FUTURA
sensor catalog

Advanced capacitance based cell density measurement technology

ABER

ABER

Continually setting the standard for real-time biomass measurements, from the pioneers of capacitance based biomass monitoring.

www.aberinstruments.com

Contents

Setting the benchmark

Aber's pioneering work in the development and use of dielectric instrumentation to monitor biomass, by measuring cell membrane capacitance and media conductivity, has regularly set new standards. In the biotech market, our current FUTURA is seen as the benchmark in determining live cell concentration online in bioreactors.

Principle of ABER's Cell Capacitance Technology

Cells with intact plasma membranes can be considered to act as tiny capacitors under the influence of an electric field. The non-conducting nature of the plasma membrane allows a build up of charge. The resulting capacitance can be measured: it is dependent upon the cell type and is directly proportional to the membrane bound volume of these viable cells.

The capacitance (pF/cm) that the Aber technology measures can easily be converted into other units such as cells/ml, g/L etc. Other units can also be derived from the raw capacitance measurements, depending on the application for which the Aber system is used.

FUTURA also measures the Conductivity of the medium, in millisiemens per centimeter (mS/cm). Conductivity is not used to measure biomass but is indicative of the production or utilization of ions by the cell suspension. The ABER system & probe provides an electrical field and measures LIVE cell concentration online.

Widely adopted

Aber's proven performance and specialized knowledge as pioneers of capacitance technology is demonstrated by the fact that Aber Sensors are widely adopted by the world's leading biotech companies in both R&D and cGMP with over 90% of all capacitance based sensors used in manufacturing supplied by Aber.

Manufacturing ready

The robustness and proven performance of Aber's sensors make them the first choice for manufacturing, providing a clear and consistent scalable pathway from R&D and process development all the way through to cGMP manufacturing. This is further enhanced by the 2 year warranty on all reusable sensors with extensive support at hand from Aber's global team and experienced network. With Instrument verification and certification packages available, our customers can rest assured that compliance is covered.

Applications

ABER has a wealth of hands-on knowledge across an expanding array of applications, from R&D through to manufacturing.

Below are some sample applications demonstrating the benefits of ABER's real-time capacitance sensors.

Special report in association

BioProcess International

How capacitance measurement can improve viral vector and virus-based vaccine production

With the increasing development of viral vector and virus-based vaccines, technologies which help to manufacture and scale-up these types of vaccine quickly and cost-effectively have become more critical.

Find out how in-line capacitance can produce a detailed fingerprint of cell culture processes and the benefits this brings to vaccine production. From case studies summaries with baculovirus, AAV and measles, you will discover from the report why using capacitance can help determine the optimum harvest time and increase maximum virus concentration to produce more vaccine doses using smaller bioreactors.

- View the report

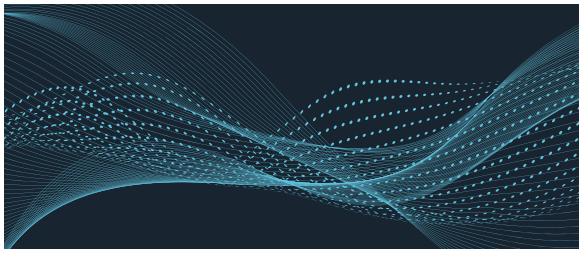
Biomass sensors for biopharmaceutical manufacturing

The biopharmaceutical industry relies on proven online analytics to monitor and automate manufacturing processes. Companies worldwide rely on Aber's proven capacitance based viable biomass sensors and support services to monitor and automate manufacturing processes in both reusable and single-use formats.

Aber's viable biomass sensors are designed to support all stages of bioprocess development and to be seamlessly transferrable to manufacturing. The sensors are available in a variety of scalable formats that can be used in mini-scale through large manufacturing systems. All sensors are fully validatable and are supplied with rigorous performance verification systems that meet stringent metrology standards.

- View the application

To view all the applications visit aberinstruments.com/applications



Optimized Perfusion by Capacitance Process Measurement & Control

Studies on biotherapeutic protein production have shown perfusion processes to be a superior technology vs. the traditional batch and fed batch approaches. Due to its associated process stability and reducing the effect of varying conditions inside the bioreactor, perfusion can deliver lower production costs and higher titer, especially in the case of low titer or fragile proteins.

As the focus on in-line techniques for bioprocess monitoring is increasing, driven primarily by the PAT/ FDA initiatives, one of the most important components to monitor on-line and in real-time is biomass, a critical process parameter that significantly impacts the critical quality attributes of the process/product.

Among all the available on-line biomass assays, the capacitance method has a clear advantage for process development and manufacturing because it is an unambiguous reflection of viable cell biovolume. (Carvell & Dowd, 2006).

- View the application

Seeing is believing!

Experience the advantages of using bio-capacitance to measure viable biomass for yourself.

With Aber's new evaluation service, you will have first-hand experience of the benefits of capacitance technology to determine live cell concentration in real-time.

Our straightforward, hassle-free, evaluation service gives you the opportunity to trial capacitance technology at your facility. So that everything runs smoothly, we provide fully supported installation together with data analysis. Helping you to get valuable insights into your bioprocess.

The ABER evaluation service provides:

Training | Installation support | Expert advice | Data analysis

To book your no-obligation evaluation today
go online at **aberinstruments.com/evaluation**

A measured approach to optimising performance, experience and outcomes

Our biomass capacitance technology centres around providing live on-line biomass reading – typically Cells/ml or g/l for different applications:

Cell culture process development and manufacturing

Aber Instruments' technology can be applied to in both R&D and manufacturing processes to monitor:

- Suspension cell
- Micro-carrier culture and packed beds
- Cell culture – Manufacturing
- Controlling constant cell concentrations

Microbial applications

And, equally our technology is successfully deployed in microbial applications to meausre:

- Bacterial fermentations
- High density yeast fermentations
- Pichia fermentations
- Mycelial fermentations

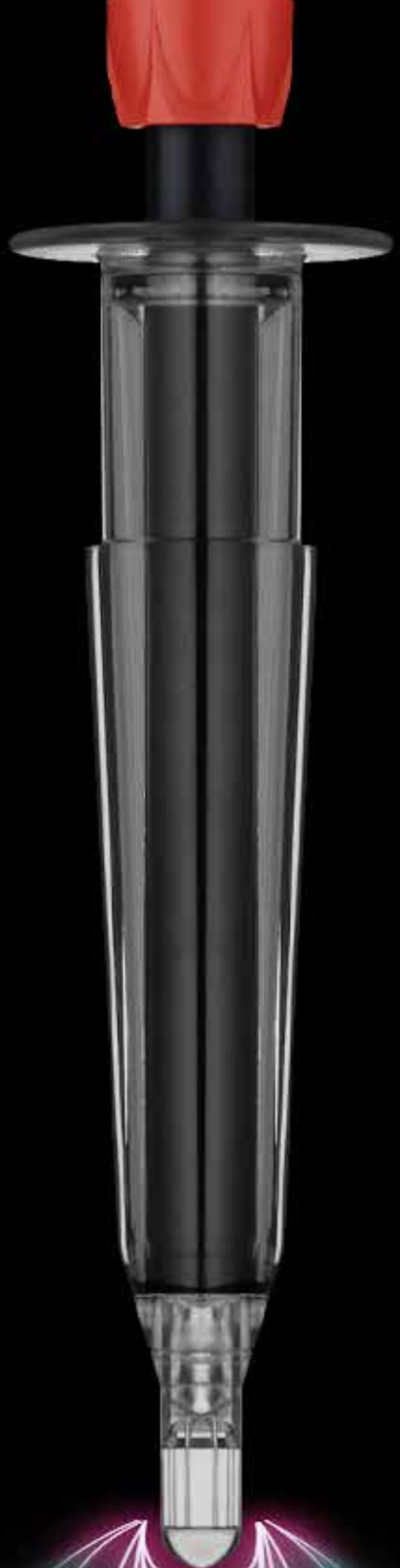
Our tech offers the unique opportunity for real time, accurate measurement and control of biomass concentrations in bioreactors at both laboratory and industrial scale, bringing significant scientific, operational and commercial benefits in terms of cost reduction and improved product quality.

Features

- Fully automated 'plug and play' solutions for rapid cell expansion
- Quick and simple process monitoring
- Automated process control and modelling
- Automated substrate feed strategies
- Harvest point determination
- Optional time of infection for viral production

Benefits

- Lower risk of contamination
- Reduced risk of unrepresentative samples (due to miniminsing the requirement for manual handling)
- Free up lab time



Real time monitoring

Sensors for conventional & single use biorectors

cGMP

Used & trusted for cGMP applications

Maximise production

Control complex feed rates

Capacitance technology provider of the largest range - Including single-use

FUTURA system overview

Sensors and head amplifiers

12 mm Probe
For small bioreactors
Headplate mounting

Standard Remote
For restricted space

25 mm Probe
For larger bioreactors DN25 port

Standard FUTURA
For larger bioreactors

The FUTURA system's three primary hardware components are:
The Probe, the FUTURA Instrument (Head Amplifier) and the Transmitter.
For the validation & testing of these system components please refer to the FUTURA test equipment on page 36.

Transmitter(s)

Connect 1
Single channel, Current Loop, Modbus, USB

Connect 4
4 channel, Current Loop, Modbus, USB

Connect xtra
Single channel, USB & choice of comms types via Anybus modules

V350 - Panel
1 Channel Current Loop
Colour Touch screen

V350 - Wall Mount
1 Channel Current Loop
Colour Touch screen

Software

Futura Tool

FUTURA Tool
Used to set up FUTURAs for connecting to the various transmitters

Futura Scada

FUTURA SCADA
Capable of frequency scanning to provide additional cell information. Can be used for retroactive data analysis. Includes OPC option

FUTURA sensors

Sensors for all applications

Aber Instruments has a wide range of probes to suit all applications, the 12mm diameter probes ideal for small bioreactors and 25mm diameter for larger vessels, typically used in manufacturing / production environments. Now, with the introduction of FUTURA neo$_{tf}$ our capacitance technology is available for Thermo Scientific S.U.B's.

All probes are electro-polished and passivated with options for USP class VI and FDA CFR21 177 certificates. By default a probe is shipped with a standard certificate of traceability. If you wish to have a full breakdown of all the materials used in the production of a probe then please order the 'Probe Certificate of Conformance' package for each probe. Contact ABER if you wish to see an example of the documentation you will receive.

Single-use
FUTURA neo$_{tf}$ single-use sensor for Thermo Scientific S.U.B.s. See page 24

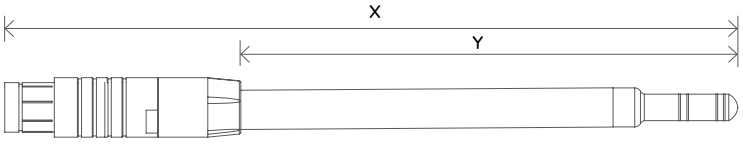
12mm
Benchtop, headplate mounted

25mm
Large Vessels, side mounted
Standard O-ring

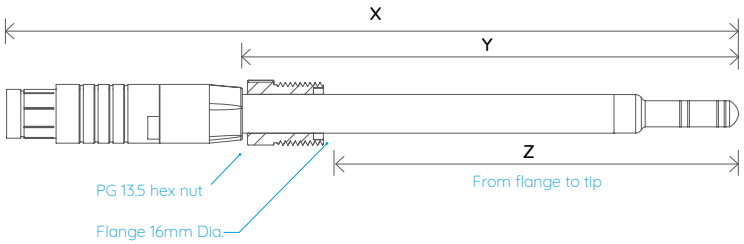
25mm
Large Vessels, side mounted

FUTURA sensors

12mm Annular probes



Part Number	Description		
		X	Y
6531-52	12 X 120mm Annular Probe	223	152
6532-52	12 X 220mm Annular Probe	323	252
6530-52	12 X 320mm Annular Probe	423	352
6534-52	12 X 450mm Annular Probe	555	482



Part Number	Description			
		X	Y	Z
6531-52/PG	12 X 120mm Annular Probe - Pre fitted PG 13.5 Nut	223	152	128
6532-52/PG	12 X 220mm Annular Probe - Pre fitted PG 13.5 Nut	323	252	228
6530-52/PG	12 X 320mm Annular Probe - Pre fitted PG 13.5 Nut	423	352	328
6534-52/PG	12 X 450mm Annular Probe - Pre fitted PG 13.5 Nut	555	482	458

All PG probes are shipped with a PTFE washer & high temperature O'ring

Part Number	Description			
		X	Y	Z
6570-52	12 x 320mm Annular probe 13.5 Nut for KleenPak connector	320	n/a	n/a

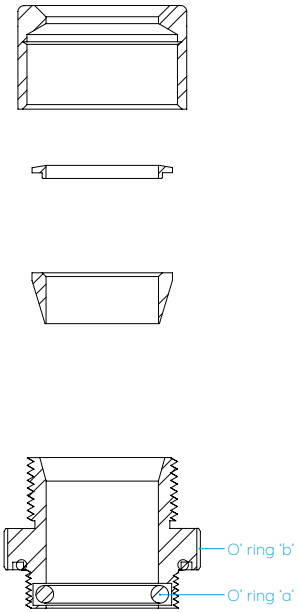
For additional information please email support@aberinstruments.com

Part Number	Description
1899-30	Set of O-ring and washer for 12mm Annular probes with pg13.5 (Pack of 4)

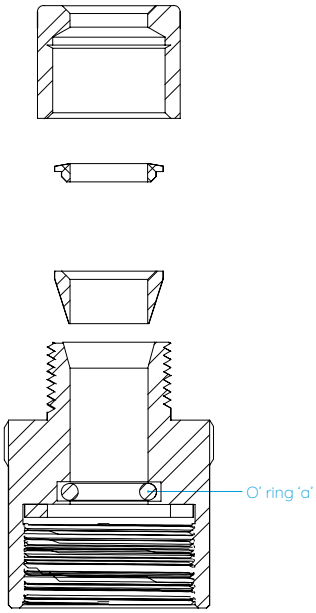
FUTURA sensors

Port adaptors

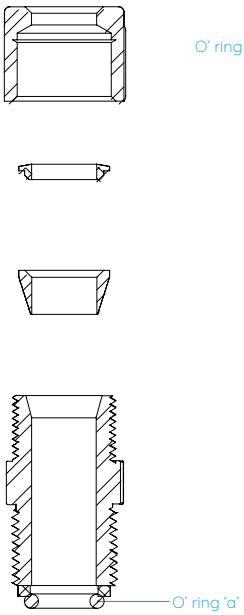
The port adaptors are designed to allow the 12mm straight Aber probes to be fitted into either Braun or Applikon 19mm (3/4") top plate, female port fitting. The New Brunswick version is similar but fits a male threaded port on either the top plate or side entry port. The o'rings provide a seal and the nut with nylon ferrules lock the probe in place.



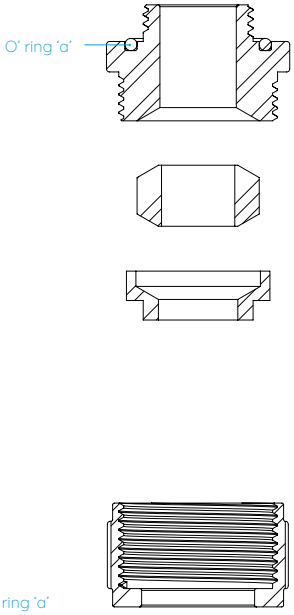
Part No.:
1295-12 & 1296-12



Part No.:
1273-12



Part No.:
1430-22

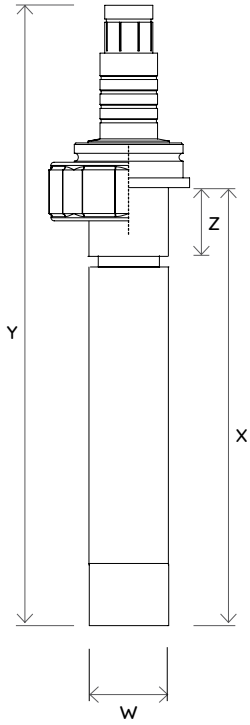


Part No.:
1432-00

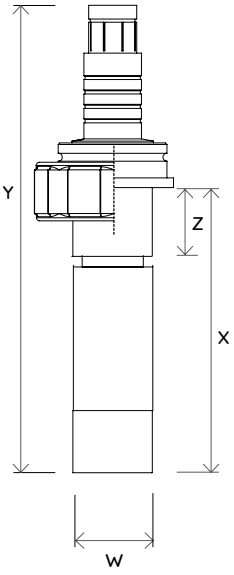
Part No.	Description	Wetted O'ring 'a'	Sealing O'ring 'b'	Sealing Washer 'c'	Mating thread
1295-12	12mm probe to 19mm Braun Sartorious metric port	Silicone FDA 10.78 x 2.62	EPDM 26.7 x 1.78	-	26 x 1 mm PITCH
1296-12	12mm probe to 3/4 Inch BSP (Applikon)	Silicone FDA 10.78 x 2.62	EPDM 26.7 x 1.78	-	3/4" BSP
1273-12	12mm probe to 19mm New Brunswick metric port	Silicone FDA 10.78 x 2.62	-	Silicone FDA 19 x 3.5 x 2	26 x 1 mm PITCH
1430-22	PG13.5 Compression fit (Swagelok Style) Adaptor for 12mm probes	Silicone FDA 10.78 x 2.62	-	-	PG 13.5
1432-00	Port Adapter 12mm probe to M18x1.5 Male (Applikon)	Silicon FDA	-	-	M18 x 1.5 mm PITCH

FUTURA sensors

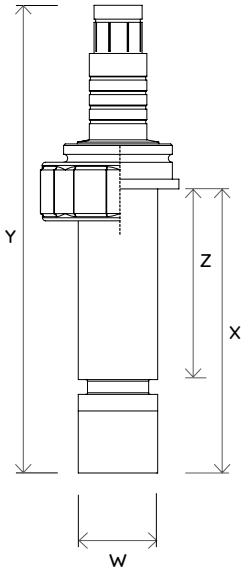
25mm Flush and annular probes



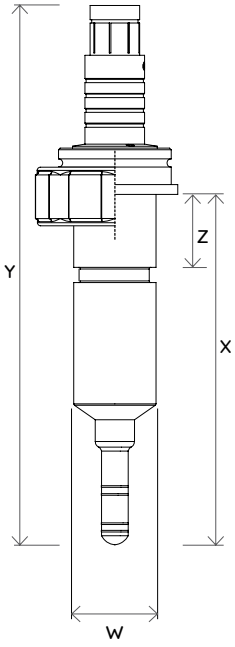
6543-52



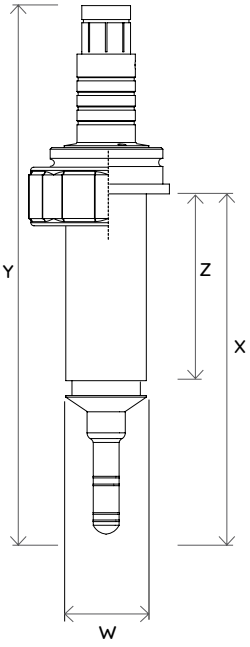
6541-52



6542-52



6545-52



6546-52

Part Number	Description	Dimensions (mm)			
		W	X	Y	Z
6541-52	25 X 75 mm Flush Probe, Standard O-ring, Retained Ring	25	75	132	22
6542-52	25 X 75 mm Flush Probe, Braun Safety Ports, Retained Ring	25	75	132	46
6543-52	25 X 175 mm Flush Probe, Retained Ring	25	175	239	22

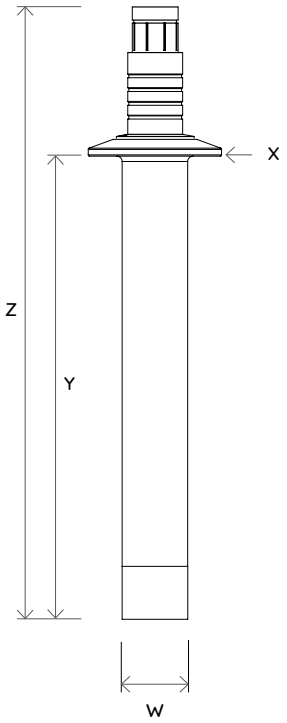
*All 25mm probes (except Tri-clamp) are supplied with a retained ring part number 1844-02 and circlip

Part Number	Description	Dimensions (mm)			
		W	X	Y	Z
6545-52	25 X 96 mm Annular Probe, Standard O-ring, Retained Ring	25	96	154	22
6546-52	25 X 96 mm Annular Probe, Braun Safety Ports, Retained Ring	25	96	154	47

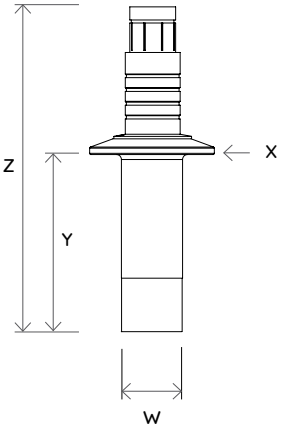
*All 25mm probes (except Tri-clamp) are supplied with a retained ring part number 1844-02 and circlip

Part Number	Description
1055-06/05	18.64x3.53mm High Temperature O'Ring - with Certificates (Pack of 5)
1055-06/10	18.64x3.53mm High Temperature O'Ring - with Certificates (Pack of 10)

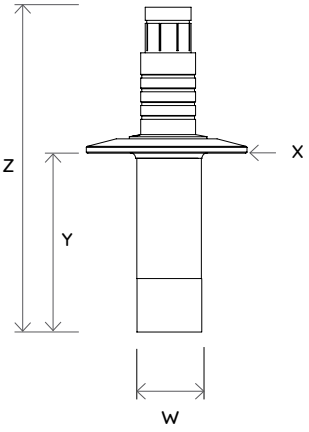
Tri Clamp probes



6551-52



6552-52



6553-52

Part Number	Description	Dimensions (mm)			
		W	X	Y	Z
6551-52	Probe Flush Electrodes 25 x 175mm Stainless Steel / Fortron with size 1 – 1.5" . Tri-clamp flange, can be used with NovAseptic ports.	25	50.4 (1.984")	175	225
6552-52	Probe Flush Electrodes 25 x 70 mm Stainless Steel / Fortron with size 1 – 1.5" . Tri-clamp flange, can be used with NovAseptic ports.	25	50.4 (1.984")	70	120
6553-52	25 x 70mm, 2" Tri-clamp flange, NovAseptic Ports	25	50.8 (2.00")	70	120

Standard FUTURA and Standard Remote FUTURA

Lightweight and compact for small spaces

Our 3rd generation head-amplifiers are the main processing units of the FUTURA system and deliver robust signal power and processing for the FUTURA sensors.

Standard Futura

Lightweight housing suitable for most bioreactors and is ideal for 25mm diameter side mounted probes and 12mm probes on vessels where the centreline of the probe is greater than 15mm from the centreline of the vessel. (Supplied with a 2 metre cable).

Standard Remote Futura

Standard Remote Futura is designed for smaller vessels where the available head space is often limited due to tight configuration of ports and Stirrer motor. It incorporates a slim, light-weight pre-amplifier making it ideal for small bioreactors with as low as 100ml working volume. The main Futura housing can be mounted away from the bioreactor vessel. (Up to a maximum of 1 metre).

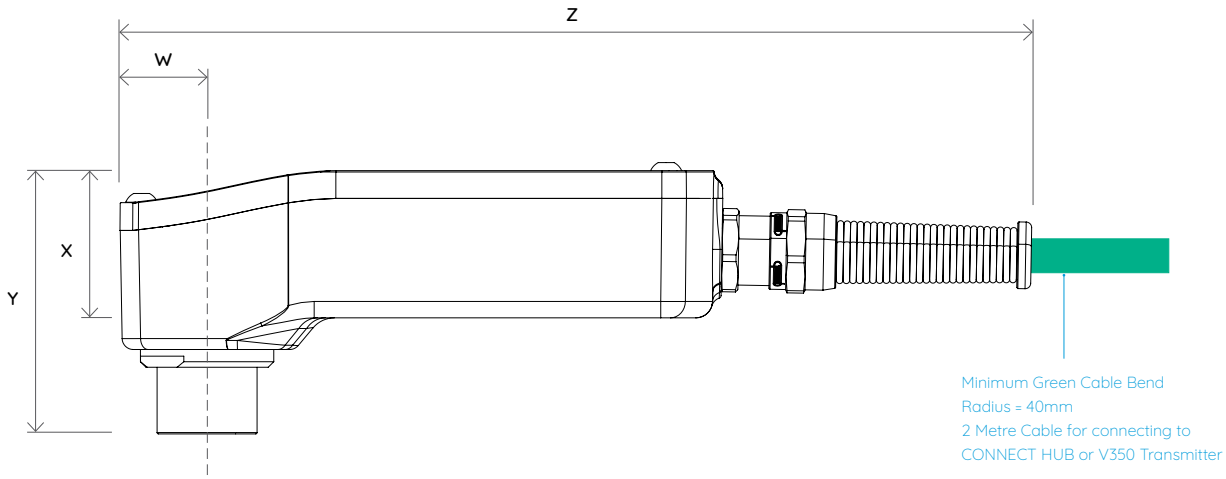
Standard Futura

Standard Remote Futura

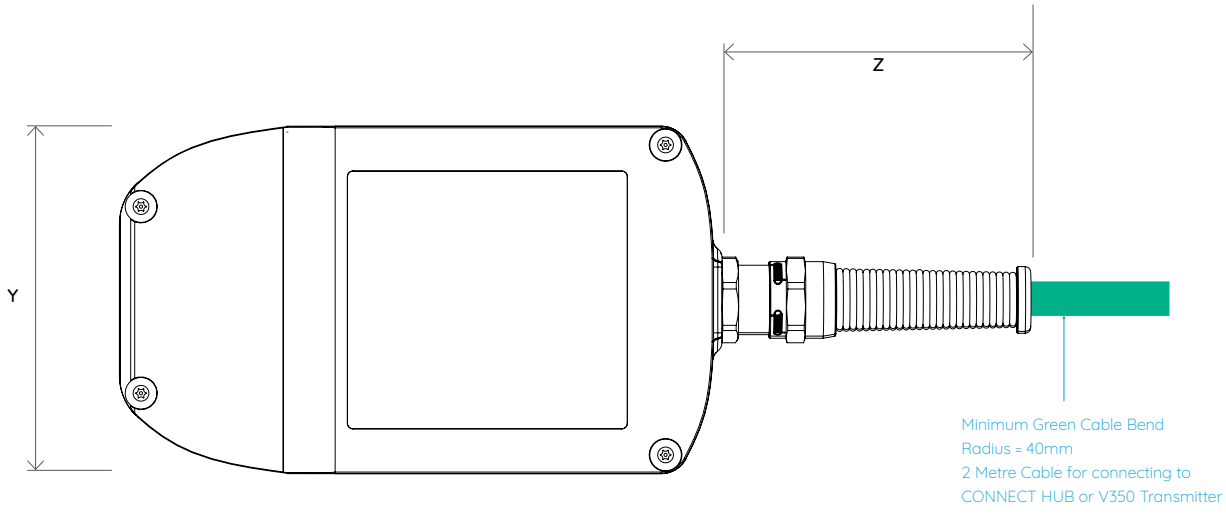

ABER
FUTURA
ABER
TRUSTED TECHNOLOGY

FUTURA

Standard Futura



Part Number	Description	Dimensions (mm)			
		W	X	Y	Z
2330-00	Standard Futura	15	27	47	164

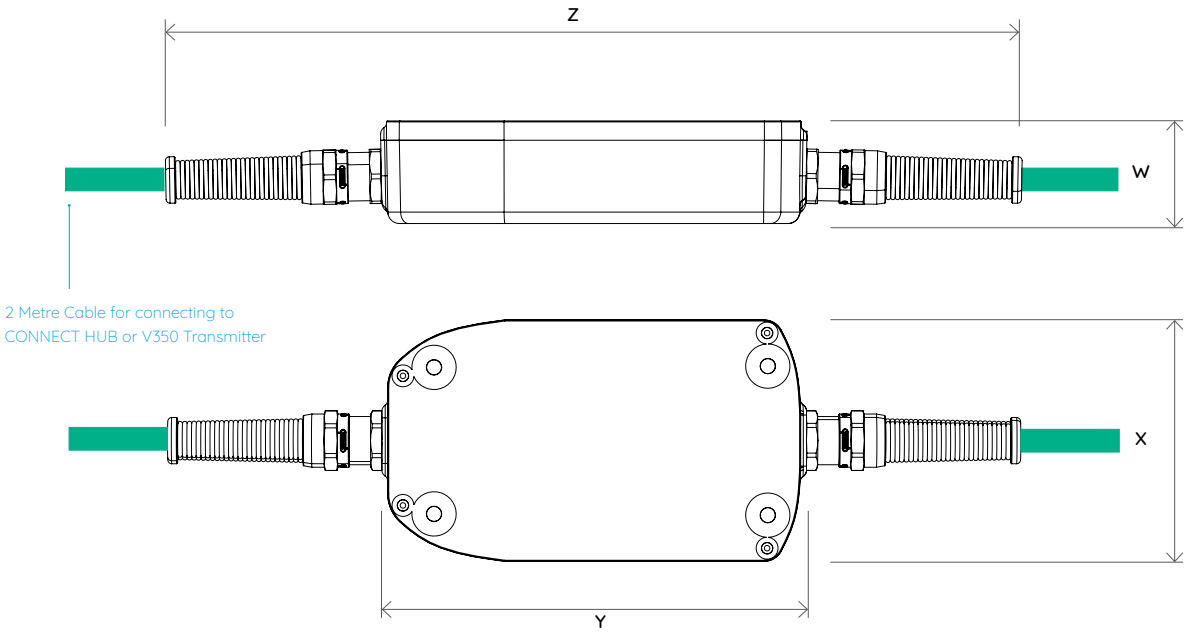


Part Number	Description	Dimensions (mm)			
		W	X	Y	Z
2330-00	Standard Futura	-	-	62	56

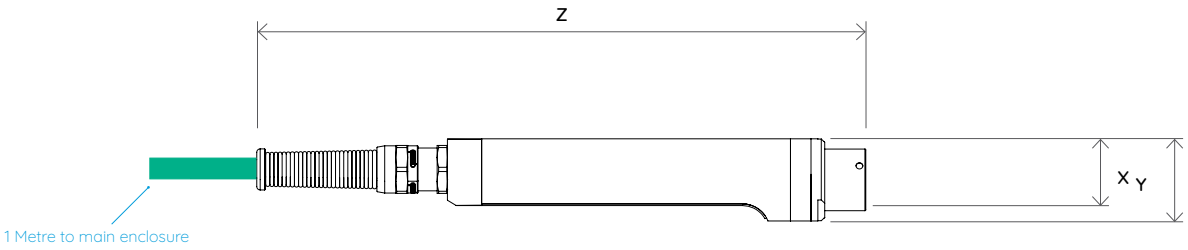
Frequency Range:	50KHz to 20MHz
Measuring Ranges:	Capacitance: 0.0 to 400 pF/cm Conductivity: 1.0 to 40 mS/cm (Higher ranges available with compatible probes)
Cell Concentration Range:	Depends on cell sizes but typically: Yeast (6 µm): 10^6 Cells/ml to 10^{10} Cells/ml Bacteria (1 µm): 10^9 Cells/ml to 10^{13} Cells/ml Animal Cell (12 µm): 10^5 Cells/ml to 10^9 Cells/ml Plant Cell (50 µm): 10^3 Cells/ml to 10^7 Cells/ml
Resolution:	Resolution: 0.1 pF/cm. Bacteria typically 2g/L dry weight or $2x10^9$ Cells/ml for E. Coli. Yeast or Animal Cells 0.05g/L or $1 x10^5$ Cells/ml The relationship of these capacitance values to biomass levels depend upon the cell type and cell line
Accuracy:	Better than ± 3% or ± 2% of the reading
Stability:	Better than ± 0.2 pF/cm at constant temperature with standard conductivity solution of ~12 mS/cm
Linearity:	Better than ± 1% over 100 pF/cm
Precision:	<± 0.5 pF/cm, no filter active
Power Supply:	24V DC power is typically supplied by an Aber CONNECT Hub running on 110V AC to 240V AC mains.
Environmental:	IP65 rated ; Reccommended ambient operating temperature range: 5°C to 40°C
Weight:	Main enclosure: 211g ; Remote enclosure: 203g

FUTURA

Standard Remote Futura



Part Number	Description	Dimensions (mm)			
		W	X	Y	Z
2343-00	Standard Remote Futura (Main enclosure)	27	62	110	221



Part Number	Description	Dimensions (mm)			
		W	X	Y	Z
2343-00	Standard Remote Futura (Remote enclosure)	-	19	24	110

The dimensions from the top plate of a vessel and a (top mounted) motor should be such that the motor is higher than 118 mm from the plate and more than 7.4 mm from the centre line of the port holding the ABER probe.

Frequency Range:	50KHz to 20MHz
Measuring Ranges:	Capacitance: 0.0 to 400 pF/cm Conductivity: 1.0 to 40 mS/cm (Higher ranges available with compatible probes)
Cell Concentration Range:	Depends on cell sizes but typically: Yeast (6 µm): 10^6 Cells/ml to 10^{10} Cells/ml Bacteria (1 µm): 10^9 Cells/ml to 10^{13} Cells/ml Animal Cell (12 µm): 10^5 Cells/ml to 10^9 Cells/ml Plant Cell (50 µm): 10^3 Cells/ml to 10^7 Cells/ml
Resolution:	Resolution: 0.1 pF/cm. Bacteria typically 2g/L dry weight or $2x10^9$ Cells/ml for E. Coli. Yeast or Animal Cells 0.05g/L or 1 $x10^5$ Cells/ml The relationship of these capacitance values to biomass levels depends upon the cell type and cell line.
Accuracy:	Better than ± 3% or ± 2% of the reading
Stability:	Better than ± 0.2 pF/cm at constant temperature with standard conductivity solution of ~12 mS/cm
Linearity:	Better than ± 1% over 100 pF/cm
Precision:	< ±0.5 pF/cm, no filter active
Power Supply:	24V DC typically supplied by an Aber CONNECT Hub running on 110V AC to 240V AC mains.
Environmental:	IP65 rated ; Reccommended ambient operating temperature range: 5°C to 40°C
Weight:	Main enclosure: 211g ; Remote enclosure: 203g

FUTURA neo$_{tf}$

Setting the standard for single-use

Our single-use viable biomass sensors are available for use with a range of Thermo Scientific Single-Use Bioreactors via a Thermo Scientific port SV20716.

With the development of single-use systems, Aber continues to expand its range of solutions available for use from R&D and pilot scale through to manufacturing.

For recommendations on suitable products for your application, please contact sales@aberinstruments.com

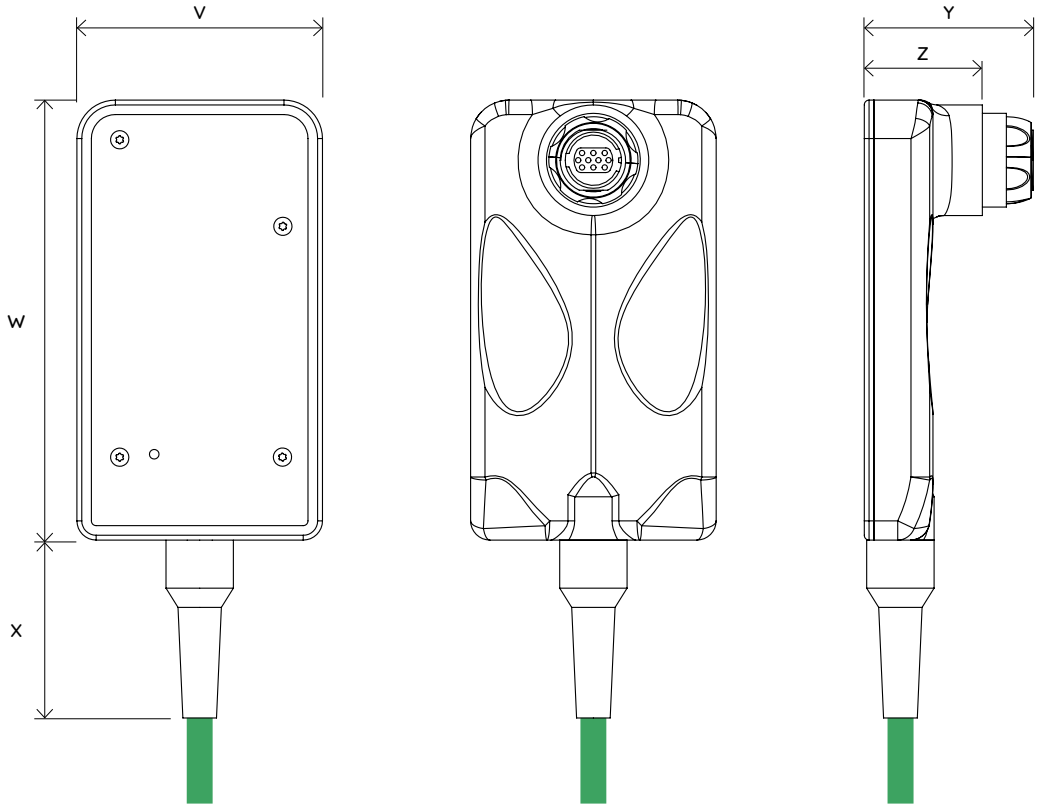
FUTURA neo$_{TF}$
headamp

FUTURA neo$_{TF}$
single-use sensor

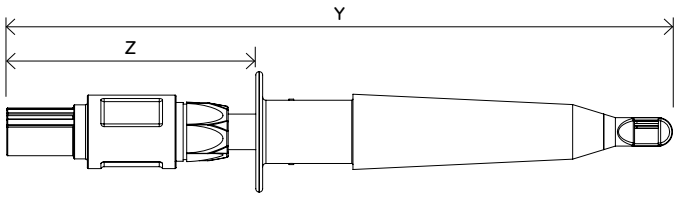

ABER

FUTURA

FUTURA neo$_{tf}$



Part Number	Description	Dimensions (mm)				
		V	W	X	Y	Z
5360-00	FUTURA neo$_{tf}$ (Head Amplifier)	51	91.5	37	34.7	24.5



Part Number	Description	Dimensions (mm)	
		Y	Z
5340-00	FUTURA neo$_{tf}$ single-use sensor for Thermo Scientific S.U.B.s	140	55

Part Number	Description
5341-00	FUTURA neo$_{tf}$ signal simulator - High Value
5342-00	FUTURA neo$_{tf}$ signal simulator - Zero Value

System technical specifications

Frequency Range:	50KHz to 20MHz
Measuring Ranges:	Capacitance: 0.0 to 400 pF/cm Conductivity: 1.0 to 40 mS/cm
Cell Concentration Range:	Depends on cell sizes but typically: Yeast (6 µm): 10^6 cells/ml to 10^{10} Cells/ml Bacteria (1 µm): 10^9 cells/ml to 10^{13} Cells/ml Animal Cell (12 µm): 10^5 cells/ml to 10^9 Cells/ml Plant Cell (50 µm): 10^3 cells/ml to 10^7 Cells/ml
Resolution:	Resolution: 0.1 pF/cm. Bacteria typically 0.2g/L dry weight or $2x10^9$ Cells/ml for E. Coli. Yeast or Animal Cells 0.05g/L or 1 $x10^5$ Cells/ml The relationship of these capacitance values to biomass levels depends upon the cell type and cell line.
Accuracy:	Better than ± 3% of the reading
Stability:	Better than ± 0.2 pF/cm at constant temperature with standard conductivity solution of ~12 mS/cm
Linearity:	Better than ± 1% over 100 pF/cm
Precision:	<± 0.5 pF/cm, no filter active
Power Supply:	24V DC power is typically supplied by an Aber Connect running on 110V AC to 240V AC mains.
EMC Compliance:	Directive 2014/30/EU as demonstrated compliance to:EN 61326-1:2013 + EN 61326-2-1:2013. FCC: CFR47 Part15 Sub Part B Part 1: General
LVD Compliance:	Low Voltage Directive 2014/35/EU and complies with the following standards:EN61010: 2010
Weight:	225g

Sensor technical specification

Operating Temperature Range:	2°C - 40°C (36°F - 140°F)
Storage Temperature Range:	2°C - 25°C (36°F - 140°F)
Process Connection:	Via Thermo Scientific port SV20716
Sterilization:	Gamma ray sterilizable 25-45 kGy
Shelf Life:	3 years after irradiation, under appropriate storage conditions
Mechanical Pressure Resistance:	1bar
Wetted Materials:	Makrolon Rx2530, Platinum 99.99%, Dymax 1180-M-UR. Complies with the requirements of FDA-modified ISO 10993-1 and USP Class VI, 2019 BPOG L&E
Precision:	Better than ± 1% over 100 pF/cm
Approvals:	USP class VI & FDA for all wetted materials, factory calibration
Minimum probe clearance:	60mm *For further information on probe clearance please contact support@aberinstruments.com

FUTURA

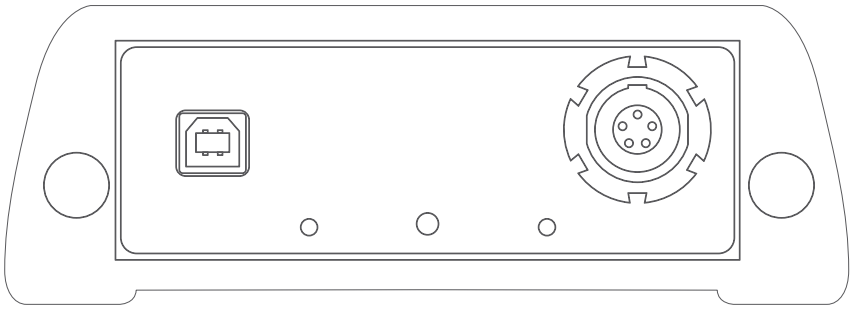
Connect options for FUTURA neo$_{tf}$

The Connect is a transmitter that is used with a single FUTURA neo$_{tf}$ instrument.

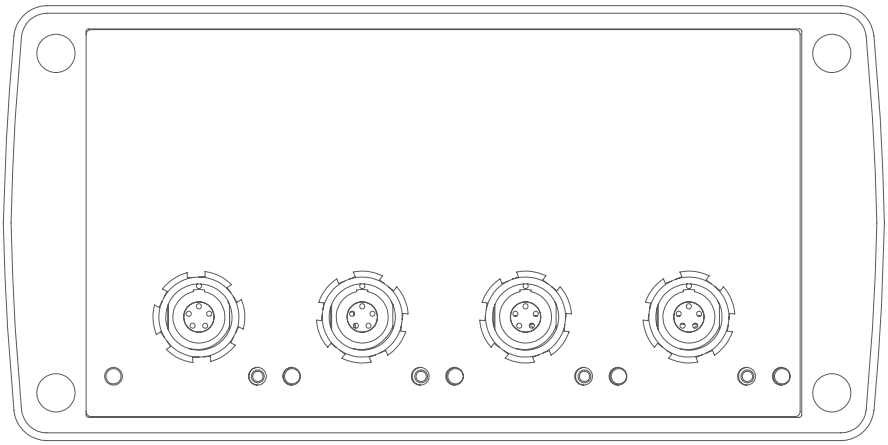
Communication:

- Connects ABER's FUTURA equipment to a PC via a USB port.
- Single channel Connect provides FUTURA equipment with 2 x 4-20mA Analog (Current loop) outputs
- 4 channel Connect provides FUTURA equipment with 8 x 4-20mA Analog (Current loop) outputs.
- Provides FUTURA equipment with a Modbus Interface to SCADA or a controller

Connect 1



Connect 4



Part Number	Description
2801-00	FUTURA Connect 1 - for full technical specification see page 33
2820-00	FUTURA Connect 1 - Din Rail Mountable - for full technical specification see page 33
2814-00	FUTURA Connect 4 - for full technical specification see page 34


ABER

FUTURA Connect

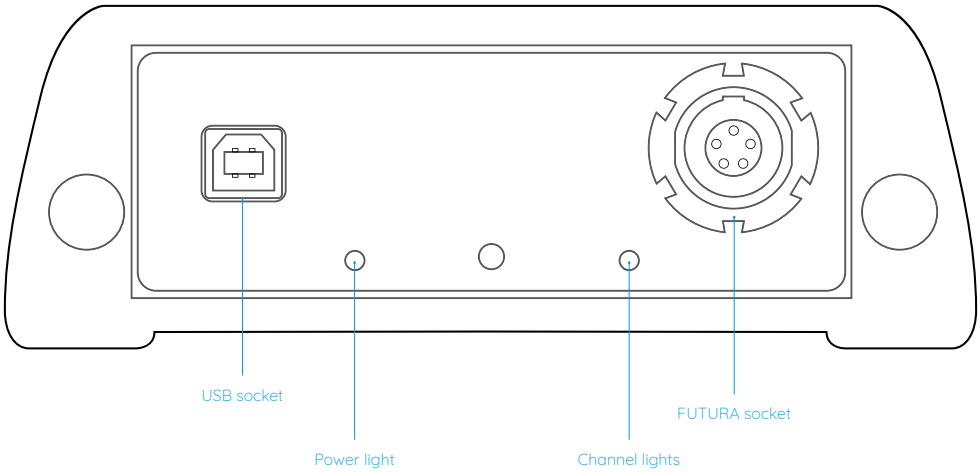
Multifunctional hub

The Futura Connect is a multifunctional hub (transmitter) that interfaces the Futura to external devices such as a PC or a bioreactor control system. It provides USB, Modbus and Current Loop (Analog) connections which allows the user to connect the Futura's signals to any bioreactor control system so that the Futura is fully integrated with your process system.

The Futura Connect hubs are available in one and four channel models and now with the introduction of the new Connect xtra single channel a wide selection of alternative communication outputs are available to choose from, giving greater flexibility in how you configure your system.

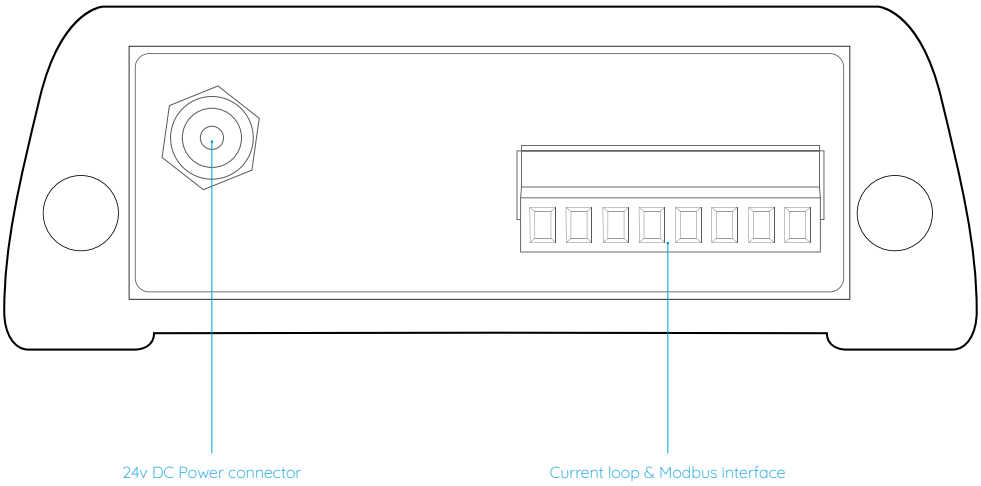
FUTURA
Connect

Front

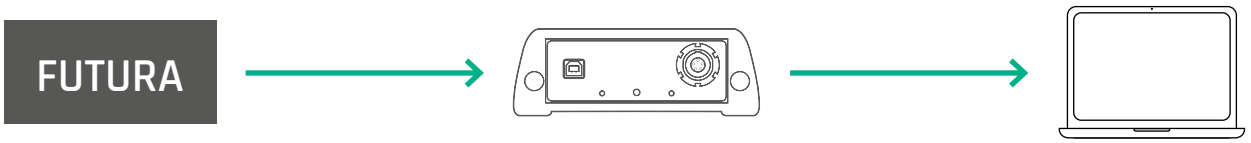


The Front panel provides the FUTURA sockets, with the rear providing both the current loop outputs and the Modbus connection point.

Back



A. FUTURA CONNECT USB



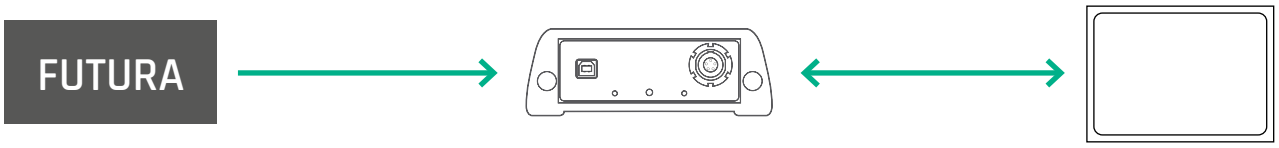
Up to 100m
Aber cable

FUTURA Connect

USB cable
up to 5m

PC/laptop
ABER Software Options
- FUTURA Tool
- FUTURA SCADA

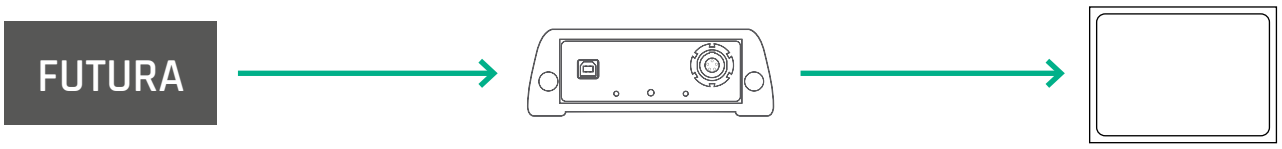
B. FUTURA CONNECT - Modbus (Available on all versions of the CONNECTS)



Up to 100m Aber cable | FUTURA Connect | Modbus Network 2 - way digital comms | PLC Factory controller

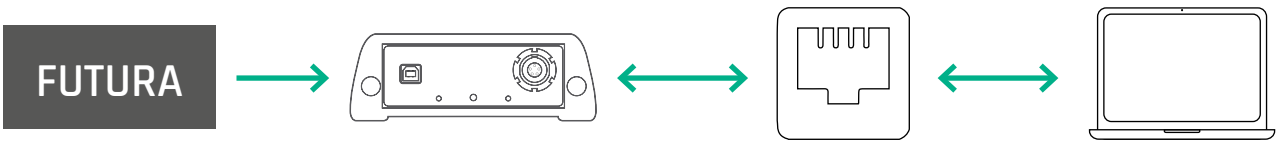
C. FUTURA CONNECT - 4-20mA Analog output

(4 - 20mA Analog (Current loop) options are on ebery 1, 4 and 8 way CONNECT)



Up to 100m Aber cable | FUTURA Connect | 4 - 20 ma Analog output Shielded twisted pair | PLC analog 4 - 20mA Inputs 2 per FUTURA

D. FUTURA CONNECT - USB to Ethernet



Up to 100m Aber cable | FUTURA Connect | USB cable up to 5m | USB to Ethernet Module | Connect via ethernet/ wireless | PC/laptop **ABER Software Options** - FUTURA Tool - FUTURA SCADA

USB to Ethernet Module

Use an Ethernet module to add connectivity to your FUTURA CONNECT

Part Number	Description
2801-36	USB to Ethernet Adaptor Module - Belkin FSL009uk or Similar

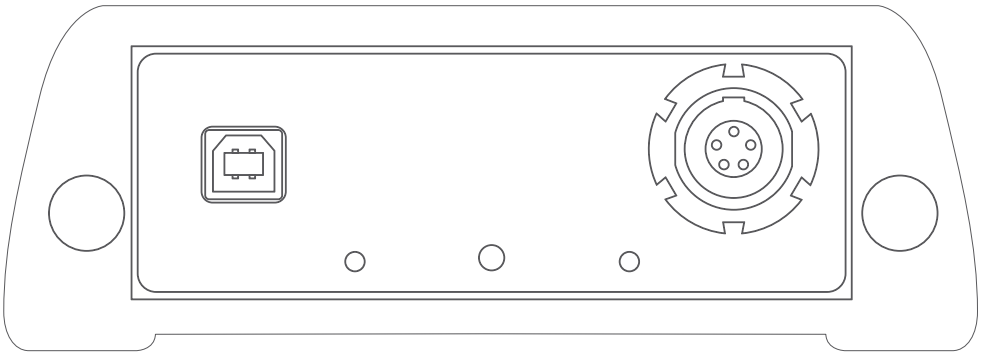
E. FUTURA CONNECT Xtra

With the addition of the new FUTURA CONNECT Xtra, additional communication outputs are now available.

Please refer to page 27 for further detail or email support@aberinstruments.com

FUTURA

Connect 1



Part Number	Description
2801-00	FUTURA Connect 1
2820-00	FUTURA Connect 1 - Din Rail Mountable

Dimensions	Height: 38 mm Width: 105 mm Depth: 145 mm Weight: 0.7 kg
Power Supply:	Desktop mains power supply. Aber part number: 2885-35 Nominally 110 to 240 volts AC 50/60Hz. Installation Category II
Power Consumption:	10W Maximum
Electrical Safety:	Must use Aber branded external power supply, part number: 2885-35
Environmental:	Safe ambient operating temperature range: 5°C to 40°C Recommended ambient operating temperature range: 15°C to 30°C Relative Humidity: < 85%. Pollution: Deg 2. (EN61010) Not Waterproof. Recommended operating altitude: < 2000m

FUTURA
Connect 4

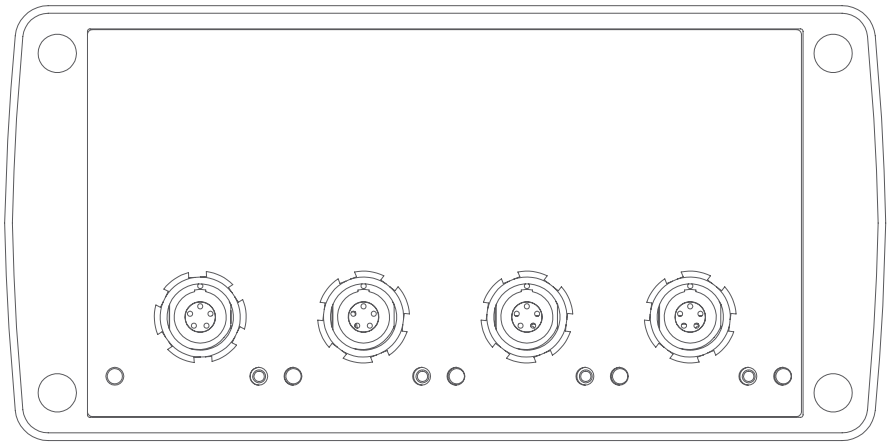
For use with up to four FUTURA and multiple bioreactors

The FUTURA CONNECT provides power and communications to the FUTURA

Communication:

- Connects ABER's FUTURA equipment to a PC via a USB port.
- Provides FUTURA equipment with 8 x 4-20mA Analog (Current loop) outputs.
- Provides FUTURA equipment with a Modbus Interface to SCADA or a controller

Front



Part Number	Description
2814-00	FUTURA Connect 4

Dimensions	Height: 88 mm Width: 175 mm Depth: 132 mm Weight: 1.35 kg
Power Supply:	Desktop mains power supply. Aber part number: 2885-35 Nominally 110 to 240 volts AC 50/60Hz. Installation Category II
Power Consumption:	60W Maximum
Electrical Safety:	Must use Aber branded external power supply, part number: 2885-35
Environmental:	Safe ambient operating temperature range: 5°C to 40°C Recommended ambient operating temperature range: 15°C to 30°C Relative Humidity: < 85%. Pollution: Deg 2. (EN61010) Not Waterproof. Recommended operating altitude: < 2000m

FUTURA

Connect xtra

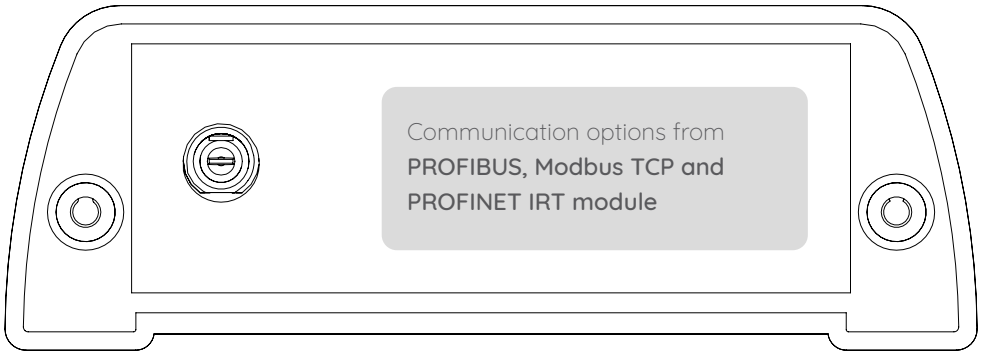
For use with one FUTURA and one bioreactor.

The FUTURA CONNECT provides power and communications to the FUTURA

Communication:

- Connects Aber's FUTURA equipment to a PC via a USB 2.0 port.
- Choose the most appropriate communication type (See Current Anybus module options.)
- Options from Anybus CompactCom M40 Module Include: PROFIBUS, Modbus TCP, PROFINET

Back



Part Number	Description
2815-00	FUTURA CONNECT Xtra (When ordering please specify PROFIBUS, Modbus TCP or PROFINET IRT module)

Dimensions	Height: 38 mm Width: 105 mm Depth: 145 mm Weight: 0.7 kg
Power Supply:	Desktop mains power supply. Aber part number: 2885-35 Nominally 110 to 240 volts AC 50/60Hz. Installation Category II
Power Consumption:	10W Maximum
Electrical Safety:	Must use Aber branded external power supply, part number: 2885-35
Environmental:	Safe ambient operating temperature range: 5°C to 40°C Recommended ambient operating temperature range: 15°C to 30°C Relative Humidity: < 85%. Pollution: Deg 2. (EN61010) Not Waterproof. Recommended operating altitude: < 2000m

FUTURA V350 touch screens

Local interfaces made for cGMP environments

V350 panel and wall mount

The V350 modules are ideal when a local interface is required close to the bioreactor. The operator can input Futura settings and monitor process values locally via the touch screen.

V350 Panel mount

The V350 modules are ideal when a local interface is required close to the bioreactor. The operator can input Futura settings and monitor process values locally.

V350 Touch Panel Mount PLC with 3.5" TFT touch screen

- Connects to any single Futura option and is programmable for different applications
- Provides power to a single Futura
- Provides 2 x 4-20mA current loops for capacitance and conductivity
- Displays graphs of recorded data
- 1 Futura pass through USB connection
- 1 x Alarm Relay
- IP65 rated when mounted in a suitable panel

V350 Wall mount

The V350 modules are ideal when a local interface is required close to the bioreactor. The operator can input Futura settings and monitor process values locally.

V350 Wall Mount

Connects to any single Futura option and is programmable for different applications.

- Provides power to a single Futura
- Provides 2 x 4-20mA current loops for capacitance and conductivity
- Displays live trend graphs
- 1 Futura pass through USB connection
- 1 x Alarm Relay
- Stainless steel enclosure rated to IP65

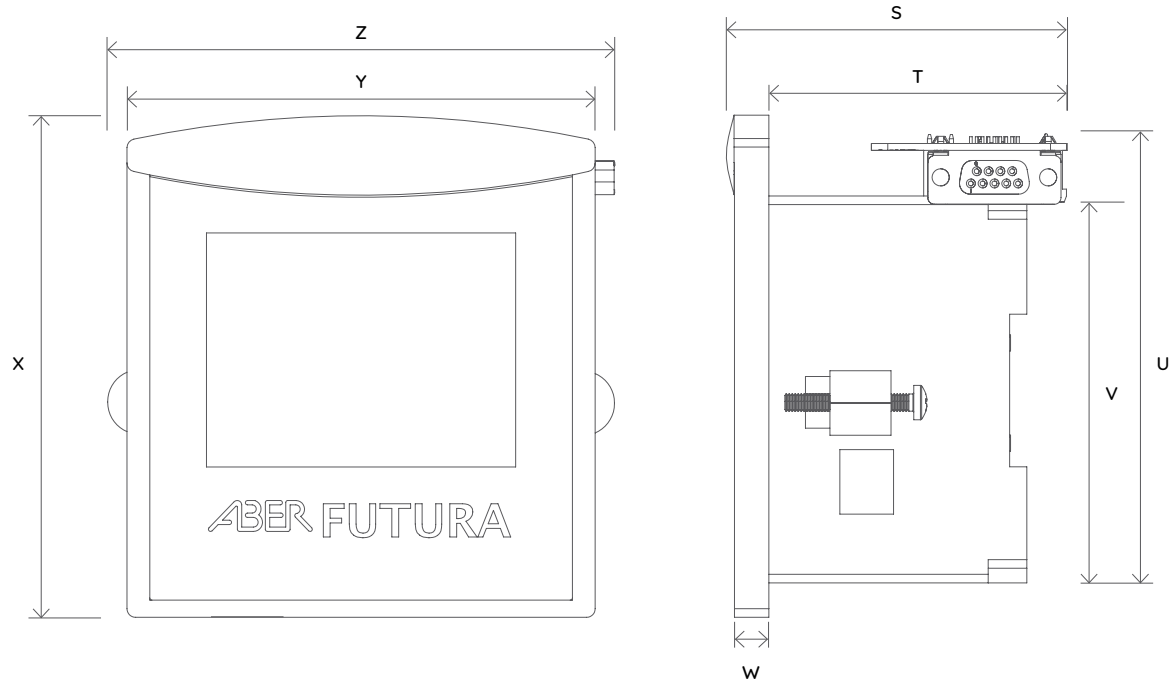
Panel mount

Wall mount


V350
ABER FUTURA

FUTURA

V350 panel mount



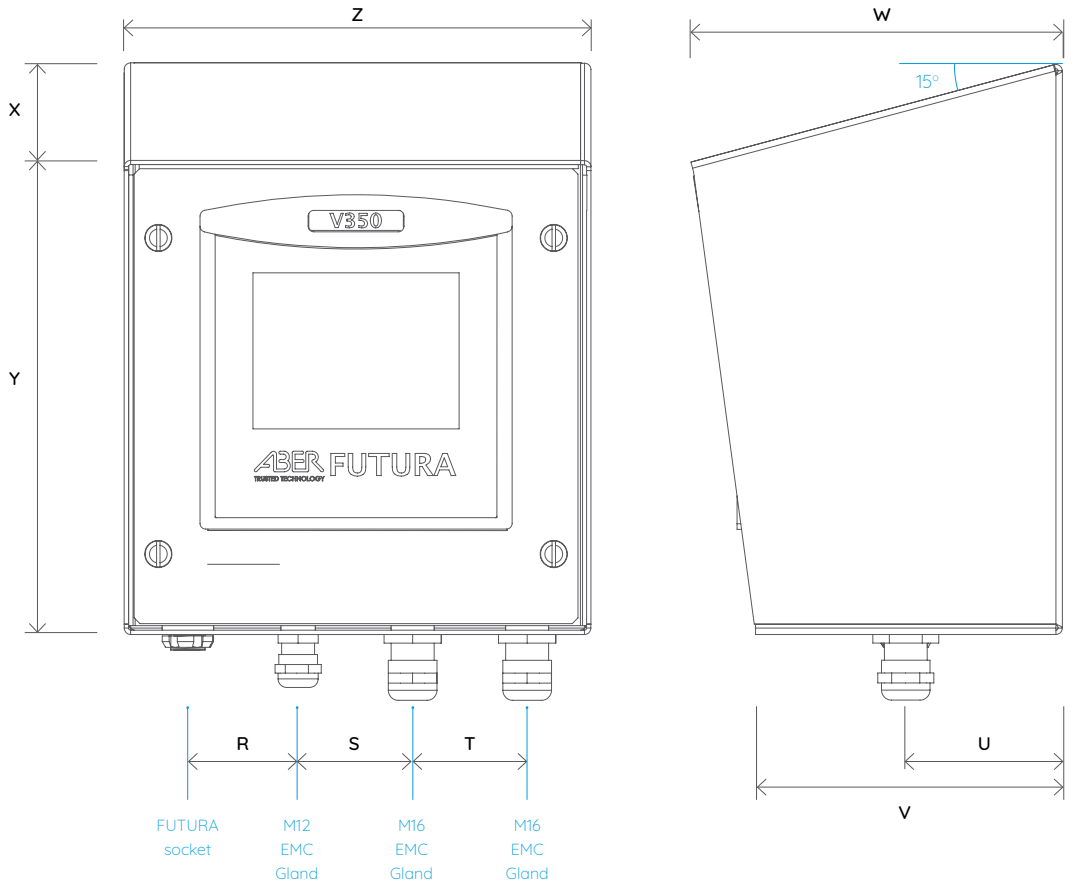
Part Number	Description	Dimensions (mm)							
		S	T	U	V	W	X	Y	Z
3501-00	V350 panel mount	77.6	60	119	90	8	114	109	118

Part Number	Description
3501-00	V350 panel mount
3525-30	V350 DC/DC Supply isolating converter
3531-30	V350 AC/DC Supply isolating converter

Measuring Ranges	Capacitance: 0 to 400pF/cm, equivalent Cells/ml Conductivity: 1 to 40mS/cm
Power Supply:	+24V DC
Power Consumption:	15W Maximum
Battery Backup::	7 years typical, at 25°C (Clock and Data Only)
Electrical Safety::	Must be mounted in a suitable EMC shielded enclosure & grounded. Refer to installation instructions.
Environmental::	IP65 for fascia, when mounted in suitable panel. Safe ambient operating temperature range: 5°C to 40°C Recommended ambient operating temperature range: 15°C to 30°C Relative Humidity: < 85%. Pollution: Deg 2. (EN61010) Recommended operating altitude: < 2000m

FUTURA

V350 Wall mount



Part Number	Description	Dimensions (mm)								
		R	S	T	U	V	W	X	Y	Z
3550-00	V350 wall mount	38.5	40	40	55	114	135	35	165	165

Measuring Ranges	Capacitance: 0 to 400pF/cm, equivalent Cells/ml Conductivity: 1 to 40mS/cm.
Power Supply:	+24V DC
Power Consumption:	15W Maximum
Battery Backup::	7 years typical, at 25°C (Clock and Data Only)
Electrical Safety::	Must be mounted in a suitable grounding system. Refer to installation instructions
Environmental::	Stainless steel enclosure is IP65 rated Safe ambient operating temperature range: 5°C to 40°C Recommended ambient operating temperature range: 15°C to 30°C Relative Humidity: < 85%. Pollution: Deg 2. (EN61010) Recommended operating altitude: < 2000m

FUTURA Test equipment

Performance check

Probe Tester

The Probe Tester has been specially designed to carry out checks on the integrity of ABER FUTURA probes. The tester will automatically run through a sequence of tests checking a probe for internal corrosion and leakage between the electrodes. An additional test cable allows the user to check the continuity between each electrode and the Head Amplifier socket.

The complete test procedure checks the health of a probe and its ability to perform correctly. The Probe Tester has an LCD display that allows the user to quantify and track the changes of a probe condition. Using traffic light indicators and numeric values for record keeping. See Page 45 for Probe Tester Certificate part number.

Part Number	Description
1486-00	FUTURA\ FUTURA pico Probe Tester

Signal simulator

The signal simulator, as the name suggests, simulates a capacitance and conductivity measurement, and is used to perform a functional test on the FUTURA.

For Signal Simulator Certificates and recalibration, please refer to page 45.

Part Number	Description
9051-00	Signal Simulator - Zero Value Only
9071-00	Signal Simulator - Mid Value Only
9052-00	Signal Simulator - High Value Only
9053-00	Signal Simulator - Clean Pulse Indicator Only

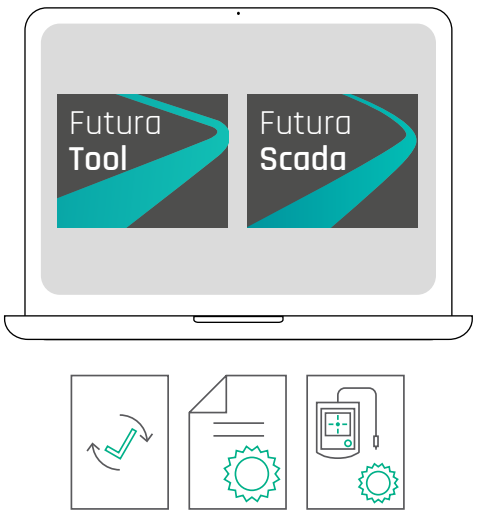
FUTURA Software, validation & calibration and extension cables

Greater connectivity, analysis and mining capabilities

The capabilities of the FUTURA Biomass monitoring system is further enhanced when combined with the FUTURA Software developed by ABER. FUTURA Tool and FUTURA SCADA deliver greater online connectivity, data analysis & mining capabilities, providing better insights throughout your Online Biomass Process. Futura Tool is provided free of charge with the purchase of a Futura system.

From ABER Instruments' range of Biotech Products, our FUTURA product range includes the FUTURA Extension Cables. Our FUTURA inline and bulkhead extension cables are available in standard lengths from 5 meters.

Software and validation & calibration



Extension cables


BR Pilot 2
Capacitance pF/cm
Conductivity mS/cm
14-May
17-May
20-May
23-May
26-May
29-May
Time (d-MMM)
Capacitance
Conductivity

FUTURA
Software

FUTURA TOOL Setup Software

FUTURA TOOL enables the end user to:

- Configure FUTURAs for use with all Hub and Connect options and the V-350 PLC View diagnostic information and set-up appropriate controls Eg current loop scaling or Modbus baud rate
- Carry out custom probe calibrations, upgrade FUTURA firmware and collect diagnostic information about your process
- Collect and manage data acquisition, with limited multi frequency scanning capability

Part Number	Description
2860-35	FUTURA Tool Software (Included with purchase of a FUTURA system)

FUTURA SCADA is a GAMP 5 compliant software package that allows the end user on one screen to:

- Set up and then optimise each individual FUTURA system
- Provide continuous data collection for any number of FUTURA systems with an events time line.
- Provide frequency scanning to calculate some additional parameters (including delta C, critical frequency, Cole-Cole alpha) and derive information on the cells including cell bio-volume and diameter.
- Carry out retrospective analysis of seperate data sets from different experiments - data is easily exported to excel via simple csv files.
- Monitor probe life parameters.
- Can also operate as an OPC server making capacitance and conductivity measurements across the different frequencies as well as the additional parameters available as tags for a third party SCADA.

Part Number	Description
2893-35	FUTURA SCADA Software - Includes Live Scanning and Post Processing Analysis
2895-35	Futura Scada - OPC activation License (Analyse Scanning data in real time)

If you are interested in transferring single frequency measurements via OPC, please contact sales@aberinstruments.com

Minimum System requirements

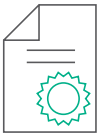
- The minimum system requirements needed to run Futura SCADA are:
- Microsoft Windows 7 SP1 or later
- 2GB RAM or higher
- 1.6GHz Intel Atom or higher
- At least 20% free hard drive space, 5GB minimum
- At least one free USB 2.0 port
- Administration privileges in order to install all the programs parts
- A screen resolution of at least 1336 x 768 pixels.

Validation & Calibration

IOQ validation package

Full System validation documentation

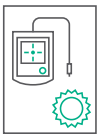
Part Number	Description
2330-60	IOQ Validation Package, Includes Certificates - One Futura with Connect 1 or V350
2814-60/01	IOQ Validation Package, Includes Certificates - Connect 4 with One Futura
2814-60/02	IOQ Validation Package, Includes Certificates - Connect 4 with Two Futuras
2814-60/03	IOQ Validation Package, Includes Certificates - Connect 4 with Three Futuras
2814-60/04	IOQ Validation Package, Includes Certificates - Connect 4 with Four Futuras



Probe Certificate of Conformance

By default a probe is shipped with a basic certificate of traceability. For manufacturing applications, a complete set of material certificates can be provided for all product contact materials.

Part Number	Description
6520-64	Probe Certificate of Conformance - For One Probe, Probe Not Included



Signal Simulator Certificate & Signal Simulator Recalibration including certificates

Signal simulator certificates show that the units are working within their functional specifications and have information on calibration dates and other important information used for validation purposes.

Part Number	Description
9051-60	Calibration Certificate for Zero Value Signal Simulator
9071-60	Calibration Certificate for Mid Value Signal Simulator
9052-60	Calibration Certificate for High Value Signal Simulator
9050-62	Signal Simulator Recalibration, 2 Values Set, Includes Certificate
9070-62	Signal Simulator Recalibration, 4 Values Set, Includes Certificate

Part Number	Description
1480-62	Probe Tester Recalibration, Includes Certificate
1486-62	FUTURA\ FUTURA pico Probe Tester Recalibration, Includes Certificate

FUTURA

Inline extension cable

Part Number	Description
1630-24/5	5 Metre Extension Cable
1630-24/10	10 Metre Extension Cable
1630-24/15	15 Metre Extension Cable
1630-24/20	20 Metre Extension Cable
1630-24/25	25 Metre Extension Cable
1630-24/30	30 Metre Extension Cable

FUTURA

Bulkhead extension cable

For use with Panel mounted V350 and Panel isolated Connects

Part Number	Description
1635-24/1	1 Metre Bulkhead Extension Cable
1635-24/5	5 Metre Bulkhead Extension Cable
1635-24/10	10 Metre Bulkhead Extension Cable
1635-24/15	15 Metre Bulkhead Extension Cable

Sales and support

Sales enquiries & Orders

Please send your purchase orders or delivery schedule enquiries to:
sales@aberinstruments.com
+44 (0)1970 636 300

Support Contact Details

For any technical queries you may have prior or post purchase for any Aber system, please initially direct them to:
support@aberinstruments.com
+44 (0)1970 636 300

Distributor Network

Aber operates through a global network of distributors, please find details of your local distributor at our website under the biotech distributor section or navigate via this link:
www.aberinstruments.com/biotech-distributors

Return Merchandise Authorization

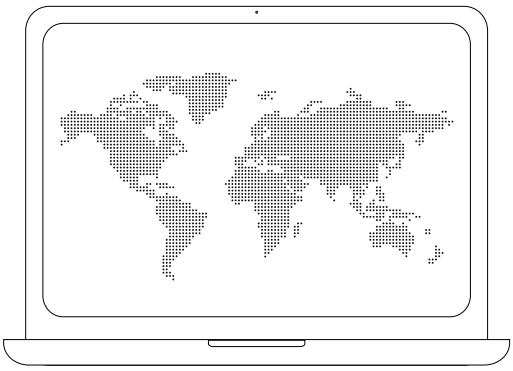
For any Return Merchandise Authorization (RMA) return, please request an RMA form from your local Aber distributor or directly from
support@aberinstruments.com
This will ensure that the items pass through customs without any unnecessary cost or delay.

Part Number	Description
9000-27	Base charge part number for any system's repair assesment and full quote.

- On receiving the equipment Aber will asses the unit/s and repair work needed and inform you of the options, including a full quote.
- Repair work will not commence until the quote has been formally accepted and a purchase order received.
- Individual parts repair work will be assessed and charged on a piece by piece basis.

Customer Resource Portal

www.aberportal.com



The Aber Customer resource Portal for customers and distributors gives access to a range of product training materials in video, document and presentation form; guides & SOP's, webinars, system manuals and software packages, along with marketing support material for distributors. If you are an Aber customer or a current distributor, please send your portal login request to: portal@aberinstruments.com

Software product key requests

Please direct your demo software key requests to: support@aberinstruments.com

aberinstruments.com

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Catalogue Part & Issue Number 2391-09-03