Installation, Operation & Maintenance Guide

NPT/ANSI-150 Connections
Canada & USA

Swimming Pool Heat Exchangers

BOWMAN®

100 YEARS OF HEAT TRANSFER TECHNOLOGY

Foreword

Dear customer,

Thank you for purchasing a high-quality Bowman swimming pool heat exchanger.

Bowman have been manufacturing swimming pool heat exchangers for over 60 years and are acknowledged as the brand leader due to their quality, heat transfer performance and durability.

Please read this Installation, Operation & Maintenance guide fully and carefully before installation to ensure your Bowman swimming pool heat exchanger operates efficiently and reliably.

Please keep this guide for future reference to ensure the long-term performance of your Bowman swimming pool heat exchanger.

Should you require additional advice or assistance, please contact your Bowman stockist or dealer.

Installation, Operation & Maintenance guides are also available in:


French


German


Italian


Spanish


Polish


Russian


Chinese

If you require a copy of this guide in one of these languages, visit

http://www.ej-bowman.com/downloads.htm where copies are available to freely download.

Warranty

All **BOWMAN®** Swimming Pool Heat Exchangers are guaranteed against manufacturing faults for a period of 12 months from the date of invoice.
Bowman titanium heat exchangers have a full 10 year guarantee on all titanium material in contact with pool water.

For full warranty terms, please see the **BOWMAN®** Conditions of Sale. A copy of which is available on request or can be downloaded from our website: **www.ej-bowman.com**

Contents

1. Safety

1.1 Hazards When Handling the Heat Exchanger

BOWMAN® "Swimming Pool Heat Exchangers" are constructed in accordance with current practice and recognised safety rules. Hazards may still arise from operation, such as:

- Injury of the operator or
- Third parties or
- Damage to the heat exchanger or
- Damage to property and equipment

Any person involved with the installation, commissioning, operation, maintenance or repair of the heat exchanger must be:

- Physically and mentally capable of performing such work
- Appropriately qualified
- Comply completely with the installation instructions

The heat exchanger must only be used for this purpose.

In the event of breakdowns which may compromise safety, a qualified plumber must always be contacted.

1.2 Safety Instructions

The following symbols are used in these operating instructions:

Danger

This symbol indicates an immediate danger to health.
Failure to comply with this instruction may result in severe injury.

Caution

This symbol indicates a possible danger to health.
Failure to comply with this instruction may result in severe injury.

Take Care

This symbol indicates a possible risk to health.
Failure to comply with this instruction may result in injury or damage to property.

This symbol indicates important information about correct handling of the equipment.
Failure to comply with this instruction may cause damage to the heat exchanger and/or its surroundings.

1.3 Approved Use

BOWMAN® "Swimming Pool Heat Exchangers" are only approved for heating or cooling pools with boiler water, solar and heat pump systems.
Any other use unless agreed by **BOWMAN®** is not approved. We decline all liability for damage associated or arising from such use.

The maximum working pressure is:

Heating Water	:	87 psi
Pool Water	:	87 psi

The maximum working temperature is:

Heating Water	:	210 °F
Pool Water	:	210 °F

1.4 ASME Boiler and Pressure Vessel Code

Bowman swimming pool heat exchangers are exempt from ASME Boiler and Pressure Vessel Code VIII-1, as they are vessels containing water under pressure for water service under the following limitations:

- A design pressure of 300 psi (20.7 bar) and a design temperature of 210°F (99°C).

1.5 Potential Hazards


Take Care

The heat exchanger may be damaged or leak, if the maximum working pressure is exceeded.


Caution

Connections on the heating water side of the heat exchanger may reach temperatures as high as 210°F.

The heat exchanger may heat up to the flow temperature of the heating water, if there is no pool water flowing through the heat exchanger. Any plastic pipe may be exposed to excessive temperature and suffer damage.

1.6 Safety Measures at Installation Site


Take Care

The heat exchanger should be installed in a frost-free enclosure.

Ensure the maximum permissible working pressure on either side of the heat exchanger is not exceeded or the heat exchanger or surrounding equipment may be damaged.

While the pool is in operation, weekly inspection of the heat exchanger and its connections should be made to check for leaks and external damage.

2. Installation

2.1 Transport / Storage

The heat exchanger must be drained prior to transportation. Once drained and dry, the heat exchanger must only be stored indoors.

2.2 Installation

Take Care

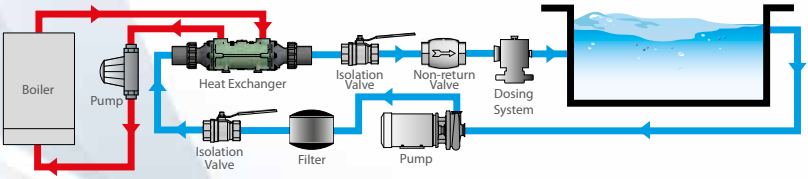
The heat exchanger should only be installed in a frost-free, dry area with a non-aggressive atmosphere. Ensure easy access for assembly/disassembly.

2.3 Fitting

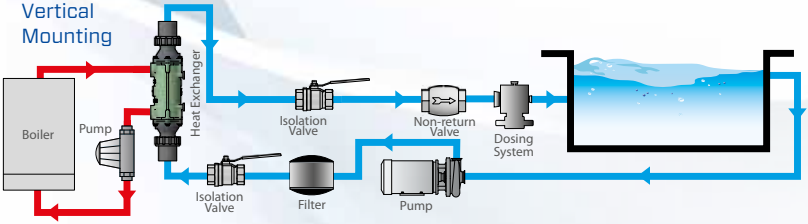
Take Care

Before fitting, check the heat exchanger for damage, it can be installed above or below the pool water level, horizontally or vertically, as shown below.

Horizontal Mounting



Vertical Mounting



The heat exchanger may be damaged by chemicals. Dosing systems must be fitted downstream from the heat exchanger incorporating a non-return valve. If chemicals are used, gases must be prevented from entering the heat exchanger when the filtration system is not in use.

The heat exchanger should always be installed downstream of the pumping and filtration equipment. The boiler/solar water must be pump-assisted and the usual precautions taken to prevent air locks. It is recommended that a central heating inhibitor is added to the boiler circuit to protect the system from corrosion.
The heat source should be controlled by a thermostat in the pool water pipework before the heat exchanger and set at the required pool temperature.

2.4 Connecting the Heat Exchanger

Take Care

Close all isolating valves in the flow and return pipes of both circuits.

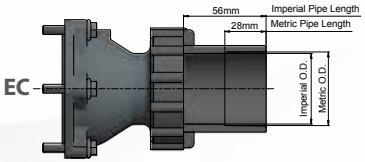
Ensure compliance with water quality and maximum permissible pressures.

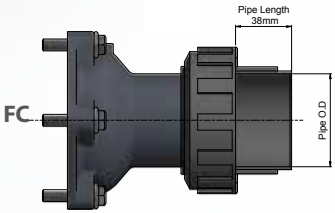
When fitting the heat exchanger into the pipework care must be taken to ensure that no debris has been introduced into it.

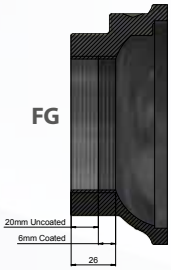
Please refer to the table below for the pool water and boiler/solar water connections.

EC heat exchangers – when installing the boiler water pipework, it is recommended that PTFE tape is wrapped 4 times around the diameter of the pipe thread, then inserted into the heat exchanger body and tightened to a maximum torque of 20Nm.

Metric	Universal Fit	Individual Fit					
Type	**EC**	**FC**	**FG**	**GL**	**GK**	**JK**	**PK**
Pool Water Connection	Solvent Weld Ø1.9 / Ø1.97" (NPS 1½")	Solvent Weld Ø2.48" (NPS 2")	Threaded 3" NPT	Flanged ANSI 150 NPS-3"	Flanged ANSI 150 NPS 4"	Flanged ANSI 150 NPS 5"	Flanged ANSI 150 NPS 6"
Boiler / Solar Water Connection	Threaded 1" NPT	Threaded 1¼" NPT	Threaded 1½" NPT	Threaded 2" NPT	Threaded 2½" NPT	Threaded 3" NPT Flanged PN6 - DN80	Threaded 3" NPT Flanged PN6 - DN100







Important pool water connection information

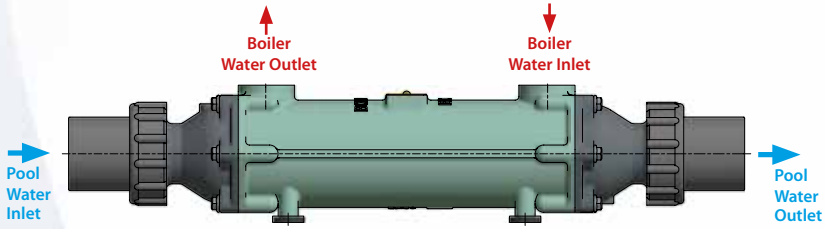
EC heat exchangers; feature 'Universal Fit' end covers designed to accommodate both metric and imperial pipe sizes. For metric 50mm (DN40) pipe, there is a 28mm deep recess to secure the pipe to the end cover. For imperial 1½" NPS pipe, there is a 56mm deep recess to secure the pipe to the end cover. When installing 1½" NPS, it is important to locate sufficient pipe length into the full recess in order to ensure a watertight seal between the pipe and the end cover. Please refer to diagram below for more details.

FC heat exchangers; are supplied with adaptors which enable either 63mm (DN50) metric pipe, or 2" NPS (60.3mm) imperial pipe sizes to be used. There is a 38mm deep recess to secure the pipe to the end cover for both pipe sizes. Please refer to diagram for more information.

FG heat exchangers; when connecting an FG heat exchanger to the pool water, always ensure that sufficient connecting pipe thread goes into the end cover to enable it to engage with the black coated thread. This eliminates the risk of uncoated thread being exposed to the pool water.

2.5 Counterflow installation

The heat exchanger must always be installed in counterflow – i.e. where the pool water flows in the opposite direction to the heating water as shown below.



NOTE: failure to install the heat exchanger in this arrangement will reduce the performance.

2.6 Integral thermostat pocket

Most Bowman swimming pool heat exchangers have an integral thermostat pocket. To ensure accurate monitoring of the pool water temperature, it is important to install the thermostat on the pool water inlet to the heat exchanger.

3. Operation

It is essential that the following instructions are followed to prevent corrosion/erosion of the heat exchanger:

a) **BOWMAN®** Stainless Steel heat exchangers should not be used with salt water chlorinators or salt water pools. (Cupro Nickel or Titanium is available for these applications).

Take Care

b) Always maintain the water pH to within correct levels. The ideal pool pH should be kept within 7.4 to 7.6. On no account should it fall below 7.2 or rise above 7.8. Checks should be made daily. Recommend chemical limits for **BOWMAN®** Swimming Pool Heat exchangers are shown below, however local swimming pool water guidelines should be followed for safe bathing.

Material	Cupronickel	Stainless Steel	Titanium
Free Chlorine	1.0 - 3.0 ppm	1.0 - 3.0 ppm	15.0 ppm max.
pH	7.2 - 7.8	7.2 - 7.8	6.8 – 8.0
Calcium Hardness	200 - 400 ppm	200 - 1000 ppm	200 - 1000 ppm
Alkalinity	100 - 150 ppm	100 - 150 ppm	100 - 150 ppm
Bromine	2.0 - 4.0 ppm	2.0 - 4.0 ppm	15.0 ppm max.
Chloride	Less than 150 ppm	Less than 350 ppm	Less than 3000 ppm

c) If a by-pass is fitted, it is essential that any valves are correctly positioned to allow the recommended pool water flow to pass through the heat exchanger.

d) The filter unit should be checked regularly, especially if sand filters are used. If sand filters are not working correctly, fine particles of sand can flow round the pool circuit causing erosion of the pipework, heat exchanger and pump.

e) Keep the pool free from debris such as leaves, grass cuttings etc. Foreign matter can decay and increase the pH level in the pool.

f) It is essential that the correct amount of chemical is added to the pool. To allow proper dispersion of the dose in the pool water, distribution of the dose should be made to various areas of the pool. Do not dose in one area only, especially adjacent to the pool return as this will create high acidic areas which can cause corrosion/erosion of the pool equipment.

4. Commissioning


Take Care


Danger

Commissioning of the heat exchanger should not be undertaken until this document has been fully read and understood.

Both circuits of the heat exchanger must be connected before commissioning.

Adequate provision should be made to ensure that correct operating equipment along with personal protection (PPE) in accordance with current standards is used.

5. Maintenance / Repair

5.1 Winter Shutdown in Frost Free Areas

When shut down in frost-free premises the heat exchanger must be completely full of water and purged of air.

5.2 Winter Shutdown in Areas Exposed To Frost

Care should be taken to prevent frost damage from a winter shutdown in premises exposed to frost. We recommend draining the heat exchanger or removing it from the installation for the shutdown period.

5.3 General Maintenance

The heat exchanger should require little attention in service, however if cleaning or replacement of the tube stack is necessary, the end cover screws should be tightened to the torque figures below. Note, new seals are recommended, if the end covers are removed.

Type	EC Series	FC Series	FG Series	GL	GK	JK	PK
Screw Size	M6	M8	M8	M10	M12	M16	M16
Torque (lb ft)	5.9	11.8	16.2	27.3	39.8	70	95.9

6. Typical performance with boilers...

Type	Pool Capacity		Heat Transfer 180°F Boiler Water	Heat Transfer 140°F Boiler Water	Boiler Water Flow	Maximum Pool Water Flow	Weight
	ft^3	US Gal	Btu/h	Btu/h	US GPM	US GPM	lb
EC80-5102-1C	1,400	10,500	68,000	41,000	9.2	40.0	6.6
EC80-5102-1S/T*	1,750	13,000	85,000	55,000	13.2	53.0	6.6/6.0
EC100-5102-2C	2,900	22,000	135,000	75,000	10.5	45.0	10
EC100-5102-2S/T*	3,200	24,000	170,000	102,000	13.2	53.0	10/9
EC120-5102-3C	4,250	32,000	240,000	135,000	15.8	60.0	12
EC120-5102-3S/T*	4,600	34,500	270,000	157,000	17.6	66.0	12/11
FC100-5103-2C	6,000	44,500	340,000	190,000	23.8	93.0	19
FC100-5103-2S/T*	6,400	48,000	375,000	205,000	26.4	100.0	19/17
FG100-5107-2C	8,000	60,000	580,000	340,000	31.7	127.0	35
FG100-5107-2S/T*	9,600	72,000	650,000	376,000	37.0	145.0	35/31
FG160-5107-5S/T*	11,000	82,000	1,000,000	580,000	40.0	180.0	64/55
GL140-5108-2C	16,000	120,000	1,000,000	580,000	54.5	222.0	66
GL140-5108-2S/T*	16,800	126,000	1,100,000	615,000	59.4	238.0	66/60
GK190-5109-3C	23,300	174,000	1,900,000	1,060,000	84.5	330.0	125
GK190-5109-3T	26,500	198,000	2,150,000	1,230,000	95.1	425.0	112
JK190-5110-3C	35,300	264,000	2,660,000	1,500,000	125.0	500.0	187
JK190-5110-3T	43,500	325,000	3,280,000	1,840,000	165.0	660.0	167
PK190-5111-3C	53,000	396,000	3,600,000	2,000,000	195.0	770.0	264
PK190-5111-3T	59,300	444,000	4,000,000	2,200,000	217.0	950.0	233

*Add the appropriate suffix indicating tube material when ordering these part numbers (C, S or T).
C = Cupronickel S = Stainless steel T = Titanium. N.B. Stainless steel heat exchangers should not be used on pools fitted with salt water chlorinators or salt water pools. The performance capabilities of the heat exchangers are based on achieving a pool water temperature of 86°F.

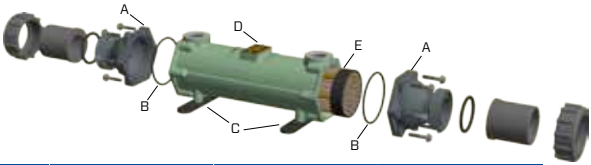
...and with solar panels & heat pumps

Type	Pool Capacity		Heat Transfer	Solar or Heat Pump Water Flow	Maximum Pool Water Flow	Weight
	ft^3	US Gal	Btu/h	US GPM	US GPM	lb
Hot Water at 158°F						
EC120-5102-3C/S/T*	1,800	13,500	102,000	6.6	27.0	12/12/11
EC160-5102-5C/S/T*	4,280	32,000	256,000	13.2	66.0	19/19/16
FC160-5103-5C/S/T*	7,000	52,400	444,000	20.0	100.0	38/38/33
FG160-5107-5C/S/T*	10,600	79,300	680,000	29.0	127.0	64/64/55
Hot Water at 140°F						
EC120-5102-3C/S/T*	1,400	10,500	68,000	6.6	27.0	12/12/11
EC160-5102-5C/S/T*	3,900	29,200	190,000	13.2	66.0	19/19/16
FC160-5103-5C/S/T*	6,500	48,600	325,000	20.0	100.0	38/38/33
FG160-5107-5C/S/T*	8,150	61,000	512,000	29.0	127.0	64/64/55
Hot Water at 113°F						
EC120-5102-3C/S/T*	700	5,200	34,000	6.6	27.0	12/12/11
EC160-5102-5C/S/T*	1,850	13,800	92,000	13.2	66.0	19/19/16
FC160-5103-5C/S/T*	3,300	24,700	160,000	20.0	100.0	38/38/33
FG160-5107-5C/S/T*	4,950	37,000	240,000	29.0	127.0	64/64/55

*Add the appropriate suffix indicating tube material when ordering these part numbers (C, S or T).
C = Cupronickel S = Stainless steel T = Titanium N.B. Stainless steel heat exchangers should not be used on pools fitted with salt water chlorinators or salt water pools.

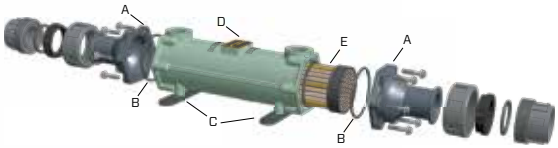
7. Spare Parts List

We always keep a comprehensive stock of spare parts. Please contact our sales department for details.



EC Spare Parts

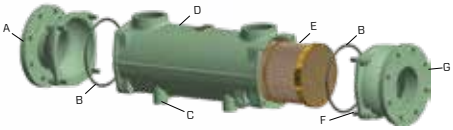
Type	End Cover Assembly (A)	'O' Seals (B)	Mounting Brackets (C)	Body (D)	Tube Stack (E)
EC80-5102-1C EC80-5102-1S EC80-5102-1T	5030-1	AN12NT	5032-1	EC069-5568-1CIN	5095-1TNP 5095-1STP 5095-1TIP
EC100-5102-2C EC100-5102-2S EC100-5102-2T	5030-1	AN12NT	5032-1	EC070-4568-2CIN	5095-2TNP 5095-2STP 5095-2TIP
EC120-5102-3C EC120-5102-3S EC120-5102-3T	5030-1	AN12NT	5032-1	EC071-4568-3CIN-SP	5095-3TNP 5095-3STP 5095-3TIP
EC160-5102-5C EC160-5102-5S EC160-5102-5T	5030-1	AN12NT	5032-1	EC073-4568-5CIN	5095-5TNP 5095-5STP 5095-5TIP



FC Spare Parts

Type	End Cover Assembly (A)	'O' Seals (B)	Mounting Brackets (C)	Body (D)	Tube Stack (E)
FC100-5103-2C FC100-5103-2S FC100-5103-2T	5031	OS46NT	5032-2	FC070-4668-2CIN	5096-2TNP 5096-2STP 5096-2TIP
FC160-5103-5C FC160-5103-5S FC160-5103-5T	5031	OS46NT	5032-2	FC073-4668-5CIN	5096-5TNP 5096-5STP 5096-5TIP

FG, GL, GK, JK & PK Spare Parts



Type	Non Drain End Cover (A)	'O' Seals (B)	Mounting Brackets (C)	Body (D)	Tube Stack (E)	End Cover Screws (F)	Drain End Cover (G)
FG100-5107-2C FG100-5107-2S FG100-5107-2T	FG7-2802CIC8N-DR	OS52NT	5032-2	FG010-4780-2CI	5090-2TN1P 5097-2STP 5097-2TIP	HS08X35DP	FG007-2802CIC8N-DR
FG160-5107-5C FG160-5107-5S FG160-5107-5T	FG7-2802CIC8N-DR	OS52NT	5032-2	FG016-4780-5CI	5090-5TN1P 5097-5STP 5097-5TIP	HS08X35DP	FG007-2802CIC8N-DR
GL140-5108-2 GL140-5108-2T	GL039-4801GM-SP	OS63NT	-	GL015-3136NF-2CI7N	3447-2TN1B 5367-2T14B	HS10X40DP	GL039-4801GM-DR-SP
GK190-5109-3 GK190-5109-3T	GK065-4802GM-SP	OS69NT	- -	GK019-2865NF-3CI8N	3448-3TN1B 5369-3T14B	HS12X50DP	GK065-4802GM-DR-SP
JK190-5110-3 JK190-5110-3T	JK041-4803GM-SP	OS74NT	-	JK019-3332NF-3CI9N	3450-3TN1B 5371-3TI4B	HS16X70DP	JK041-4803GM-DR-SP
PK190-5111-3 PK190-5111-3T	PK004-2926CIC	OS81NT	- -	PK019-2920HF-3CI0	3449-3TN1B 5373-3TI4B	HS16X70DP	PK004-2926CIC-DR

Whenever an end cover is removed for cleaning or maintenance, a new 'O' seal should be fitted up on re-assembly.

IMPORTANT: FG100 & FG160 Specification Change - end covers are now supplied with 2 ½" NPT threads.

Bowman heat transfer solutions

Bowman is now established as the leading manufacturer of swimming pool heat exchangers. With tens of thousands of units operating reliably and efficiently throughout the world, you can have complete confidence when you specify Bowman heat exchangers for your pool.

Additionally, Bowman heat exchangers and oil coolers can be found in Active Fire Protection Systems, Automotive Engine Testing, Combined Heat & Power, Hydraulic Systems, Marine Engineering, plus Mining Equipment and Machinery, in a range that includes:

Exhaust Gas Heat Exchangers

Hydraulic Oil Coolers

Charge Air Coolers

Stainless Steel Heat Exchangers

Header Tank Heat Exchangers

Plate Heat Exchangers

Transmission Coolers

Engine Oil Coolers

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