ABB MEASUREMENT & ANALYTICS | DATA SHEET | DS/AZ10-EN REV. E

ENDURA AZ10 OXYGEN ANALYZER

Combustion gas analysis for
small-package boilers and marine

ENGINEERED
TO OUTRUN



MEASUREMENT MADE EASY

Superior technology and quality from the world leader in oxygen measurement

Advanced design and precision manufacturing
- Robust, long-life probe for process temperatures up to 800 °C (1,472 °F).
- Multi-layered electrode prolongs cell life even in SO_x environment.
- Proven cell design from over 50 years' experience.
- Fast response to process variations.
- Stable and accurate oxygen measurement.
- Accuracy better than ≤1 % of reading or ±0.05 $\%O_2$.

Marine certification
- IACS E10, Rev. 10 Oct. 2024 Test Specification for type approval.
- ABS certificate 26-0645507-PDA.

Advanced transmitters
- Onboard sensor lifetime indicator gives pre-warning of sensor status.
- HART® communication v5.7.

Manual, remote, or automatic calibration
- Automatically on time schedule.
- Can be initiated locally or by external command.

Rapid commissioning and start-up
- Commissioning in less than 10 minutes using 'Easy Set-up' function.
- Supplied ready to operate using factory calibrated data.

Simple installation and operation
- Close-coupled sensor and standard intake tubes.
- No need for pumped- or compressed-reference air.

Minimal maintenance even in hostile environment
- Can be performed in situ with basic tools.
- Extremely low-drift ABB zirconia technology (typically ≤0.2 $\%O_2$/month).
- Normally needs only periodic 1-point calibration with air.

What is Endura AZ10?

Endura AZ10 is the latest in a long line of high-performance, combustion gas oxygen analyzers from ABB. It is designed specifically for small, industrial boilers and marine applications.

The system is designed to work in process temperatures up to 800 °C (1,472 °F) and is limited only by a maximum mounting flange temperature of 400 °C (752 °F).

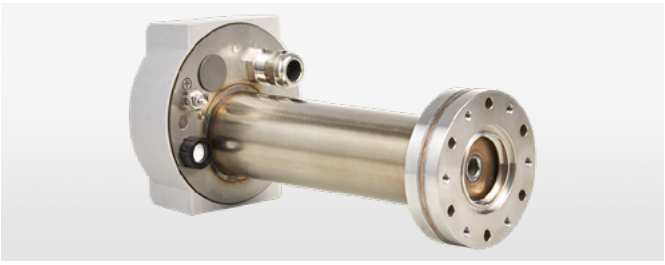
Endura AZ10 comprises a remote transmitter and zirconia-based sensor located on the outside of the process duct wall. The sample travels to the sensor using a guide tube. In applications where the process duct is small, the sensor may be mounted directly in the process without the use of a sample guide tube.



01 AZ10 transmitter, probe and sample guide tubes

Operation without pumped- or compressed-reference air

All reliable zirconia-based sensors need reference air for accurate oxygen measurement. The AZ10 sensor provides atmospheric, reference air by diffusion. It passes through a porous membrane that permits air to enter, yet maintains the probe's IP66 (NEMA 4X) rating. An external pumped- or compressed-air supply is not required.



02 Diffusion inlet for reference air on underside of AZ10 sensor

Compact auto-calibration system

ABB's fully automatic calibration system controls the test gas sequence and detects test gas availability, eliminating incorrect calibrations due to loss of test gas. Auto-calibration provides security of measurement and complete confidence in system performance.



03 Automatic calibration system

Long-term operation without technician intervention minimizes operating costs, total cost-of-ownership and optimizes system accuracy. A significant proportion of service visits to an analyzer result in 'no fault found'. Endura AZ10's high-quality manufacture, advanced diagnostics and automatic calibration is targeted at reducing this wasted effort and cost.

Minimal maintenance even in hostile environments

To comply with IMO standards and aid operators of small package boilers, Endura AZ10 has been designed to require absolutely minimal maintenance. The AZ10 probe cell is easily accessed and replaced. Simple maintenance can be performed in situ with basic tools and skills.



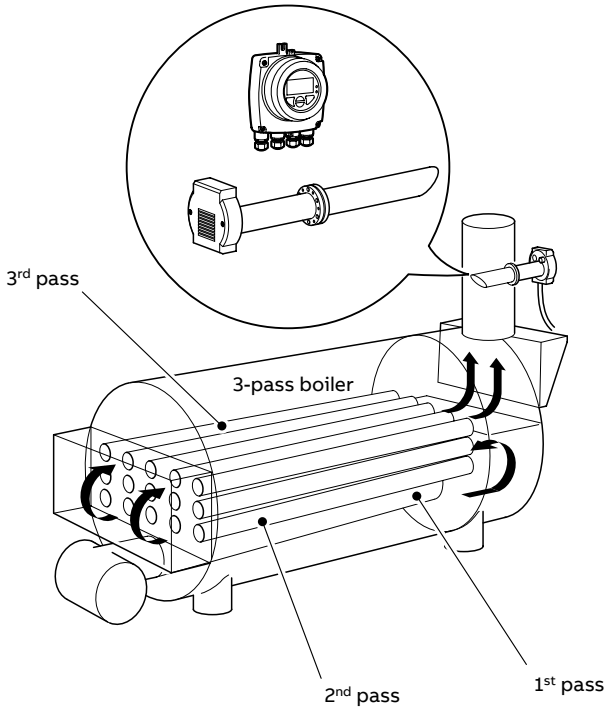
04 The AZ10 sensor is easily replaceable

Ideal for small package boilers

Cost-effective solution for precise monitoring of small boilers in hospitals, academia, and manufacturing industries such as fertilizer production, paper manufacturing, food & beverage production, and the chemical and pharmaceutical industries.

Flexibility and simplicity of installation, along with ease of operation, make the advanced AZ10 an ideal choice for OEMs and end-users. It provides an economical investment to minimize emissions and improve boiler efficiency and economy.

AZ10 has been designed for small industrial boilers commonly up to 27 t/h of steam capacity, 6 to 25 bar (87 to 362 psi), and generally ≤10 MW. Up to 3 oxygen measurement systems can be used in a boiler furnace or economizer outlets. A typical process is fueled by biomass, fuel oil, kerosene or gas, and operates between 150 and 300 °C (300 and 570 °F), ±0.5 kPa and dust ≤1 g/Nm^3.



05 Typical measurement point – boiler furnace outlet or economizer outlet

Proven solution for Marine EGR

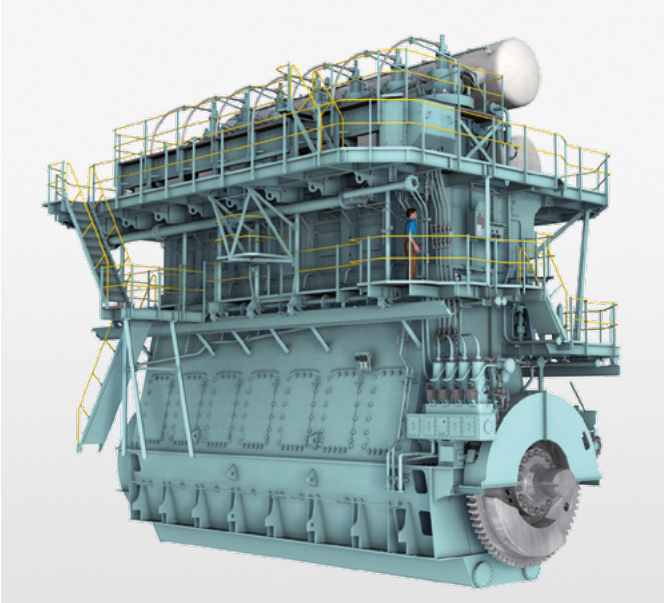
AZ10 performs a critical role in marine applications, enabling optimization of exhaust gas recirculation (EGR) technology in marine diesel engines. This helps ensure regulatory compliance with the International Maritime Organization (IMO) Annex VI regulation. Oxygen measurement also permits optimization of engine performance.

The EGR recirculates engine exhaust gases mixed with intake air back to the combustion chamber. By replacing oxygen with carbon dioxide, peak combustion temperatures are reduced, limiting NOx emissions. The oxygen content is monitored closely by the AZ10.

The AZ10 system has been used successfully in hundreds of marine EGR installations. ABB's multilayered electrode technology prolongs cell life even in hazardous marine diesel engine NO_x emissions environment. Performance has been validated by marine industry extreme tests with type approval testing to Classification Society rules.

Endura AZ10 is marine certified:

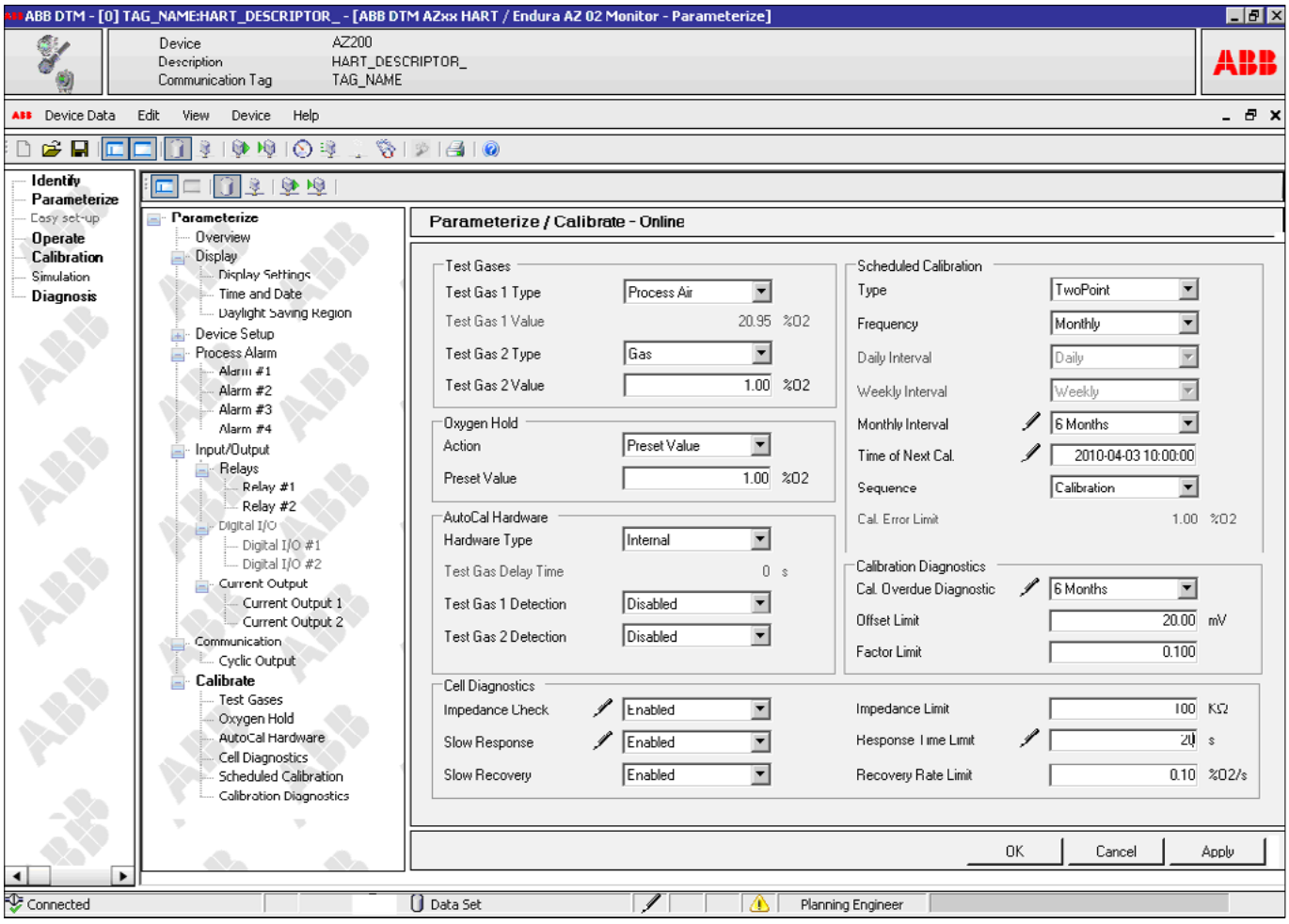
- IACS E10, Rev. 10 Oct. 2024 test specification for type approval.
- ABS certificate 26-0645507-PDA.



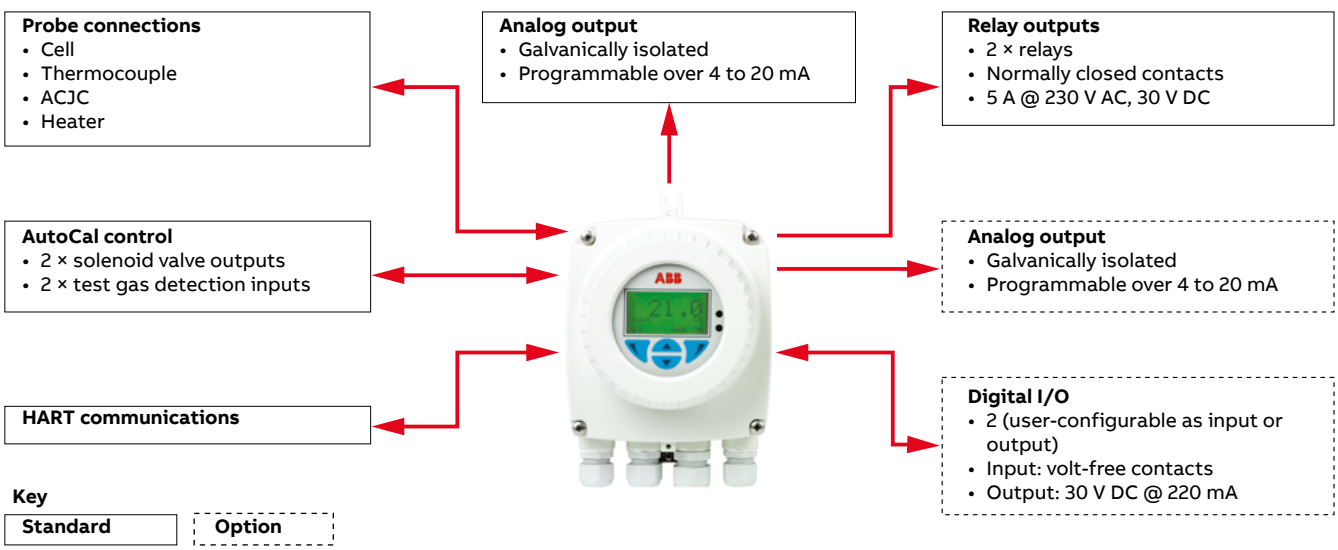
06 Continuous oxygen monitoring on EGR with AZ10 marine sensor technology

Endura AZ10 transmitter

The Endura AZ10 transmitter is equipped with HART communication as standard, supported by a full Device Type Manager (DTM) to enable remote access to the analyzer through a user-friendly graphical interface. The DTM provides full access to the transmitter setup, logged data and diagnostics information together with live data.



07 DTM graphical interface



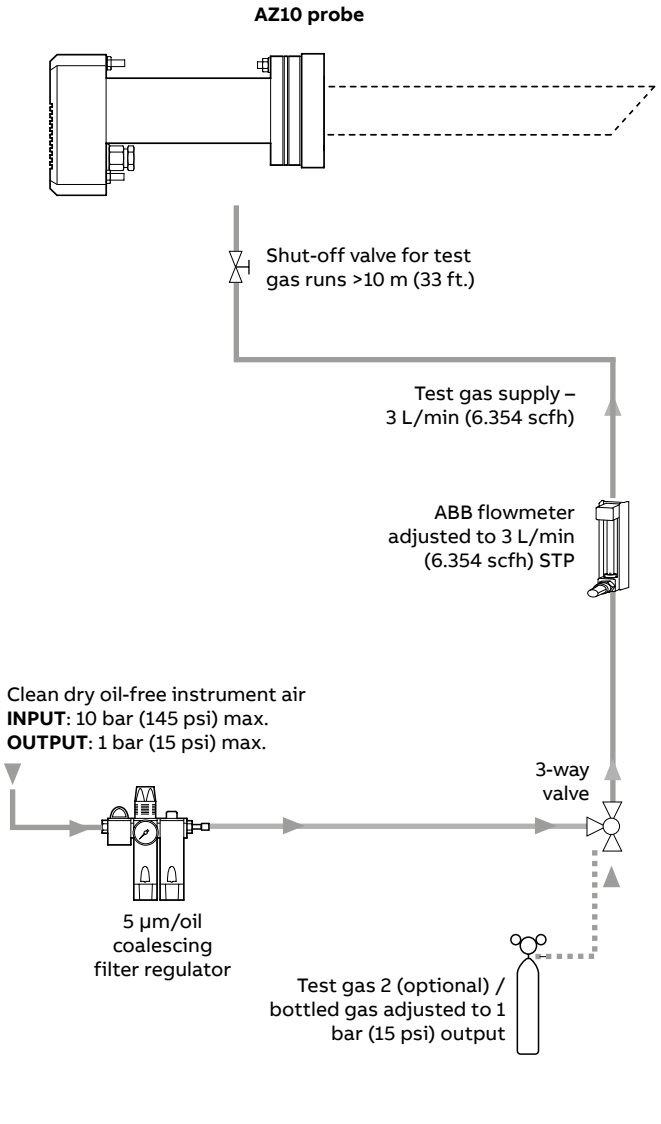
08 AZ10 inputs and outputs

Test gas and reference air supply configurations – non-AutoCal systems

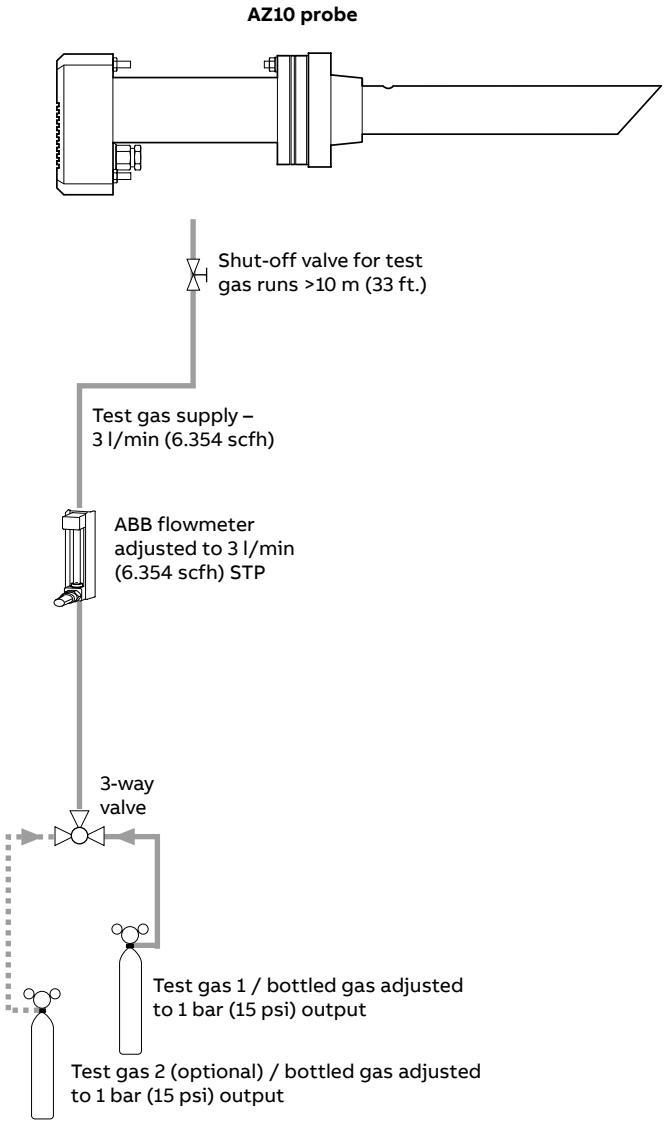
If using the ABB-supplied test gas port with standard filter option, the test gas supply must be 3 to 3.5 L/min (6.354 to 7.413 scfh).

Test gas can be connected to the supplied sensor test gas connection or via customer's manifold. If using customer's manifold, flows may differ from values shown below.

System using air as test gas 1 and bottled gas as (optional) test gas 2



System using 2 bottled test gases

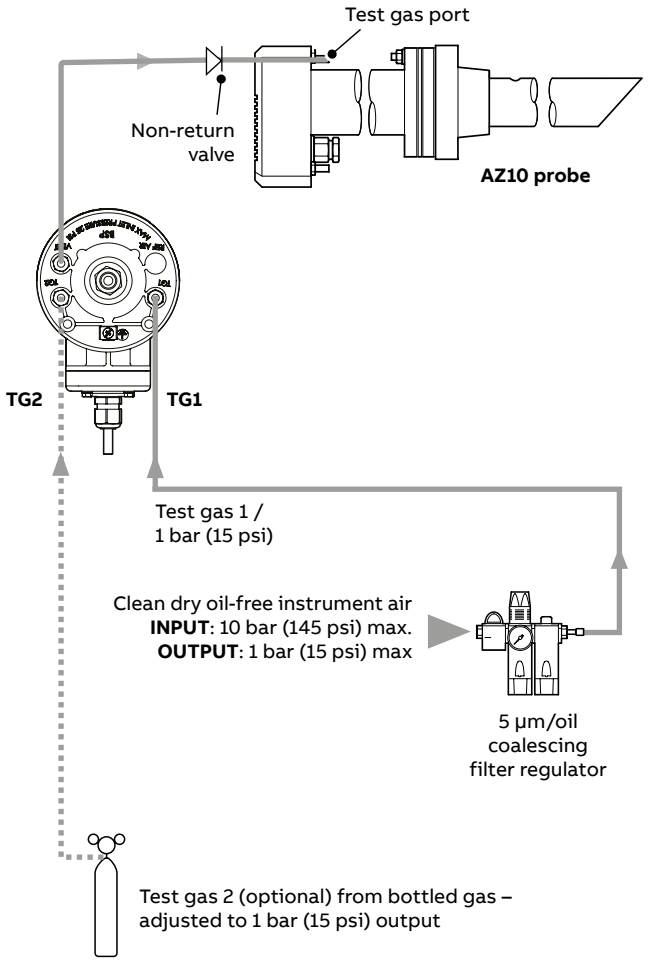


Test gas and reference air supply configurations – AutoCal systems with restrictors

System using air as test gas 1 and bottled gas as (optional) test gas 2

AZ10 AutoCal unit

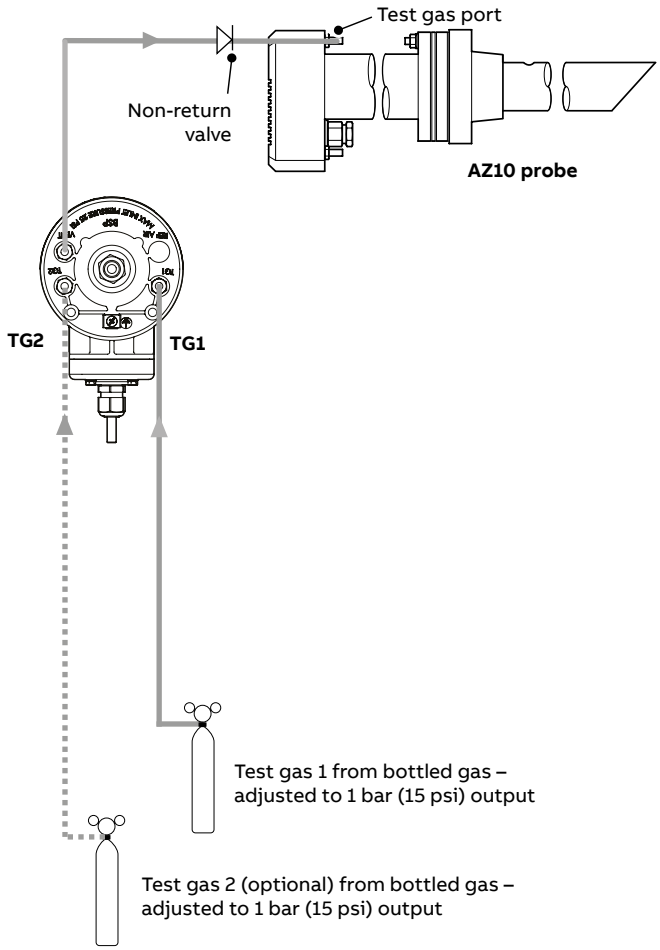
- Test gas supply:
  - restrictor in AutoCal unit limits flow to 2.2 l/min (4.662 scfh) at 1 bar (15 psi)



System using 2 bottled test gases

AZ10 AutoCal unit

- Test gas supply:
  - restrictor in AutoCal unit limits flow to 2.2 l/min (4.662 scfh) at 1 bar (15 psi)

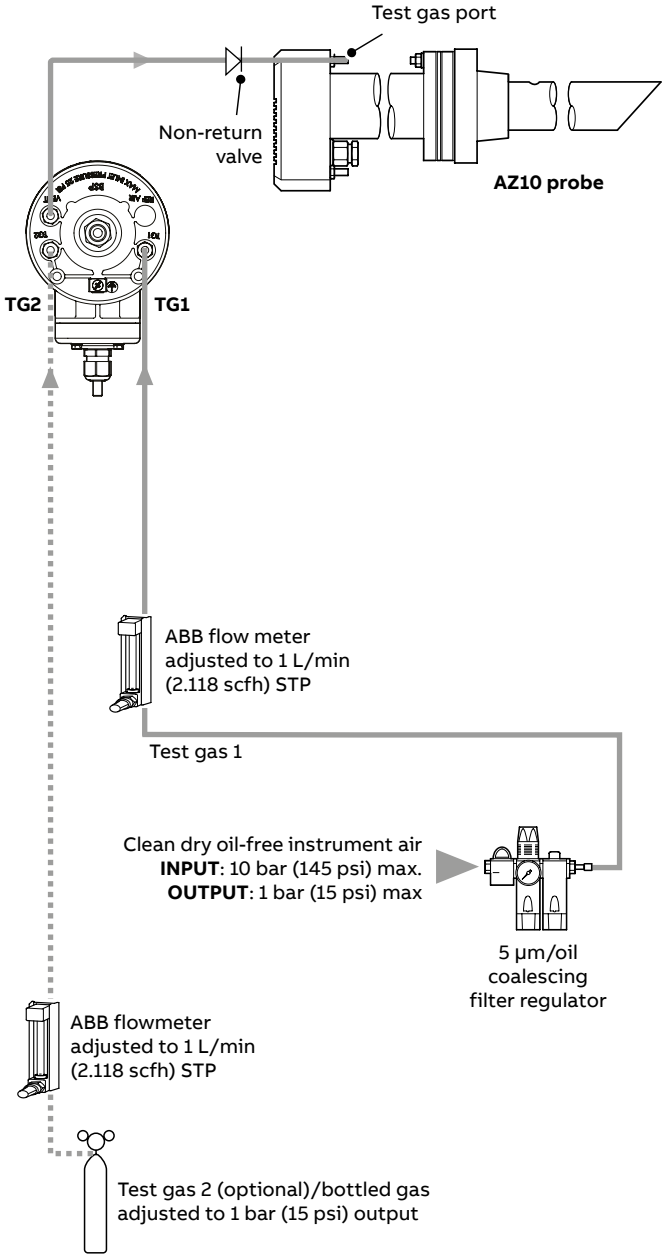


Test gas and reference air supply configurations – AutoCal systems without restrictors

System using air as test gas 1 and bottled gas as (optional) test gas 2

AZ10 AutoCal unit

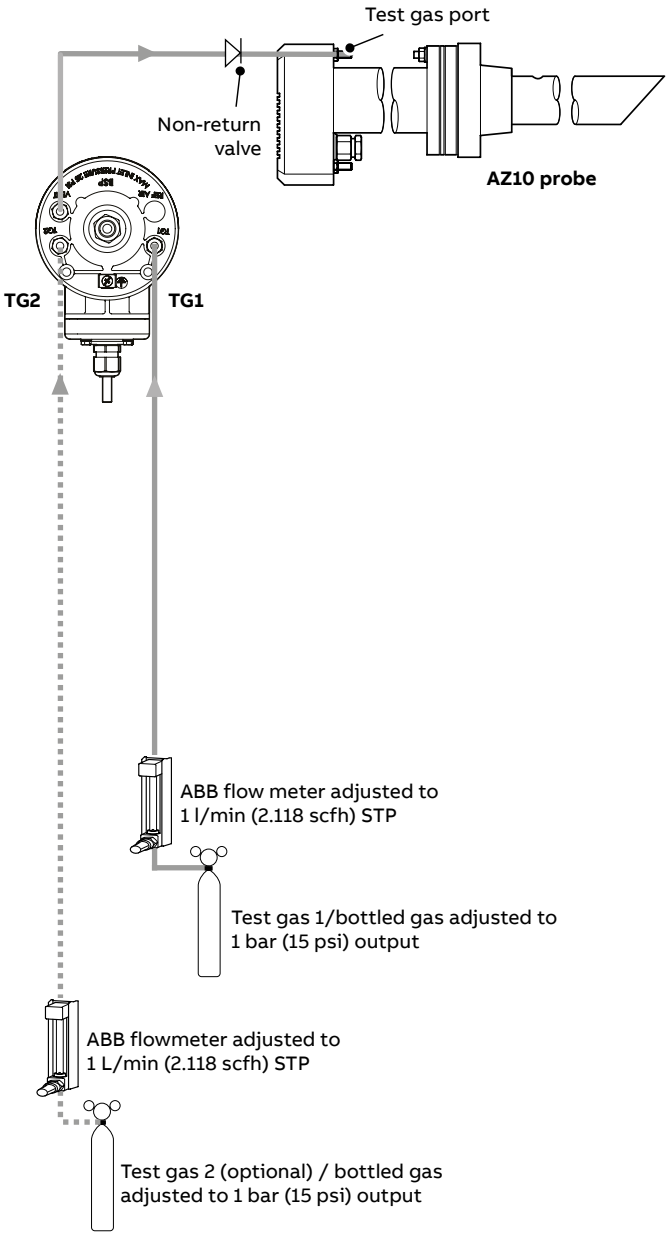
- Test gas supply:
  - 1 L/min (2.118 scfh)



System using 2 bottled test gases

AZ10 AutoCal unit

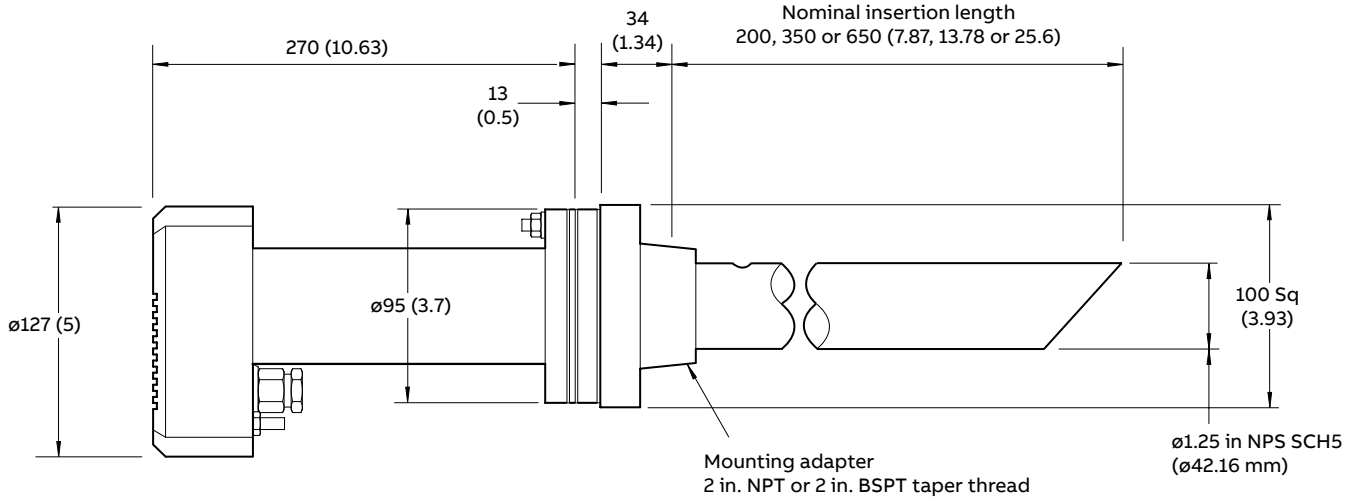
- Test gas supply:
  - 1 L/min (2.118 scfh)



Dimensions

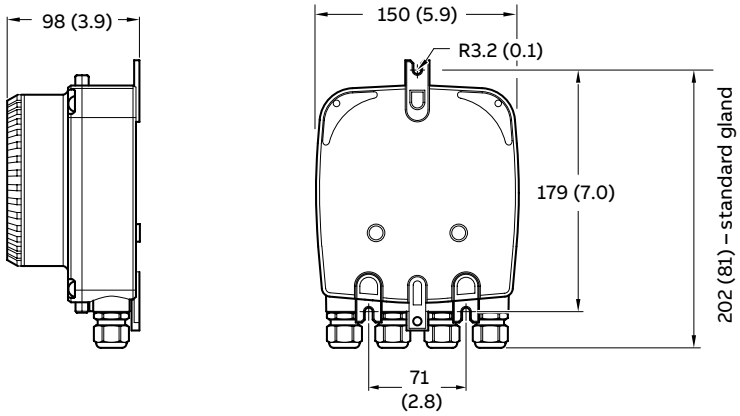
Probe

Dimensions in mm (in.)



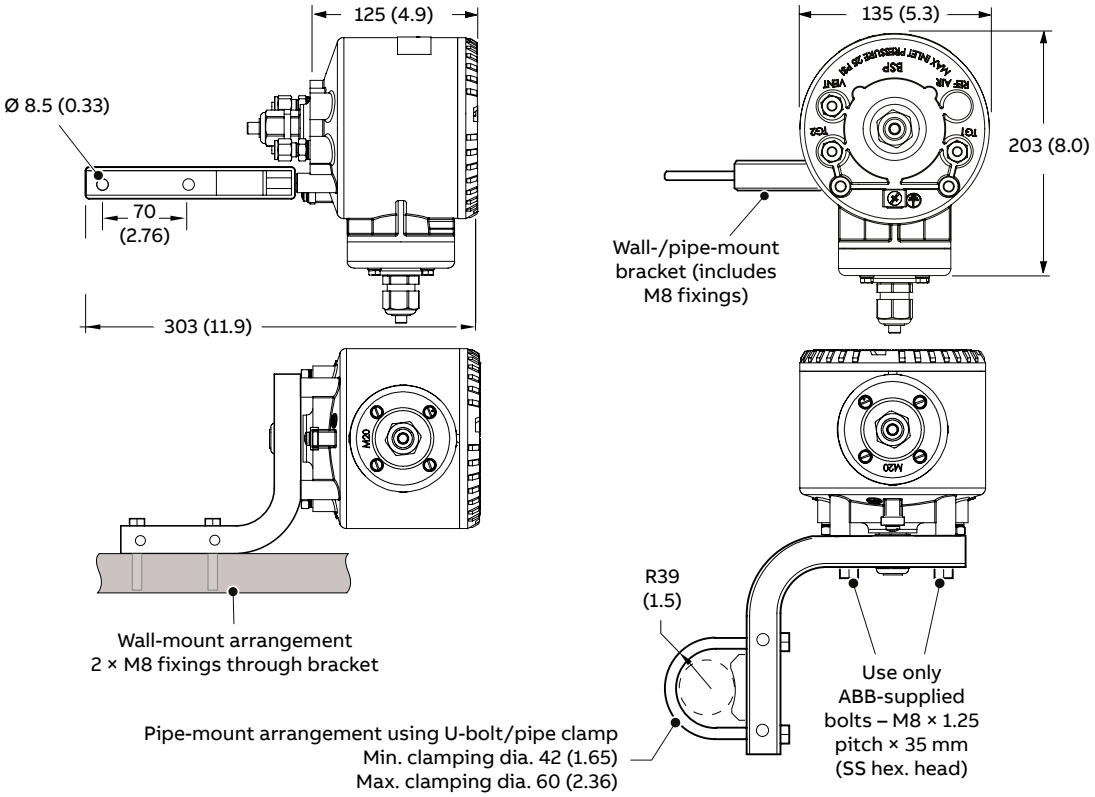
Transmitter (standard gland shown)

Dimensions in mm (in.)



…Dimensions

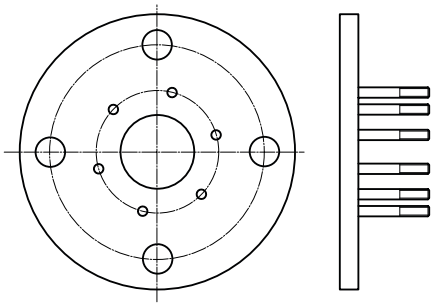
Auto-calibration unit
Dimensions in mm (in.)



Probe flanges (all probe lengths) and mounting plates for standard probe flanges

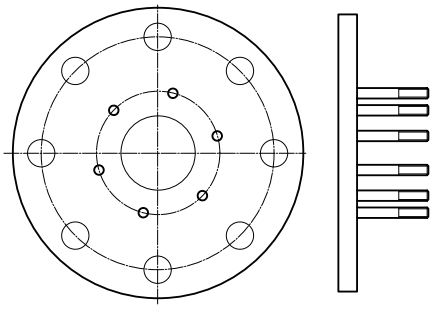
Dimensions in mm (in.).

Flange type	A	B	C (Ø)	D (PCD)
ANSI 2.5 in. 150	177.8 (7.00)	12 (0.47)	19 (0.75)	139.7 (5.50)
ANSI 3 in. 150	190.5 (7.50)	12 (0.47)	19 (0.75)	152.4 (6.00)
DIN 65 PN16	185 (7.28)	12 (0.47)	18 (0.70)	145 (5.70)



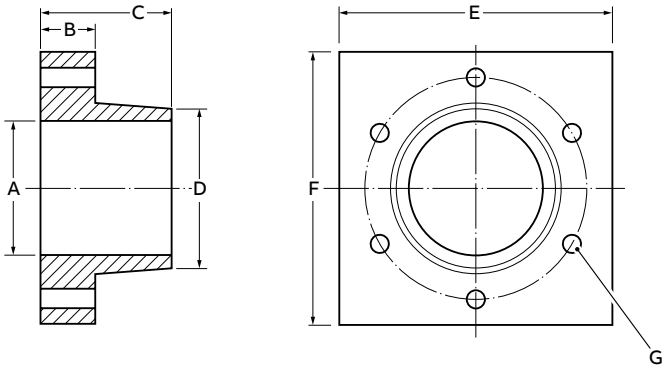
4-hole probe flange types and dimensions

Flange type	A	B	C (Ø)	D (PCD)
DIN 80 PN16	200 (7.87)	12 (0.47)	18 (0.70)	160 (6.30)



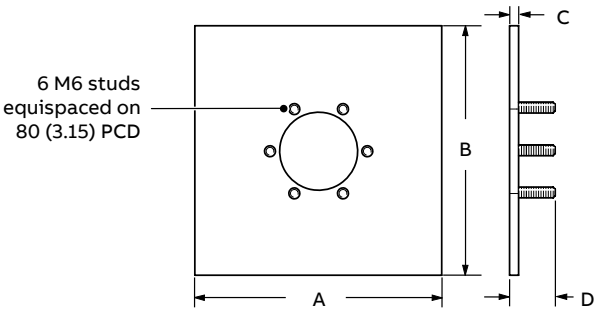
8-hole probe flange types and dimensions

Flange type	A	B	C	D	E	F	G (PCD)
2 in. NPT	48 (1.88)	20 (0.79)	48 (1.89)	2 in. thread	100.8 (3.96)	100.8 (3.96)	80 (3.15)
2 in. BSP	48 (1.88)	20 (0.79)	48 (1.89)	2 in. thread	100.8 (3.96)	100.8 (3.96)	80 (3.15)



09 2 in. NPT/BSP mounting adapter and dimensions

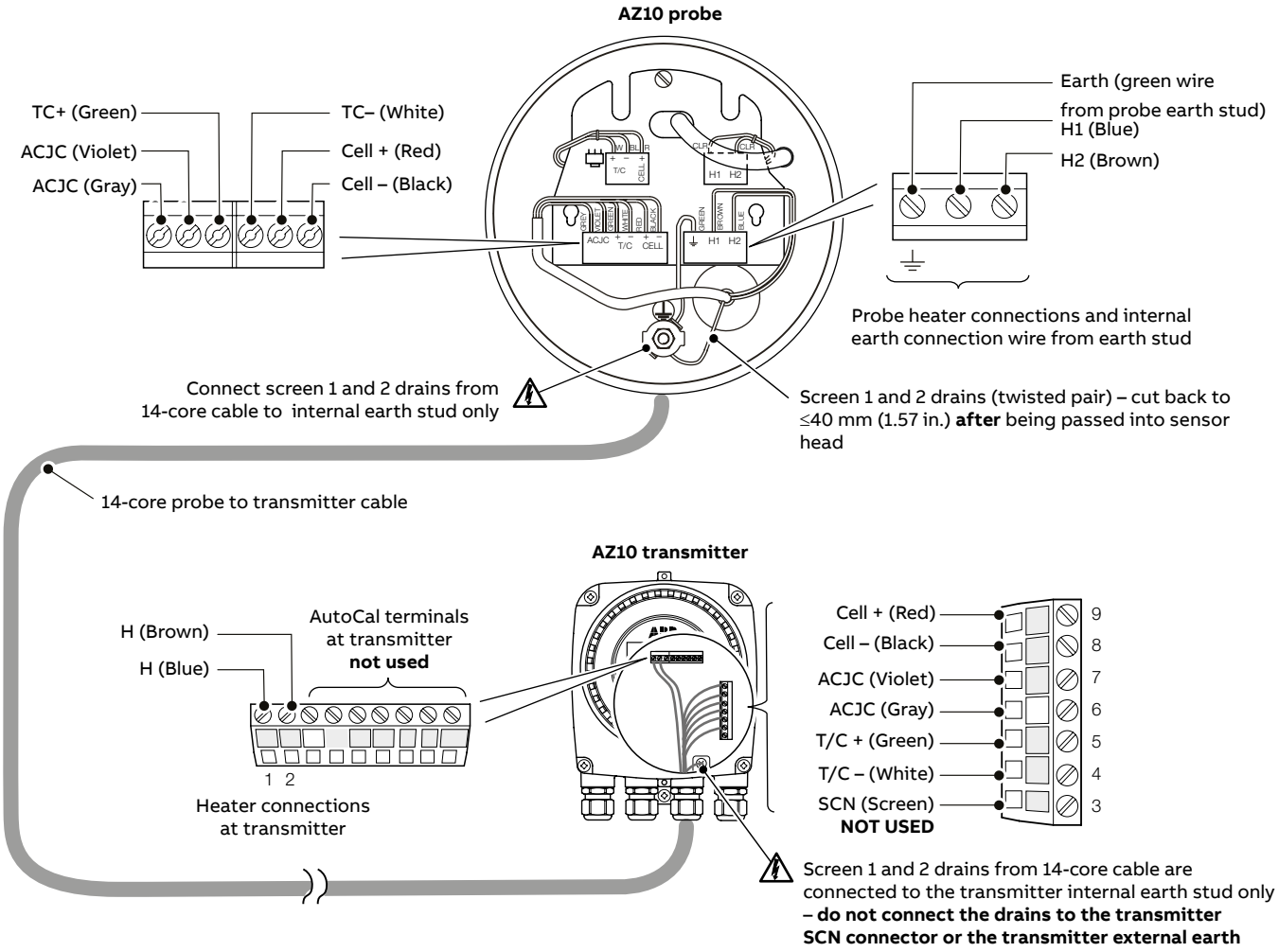
Flange type	A	B	C	D
ABB standard	160 (6.3)	160 (6.3)	7 (0.27)	16 (0.63)
Comprising: mounting plate, gasket, 6 each: M6/M10 shakeproof washers, plain washers and nuts				



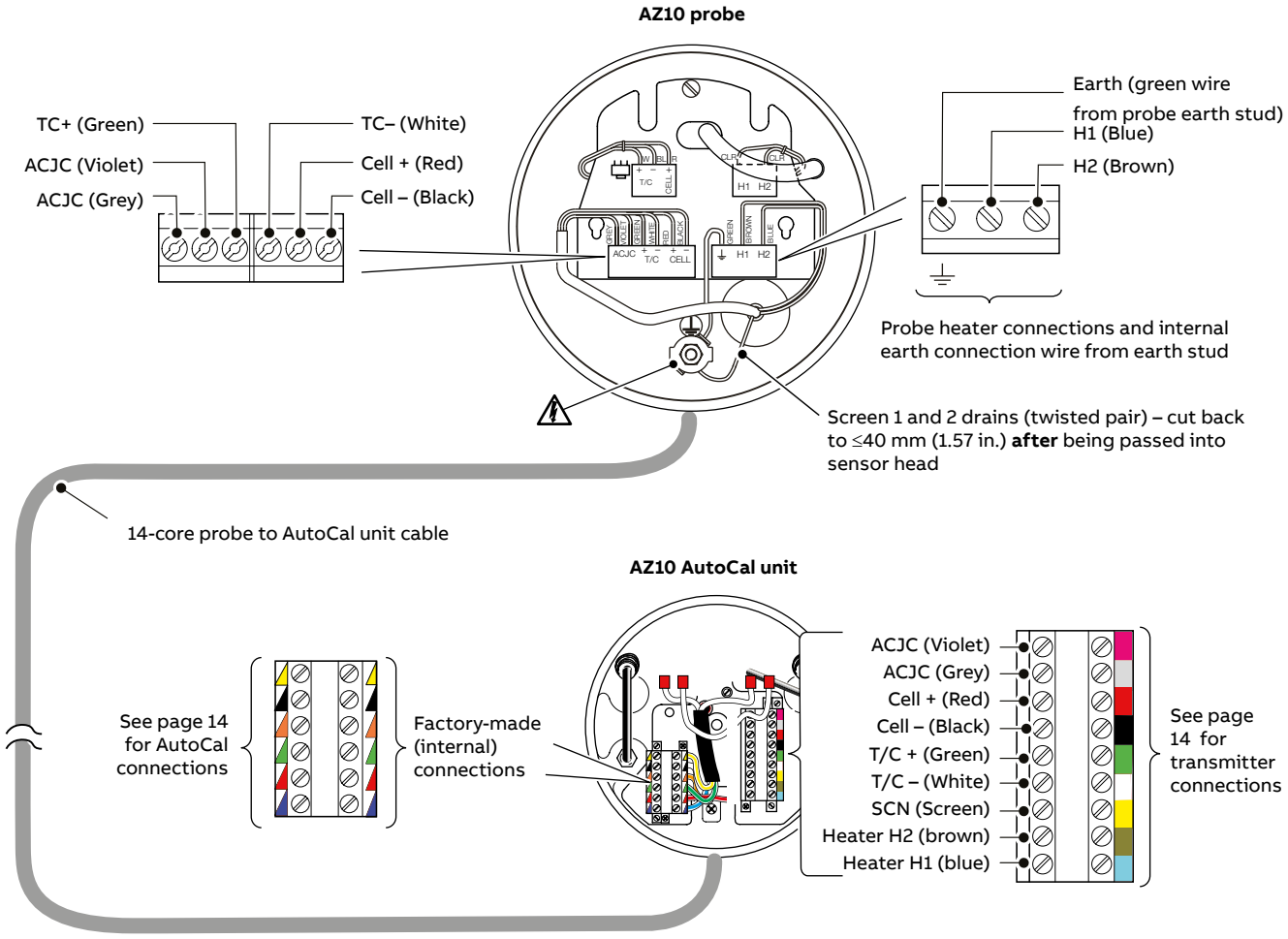
10 ABB standard mounting plate

Electrical connections

AZ10 probe to AZ10 transmitter (non-AutoCal systems only)

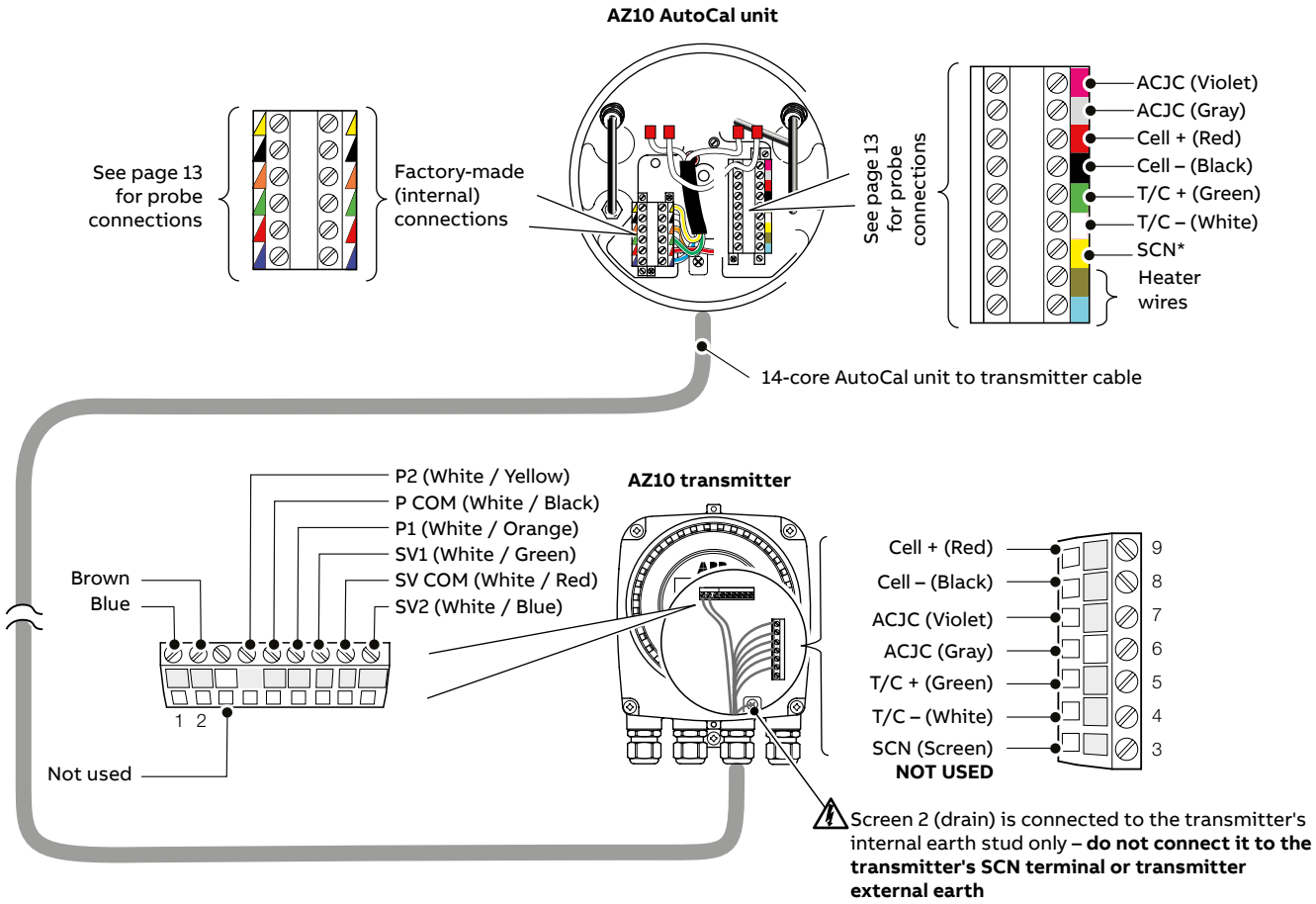


AZ10 probe to AZ10 AutoCal unit (AutoCal systems only)



...Electrical connections

AZ10 AutoCal unit to AZ10 transmitter (AutoCal systems only)



* Screen 2 (drain) is connected to the AutoCal unit's outer SCN connector only

System specification

Measurement performance

Range:

0.01 to 100 % O2

Test gas response time

- Initial dead time 3 seconds
- T90 < 15 seconds

System accuracy

< ±1 % of reading or 0.05 % O_2, whichever is the greater, based on a nominal range of 0.01 to 25 % O_2

Drift

- < ± 1 % maximum % O_2 range value per month (without calibration)
- < ± 0.2 % typical

Error due to flue wall temperature changes

0.017 % of reading/°C (0.008 % of reading/°F) (based on a 2-point calibration against certified test gases)

Environmental data

Ambient operating temperature

- Transmitter –20 to 55 °C (–4 to 131 °F)
- Probe –20 to 70°C (–4 to 158 °F)

Storage temperature

–40 to 85 °C (–40 to 185 °F)

Operating humidity

Up to 95 % RH, non-condensing

Sunlight

Store and operate out of direct sunlight

Ingress protection

- Probe (excludes remote/integral transmitter): IP66 (NEMA 4X)
- Electronics enclosures – remote and integral: IP66 (NEMA 4X)

Power supply

AC power supply

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

Electronics

< 10 W

Probe heater

< 100 W

EMC

Emissions and immunity

Conforms to EN61326-1

Safety

General safety

Conforms to EN61010-1

Approvals and safety certification

CE mark

Probe specification

Physical

Process connection

- ANSI B16.5 150 lb
- 2.5, 3 in.
- DIN2501 Part 1
- 65, 80 mm
- 2 in. NPT, 2 in. BSP (flange pressure ratings do not apply)
- ABB standard flange

Probe body material

316L stainless steel

Mounting angle

Horizontal to vertically down

Process conditions

Standard process temperature

–20 to 800 °C (–4 to 1,472 °F)

Process pressure

Designed to withstand 35 kPa (5.1 psi) – positive or negative (pressure compensation required above 5 kPa (0.7 psi) – transmitter can apply fixed pressure compensation)

Operating requirements

Test gas

User-selectable, 100 to 0.1 % O_2 balance N_2 and / or air (air is recommended as one of the test gases)

AutoCal with restrictors	1 bar (15 psi) – flow meters not required as restrictors preset flow to 2.2 L/min (4.662 scfh)
AutoCal without restrictors	1 bar (15 psi) – flow meters required, set to 2.2 L/min (4.662 scfh) flow
No AutoCal	1 bar (15 psi) – flow meter required

Calibration

Manual, semi-automatic or automatic (controlled by Endura transmitter)

Automatic calibration unit

AutoCal hardware

- Built-in solenoid valves for control of test gas flow
- Built-in pressure switches to detect presence of test gases

Heater operational requirements

Probe

Nominally 190 Ω, 70 W at 115 V AC – power is limited to 70 W max. by transmitter over an 85 to 265 V AC range

Transmitter specification

Transmitter enclosures

Remote

Wall-mounted
4 gland entries
Optional ½ in. NPT, M20

Automatic calibration

AutoCal hardware

- Isolated solenoid valve control as standard, 24 V @ 2 W per valve*
- Dedicated isolated digital inputs to monitor pressure switch contacts as standard – voltage-free, normally closed with gas present

Display and switches

Display type

Graphical 128 x 64 pixel LCD

Display backlight

Green LED

Operator switches

4 capacitive switches (operated through the front glass)

Relay outputs

Number

2 standard

Type

Normally closed, 5 A @ 230 V AC
or 30 V DC (non-inductive)

Functions

User-configurable – can be activated by one or more of the following signals:

- Process alarm 1, 2, 3, 4
- Calibration in progress
- Calibration failed
- Out of test gas 1, 2
- Test gas 1 valve control
- Test gas 2 valve control
- Failure diagnostic
- Out-of-specification diagnostic
- Maintenance required diagnostic
- Function check diagnostic

Analog outputs

Standard

- 1 isolated current output
- Programmable to retransmit oxygen (linear or logarithmic) or temperature
- Programmable over 4 to 20 mA
- Over-range capability to indicate system failure programmable from 4 to 22 mA

Optional

- 1 isolated current output
- Programmable to retransmit oxygen (linear or logarithmic) or temperature
- Programmable over 0 to 20 mA
- Over-range capability to indicate system failure programmable from 0 to 22 mA

* For driving internal automatic calibration (AutoCal) probes or can be used to drive external calibration units on remote transmitters only.

Digital I/O

Number of digital I/Os

2

I/O configuration

User-configurable as either input or output

Input type

Volt-free contact

Output

Transistor switch capable of sinking 220 mA, low output, < 2 V DC, switch voltage 30 V DC maximum

Isolation

Not isolated from each other or from the microprocessor circuitry

Input functions

- Automatic calibration start on falling edge (when a volt-free switch is closed)
- Automatic calibration start on rising edge (when a volt-free switch is open)
- Automatic calibration stop on falling edge (when a volt-free switch is closed)
- Automatic calibration stop on rising edge (when a volt-free switch is closed)
- Automatic calibration start/stop – starts auto-calibration on falling edge (volt-free switch is closed) and stops auto-calibration on rising edge (volt-free switch is open)
- Select 1-point/2-point calibration type – high level (volt-free switch is open) selects 1-point, low level (volt-free switch is closed) selects 2-point

Output functions

- Process alarm 1, 2, 3, 4
- Calibration in progress
- Calibration failed
- Out of test gas 1
- Out of test gas 2
- Test gas 1 valve control
- Test gas 2 valve control
- Failure diagnostic
- Out-of-specification diagnostic
- Maintenance required diagnostic
- Function check diagnostic

HART communications

Version

5.7 as standard

Integration

- Device Type Manager (DTM) and Electronic Device Description (EDD)
- Provide online/offline device configuration, online monitoring of measurement values and diagnostic states

DTM

- FDT v1.2.1 compliant
- Works with FDT framework packages (for example, ABB Asset Vision Basic)

EDD

Compliant with suitable framework tools (for example, SDC 625 and SIMATIC PDM tools)

Languages

English

Calibration

Manual calibration

- 1 point (offset)
- 1 point (factor)
- 2 point (offset + factor)

Automatic calibration

- 1 point (offset)
- 2 point (offset + factor)

Calibration control

- Front panel controls
- Digital inputs
- HART commands
- User-defined schedule

Calibration scheduler

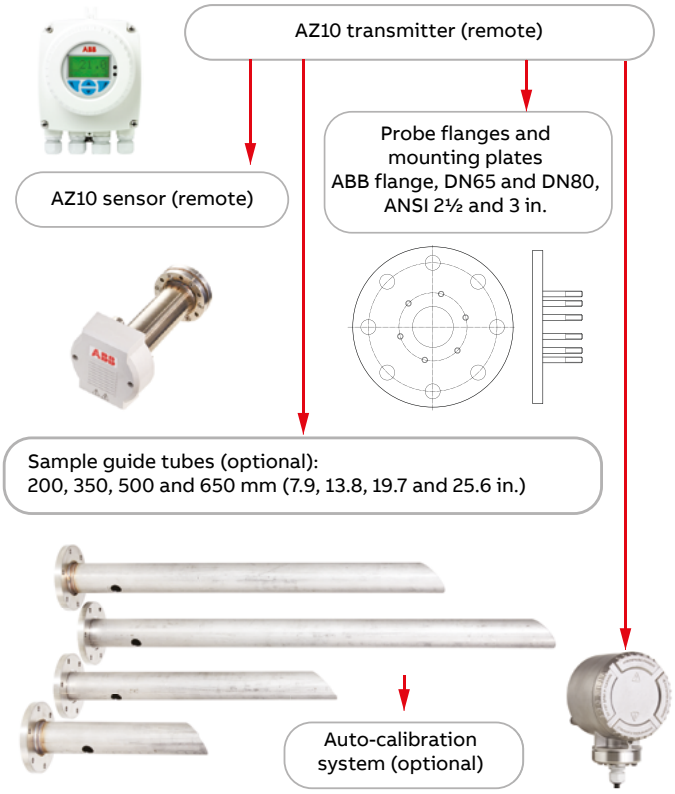
User-defined schedule enables automatic calibration frequency to be set from 1 day to 12 months

Ordering information

The Endura AZ10 system comprises a codeable transmitter and sensor. The system can be optimized to suit local requirements by selection of optional accessories:

- Probe flange mounting plate
- Sample guide tube
- Probe to transmitter cable
- Auto-calibration system
- Auto-calibration cable

Sample guide tubes are available in lengths of 200, 350, 500 and 650 mm (7.9, 13.8, 19.7, and 25.6 in.). To ensure a reliable supply of sample to the sensor, guide tubes longer than 650 mm (25.6 in.) are not recommended.

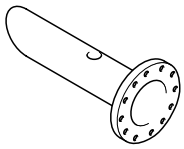
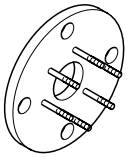
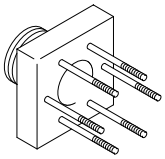
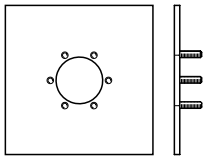
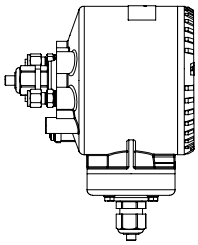


Endura AZ10 oxygen analyzer	**AZ10/**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**/XXX**
Transmitter options										
None (no transmitter required)		0								
1 analog output		1								
2 analog outputs		2								
1 analog output + 2 digital inputs/outputs		3								
Transmitter entry type										
None (no transmitter required)			0							
Metric (M20) metal			3							
Imperial (½ in. NPT) metal			4							
Transmitter system type										
None (no transmitter required)				0						
Remote sensor				3						
Sensor type*										
None (no sensor required)					0					
Remote sensor – standard AZ10					4					
Remote sensor – old AZ100-type**					5					
Sensor entry type										
None (no sensor required)						0				
Metric (M20)						1				
Imperial (½ in. NPT)						2				
Sensor filter options type										
None (no sensor required)							0			
Standard filter							1			
No filter (recommended for marine duty)							2			
System location										
Marine (all metal glands)								1		
General purpose (plastic transmitter glands, metal sensor gland)**								2		
Language (operating instructions)										
English									E	
German									G	
French									F	
Spanish									S	
Italian									I	
Engineering										
Standard										/STD
Special										/SPX

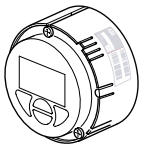
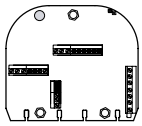
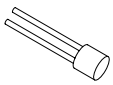
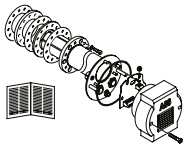
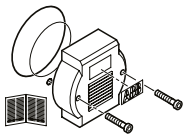
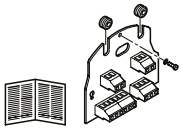
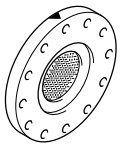
* Backwards-compatible (to suit AZ100 system).

** Not part of Marine certificate.

Accessories

Part number	Description	
	Sensor and auto-cal cable (standard)	
AZ200141	5 m (16.4 ft)	
AZ200142	10 m (32.8 ft)	
AZ200143	25 m (49.2 ft)	
AZ200144	50 m (164.0 ft)	
AZ200145	75 m (213.2 ft)	
AZ200146	100 m (328.0 ft)	
	Sensor and auto-cal cable (CSA-approved)	
AZ200431	5 m (16.4 ft.)	
AZ200432	10 m (32.8 ft.)	
AZ200433	25 m (49.2 ft.)	
AZ200434	50 m (164.0 ft.)	
AZ200435	75 m (213.2 ft.)	
AZ200436	100 m (328.0 ft.)	
	Sample guide tube	
AZ100078	200 mm (9.84 in.)	
AZ100079	350 mm (15.75 in.)	
AZ100080	500 mm (21.65 in.)	
AZ100081	650 mm (27.56 in.)	
	Flange adapter	
AZ100092	2.5 in. ANSI	
AZ100093	3 in. ANSI	
AZ100094	DIN 65	
AZ100095	DIN 80	
	Adapter	
AZ100096	2 in. NPT	
AZ100097	2 in. BSP	
AZ100098	Mounting plates for ABB standard flange	
	Endura AZ10 AutoCal unit (without test gas restrictors)	
AZ250098	BSP	
AZ250096	NPT	
	Endura AZ10 AutoCal unit (with test gas restrictors)	
AZ250099	BSP	
AZ250097	NPT	

Spares

Part number	Description	
	AZ20 Transmitter cartridge	
AZ200 750	Standard	
AZ200 751	Standard + analog O/P	
AZ200 752	Standard + digital O/P	
AZ200758	Remote (type 4) transmitter backplane	
AZ200724	Probe heater circuit fuse	
AZ200725	PT1000 cold junction compensation	
AZ100065	Seals and fixings kit	
AZ100068	Lid assembly spares kit	
AZ100256	Probe terminal PCB	
AZ100069	Probe filter kit	
AZ100057	M20 gland large bore kit	
AZ100070	½ in. NPT gland large-bore kit	

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- SIMATIC is a registered trademark of Siemens AG.

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