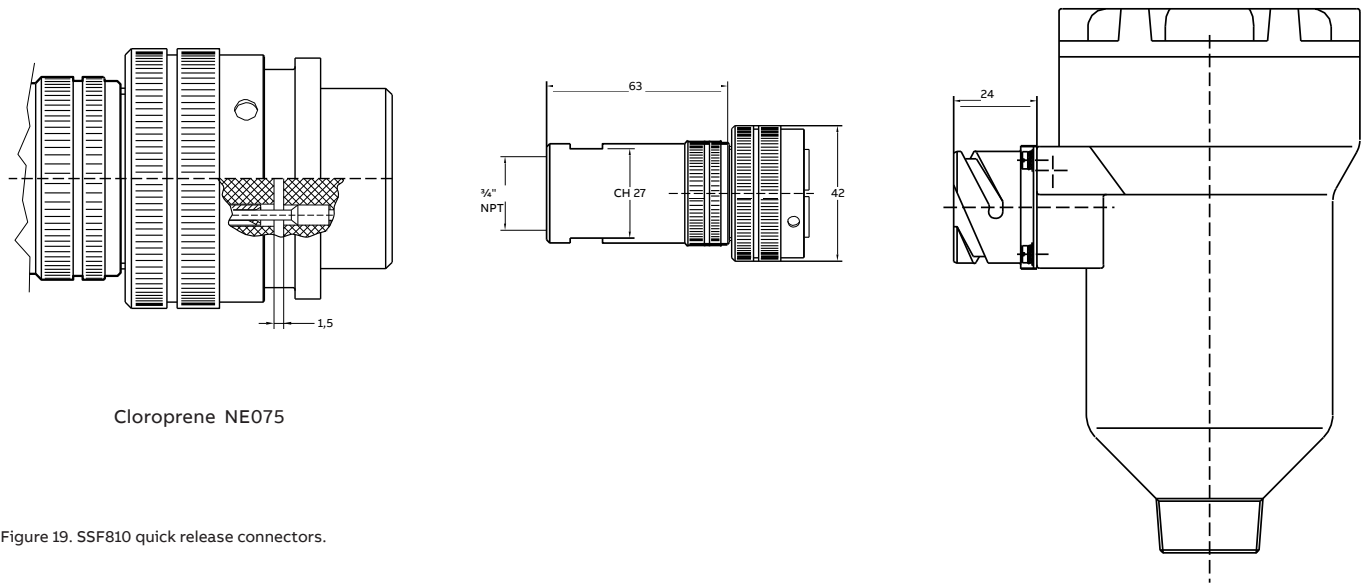


Figure 19. SSF810 quick release connectors.

The following Infrared Spectroscopy (IR), Thermogravimetry (TGA), and Differential Scanning Calormetry (DSC) tests were performed in accordance with methods referenced in the Standard for Polymeric Materials - Short Term Property Evaluation, UL 746A.

Grade designation	Sample Ticket No.	Composition Ascertained from Infrared Analysis	Reference Dates		
			IR	TGA	DSC
NE075	M211555	CR	08/12/99	02/03/99	06/11/99

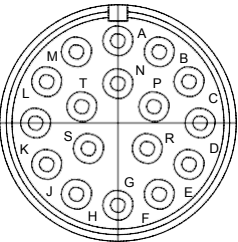


Figure 20. Front view contacts insert.

	20-29
No. of contacts	17
Contacts size	16
Service rating	A
Rated temperature	-55° to 125°C

Table 10. Single sensor connector pin assignment details.

Service rating	Min. distance air spacing guaranteed		Min. distance creepage guaranteed	
A	1.6mm		3.2mm	

Service rating	Operating voltage VDC	Operating voltage VAC	Test voltage VAC RMS	Minimum flashover VAC RMS
A	700	500	2000	2800

SF810 wiring diagram: Single sensor flame scanner

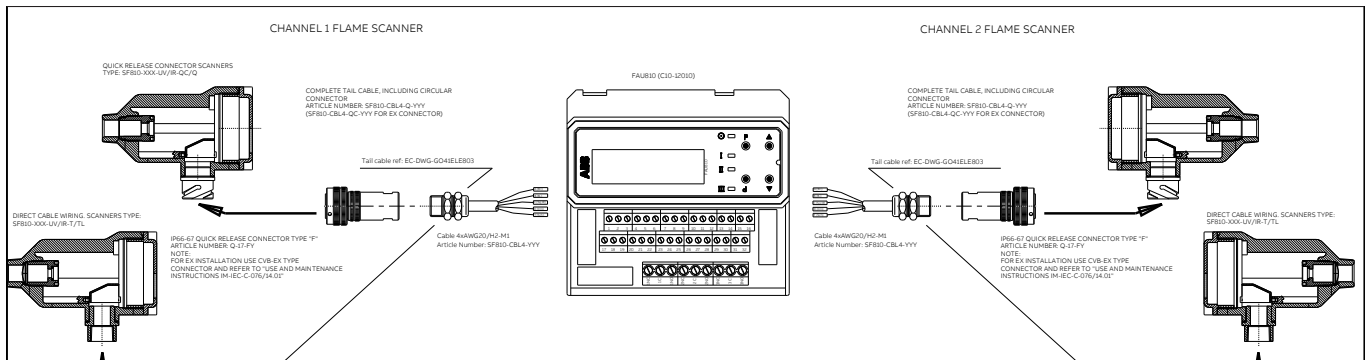


Figure 21. SF810 single sensor flame scanner wiring diagram.

Table 11. SF810 single sensor flame scanner wiring details.

SF810 Single Sensor #1 Terminal Board	FAU810 Terminal Board	Signal
+15V	+B (18)	+15VDC
-15V	-B (21)	-15VDC
OUT	IN (19)	Live flame signal
GND	COM (20)	GND
NC		NC (not used)
SHIELD	Ext. Ground Bar	SHIELD

SF810 Single Sensor #2 Terminal Board	FAU810 Terminal Board	Signal
+15V	+B (23)	+15VDC
-15V	-B (26)	-15VDC
OUT	IN (24)	Live flame signal
GND	COM (25)	GND
NC		NC (not used)
SHIELD	Ext. Ground Bar	SHIELD

SF810-PYRO Terminal Board	FAU810 Terminal Board	Signal
+15V	+B (18)	+15VDC
-15V	-B (21)	-15VDC
Out_IR1	IN (19)	Live flame signal IR1
GND	COM (20)	GND
NC		NC (not used)
SHIELD	Ext. Ground Bar	SHIELD
+15V	+B (23)	+15 VDC
-15V	-B (26)	-15 VDC
Out_IR2	IN (24)	Live flame signal IR2
GND	COM (25)	GND
NC		NC (not used)

Wiring Note:

Flame Analysis Unit FAU810 has two (2) configurable sensor input channels. Each channel must be configured for the sensor being connected. Please refer to FAU810 User Manual for configuration instruction.

For SF810-PYRO, Flame Analysis Unit FAU810 both sensor input channels must be configured for IR sensor. Please refer to FAU810 User Manual for input settings.

SF810 wiring diagram: Dual sensor flame scanner

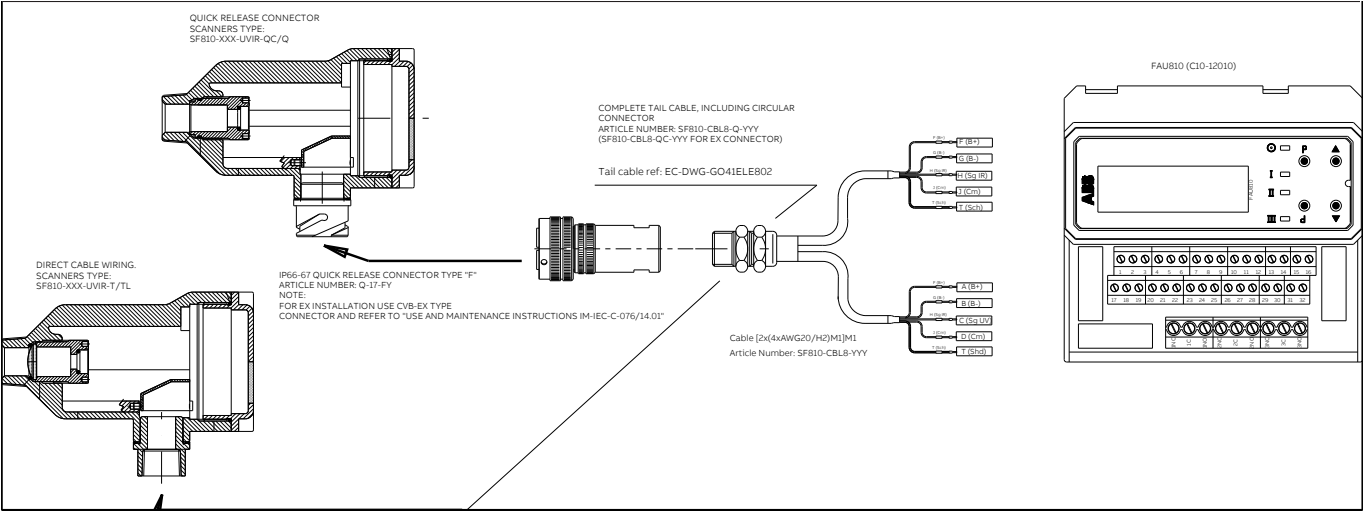


Figure 22. SF810 dual sensor flame scanner wiring diagram.

Table 12. SF810 dual sensor flame scanner wiring details.

SF810 UVIR Terminal Board	FAU810 Terminal Board	Signal
+15V	+B (18)	+15VDC
-15V	-B (21)	-15VDC
Out_IR	IN (19)	Live flame signal IR
GND	COM (20)	GND
NC		NC (not used)
SHIELD	Ext. Ground Bar	SHIELD
+15V	+B (23)	+15VDC
-15V	-B (26)	-15VDC
Out_UV	IN (24)	Live flame signal UV
GND	COM (25)	GND
NC		NC (not used)

Wiring Note:
Flame Analysis Unit FAU810 has two (2) configurable sensor input channels. Each channel must be configured for the sensor being connected. Please refer to FAU810 User Manual for configuration instruction.

SF810 wiring diagram: PYRO sensor flame scanner

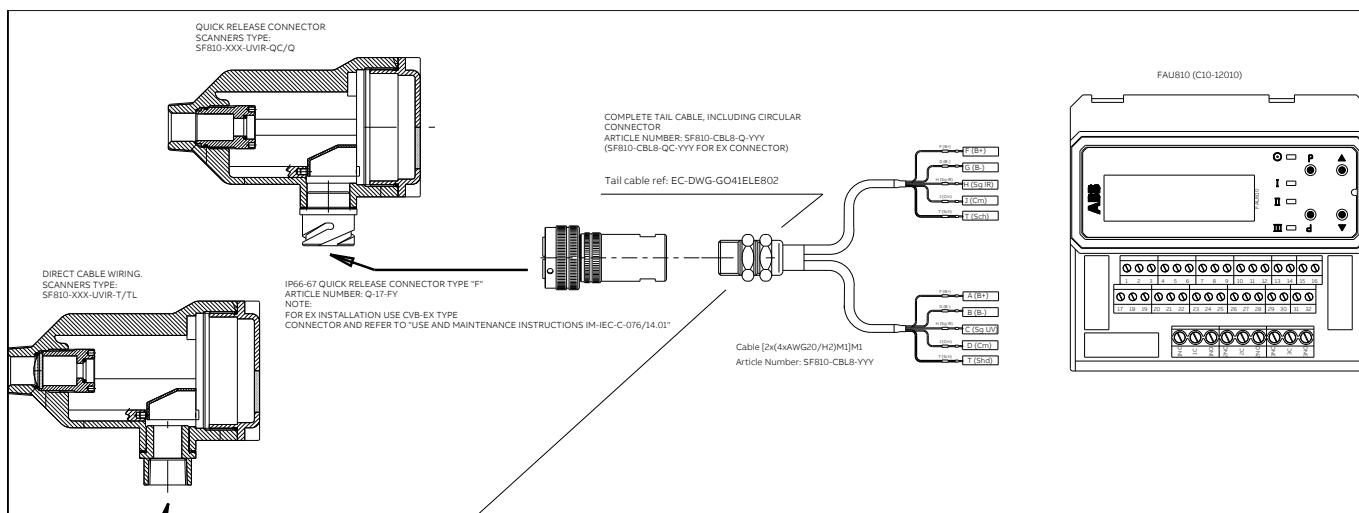


Figure 23. SF810-PYRO flame scanner wiring diagram.

Table 13. SF810-PYRO flame scanner wiring details.

SF810-PYRO Terminal Board	FAU810 Terminal Board	Signal
+15V	+B (18)	+15VDC
-15V	-B (21)	-15VDC
Out_IR1	IN (19)	Live flame signal IR1
GND	COM (20)	GND
NC		NC (not used)
SHIELD	Ext. Ground Bar	SHIELD
+15V	+B (23)	+15VDC
-15V	-B (26)	-15VDC
Out_IR2	IN (24)	Live flame signal IR2
GND	COM (25)	GND
NC		NC (not used)

Wiring Note:

Flame Analysis Unit FAU810 has two (2) configurable sensor input channels. Each channel must be configured for the sensor being connected. Please refer to FAU810 User Manual for configuration instruction.

Table 14. Flame scanners selection for corner fired (tangential fired) boilers.

Fuel Sensor	Gas (H ₂ , Propane, NG)*	Oil (Heavy oil)	Oil & Gas	Low NOx Pulverized Coal/ Oil & Coal	Legend
SF810 - LOS-IR	N/A	N/A	N/A	N/A	NG: Natural Gas
SF810 - FOC-IR	N/A		N/A		H ₂ : Hydrogen
SF810 - LOS-UV	N/A	N/A	N/A	N/A	Gas also includes blast furnace
SF810 - FOC-UV		N/A		N/A	Heavy Oil: With steam atomization
SF810 - LOS-UVIR	N/A	N/A	N/A	N/A	UV: Ultraviolet
SF810 - FOC-UVIR	N/A	N/A		N/A	IR: Infrared
SF810 - LOS-PYRO	N/A	N/A	N/A	N/A	LOS: Line of Sight (direct view)
SF810 - FOC-PYRO	N/A		N/A		FOC: Fiber Optic Cable (through the windbox)
					N/A: Not applicable or over requirements
					 Acceptable performance
					 Good performance
					 Excellent performance

* For off-shore installation, ABB recommends SF810 detector with standard SS316L casing.

Table 15. Flame scanners selection for wall (front or rear) fired boilers.

Fuel Sensor	Gas (H ₂ , Propane, NG)*	Oil (Heavy oil)	Oil & Gas	Low NOx Pulverized Coal/ Oil & Coal	Legend
SF810 - LOS-IR	N/A		N/A		NG: Natural Gas
SF810 - FOC-IR	N/A		N/A		H ₂ : Hydrogen
SF810 - LOS-UV		N/A	N/A	N/A	Gas also includes blast furnace
SF810 - FOC-UV		N/A	N/A	N/A	Heavy Oil: With steam atomization
SF810 - LOS-UVIR	N/A	N/A		N/A	UV: Ultraviolet
SF810 - FOC-UVIR	N/A	N/A		N/A	IR: Infrared
SF810 - LOS-PYRO	N/A		N/A		LOS: Line of Sight (direct view)
SF810 - FOC-PYRO	N/A		N/A		FOC: Fiber Optic Cable (through the windbox)
					N/A: Not applicable or over requirements
					 Acceptable performance
					 Good performance
					 Excellent performance

* For off-shore installation, ABB recommends SF810 detector with standard SS316L casing.

Table 16. Flame scanners selection for Down Shot boilers.

Fuel Sensor	Gas (H ₂ , Propane, NG)*	Oil (Heavy oil)	Oil & Gas	Low NOx Pulverized Coal/ Oil & Coal	Legend
SF810 - LOS-IR	N/A	N/A	N/A		NG: Natural Gas
SF810 - FOC-IR	N/A	N/A	N/A		H ₂ : Hydrogen
SF810 - LOS-UV	N/A	N/A	N/A	N/A	Gas also includes blast furnace
SF810 - FOC-UV	N/A	N/A	N/A	N/A	Heavy Oil: With steam atomization
SF810 - LOS-UVIR	N/A	N/A	N/A	N/A	UV: Ultraviolet
SF810 - FOC-UVIR	N/A	N/A	N/A	N/A	IR: Infrared
SF810 - LOS-PYRO	N/A	N/A	N/A		LOS: Line of Sight (direct view)
SF810 - FOC-PYRO	N/A	N/A	N/A		FOC: Fiber Optic Cable (through the windbox)
					Acceptable performance
					Good performance
					Excellent performance

* For off-shore installation, ABB recommends SF810 detector with standard SS316L casing.

Table 17. Flame scanners selection for Gas Turbines.

Fuel Sensor	Gas Turbine	Legend
SF810 - LOS-IR	N/A	UV: Ultraviolet
SF810 - FOC-IR	N/A	IR: Infrared
SF810 - LOS-UV		LOS: Line of Sight (direct view)
SF810 - FOC-UV		FOC: Fiber Optic Cable (through the windbox)
SF810 - LOS-UVIR	N/A	N/A: Not applicable or over requirements
SF810 - FOC-UVIR	N/A	 Acceptable performance
SF810 - LOS-PYRO	N/A	 Good performance
SF810 - FOC-PYRO	N/A	 Excellent performance

* For off-shore installation, ABB recommends SF810 detector with standard SS316L casing.

Versions and ordering codes

SF810 SafeFlame Scanners are offered with several mounting and wiring options to suite customer needs. The standard versions come with removable terminals. A quick release connector and preassembled connecting cable is also available.

Contact your local ABB organization for additional details.

Table 18. SF810 options and ordering codes.

Feature	Available models	Uvisor SF810 ordering codes						
Installation type	FOC (Scanner head for Fiber Optic Cable)	SF810	–	FOC	–	.....	–	...
	LOS (Scanner head for Line of Sight)	SF810	–	LOS	–	.....	–	...
Spectral range	IR	SF810	–	.....	–	IR	–	...
	UV	SF810	–	.....	–	UV	–	...
	UV + IR (dual sensor)	SF810	–	.....	–	UVIR	–	...
	PYRO (dual IR sensor)	SF810	–	.....	–	PYRO	–	...
Cabling method, protection index, hazardous areas	Screw terminals IP66/IP67 - Ex	SF810	–	.....	–	.....	–	T
	Screw terminals IP66/IP67	SF810	–	.....	–	.....	–	TL
	Quick-release connector IP66/IP67	SF810	–	.....	–	.....	–	Q
	Quick-release connector IP66/IP67 - Ex	SF810	–	.....	–	.....	–	QC
Housing	Stainless steel AISI316 case	SF810	–	.....	–	.....	–	TX
Notes	IP66/IP67 and ATEX certificates on FOC assemblies are guaranteed only with ABB fiber optic cable P/N: • EC-DWG-G041MEC020 • EC-DWG-G041MEC021 • EC-DWG-G041MEC022							

Table 19. SF810 spare part options.

Assembly type	Article number	Description
SF810-FOC all models	Lens SF810-FOC	19mm Quartz Lens for SF810(i)
SF810-FOC all models	Lens holder SF810-FOC	SF810 FOC Lens Holder with Seeger ring and retainer
SF810-IR all models	SF810_IR Card	PCB IR Sensor for SF810-IR Flame Scanner
SF810-UV all models	SF810_UV Card	PCB UV Sensor for SF810-IR Flame Scanner
SF810-UVIR all models	SF810_UVIR Card	PCB UVIR Sensor for SF810-IR Flame Scanner

Table 20. SF810 fiber optic options and ordering codes.

Warning:
The Ex certified scanners versions (SF810i-FOC-xx-T and SF810i-FOC-xx-QC) must be mandatory used together with the ABB Ex ABB fiber optic cable P/N:

- EC-DWG-G041MEC020
- EC-DWG-G041MEC021
- EC-DWG-G041MEC022

Feature	Available choices	Part number assignment							
Fiber optic cable	Fiber optic cable for IR sensor	<table><tr><td>SF810</td><td>–</td><td>FO</td><td>–</td><td>G</td><td>–</td><td>XXXX</td></tr></table> Fiber Optic Cable for SF810 sensor IR Length = base length 1500mm Additional step 250mm to specify with the PO. Ref. Figure "C" for the ordering length	SF810	–	FO	–	G	–	XXXX
	SF810	–	FO	–	G	–	XXXX		
	Fiber optic cable for UV sensor	<table><tr><td>SF810</td><td>–</td><td>FO</td><td>–</td><td>Q</td><td>–</td><td>XXXX</td></tr></table> Fiber Optic Cable for SF810 sensor UV Length = base length 1500mm Additional step 250mm to specify with the PO. Ref. Figure "C" for the ordering length	SF810	–	FO	–	Q	–	XXXX
SF810	–	FO	–	Q	–	XXXX			
Fiber optic cable for UVIR sensor	<table><tr><td>SF810</td><td>–</td><td>FO</td><td>–</td><td>GQ</td><td>–</td><td>XXXX</td></tr></table> Fiber Optic Cable for SF810 sensor UVIR Length = base length 1500mm Additional step 250mm to specify with the PO. Ref. Figure "C" for the ordering length	SF810	–	FO	–	GQ	–	XXXX	
SF810	–	FO	–	GQ	–	XXXX			
Guide pipe	Rigid	<table><tr><td>SF810</td><td>–</td><td>OGP</td><td>–</td><td>RE</td><td>–</td><td>XXXX</td></tr></table> Guide pipe for SF810 Rigid Extension for all type sensors Length = base length 1500mm Ref. Figure "B" for the ordering length	SF810	–	OGP	–	RE	–	XXXX
	SF810	–	OGP	–	RE	–	XXXX		
Flexible	<table><tr><td>SF810</td><td>–</td><td>OGP</td><td>–</td><td>FE</td><td>–</td><td>XXXX</td></tr></table> Guide pipe for SF810 Flexible Extension for all type sensors Length = base length 1500mm Ref. Figure "A" for the ordering length	SF810	–	OGP	–	FE	–	XXXX	
SF810	–	OGP	–	FE	–	XXXX			

Fiber Optic Cable (FOC): Cable assembly ordering data

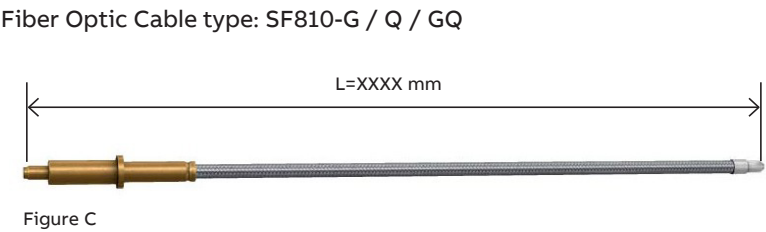
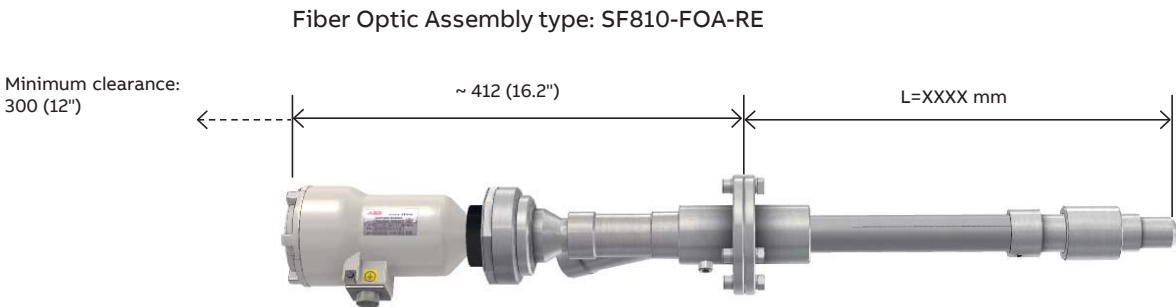
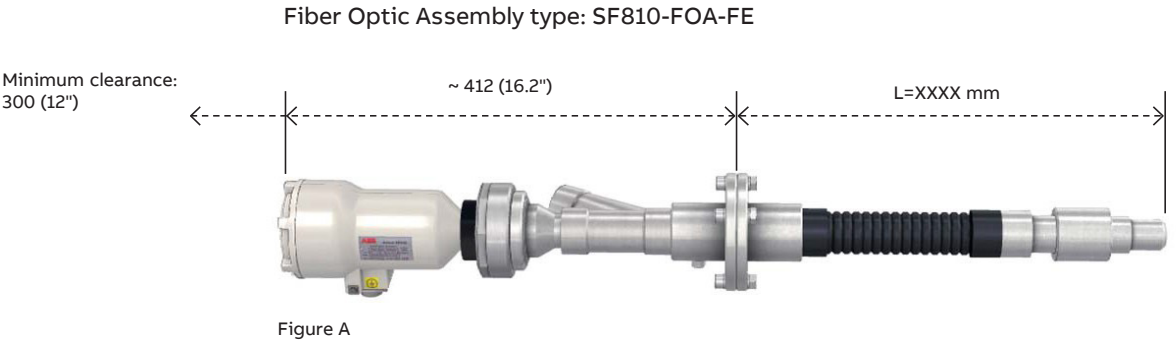


Figure 24. Fiber optic cable assembly options.

Table 21. SF810 fiber optic cable options and ordering codes.

Cable	Article number	Length "L" (meter)	Description
ABB cable for SF810 Single Sensor Cable only, no connectors	SF810-CBL4-YYY YYY= meters		Cable type: 4x20 AWG/ST - M1 – BLU - R.5015 - H/F UV RESIST. -20°C +90°C (-4°F +194°F) OD: 6.8±0.2
ABB tail cable for SF810. Cable with pre-assembled quick-release "M" plug at one side only (IP66/IP67)	SF810-CBL4-Q-YYY YYY= meters	L =	Cable type: 4x20 AWG/ST - M1 – BLU - R.5015 - H/F UV RESIST. -20°C +90°C (-4°F +194°F) OD: 14.0±0.5 preassembled with connector EC-DWG-GO18MEC773-B and Cable Gland
ABB tail cable for SF810 Cable with pre-assembled quick-release "M" plug at one side only. Ex. IP66/IP67	SF810-CBL4-QCYYY YYY= meters	L =	Cable type: 4x20 AWG/ST - M1 – BLU - R.5015 - H/F UV RESIST. -20°C +90°C (-4°F +194°F) OD: 14.0±0.5 preassembled with connector CVB-EX and Cable Gland
ABB cable for SF810 Dual Sensor Cable only, no connectors	SF810-CBL8-YYY YYY= meters	L =	Cable type: 2x [4x20 AWG/ST - M1] – BLU - R.5015 - H/F UV RESIST. -20°C +90°C (-4°F +194°F) OD: 14.0±0.5
ABB tail cable for SF810. Cable with pre-assembled quick-release "M" plug at one side only (IP66/IP67)	SF810-CBL8-Q-YYY YYY= meters	L =	Cable type: 2x [4x20 AWG/ST - M1] – BLU - R.5015 - H/F UV RESIST. -20°C +90°C (-4°F +194°F) OD: 14.0±0.5 preassembled with connector EC-DWG-GO18MEC773-B and Cable Gland
ABB tail cable for SF810. Cable with pre-assembled quick-release "M" plug at one side only. Ex. IP66/IP67	SF810-CBL8-QCYYY YYY= meters	L =	Cable type: 2x [4x20 AWG/ST - M1] – BLU - R.5015 - H/F UV RESIST. -20°C +90°C (-4°F +194°F) OD: 14.0±0.5 preassembled with connector CVB-EX and Cable Gland
Quick-release connector "F" type. Loose item. IP66/IP67	Q-17-FY		Drawing ref: EC-DWG-GO18MEC773-B
Quick-release connector "F" type. Loose item. Ex. IP66/IP67	QC-17-FY		Model: CVB-EX WARNING! Ref. doc. IM.C-110/07.01rev. 02 for Installation and Maintenance Instruction

Table 22. SF810 fitting accessories details and ordering codes.

Fitting	Article number	Notes
1" NPTM / 1" NPTF Thermal isolation union	THU-1NPTMF	Drawing: EC-DWG-G018MEC779
Isolating Valve 1" NPTF / 1" NPTF	IV-1NPTF	Drawing: EC-DWG-G041MEC108
Purging air "Y" 1" NPTF / 1" NPTF Air inlet 3/4" NPTF with Nipple 1" NPTM / 1" NPTM	PAY-1NPTFF	Drawing: EC-DWG-G041MEC010-B
Swivel flange assembly with 1" NPTM nipple and gasket ØEXT=100 mm (3.937")	SWF-1NPTM-100	Drawing: SWF-1NPTM-100
Swivel flange assembly with 1" NPTM nipple and gasket ØEXT=72 mm (2.834")	SWF-1NPTM	Drawing: EC-DWG-G041MEC101-A
Purging air flexible hose - Armoured hose type 2TE DIN 2021 EN854 ND-19 Temperature -30 to 80°C (-22 to 176°F) L=1200 mm	84410-S-0400000	
ND-25 Temperature -30 to 80°C (-22 to 176°F) L=1200 mm (47.2") 2021 EN854 (47.2") Purging air flexible hose - Armoured hose type 2TE DIN	84410-S-0400001	
Armoured cable gland ATEX II 2GD T6 IP66 (gas & dusts)	CG3/4-EEEx	
Counter flange for FOC external guide pipe	84410-S-0400002	Drawing: EC-DWG-G041MEC014-A
Set of diaphragms (Ø 4/6/8 mm) to be installed in THU-1NPTMF to reduce the irradiation to sensor	TU_KIT01	Drawing: EC-DWG-G041MEC107-A
Quartz isolating air tight kit to be installed in THU-1NPTMF to isolate scanner from combustion chamber	TU_KIT02	Drawing: EC-DWG-G041MEC106-A
Set of diaphragm suitable for FOC LENS HOLDER ASSEMBLY Part: EC-DWG-G041MEC005 (Ø 2/4/6 mm)	TU_KIT03	Drawing: EC-DWG-G041MEC109-B
Cooling air jacket for SF810-SF810INT LOS type scanners	CAC-LOS	Drawing: EC-DWG-G041MEC111-A

Fiber Optic Cable (FOC): Assembly fitting options

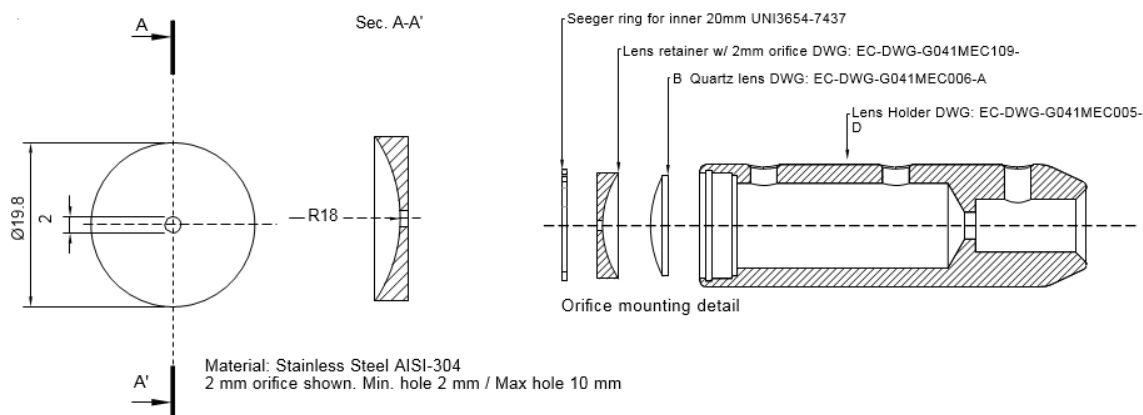


Figure 25. Orifice kit for flexible and rigid FOC assemblies.

The use of orifice, available with different size, restricts the field of view (target area) and increase discrimination between target flame and adjacent, opposite or background radiation. To prevent it from falling apart, the orifice is firmly secured in the lens holder assembly. Once installed, performance can be ensured within the burner operation range. Article number: TU_KIT03.

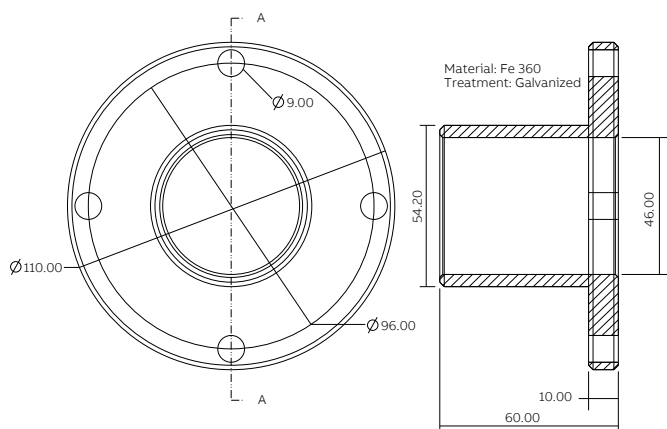


Figure 26. Boiler mounting counter flange for FOC assemblies P/N: EC-DWG-G041MEC014.

The boiler mounting counter flange matches the mounting flange of the standard FOC assemblies (Ref. figures A and B).

WARNING! This flange has a galvanic treatment. Following the applicable recommendation for welding, operator is recommended to wear an FFP2 dust mask. First, remove the Zinc from the welding surface(s). After welding the Zinc-free carbon-steel, restore the corrosion resistance with high in elemental zinc (i.e., "Zinc-rich") paint. This paint can be applied to the weld after wire brushing to remove all welding slag then followed by wiping the weld clean with a rag. Article number: 84410-S-0400002.

Fiber Optic Cable (FOC) Assembly: DFS direct replacement

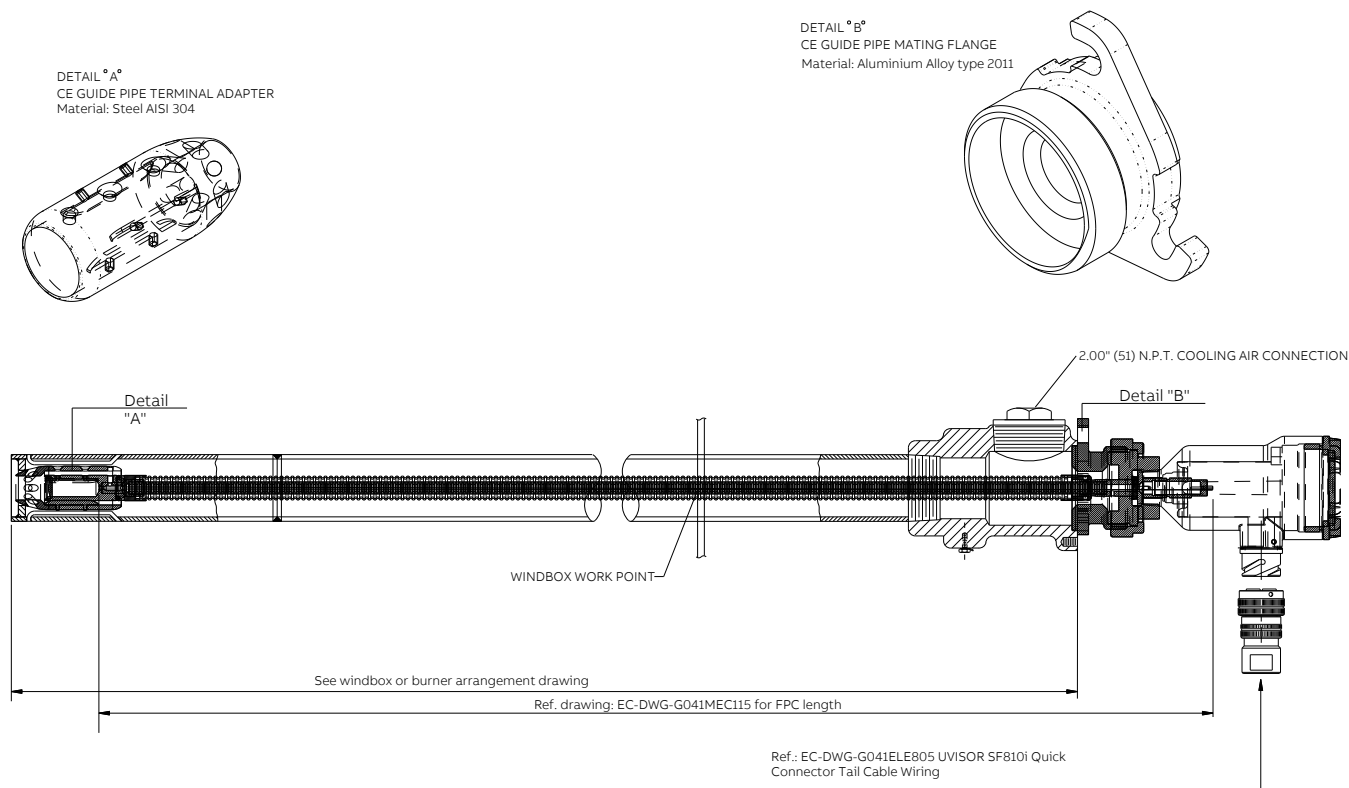


Figure 27. DFS flame scanner direct replacement assembly.

This option provides the user with a cost-efficient solution to upgrade an existing DFS flame scanner installation without need of boiler shutdown or effort (scaffolding, cut & welding, etc.). SF810-FOC final equipment selection is based on the specific customer and application needs.

Ref. Assembly P/N: EC-DWG-G041MEC115 Article Number: SF810-FOACE-IR (UV; UVIR).
For more details ref. 9AKK101130D3800-B1 SF810 User Manual.

Fiber Optic Cable (FOC): Bailey FlameOn direct replacement

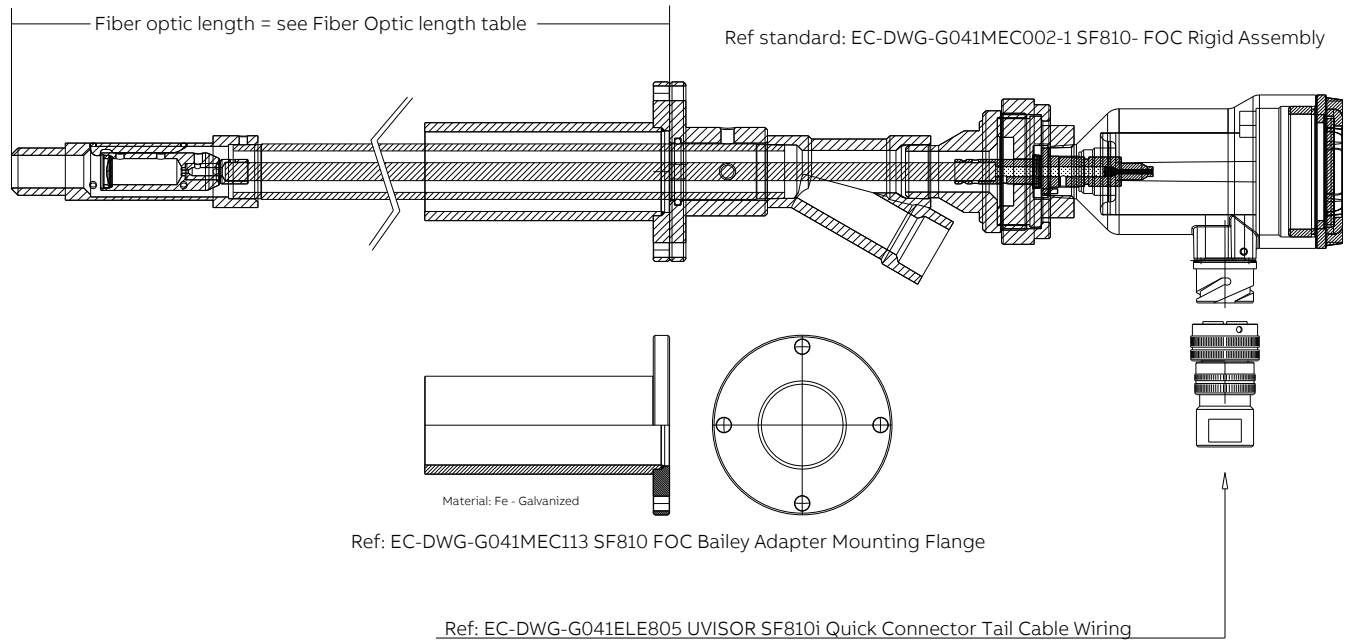
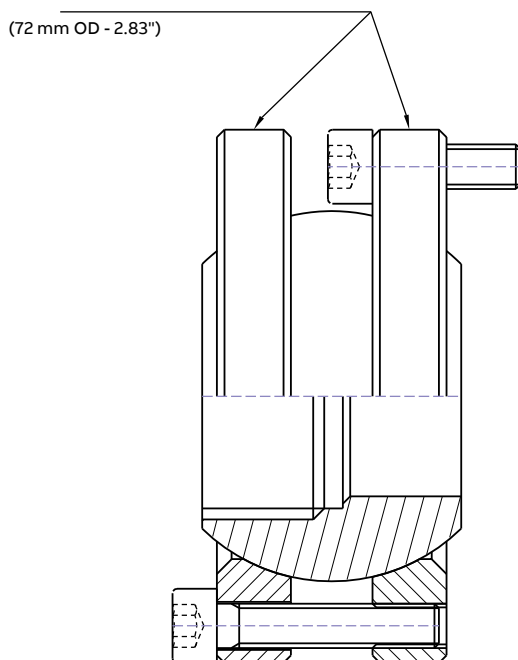


Figure 28. Bailey FlameOn direct replacement assembly.

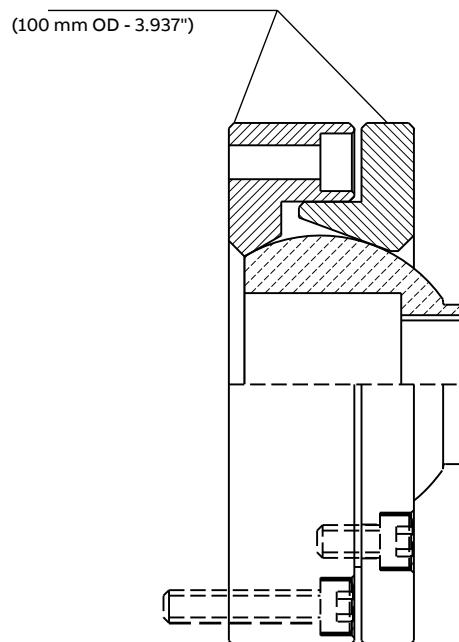
This option provides the user with a convenient solution to upgrade an existing Bailey FlameOn flame series UM...UW...flame scanner with flexible fiber optic design or reflecting tube. SF810i-FOC final equipment selection is based on the specific customer and application needs.

Ref. Assembly P/N: EC-DWG-G041MEC119. For more details ref. 9AKK101130D3800-B1 SF810 User Manual.

Swivel mounting flange assembly



Recommended to adjust the scanner sighting angle after the scanner has been installed.
Article number: SWF-1NPTM-72



Recommended to adjust the scanner sighting angle after the scanner has been installed. Article number: SWF-1NPTM-100

Figure 29. Swivel mounting flange assembly.

Cooling air jacket

The cooling air jacket is designed to use the low pressure purging air to drain heat away from the scanner body thus to allow operation on severe high temperature environment, up to 105°C (221°F)

- No additional air provision other than the standard purging air
- Recommended air inlet temperature less than 30°C (86°F).
- Air consumption 115 l/min (4 SCFM) @ 20mm H₂O (1" W.C.) above the maximum windbox pressure

Article number: CAJ

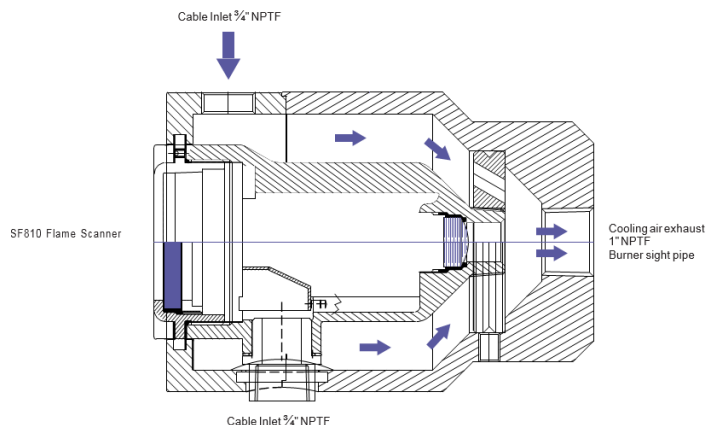


Figure 30. Cooling air jacket.

Note:

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