Data sheet DS/FPD580–EN Rev. B

StackFlowMaster FPD581, FPD583 and FPD585
Stack gas metering systems

Measurement made easy

Flow metering solutions for Continuous Emissions Monitoring (CEMS)

Continuous measurement
— provides continuous, in-stack measurement of volume / mass flowrate and velocity

MCERTS approved
— meets the requirements of EN 14181 and EN 15267-3

Manual and automatic versions
— simple system for basic applications
— optional meter purging and automatic zero / span

Complete CEMS package available
— ABB can combine with analyzer system to offer a complete CEMS package

Optional purging feature
— for solids contamination levels up to 300 mg/m^3

Suitable for wide range of stack sizes and gas temperatures
— for stacks from 1 to 8 m (3.3 to 26.25 ft.) diameter and gas temperatures up to 1200 °C (2192 °F)

Power and productivity for a better world™

StackFlowMaster FPD581, FPD583 and FPD585
Stack gas metering systems

Introduction

The FPD580 series is a range of stack gas flow metering solutions that, when combined with a CEMS analyzer, forms a complete CEMS package for the measurement of mass flowrate of pollutants into the environment. The FPD580 is based on the Torbar multi-port self-averaging pitot flow meter, thousands of which have been installed into a large variety of industries world-wide over many years.

Torbar

The Torbar probe within the FPD580 series produces an averaged differential pressure (DP) signal proportional to the square of the flow rate or velocity. The DP output is fed to a multi-variable transmitter that generates an electrical signal proportional to the flow rate, compensated for pressure and temperature. The outer impact tube has a number of pressure-sensing holes facing upstream that are positioned at equal annular points across the stack diameter, in accordance with a log-linear distribution. The 'total pressures' developed at each upstream hole by the sum of the impact of the flowing medium and the static pressure are first averaged within the outer impact tube and then averaged to a second, more accurate order within the internal averaging tube. This pressure is represented at the head as the high pressure component of the DP output. The low pressure component is generated from a single sensing hole located on the downstream side of the outer impact tube, that measures the static pressure within the stack.

The Torbar is an improvement on the round sensor design due to the unique profiled flats that are positioned around the downstream hole in order to define the point at which the flow lines separate as the stack gasses pass around the outer impact tube. This feature creates a stable pressure area at the downstream pressure sensing hole, maintaining a constant flow coefficient at high velocities enabling a very wide range of flow measurement (turndown).

Each probe is designed to measure across the complete diameter of the stack. For larger diameters the probe is supplied in 2 pieces that are joined on-site using a flanged centre coupling. This approach simplifies transportation, handling and installation.

The probes are supplied in a variety of materials and are designed for attachment to the stack via a range of flanged mountings. The mountings are available from ABB (if required), or an existing fitting on the stack or a fitting supplied by the customer can be used. Larger stacks typically require a flanged fitting on both sides of the stack (end-supported) for mechanical stability and to prevent probe resonance that reduces product life. ABB's sizing program checks automatically for resonance issues and warns when they may be present, enabling selection of an end-supported variant to be made. For combinations of high temperature and long insertion lengths, the probe is designed to lock into the end support to reduce the risk of distortion of the probe material.

Interface units

In many applications an interface unit must be installed between the Torbar and the DCS. Two basic (manual) types of interface unit are available that perform one or more of the following functions:

— send outputs to the DCS (to both those required by legislation and those needed by the user)
— enable regulatory tests to be carried out without having to climb the stack
— enable the DCS to send instructions to the system for testing or purging

An automatic interface unit is also available with the following options:

— probe purging (to clear sensing port blockages)
or
— automatic zero and span checks (for regulatory compliance)
or
— both purging and automatic zero / span check.

The interface unit can be provided with an optional heater to avoid condensation issues when operating in low ambient temperatures.

Product variants

The FPD580 series comprises 3 versions:

FPD581 manual control system

— for the supply of systems that do not require MCERTS or purging or auto zero / span facilities
— for replacement or spare metering probes

Fig. 1: FPD581 sensor to work with remote transmitter (transmitter not shown)

FPD583 manual control system

— a self-contained flow metering system
— supplied with MCERTS interface unit
— for applications where blockage of the probe metering ports is not expected

Fig. 2: Typical stack gas flow probe with StackFlowMaster FPD583 Type A interface unit

StackFlowMaster FPD581, FPD583 and FPD585
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FPD585 automatic control system

— with optional manual / automatic meter purging for particle densities of 30 to 300 mg/m^3
(for concentrations above 300 mg/m^3, contact ABB)
— the purge duration and frequency is programmable to keep the Torbar sensing holes clear of contaminants
— optional automatic system zero / span check
— optional MCERTS (future option)

Fig. 3: FPD585 sensor with purge interface unit

System summary

Model	Description	Interface unit type	Purge (30 to 300 mg/m^3)	Zero / Span check	Transmitter	MCERTS	Temperature element
FPD581	standard system	None	No	No	Optional	No	Optional
FPD583	MCERTS system	MCERTS 'Manual A'	No	No	Yes	Optional	Optional
FPD585	automated metering system	Automatic-B	No	Yes *	Yes	Optional	Optional
		Automatic-C	Yes	Yes *	Yes	(future)	
		Automatic-D	Yes	No	Yes		

* Manual (standard) or Automatic (optional)

Installation and location

Recommended upstream distances

Correct location of the measuring probe in the stack is important in order to optimize performance. Flow that is disturbed by upstream fittings such as valves / dampers, bends and may have an adverse effect on accuracy unless the measuring probe is located at least 8 stack diameters after any such fittings. Minor fittings such as extractive sampling probes (for gas analysis) may be within this distance, providing they are no closer than 3 stack diameters from the probe. If the probe is fitted within distances less than those recommended, the absolute accuracy may be downgraded but repeatability of measurement is still excellent due to the probe's inherent averaging characteristics. Where it is not possible to provide the specified distances and maximum accuracy is required, the use of a flow straightening spool piece enables shorter distances.

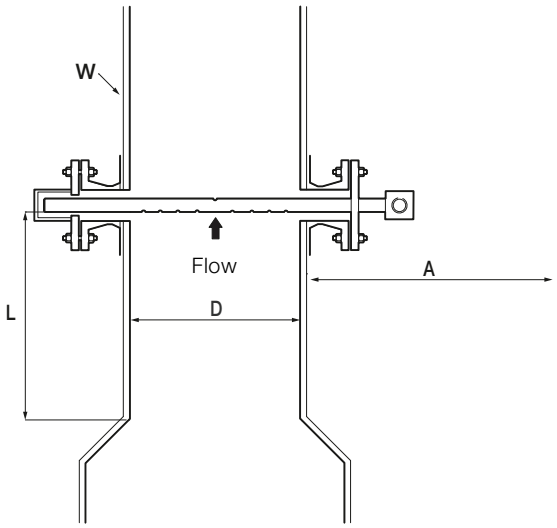

Fig. 4: Installation requirements

Key:

D = Stack internal diameter (diameter of flow path)

W = Stack wall thickness (including any refractory lining)

A = Available access

Note. Care should be taken when the stack is surrounded by a wind shield

L = Upstream straight length

Orientation in stack

The measuring probe must be installed at right angles to the stack and across the stack diameter within the tolerances shown in Fig. 5.

Before installation or removal of a measuring probe it is imperative that careful reference is made to the appropriate installation instructions that are supplied with each shipment. The installation instructions are also available separately on request.

Caution. A vibrating stack can distort the output signal and affect the structural limits of the measuring probe.

Warning. Refer to the instruction manual before installing any FPD580-series.

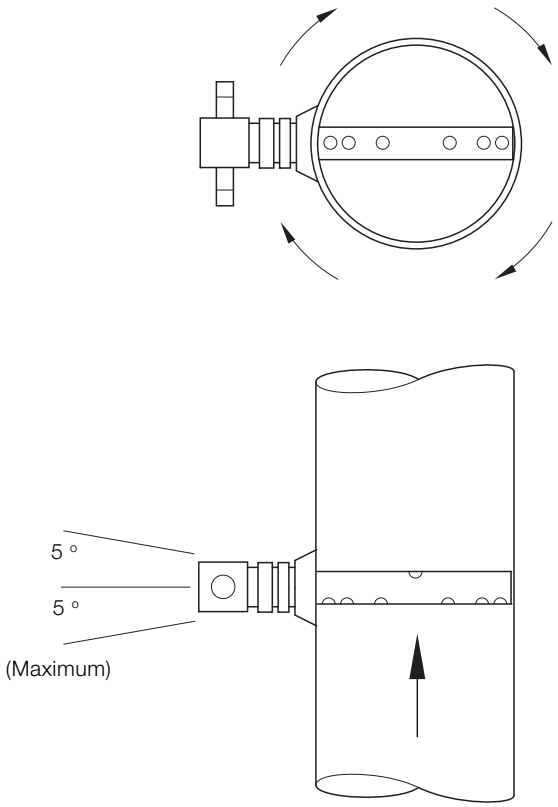

Fig. 5: Orientation

StackFlowMaster FPD581, FPD583 and FPD585
Stack gas metering systems

Specification – probe

Diameter
25 mm (1 in.) or 60 mm (2.36 in.)

Insertion length
1 to 8 meters (3.3 to 26.25 ft.)

Construction
— Single piece
— 2-piece with centre coupling for unsupported lengths ≥5 m (16.4 ft.) (optional)
— Bayonet-style lock within end support for large stacks at high temperatures (optional)

Mounting
— Flanged fittings (single or end-supported) – supplied by ABB or customer
— PN10 RF in sizes DN 40, DN 50, DN80, DN 100 and DN 150
— ASME 150 lb RF in sizes 1½, 2, 3, 4, 6 in. NB

Temperature measurement
Optional, via integral RTD or remote thermocouple (for stack temperatures >600 °C [1112 °F])

Fluid velocity
Up to 50 m/s (3 to 35 m/s for MCERTS approved systems)

Process fluid
Combustion gases
(details of the gas composition are required by ABB for sizing)

Process temperature limits
316L and 321H stainless steel probes
550 °C (1022 °F)
700 °C (1292 °F) with bayonet fitting option
UNS N06625 Gr.2 probe
— 900 °C (1652 °F)
— 1200 °C (2192 °F) *
With remote transmitter
As above, depending on probe material
With integral transmitter
180 °C (356 °F)
* possible but with limited probe life

Process pressure limits
Up to pressure rating of mounting flange at operating/design temperature

Construction materials
Probe
— 316L stainless steel
— 321H stainless steel
— UNS N06625 Gr.2
Mountings
— Carbon steel
— A105 carbon steel
— 316L stainless steel
— 321H stainless steel
— UNS N06625 Gr.2
Nuts and bolts
— ASTM A193 B7 / ASTM A194 2H
— ASTM A193 8M / ASTM A194 8MA
Gaskets
— Asbestos-free
— Spiral wound 316 stainless steel (optional)

Specification – transmitter

Type
ABB multivariable transmitter type 267CS

Measuring range & span limits

Sensor code	Upper range limit (URL)	Lower range limit (LRL)	Minimum span
A	1 kPa 10 mbar 4 in. H_2O	0	0.05 kPa 0.5 mbar 0.2 in. H_2O
C	6 kPa 60 mbar 24 in. H_2O	0	0.2 kPa 2 mbar 0.8 in. H_2O

Display
LCD display, plug-in and rotatable with optional back-lighting

Communications
— HART digital communication and 4 to 20 mA
— Modbus RS485

Electrical connections
— ½ to14 NPT
— M20 x 1.5

Electrical certification and hazardous atmospheres (FPD581 & FPD583 only)
Note. All interface units must be installed in safe area
— ATEX Ex ia, ATEX EEx d or ATEX Ex nL (upon application)
— UL (future)
— Factory Mutual (FM) – intrinsically safe (future)
— Factory Mutual (FM) – explosion-proof (future)
— Canadian Standard Association – explosion-proof (future)

Construction materials
Process isolating diaphragms
Hastelloy™ C276
Process flange, adapter, plugs and drain/vent valves
Stainless steel
Sensor fill fluid
Silicone oil
Sensor housing
Stainless steel
Mounting bracket
Stainless steel
Gaskets
PTFE
Nuts and bolts
Stainless steel class A4-70 according to ISO 3506, conforming to NACE MR0175 Class II
Electronics housing and cover
— Aluminum alloy with low copper content
— Baked epoxy finish
— Stainless steel
Cover O-rings
Viton™

StackFlowMaster FPD581, FPD583 and FPD585
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Specification – interface unit

FPD583 MCERTS manual system

Protection
IP65 (NEMA 4) rated. Not suitable for use in hazardous area

Electrical connection
Via 3 x M20 plastic cable glands

Thermostatic internal heater (optional)
Power supply:
— 90 (min.) to 264 V (max.)
— 100 to 240 V AC ±10 %, 50 / 60 Hz

Housing construction
Epoxy painted steel

FPD585 automatic system

Protection
IP65 (NEMA 4) rated – not suitable for use in hazardous area

Process connections
1/2 in. BSP stainless steel

Supply air connection
1/2 in. BSP stainless steel

Electrical connection
Via 4 x M20 plastic cable glands

Thermostatic internal heater (optional)
Power supply:
— 90 (min.) to 264 V (max.)
— 100 to 240 V AC ±10 %, 50 / 60 Hz

Ambient temperature
–20 to 50 °C (–4 to 122 °F) – below 0 °C requires heater option

Air supply
Max. 6 barg (87 psig)

Display
89 mm (3.5 in.) color TFT, 1/4 VGA (320 x 240 pixels)

Display backlight
White LED

Operator switches
6 keys accessible without opening the front door

Power supply
— 90 (min.) to 264 V (max.)
— 100 to 240 V AC ±10 %, 50/60 Hz

Measured components
— Operating pressure
— Operating temperature (optional)
— Differential pressure

Calculated components
— Mass flowrate
— Volumetric flowrate
— Velocity

Digital inputs / outputs
6

Input Functions
— Remote purge activation
— Remote zero check
— Remote span check

Output functions
— Out of service
— Purge in process
— Zero check in process
— Span check in process
— Zero check alarm
— Span check alarm

Analog outputs
Up to 4 with retransmission of pressure, temperature, DP and flow

Type
Programmable, 4 to 20 mA

Housing construction
Epoxy painted steel

Measurement performance

System accuracy
±2 %

Repeatability
≤ 2 % of measuring range

Drift
<0.5 % of measuring range

Data logging parameters
— Temperature
— Operating pressure
— Differential pressure
— Velocity
— Mass flow

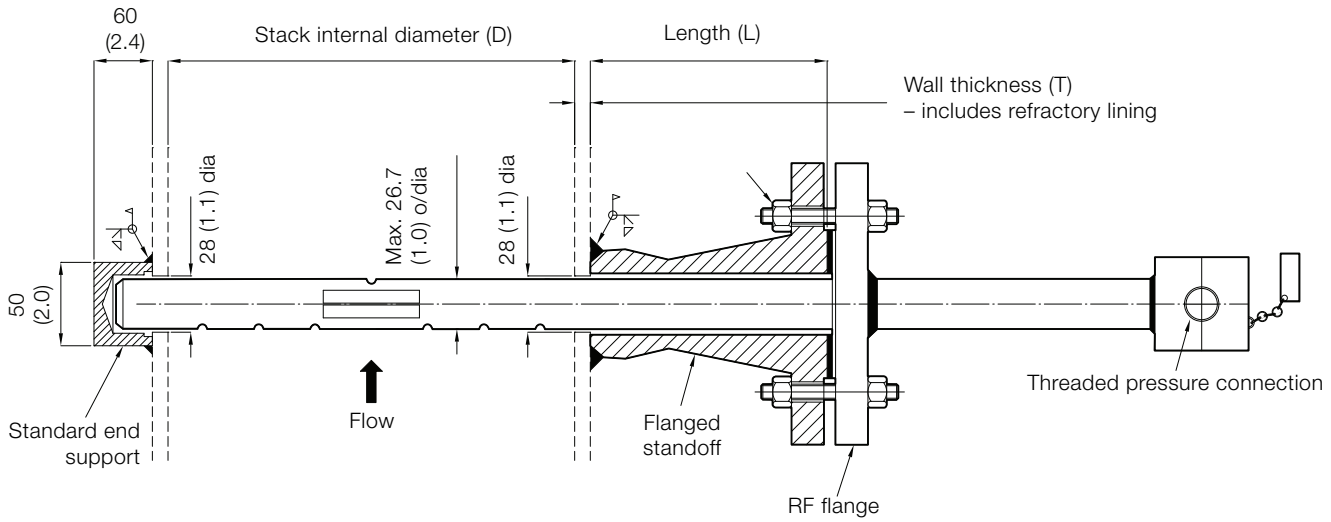
Data storage and retrieval
Internal – SD interface

Sampling frequency
1 to 180 seconds, fully-adjustable

Dimensions

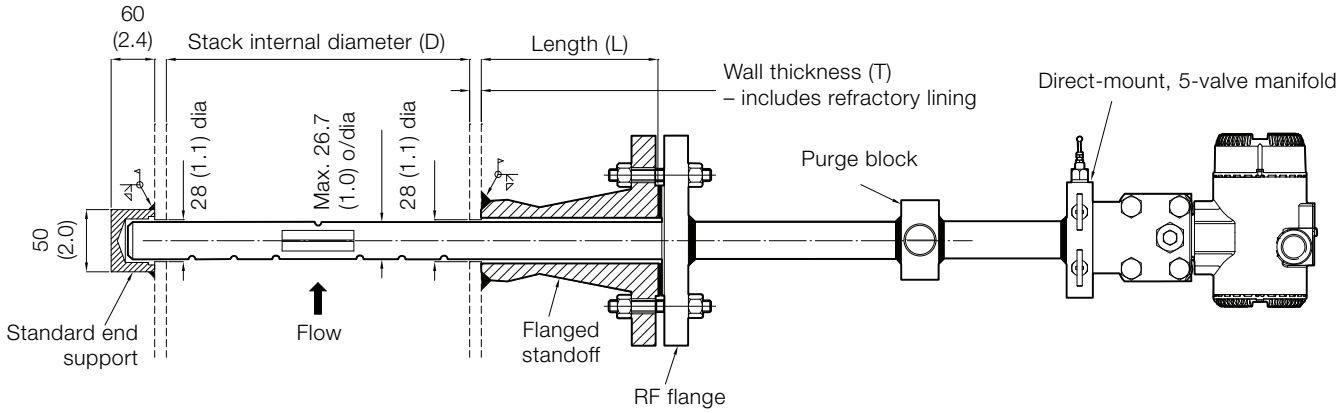
Probe – 25 mm (1.0 in.) diameter with weldcup end support (for remote transmitter)

Dimensions in mm (in.)



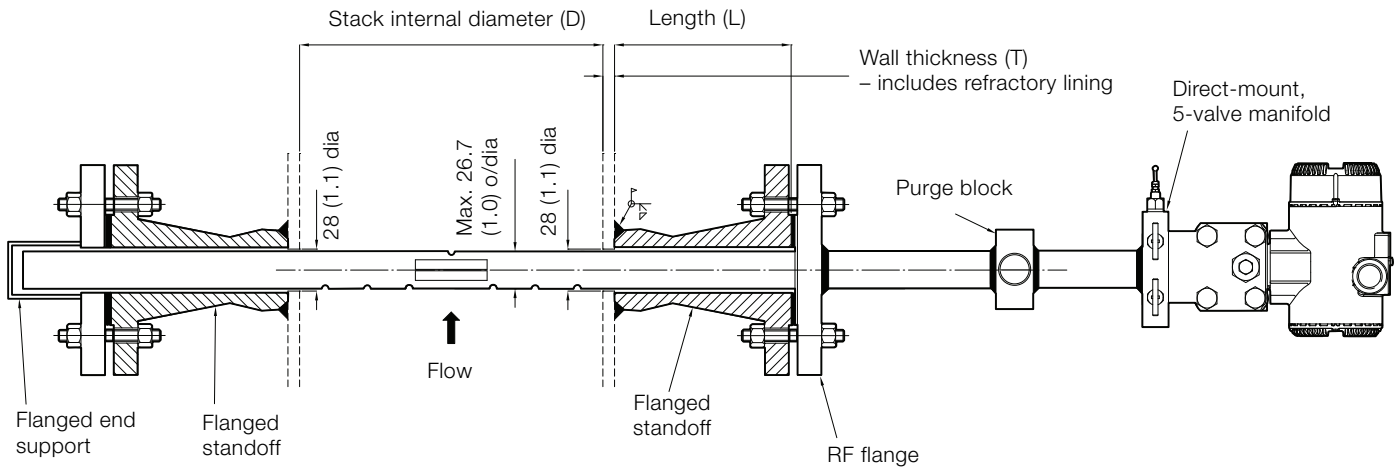
Probe – 25 mm (1.0 in.) diameter with weldcup end support (with integral transmitter)

Dimensions in mm (in.)



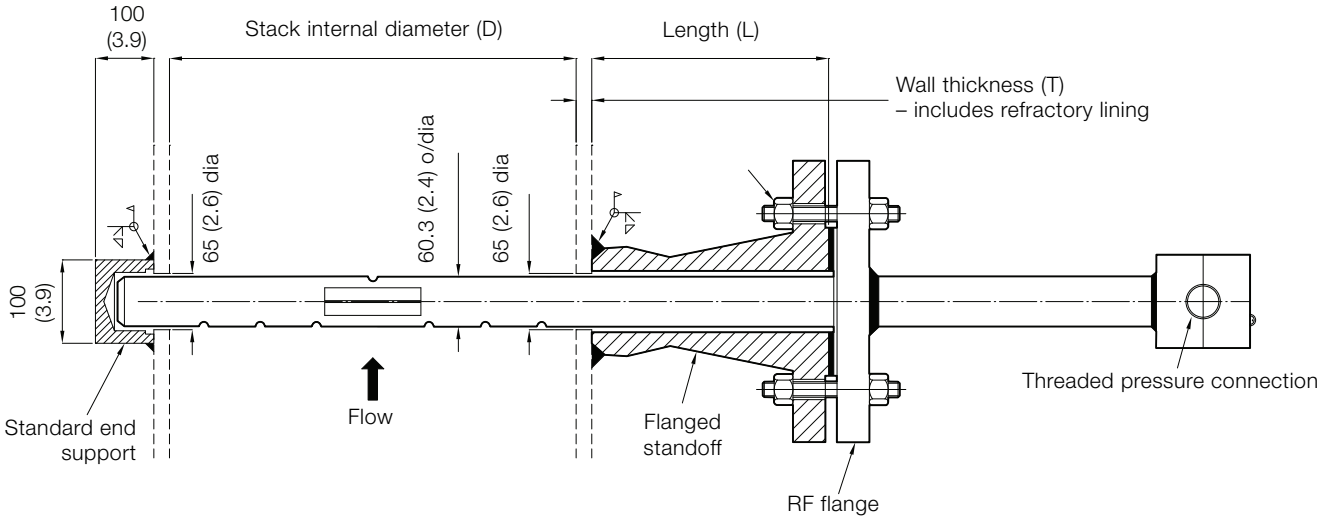
Probe – 25 mm (1.0 in.) diameter with flanged end support (with integral transmitter)

Dimensions in mm (in.)



Probe – 60 mm (2.4 in.) diameter with weldcup end support (for remote transmitter)

Dimensions in mm (in.)



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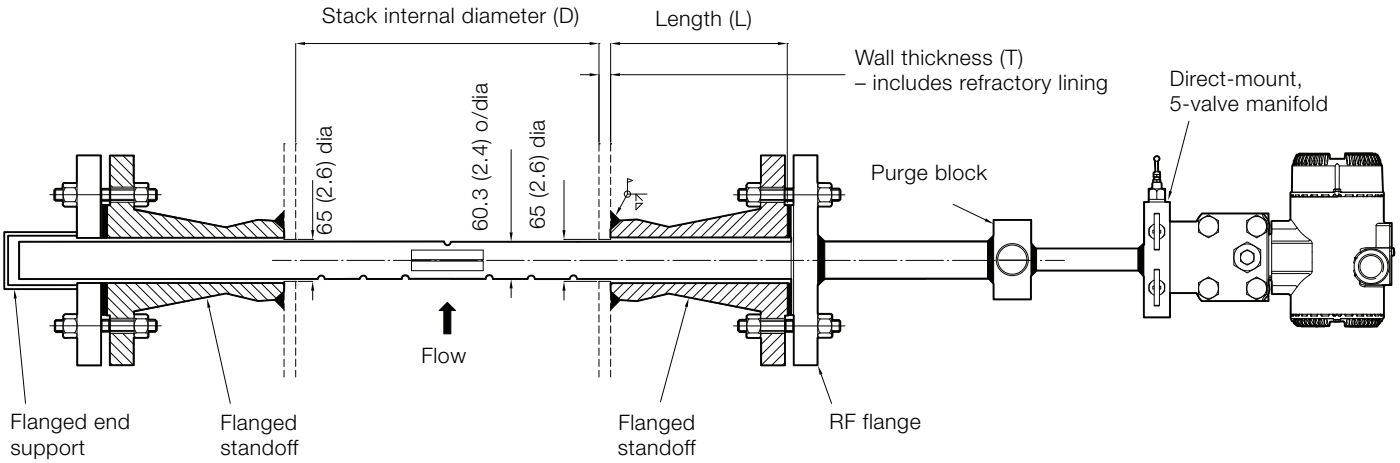
Stack gas metering systems

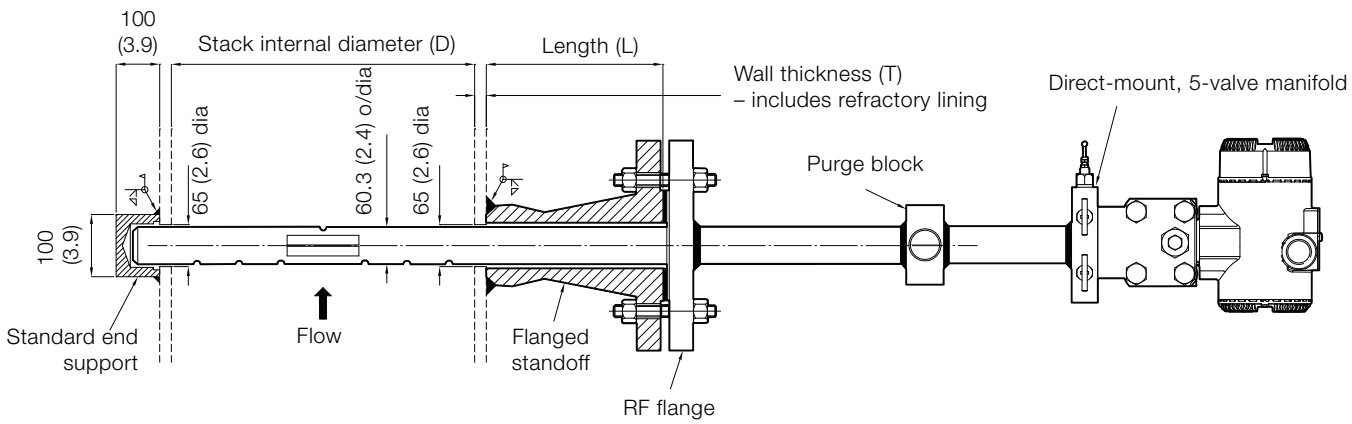
Probe – 60 mm (2.4 in.) diameter with flanged end support (for integral transmitter)

Dimensions in mm (in.)



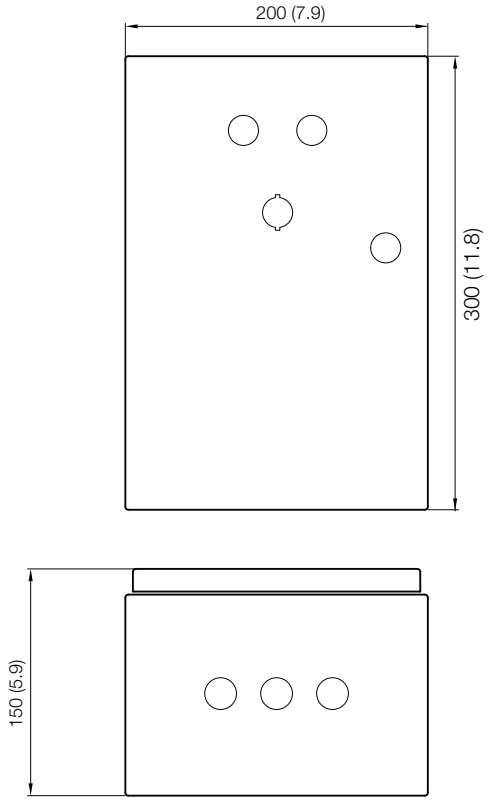
Probe – 60 mm (2.4 in.) diameter with weldcup end support (with integral transmitter)

Dimensions in mm (in.)



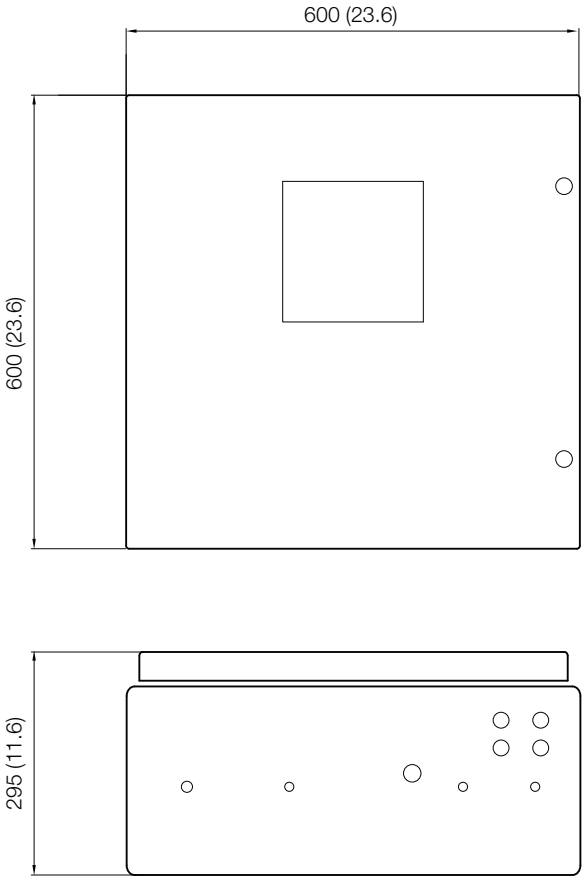
FPD583 manual interface unit

Dimensions in mm (in.)



FPD585 automatic interface unit

Dimensions in mm (in.)



StackFlowMaster FPD581, FPD583 and FPD585
Stack gas metering systems

Ordering information

StackFlowMaster FPD581 – probe only

		Standard codes													Optional codes					
StackFlowMaster probe	**FPD581**	XX	XX	XX	XX	XXX	XXX	X	X	X	X	X	XX	X	X	XX	XX	XXX	XX	XX	XX
Design level																					
Not applicable	Y0																				
1 – mass flow (267CS)	M1																				
Probe type																					
25 mm OD flanged probe without end support		F3																			
25 mm OD flanged probe with cup end support		F4																			
25 mm OD flanged probe with flanged external end support		F5																			
60 mm OD flanged probe without end support		G3																			
60 mm OD flanged probe with flanged external end support		G5																			
Probe material																					
316L stainless steel			S6																		
321H stainless steel			S1																		
UNS N06625 Gr.2			N2																		
Other			Z9																		
Stack fitting material																					
Not required				YO																	
Carbon steel				C3																	
316L stainless steel				S6																	
321H stainless steel				S1																	
UNS N06625 Gr.2				N2																	
Other				Z9																	
Process connection size																					
DN 40 (1½ in.)					040																
DN 50 (2 in.)					050																
DN 80 (3 in.)					080																
DN 100 (4 in.)					100																
DN 150 (6 in.)					150																
Other					999																
Process connection rating																					
ASME 150 lb RF						A1F															
PN 10 / PN 16 RF						D1F															
Other						Z9Z															
Standoff																					
Not required							0														
Flange standoff							1														
2 x flange standoff + flanged end support							2														
Flanged end support only							3														

See page 16

Continued on page 15

	Standard codes													Optional codes						
StackFlowMaster probe	**FPD581**	XX	XX	XX	XX	XXX	XXX	X	X	X	X	X	XX	X	X	XX	XX	XXX	XX	XX	XX
		See page 14														See page 16					
Interface unit options																					
No interface unit									Y												
DP transmitter mounting position																					
1/4 in. NPT needle valves (remote transmitter mounting only)									1												
1/2 in. NPT needle valves (remote transmitter mounting only)									2												
Integral 5-valve manifold (direct mount transmitter only)									5												
Other									9												
DP span limits																					
Not applicable										Y											
1 kPa / 10 mbar / 4 in. H_2O										A											
6 kPa / 60 mbar / 24 in. H_2O										C											
Seal material																					
Not applicable											0										
PTFE											4										
Communications output																					
Not applicable												Y0									
HART digital communication and 4 to 20 mA												H1									
Modbus 485												M1									
DP transmitter housing																					
Not applicable													Y								
Aluminium alloy / 1/2 – 14 NPT													A								
Aluminium alloy / M20 x 1.5													B								
AISI 316L stainless steel / 1/2 – 14 NPT													S								
AISI 316L stainless steel / M20 x 1.5													T								
Integrated LCD display																					
Not applicable														0							
LCD display (backlit)														2							

StackFlowMaster FPD581, FPD583 and FPD585
Stack gas metering systems

		Standard codes													Optional codes					
StackFlowMaster probe	**FPD581**	XX	XX	XX	XX	XXX	XXX	X	X	X	X	X	XX	X	X	XX	XX	XXX	XX	XX	XX
		See pages 14 and 15																			
Temperature element																					
Integral to probe (RTD)																AT					
Integral to probe (thermocouple – no temperature compensation)																AV					
Bolts and gaskets																					
Asbestos free gasket, B7 / 2H stud bolts																	K1				
Asbestos free gasket, 8M / 8MA stud bolts																	K2				
Spiral wound gasket, B7 / 2H stud bolts																	K3				
Spiral wound gasket, 8M / 8MA stud bolts																	K4				
Probe design																					
2-piece construction																		TP2			
Bayonet fitting																		TP3			
DP transmitter explosion certificates																					
Factory mutual (FM) – intrinsically safe																			EA		
Factory mutual (FM) – explosion-proof																			EB		
Canadian Standard Association (CSA) – explosion-proof																			EE		
Certificates																					
Material monitoring with inspection certificate 3.1 acc. EN 10204																				C2	
Material monitoring NACE MR 01-75 with inspection certificate 3.1 acc. EN 10204																				CN	
Dye penetrant NDE of welds																				C9	
Hydrostatic pressure test certificate																				CB	
Documentation language* (supplied in English as standard)																					
German																					M1
Italian																					M2
Spanish																					M3
French																					M4
Chinese																					M6

*Commissioning instructions are supplied with each transmitter.

Comprehensive operating instructions are available as a free download from www.abb.com or printed copies can be ordered as additional items.

StackFlowMaster FPD583 – manual system

		Standard codes													Optional codes						
StackFlowMaster system (manual)	**FPD583**	XX	XX	XX	XX	XXX	XXX	X	X	X	X	XX	X	X	XX	XX	XXX	XXX	XX	XX	XX
Design level																					
Not applicable	Y0																				
1 – mass flow (267CS)	M1																				
Probe type																					
Interface unit only		Y0																			
25 mm OD flanged probe without end support		F3																			
25 mm OD flanged probe with cup end support		F4																			
25 mm OD flanged probe with flanged external end support		F5																			
60 mm OD flanged probe without end support		G3																			
60 mm OD flanged probe with flanged external end support		G5																			
Probe material																					
Interface unit only			Y0																		
316L stainless steel			S6																		
321H stainless steel			S1																		
UNS N06625 Gr.2			N2																		
Other			Z9																		
Stack fitting material																					
Not required				YO																	
Carbon steel				C3																	
316L stainless steel				S6																	
321H stainless steel				S1																	
UNS N06625 Gr.2				N2																	
Other				Z9																	
Process connection size																					
Not required (interface unit only)					000																
DN 40 (1½ in.)					040																
DN 50 (2 in.)					050																
DN 80 (3 in.)					080																
DN 100 (4 in.)					100																
DN 150 (6 in.)					150																
Other					999																
Process connection rating																					
Interface unit only						Y0Y															
ASME 150 lb RF						A1F															
PN 10 / PN 16 RF						D1F															
Other						Z9Z															

See page 16

Continued on page 18

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		Standard codes													Optional codes						
StackFlowMaster system (manual)	**FPD583**	XX	XX	XX	XX	XXX	XXX	X	X	X	X	X	XX	X	X	XX	XX	XXX	XXX	XX	XX	XX
		See page 17														See page 19						
Standoff																						
Not required								0														
Flange standoff								1														
2 x flange standoff + flanged end support								2														
Flanged end support only								3														
Interface unit options																						
Status module interface unit – safe area only									A													
DP transmitter mounting position																						
Interface unit only										0												
1/4 in. NPT needle valves (remote transmitter mounting only)										1												
1/2 in. NPT needle valves (remote transmitter mounting only)										2												
Integral 5-valve manifold (direct mount transmitter only)										5												
Other										9												
DP span limits																						
Not applicable											Y											
1 kPa / 10 mbar / 4 in. H_2O											A											
6 kPa / 60 mbar / 24 in. H_2O											C											
Seal material																						
Not applicable												0										
PTFE												4										
Communications output																						
Not applicable													Y0									
HART digital communication and 4 to 20 mA													H1									
Modbus 485													M1									
DP transmitter housing																						
Not applicable														Y								
Aluminium alloy / 1/2 – 14 NPT														A								
Aluminium alloy / M20 x 1.5														B								
AISI 316L stainless steel / 1/2 – 14 NPT														S								
AISI 316L stainless steel / M20 x 1.5														T								
Integrated LCD display																						
Not applicable															0							
LCD display (backlit)															2							

		Standard codes													Optional codes						
StackFlowMaster system (manual)	**FPD583**	XX	XX	XX	XX	XXX	XXX	X	X	X	X	X	XX	X	X	XX	XX	XXX	XXX	XX	XX	XX
		See pages 17 and 18																				
Temperature element																						
Integral to probe (RTD)																AT						
Integral to probe (thermocouple – no temperature compensation)																AV						
Bolts and gaskets																						
Asbestos free gasket, B7 / 2H stud bolts																	K1					
Asbestos free gasket, 8M / 8MA stud bolts																	K2					
Spiral wound gasket, B7 / 2H stud bolts																	K3					
Spiral wound gasket, 8M / 8MA stud bolts																	K4					
Probe design																						
2-piece construction																		TP2				
Bayonet fitting																		TP3				
Heater interface unit																						
Heater – 230 V AC																			HC2			
Heater – 110 V AC																			HC3			
DP transmitter explosion certificates																						
Factory mutual (FM) – intrinsically safe																				EA		
Factory mutual (FM) – explosion-proof																				EB		
Canadian Standard Association (CSA) – explosion-proof																				EE		
Certificates																						
Material monitoring with inspection certificate 3.1 acc. EN 10204																					C2	
Material monitoring NACE MR 01-75 with inspection certificate 3.1 acc. EN 10204																					CN	
Dye penetrant NDE weld inspection																					C9	
Hydrostatic pressure test certificate																					CB	
MCerts																					CV	
EN 14181 / EN 15267-3 (TÜV Report)																					CU	
Documentation language* (supplied in English as standard)																						
German																						M1
Italian																						M2
Spanish																						M3
French																						M4
Chinese																						M6

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StackFlowMaster FPD581, FPD583 and FPD585
Stack gas metering systems

StackFlowMaster FPD585 – automatic system

StackFlowMaster system (automatic)	FPD585	XX	XX	XX	XX	XXX	XXX	X	X	X	X	X	XX	X	X
Design level															
1 – mass flow (267CS)	M1														
Probe type															
Interface unit only		Y0													
25 mm OD flanged probe without end support		F3													
25 mm OD flanged probe with cup end support		F4													
25 mm OD flanged probe with flanged external end support		F5													
60 mm OD flanged probe without end support		G3													
60 mm OD flanged probe with flanged external end support		G5													
Probe material															
Interface unit only			Y0												
316L stainless steel			S6												
321H stainless steel			S1												
UNS N06625 Gr.2			N2												
Other			Z9												
Stack fitting material															
Not required				YO											
Carbon steel				C3											
316L stainless steel				S6											
321H stainless steel				S1											
UNS N06625 Gr.2				N2											
Other				Z9											
Process connection size															
Not required (interface unit only)					000										
DN 40 (1½ in.)					040										
DN 50 (2 in.)					050										
DN 80 (3 in.)					080										
DN 100 (4 in.)					100										
DN 150 (6 in.)					150										
Other					999										
Process connection rating															
Interface unit only						Y0Y									
ASME 150 lb RF						A1F									
PN 10 / PN 16 RF						D1F									
Other						Z9Z									

Standard codes

Optional codes							
XX	XX	XXX	XXX	XXX	XX	XX	XX

See page 22

Continued on page 21

		Standard codes													Optional codes							
StackFlowMaster system (automatic)	**FPD585**	XX	XX	XX	XX	XXX	XXX	X	X	X	X	X	XX	X	X	XX	XX	XXX	XXX	XXX	XX	XX	XX
		See page 20														See page 22							
Standoff																							
Not required								0															
Flange standoff								1															
2 x flange standoff + flanged end support								2															
Flanged end support only								3															
Interface unit options																							
Control interface unit with zero and span check – safe area only									B														
Control interface unit with zero and span check and purge – safe area only									C														
Control interface unit with purge – safe area only									D														
DP transmitter mounting position																							
Interface unit only										0													
1/4 in. NPT needle valves (remote transmitter mounting only)										1													
1/2 in. NPT needle valves (remote transmitter mounting only)										2													
Other										9													
DP span limits																							
1 kPa / 10 mbar / 4 in. H_2O											A												
6 kPa / 60 mbar / 24 in. H_2O											C												
Seal material																							
PTFE												4											
Communications output																							
4...20 mA output													M5										
Modbus 485													M6										
DP transmitter housing																							
Aluminium alloy / M20 x 1.5														B									
Integrated LCD display																							
LCD display															1								
LCD display (backlit)															2								

StackFlowMaster FPD581, FPD583 and FPD585
Stack gas metering systems

		Standard codes													Optional codes							
StackFlowMaster system (automatic)	**FPD585**	XX	XX	XX	XX	XXX	XXX	X	X	X	X	X	XX	X	X	XX	XX	XXX	XXX	XXX	XX	XX	XX
		See pages 20 and 21																					
Temperature element																							
Integral to probe (RTD)																AT							
Integral to probe (thermocouple – no temperature compensation)																AV							
Bolts and gaskets																							
Asbestos free gasket, B7 / 2H stud bolts																	K1						
Asbestos free gasket, 8M / 8MA stud bolts																	K2						
Spiral wound gasket, B7 / 2H stud bolts																	K3						
Spiral wound gasket, 8M / 8MA stud bolts																	K4						
Probe design																							
2-piece construction																		TP2					
Bayonet fitting																		TP3					
Heater interface unit																							
Heater – 230 V AC																			HC2				
Heater – 110 V AC																			HC3				
Span check regulator																							
Span check regulator																				PC1			
DP transmitter explosion certificates																							
Factory mutual (FM) – intrinsically safe																					EA		
Factory mutual (FM) – explosion-proof																					EB		
Canadian Standard Association (CSA) – explosion-proof																					EE		
Certificates																							
Material monitoring with inspection certificate 3.1 acc. EN 10204																						C2	
Material monitoring NACE MR 01-75 with inspection certificate 3.1 acc. EN 10204																						CN	
Dye penetrant NDE weld inspection																						C9	
Hydrostatic pressure test certificate																						CB	
MCerts (future option)																						CV	
EN 14181 / EN 15267-3 (TÜV Report) (future option)																						CU	
Documentation language* (supplied in English as standard)																							
German																							M1
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Notes

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