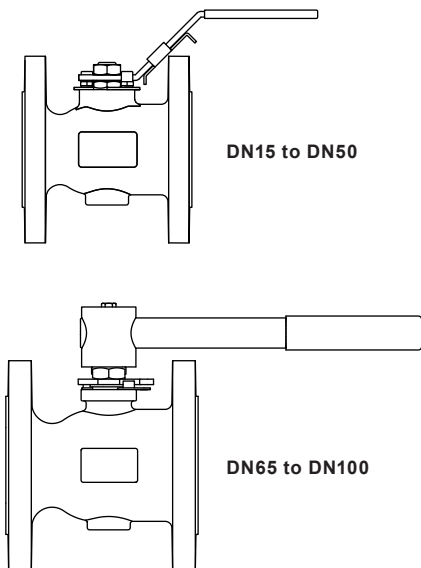


M21ECFi4 Food+
Reduced Bore Ball Valve
DN15 to DN100 Flanged PN40
Installation and Maintenance Instructions



1. Safety information
2. General product information
3. Installation
4. Commissioning
5. Operation
6. Maintenance
7. Spare parts

1. Safety information

Safe operation of these products can only be guaranteed if they are properly installed, commissioned, used and maintained by qualified personnel (see Section 1.11) in compliance with the operating instructions. General installation and safety instructions for pipeline and plant construction, as well as the proper use of tools and safety equipment must also be complied with.



This product is intended to be connected into a system that can operate an EC1935 compliant process.

To minimise the risk of non-intentionally added substances in the system, it is essential that an appropriate CIP (cleaning in place) cycle is carried out by the end user prior to first use in a food contact application.

A list of the materials that could come directly into contact with foodstuffs can be found in the Declaration of Conformity supplied with this product.

1.1 Intended use

Referring to the Installation and Maintenance Instructions, name-plate and Technical Information Sheet, check that the product is suitable for the intended use/application.

The product listed below complies with the requirements of the EU Pressure Equipment Directive 2014/68/EU/ UK Pressure Equipment (Safety) Regulations and carries the  /  mark when so required.

The product falls within the following Pressure Equipment Directive category:

Product	Group 2 Gases	Group 2 Liquids
	DN15 - DN32	SEP
DN40 - DN100	1	SEP

- i) The product has been specifically designed for use on steam, compressed air, water/condensate and other industrial fluids that are in Group 2 of the above mentioned Pressure Equipment Directive.
- ii) Check material suitability, pressure and temperature and their maximum and minimum values. If the maximum operating limits of the product are lower than those of the system in which it is being fitted, or if malfunction of the product could result in a dangerous overpressure or overtemperature occurrence, ensure a safety device is included in the system to prevent such over-limit situations.
- iii) Determine the correct installation situation and direction of fluid flow.
- iv) Spirax Sarco products are not intended to withstand external stresses that may be induced by any system to which they are fitted. It is the responsibility of the installer to consider these stresses and take adequate precautions to minimise them.
- v) Remove protection covers from all connections and protective film from all name-plates, where appropriate, before installation on steam or other high temperature applications.

1.2 Access

Ensure safe access and if necessary a safe working platform (suitably guarded) before attempting to work on the product. Arrange suitable lifting gear if required.

1.3 Lighting

Ensure adequate lighting, particularly where detailed or intricate work is required.

1.4 Hazardous liquids or gases in the pipeline

Consider what is in the pipeline or what may have been in the pipeline at some previous time. Consider: flammable materials, substances hazardous to health, extremes of temperature.

1.5 Hazardous environment around the product

Consider: explosion risk areas, lack of oxygen (e.g. tanks, pits), dangerous gases, extremes of temperature, hot surfaces, fire hazard (e.g. during welding), excessive noise, moving machinery.

1.6 The system

Consider the effect on the complete system of the work proposed. Will any proposed action (e.g. closing isolation valves, electrical isolation) put any other part of the system or any personnel at risk?

Dangers might include isolation of vents or protective devices or the rendering ineffective of controls or alarms. Ensure isolation valves are turned on and off in a gradual way to avoid system shocks.

1.7 Pressure systems

Ensure that any pressure is isolated and safely vented to atmospheric pressure. Consider double isolation (double block and bleed) and the locking or labelling of closed valves. Do not assume that the system has depressurised even when the pressure gauge indicates zero.

1.8 Temperature

Allow time for temperature to normalise after isolation to avoid danger of burns.

If parts made from PTFE have been subjected to a temperature approaching 230 °C (446 °F) or higher, they will give off toxic fumes, which if inhaled are likely to cause temporary discomfort. It is essential for a no smoking rule to be enforced in all areas where PTFE is stored, handled or processed as persons inhaling the fumes from burning tobacco contaminated with PTFE particles can develop 'polymer fume fever'.

1.9 Tools and consumables

Before starting work ensure that you have suitable tools and/or consumables available. Use only genuine Spirax Sarco replacement parts.

1.10 Protective clothing

Consider whether you and/or others in the vicinity require any protective clothing to protect against the hazards of, for example, chemicals, high/low temperature, radiation, noise, falling objects, and dangers to eyes and face.

1.11 Permits to work

All work must be carried out or be supervised by a suitably competent person. Installation and operating personnel should be trained in the correct use of the product according to the Installation and Maintenance Instructions.

Where a formal 'permit to work' system is in force it must be complied with. Where there is no such system, it is recommended that a responsible person should know what work is going on and, where necessary, arrange to have an assistant whose primary responsibility is safety.

Post 'warning notices' if necessary.

1.12 Handling

Manual handling of large and/or heavy products may present a risk of injury. Lifting, pushing, pulling, carrying or supporting a load by bodily force can cause injury particularly to the back. You are advised to assess the risks taking into account the task, the individual, the load and the working environment and use the appropriate handling method depending on the circumstances of the work being done.

1.13 Residual hazards

In normal use the external surface of the product may be very hot. If used at the maximum permitted operating conditions the surface temperature of this product may reach temperatures of 230 °C (446 °F)

This product is not self-draining. Take due care when dismantling or removing them from an installation (refer to 'Maintenance instructions').

1.14 Freezing

Provision must be made to protect products which are not self-draining against frost damage in environments where they may be exposed to temperatures below freezing point.

1.15 Safety information - Product specific

Hydraulic locking

Ball valves are prone to lock-up when used on certain heating/cooling applications where both steam and liquid will pass through the valve. This is caused by liquid trapped in the ball during closure being heated to create a high hydraulic pressure inside the ball cavity. To prevent this, during manufacture, a minute hole is drilled in the ball, so, that in the closed position, any excess pressure will be relieved. Spirax Sarco ball valves for these applications are clearly marked to allow the valve to be correctly installed, such that, when closed, the hole is facing the steam source.

1.16 Disposal

Recyclable parts

Unless otherwise stated in the Installation and Maintenance Instructions, this product is recyclable and no ecological hazard is anticipated with its disposal providing due care is taken, with the exception of PTFE.

PTFE disposal:

- Can only be disposed of by approved methods, not incineration.
- Keep PTFE waste in a separate container, do not mix it with other rubbish.

Please visit the Spirax Sarco product compliance web pages

<https://www.spiraxsarco.com/product-compliance>

for up to date information on any substances of concern that may be contained within this product. Where no additional information is provided on the Spirax Sarco product compliance web page, this product may be safely recycled and/or disposed providing due care is taken. Always check your local recycling and disposal regulations.

1.17 Returning products

Customers and stockists are reminded that under EC Health, Safety and Environment Law, when returning products to Spirax Sarco they must provide information on any hazards and the precautions to be taken due to contamination residues or mechanical damage which may present a health, safety or environmental risk. This information must be provided in writing including Health and Safety data sheets relating to any substances identified as hazardous or potentially hazardous.

2. General product information

2.1 Description

The M21ECFi4 is a reduced bore ball valve with a single piece body, having ISO mounting as standard. It was designed and manufactured specially for Steam and Condensate applications to be used as an isolating valve, not a control valve. The valve complies with EC1935:2004 Food Contact Materials and its plastic materials and articles intended to come into contact with food comply with EC10:2011. It also complies with regulation EC2023:2006 on good manufacturing practice for materials and articles intended to come into contact with food.

ISO mounting

The integral ISO body mounting allows the valve to be automated without losing seal integrity, as the body does not require disassembly. Manual to remote control may therefore be easily accomplished by the ISO range of Spirax Sarco ball valves.

Standards

This product complies with the requirements of the EU Pressure Equipment Directive 2014/68/EU/ UK Pressure Equipment (Safety) Regulations and carries the  /  mark when so required.

Certification

This product comes as standard with a certification package, which contains the following certificates and Declarations of Compliance:

- EN 10204 3.1 material certificates for all wetted parts (including seats and seals)
- EC1935:2004 Materials and Articles Intended to come into Contact with Food
- EC2023:2006 Good Manufacturing Practice for Materials and Articles Intended to come into Contact with Food
- EC10:2011 Plastic Materials and Articles Intended to come into Contact with Food

The material for the seals is compliant with:

- FDA CFR Title 21. Paragraph 177. 1550.

Note: For further information on this product see Technical Information sheet (TI-P798-02).

2.2 Sizes and pipe connections

DN15, DN20, DN25, DN32, DN40, DN50, DN65, DN80 and DN100.

Standard flange: EN 1092 PN40

Face-to-face dimensions:

- DN15 to DN100 according to DIN 3202 F4.

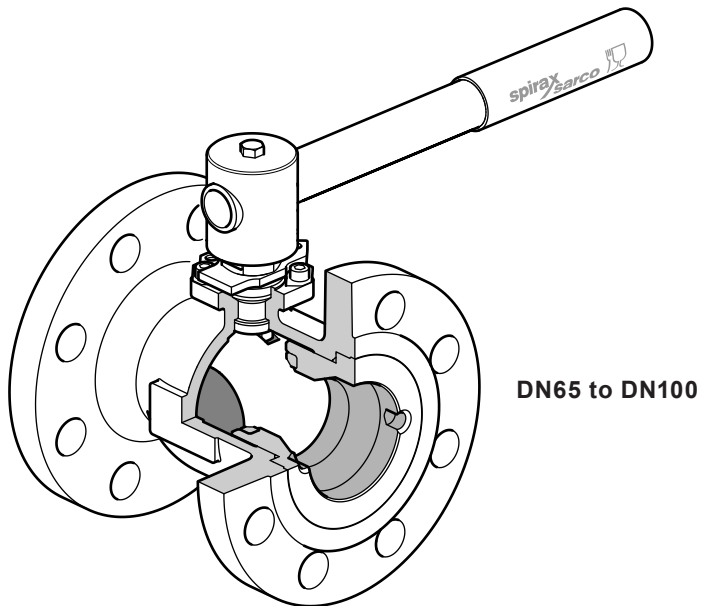
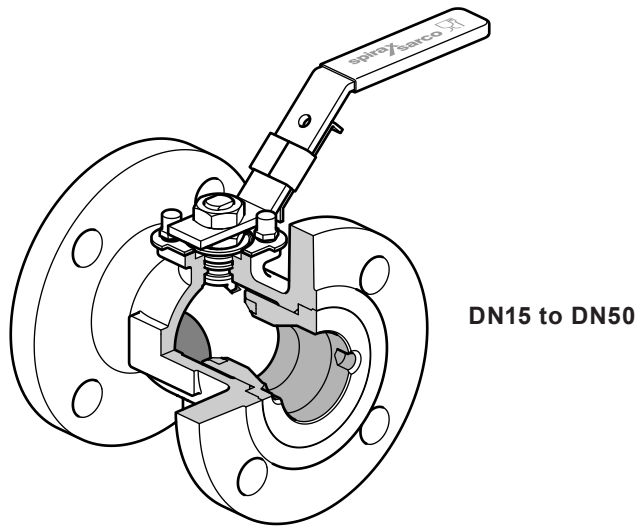
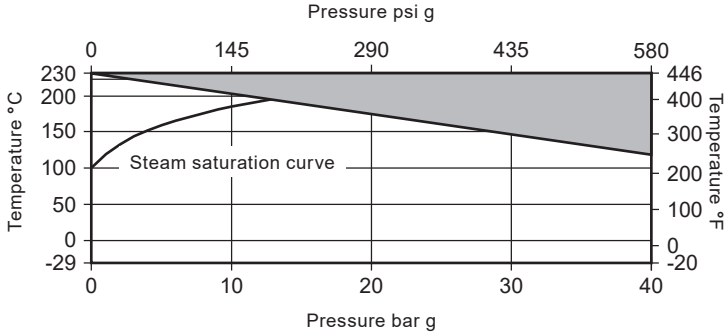



Fig. 1

M21ECFi4 Food+ Reduced Bore Ball Valve DN15 to DN100 Flanged PN40

2.3 Pressure/temperature limits



 The product **must not** be used in this region.

Body design conditions		PN40	
PMA	Maximum allowable pressure	40 bar g @ 120 °C	580 psi g @ 248 °F
TMA	Maximum allowable temperature	230 °C @ 0 bar g	446 °F @ 0 psi g
	Minimum allowable temperature	-29 °C	-20 °F
PMO	Maximum operating pressure for saturated steam service	12 bar g	174 psi g
TMO	Maximum operating temperature	230 °C @ 0 bar g	446 °F @ 0 psi g
	Minimum operating temperature	-29 °C	-20 °F
Note: For lower operating temperatures consult Spirax Sarco.			
ΔPMX	Maximum differential pressure is limited to the PMO		
Designed for a maximum cold hydraulic test pressure of:		60 bar g	870 psi g

3. Installation

Note: Before actioning any installation observe the 'Safety information' in Section 1.

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Although the valve has great structural integrity, severe misalignment and/or the pulling effect of incorrect pipe length will have a detrimental effect on the valve and must be avoided. Particular attention should be paid to correct pipe alignment such that the inlet pipework and valve are all on the same axis.

Valves are for on/off applications and may be operated manually.

Wherever practicable, valves should be installed where there is adequate space available so that they can be conveniently operated and maintained.

Before installing a valve, check to ensure that size, pressure rating, materials of construction, end connections, etc. are suitable for the service conditions of the particular application. Care must be taken to ensure that all dirt which may have accumulated in the valve during storage is removed before installation, maintain cleanliness during installation since the introduction of dirt can result in damage to the valve seats and operating mechanism. To minimise the danger of abrasive particles damaging the seats, pipeline strainers should be fitted upstream of the valves.

Install the valve with the handle in a suitable position. The preferred position is with the spindle vertical. The valve can be installed in any position for gas service (see Figure 3 below).

When used on steam services:

1. Fit a trapped drain pocket upstream of the valve.
2. Open valve slowly to prevent the risk of waterhammer damage.

Do not mount the valve upside down for liquid service (Figure 2).

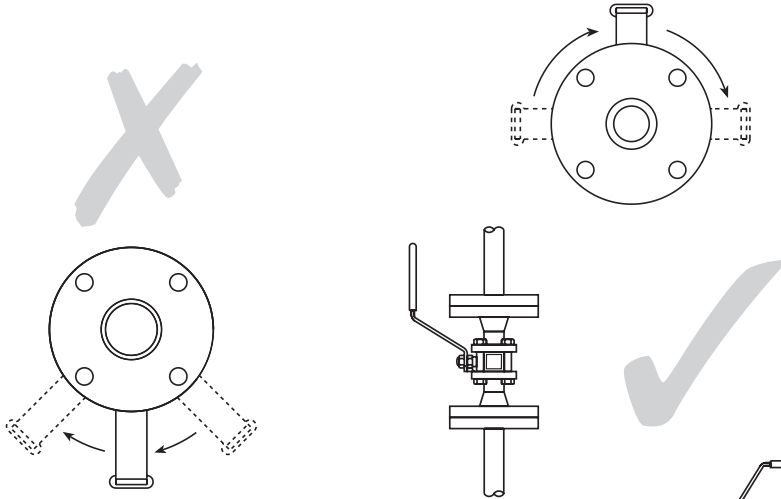


Fig. 2 Incorrect installation for liquid service

Caution:
Always open valves slowly to avoid system shocks.

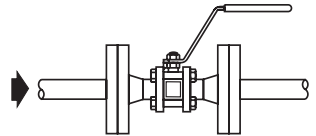


Fig. 3 Correct installation for gas service

4. Commissioning

After installation or maintenance ensure that the system is fully functioning. Carry out tests on any alarms or protective devices.

5. Operation

The valve is operated manually by a handle, or automatically by an actuator. Special care must be taken to ensure that the movement is made in the correct direction.

The valve can be used as an on/off control valve, and can be operated fully open or fully closed.

6. Maintenance

Note: Before actioning any maintenance programme observe the 'Safety information' in Section 1.

6.1 General information

As with all mechanical devices, regular maintenance is the most efficient means of ensuring continued operational efficiency. Regular scheduled inspection of all valves is essential especially on valves which are operated only occasionally.

6.2 General maintenance

Remove the complete flanged valve from the pipeline. The complete body assembly can then be removed and new parts fitted. **Please note:** A special tool, that is only available from Spirax Sarco, is required in order to remove the insert (2) - See Section 7, Available spares. When the seats have been replaced and the valve has been reassembled it is recommended that the following tests are conducted before commissioning back into service:

- Cold hydraulic test to the body at 60 bar g (870 psi g).
- Seat leakage test using compressed air at 7 bar g (101 psi g).

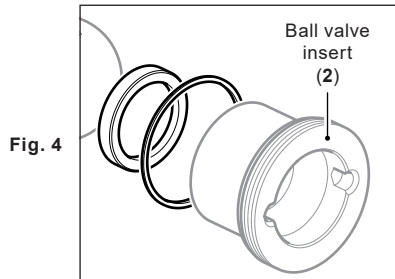


Table 1 Recommended tightening torques

Item no.	Part	Size	N m	lbf ft
2	Insert	DN15, DN20, DN25 and DN32	108 - 135	80 - 100
		DN40	135 - 160	100 - 120
		DN50	215 - 245	160 - 180
		DN65	245 - 270	180 - 200
		DN80	405 - 605	300 - 450
		DN100	540 - 740	400 - 550
15 and 16	Stem nuts	DN15 and DN20	10.8 - 13.5	8 - 10
		DN25	17.5 - 20.3	13 - 15
		DN32, DN40, DN50 and DN65	34 - 40	25 - 30
		DN80 and DN100	54 - 61	40 - 45

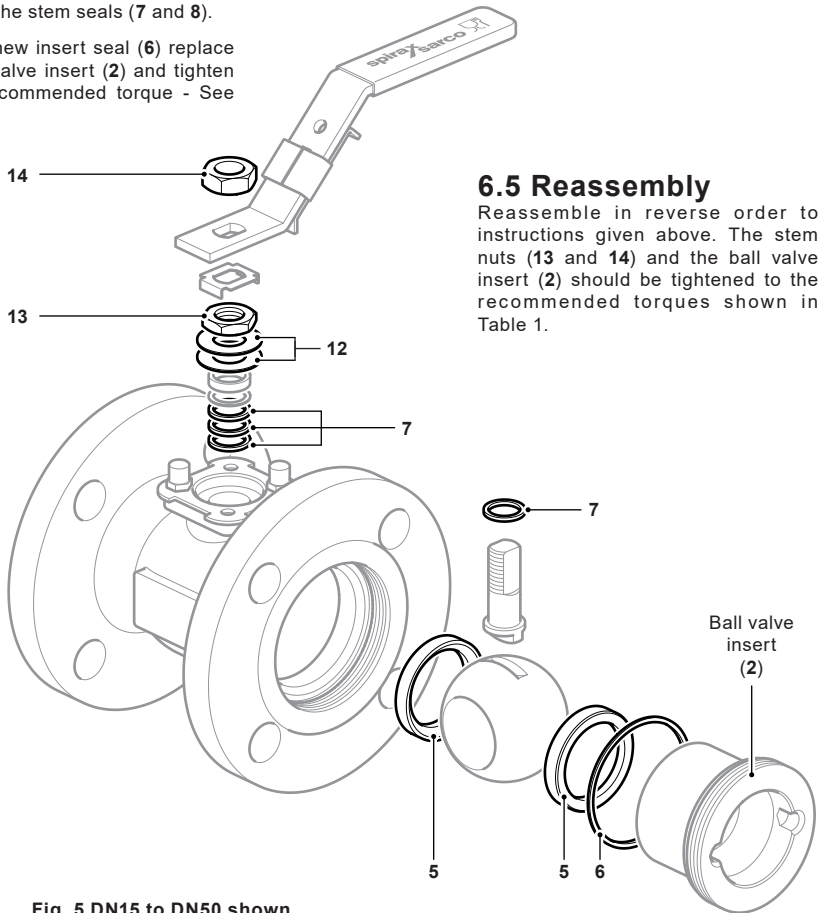
6.3 How to replace the seats (5):

- Remove the body as described in Section 6.2.
- With the body removed, remove the seats (5) and insert seal (6).
- Fit new seats (5) pushing them into the body chamber.
- Using a new insert seal (6) replace the ball valve insert (2) and tighten to the recommended torque - See Table 1.

6.4 How to replace the stem seals (7 and 8):

- Remove the body as described in Section 6.2.
- Remove the nuts (13 and 14).
- Replace the stem seals (7 and 8).

Using a new insert seal (6) replace the ball valve insert (2) and tighten to the recommended torque - See Table 1.



6.5 Reassembly

Reassemble in reverse order to instructions given above. The stem nuts (13 and 14) and the ball valve insert (2) should be tightened to the recommended torques shown in Table 1.

Fig. 5 DN15 to DN50 shown

7. Spare parts

DN15 to DN50 Spare parts

The spare parts available are shown in solid outline. Parts drawn in a grey line are not supplied as spares.

Available spares

Seats, insert seal and stem seals	5, 6, 7 and 8
Insert tool - Required to aid the removal of the ball valve insert (2)	Not shown

How to order spares

Always order spares by using the description given in the column headed 'Available spares' and state the size and type of ball valve.

Example: 1 set of seats, insert seal and stem seals for a Spirax Sarco DN50 flanged PN40 M21ECFi4 ball valve.

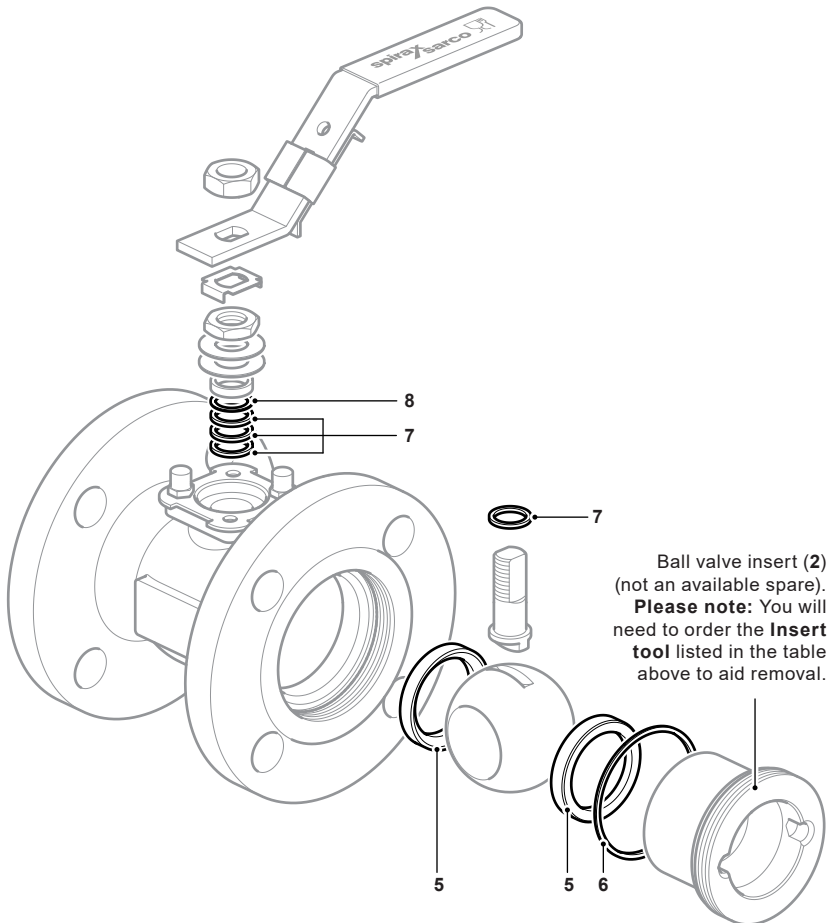


Fig. 6

M21ECFi4 Food+ Reduced Bore Ball Valve DN15 to DN100 Flanged PN40

DN65 to DN100 Spare parts

The spare parts available are shown in solid outline. Parts drawn in a grey line are not supplied as spares.

Available spares

Seats, insert seal, lower stem seals and upper stem packaging	5, 6, 9 and 10
Insert tool - Required to aid the removal of the ball valve insert (2)	Not shown

How to order spares

Always order spares by using the description given in the column headed 'Available spares' and state the size and type of ball valve.

Example: 1 set of seats, insert seal, lower stem seals and upper stem packaging for a Spirax Sarco DN50 flanged PN40 M21ECFi4 ball valve.

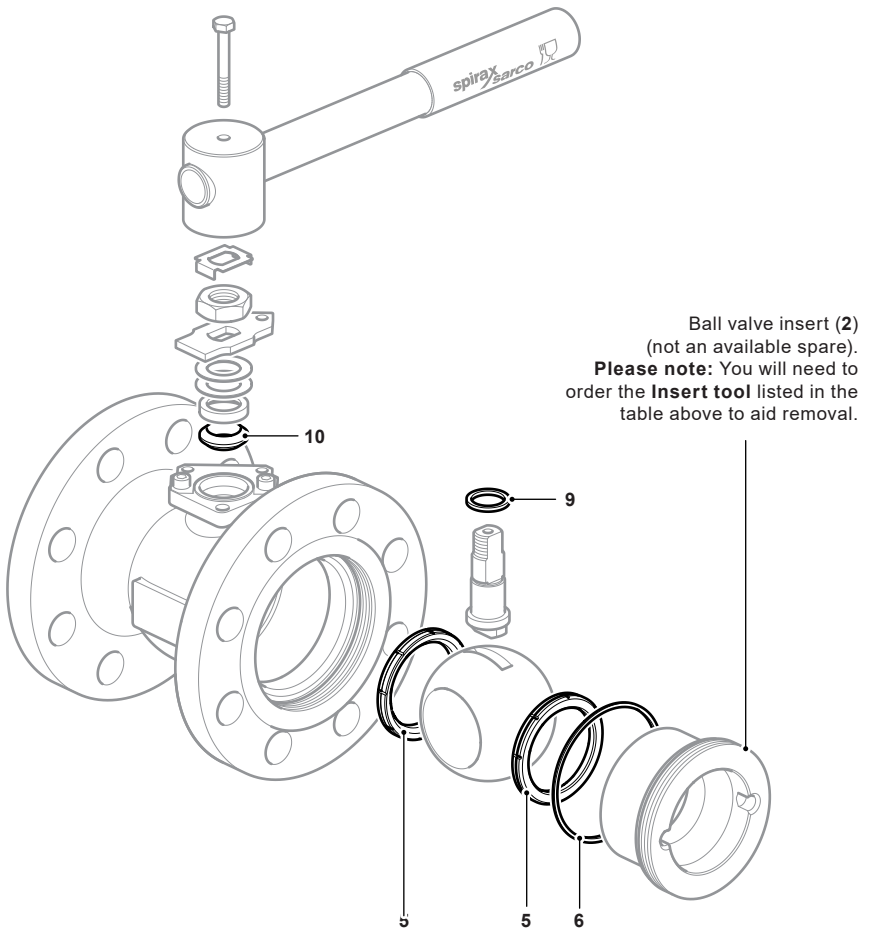


Fig. 7

M21ECFi4 Food+ Reduced Bore Ball Valve DN15 to DN100 Flanged PN40

M21ECFi4 Food+ Reduced Bore Ball Valve DN15 to DN100 Flanged PN40

