ENGINEERING
TOMORROW

Domestic
Product Selection Guide

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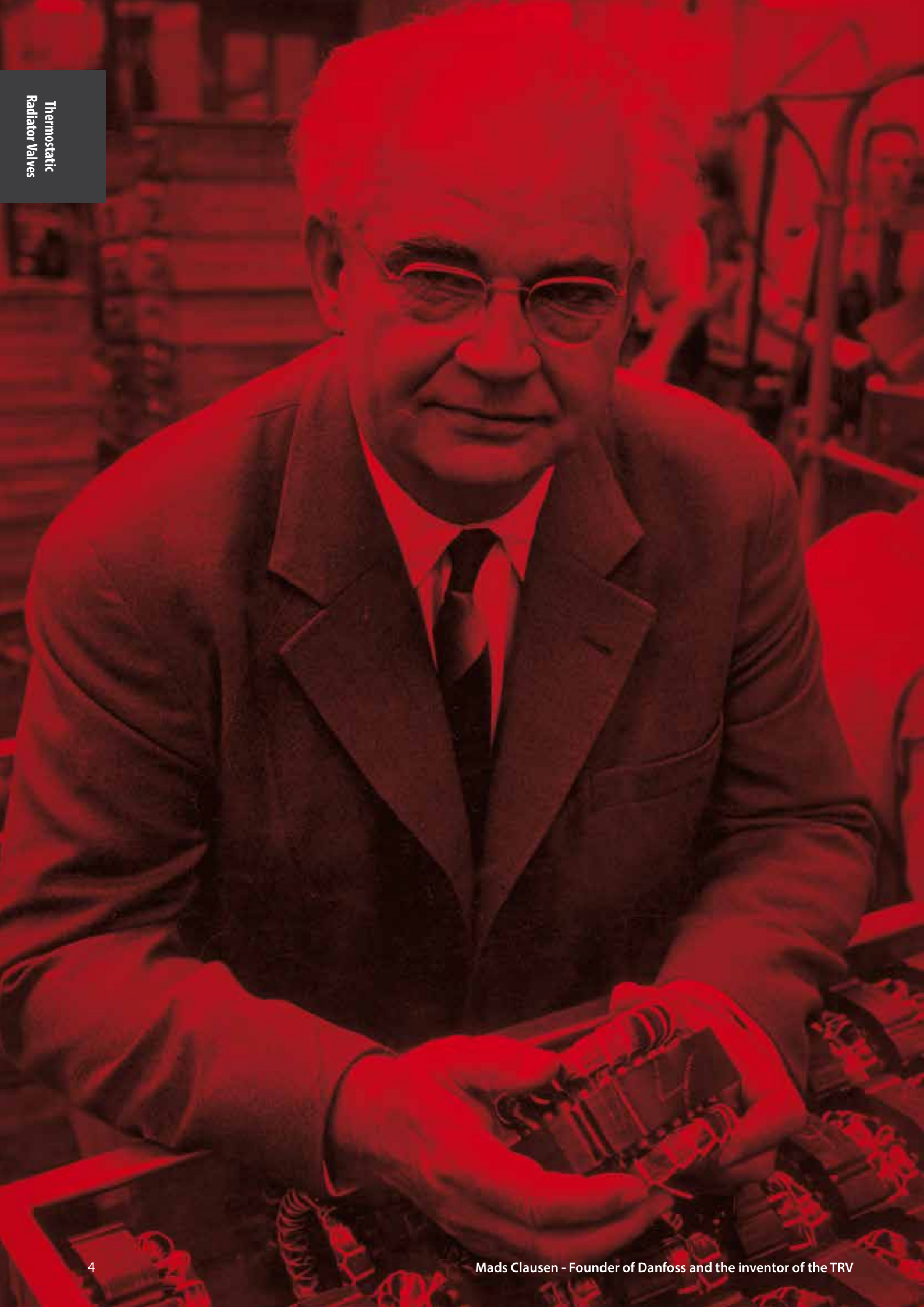
Efficient lean production facility

State of the art, temperature controlled auto assembly cell

On-site product testing laboratory used internally and externally for product validation and research

Contents

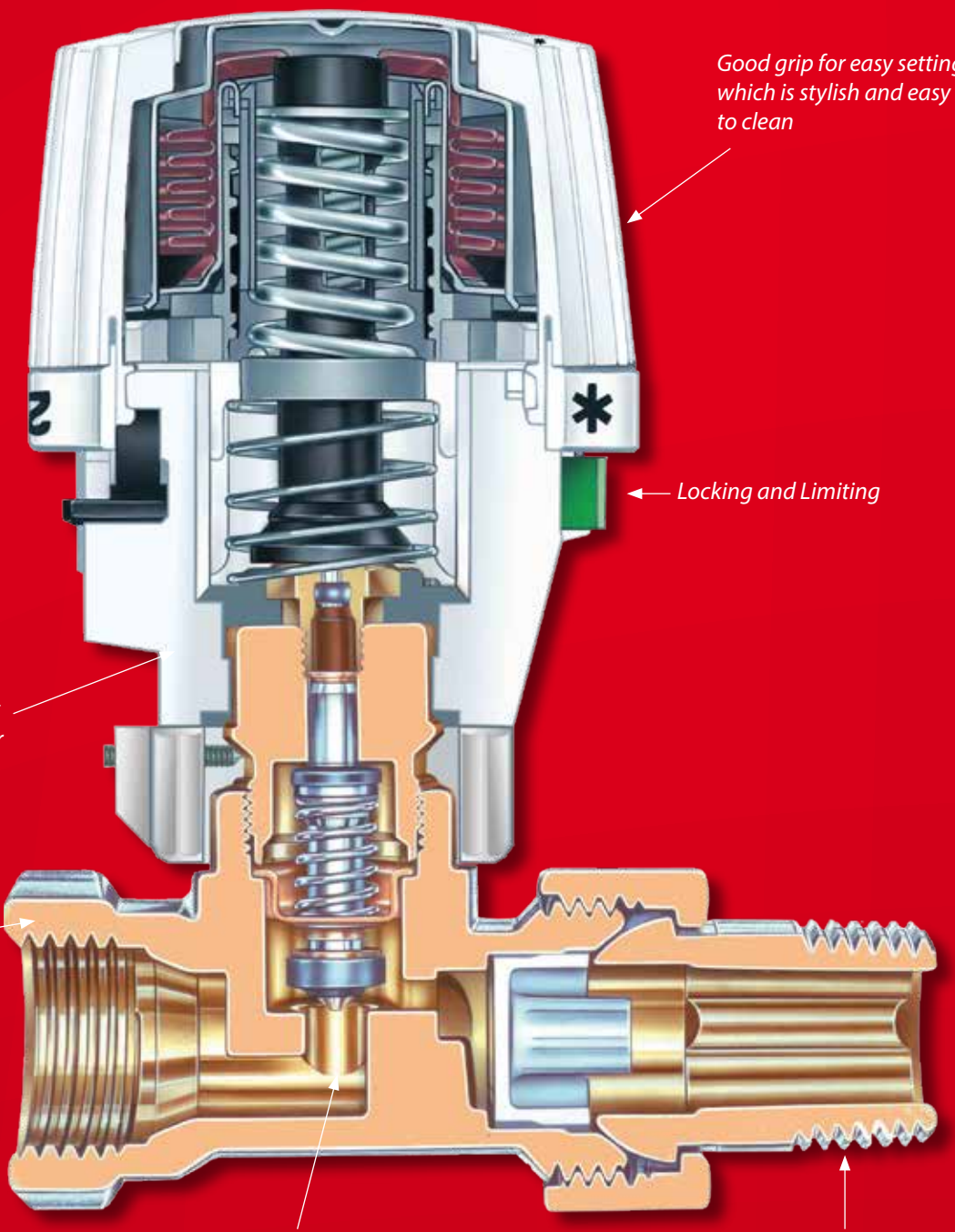


Mads Clausen - Founder of Danfoss and the inventor of the TRV

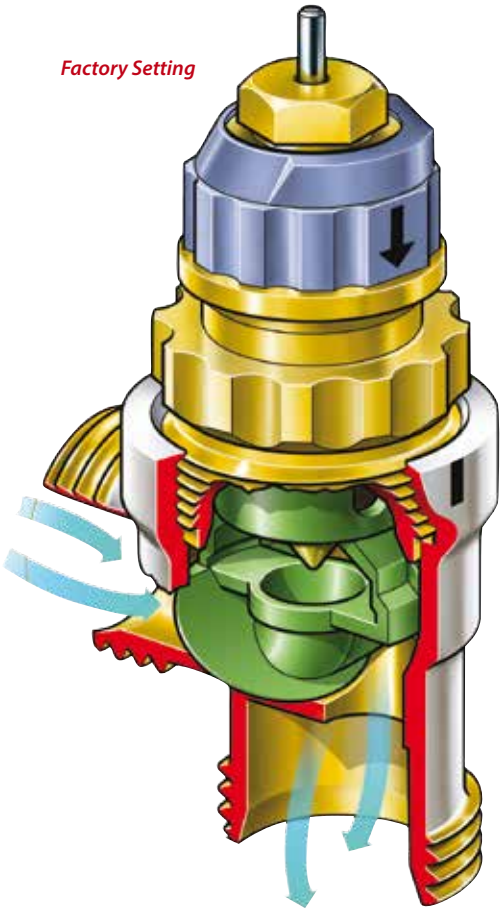
Radiator Thermostats

Contents

Working **Principle**



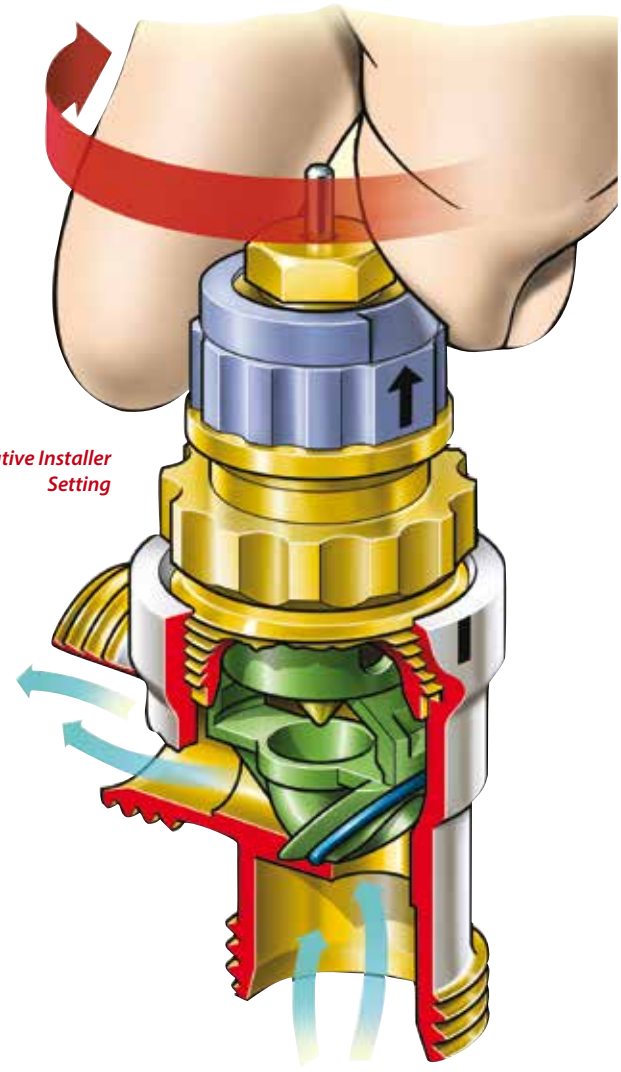
Bi-Directional Valves



Traditional 'cone and seat' type valves need to be fitted on the flow rather than the return side of the radiator to prevent hammer when a partially open valve is forced to slam shut by water flowing the wrong way through the valve - resulting in a costly call back for the heating engineer.

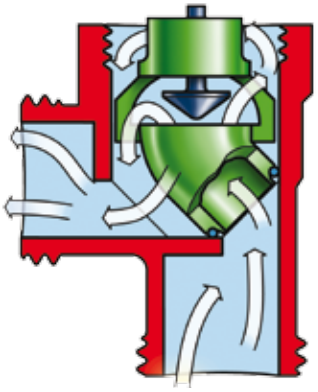
The 'flow selectable' bi-directional TRV from Danfoss can be installed horizontally or vertically, in the flow or return. If any noise occurs after fitting it can be stopped by simply 'revolving' the patented flow direction selector on the valve head from the factory-set position to the alternative setting.

This quick and easy adjustment changes the direction of water flow around the cone, ensuring hammer-free flow in the appropriate direction without a time-consuming drain down, use of special tools, or loss of profit or business reputation.



The 'flow selectable' bi-directional TRV is a real-time saver, particularly in large domestic heating installations, where resolving problems with TRVs that had been installed the wrong way round could be a time-consuming task.

Featuring a new generation bi-directional valve body, this TRV is designed by Danfoss to deliver improved performance in whatever direction it is fitted. It utilises high performance liquid actuators and is CEN approved for maximum customer confidence and reliability in use.



The bi-directional valve body is supplied with all RAS-C^2, RAS-D^2 and RTW TRV sensors.


Danfoss

Domestic
Radiator Thermostats

Domestic Radiator Valves

RAS-C²

- With unique flow selectable bi-directional valve
- Stylish sensor, compact and easy to fit
- Available in convenient combi packs
- Radiator packs with matching lockshield valves also available
- Available in 10 and 15mm sizes, plus 10mm push-fit elbow version
- High performance liquid sensor

The compact RAS-C² is equally suited to both the domestic and contract market, and comes complete with the revolutionary 'flow selectable' revolver valve body.

The stylish RAS-C² sensor is packaged together with the innovative flow selectable RA-FS bi-directional valve body which can be mounted either vertically or horizontally in flow or return. If water hammer is experienced a patented flow selection device within the valve can be turned to reverse the water direction inside the valve without the need to drain down the system. A quick and easy solution to an otherwise expensive problem.

The RAS-C² sensor, based upon the tried and tested liquid sensor actuator, is compact and provides highly accurate temperature control. Sensor mounting requires no tools, simply press the sensor onto the valve body and hand tighten a clamping ring to secure. The sensor incorporates a frost protection setting and a positive off feature, useful if radiators need to be removed for decoration.

RAS-C² sensors are compatible with RA-FS flow selectable bi-directional valves, RA-FN, RA-N and RA-G valve bodies.

Approved to European standard EN215 and manufactured assessed and certified by Bureau Veritas against ISO 9001 / 2008 Quality Management Systems.

Please note: If the RA-FS valve is used with RA2000 sensors, the flow direction must be determined during commissioning and the flow selector set accordingly.

Additional Information:

Lockshield Valves p.14
Compression Fittings p.27
Heating Efficiency Packs p.76

RAS-C² Bi-Directional TRV c/w built-in sensors Combi Packs (2-pipe systems)		
Code No	**Description** [3]	**Temp. Range °C (Xp=2k)**
Combi Pack: Sensor and TRV Valve		
013G605000	15mm Reversible Angle c/w Built-in Sensor	8-28 [1]
013G605500	10mm Reversible Angle c/w Built-in Sensor	
013G605100	15mm Straight c/w Built-in Sensor	
013G605600	10mm Straight c/w Built-in Sensor	
013G606000	15mm Reversible Angle with 10mm push-fit elbow c/w Built-in Sensor [2]	
Radiator Pack: Sensor, TRV Valve and Lockshield Valve		
013G600500	15mm Reversible Angle TRV c/w Built-in Sensor & Matching Lockshield Valve	8-28 [1]
013G600600	10mm Reversible Angle TRV c/w Built-in Sensor & Matching Lockshield Valve	
013G600300	15mm Straight c/w Built-in Sensor & Matching Lockshield Valve	
013G600400	10mm Straight c/w Built-in Sensor & Matching Lockshield Valve	
013G600700	15mm Reversible Angle TRV c/w Built-in Sensor & Matching Lockshield Valve, both with 10mm push-fit elbows [2]	
RAS-C² Thermostatic Sensor Only		
013G604000	Built-in Sensor includes 'Positive Off'	8-28 [1]

Angled Bi-Directional Valve Bodies c/w Fittings, Reversible for 2-Pipe Systems				
Code No	**Pattern**	**Connections**		**Kv Value (Xp=2k)**
		Pipe	**Radiator Tail**	
013G628300	RA-FS Angle	10mm	1/2"BSP	0.55
013G628100	RA-FS Angle	15mm	1/2"BSP	0.55

Accessories	
013G491300	Collet Clip to Prevent Accidental De-mounting of Push-fit Fitting (10 Pieces)
013G491200	Decorative Cover for Push-fit Fitting (10 Pieces)
003L010500	Drain-off Tailpiece for Use with RLV-D Valve and RA-FS Valves

(1) Allowing for influence of flow temperature and radiation.
(2) For use with PB and PEX plastic pipes complying with BS7291, including Hep$_2$O, Osmagold, Polyplumb and Equator - correct insert must be used.
(3) All valves have 1/2" connection to radiator.

RAS-C² Radiator Pack

Domestic Radiator Valves
RAS-D²

027

RAS-D² Bi-Directional TRV c/w built-in sensors Combi Packs (2-Pipe systems)		
Code No	**Description** [2]	**Temp Range °C (Xp=2k)**
Combi Pack: Sensor & TRV Valve		
013G601300	10/15mm Reversible Angle, Chrome/White, Built-in Sensor	8-28 [1]
013G601200	10/15mm Reversible Angle, All Chrome, Built-in Sensor	
013G601500	10/15mm Reversible Straight Chrome/White	
013G601400	10/15mm Reversible Straight All Chrome Built-in Sensor	
Radiator Pack: Sensor, TRV Valve & Lockshield Combinations		
013G601700	10/15mm angle, white/chrome sensor and chrome valve body. Flow selectable reversible bi-directional. Includes compression connections	8-28 [1]
013G601600	10/15mm angle, All chrome sensor and chrome valve body. Flow selectable reversible bi-directional. Includes compression connections.	
013G601900	10/15mm straight, white/chrome sensor and chrome valve body. Flow selectable reversible bi-directional. Includes compression connections.	
013G601800	10/15mm straight, All chrome sensor and chrome valve body. Flow selectable reversible bi-directional. Includes compression connections.	
RAS-D² Thermostatic Sensor Only		
013G617600	Fixed Sensor, white/chrome	8-28 [1]
013G617000	Fixed Sensor, All chrome	8-28 [1]

Angled Bi-Directional Chrome Valve Body c/w Fittings, Reversible for 2-Pipe Systems				
Code No	**Pattern**	**Connections**		**Kv Value (Xp=2k)**
		Pipe	**Radiator Tail**	
013G628200	RA-FS Angle	10/15mm	1/2"BSP	0.55
Straight Bi-Directional Chrome Valve Body Complete with Fittings (2-Pipe Systems)				
013G628400	RA-FS Straight	10/15mm	1/2"BSP	0.55

Notes:
(1) Allowing for influence of flow temperature and radiation.
(2) All valves have 1/2" connection to radiator.

RAS-D² Radiator Pack

- Unique flow selectable bi-directional valve
- High performance liquid sensor
- Convenient combi packs
- Radiator packs available with matching lockshield valves
- Reversible bi-directional angled pattern valve bodies
- Available in white with chrome styling or a stunning all chrome model to compliment designer radiators and towel rails

The RAS-D² range complements the one-off market with its modern, stylish design and comes complete with the revolutionary 'flow selectable' revolver valve body.

The RAS-D² radiator thermostats are designed for use in 2-pipe domestic heating systems like designer radiators or towel rails. All RAS-D² Combi Packs comprise of a RA-FS bi-directional valve and a RAS-D² sensor. Combi packs are also available with a RLV-D lockshield valve. The valves have a ½" BSP (R½") tail piece connection to the radiator and include 10mm and 15mm compression fittings to connect the valve to the pipe work.

Valve bodies are reversible and bi-directional and include a flow-selectable feature to ensure trouble free installation without any risk of water hammer. The valve is supplied with a protective cap, which can be used for manual regulation during the construction phase. The cap must not be used as a manual shut off device. RAS-D² sensors incorporate a "Frost Protection" setting and a "Positive Off" feature for maximum user flexibility. Temperature range is from 8°C to 28°C.

All Danfoss RAS-D² sensors and RA-FS valves are manufactured to the highest standards. All Danfoss radiator thermostats and valves are manufactured in factories, assessed and certified by Bureau Veritas against ISO 9001 / 2008 Quality Management Systems.
Valve bodies are manufactured from brass with chrome plating. The spindle in the gland seal is made of chrominium steel and works in a lifetime lubricated O-ring. The complete gland assembly can be replaced without draining down the system.

Additional Information:

Lockshield Valves p.14
Compression Fittings p.27

Domestic Radiator Valves
RTW

027

- Unique flow selectable bi-directional TRV
- Compact and robust sensor
- Available in combi packs
- Liquid sensor for reliable performance

Ideal for domestic and contract applications, the RTW sensor comes complete with the 'flow selectable' revolver valve body.

Designed with the installer in mind, the RA-FS bi-directional valve can be installed on the flow or return, thanks to the unique 'revolver' technology.

Should water hammer be experienced, the patented flow selection device within the valve can be turned to reverse the water direction inside the valve without the need to drain down the system.

The RTW sensor is based upon Danfoss' accurate and reliable liquid sensor actuator, is compact and robust and provides accurate temperature control.

The sensor incorporates both a frost protection setting and a positive shut-off feature, useful if radiators need to be removed for decoration.

RTW sensors are compatible with RA-FS flow selectable bi-directional valves, RA-FN, RA-N and RA-G valve bodies.

Approved to European standard EN215 and manufactured assessed and certified by Bureau Veritas against ISO 9001 / 2008 Quality Management Systems.

Additional Information:
Compression Fittings p.27

RTW Bi-Directional TRV c/w built-in sensors Combi Packs (2-pipe systems)		
Code No	**Description [2]**	**Temp. Range °C (Xp=2k)**
Combi Pack: Sensor & TRV Valve		
013G712000	15mm Reversible Angle c/w Built-in Sensor	8-28 [1]
013G712500	10mm Reversible Angle c/w Built-in Sensor	
Radiator Pack: Sensor, TRV Valve and Lockshield Valve		
013G710600	10mm Reversible Angle c/w Built-in Sensor and Lockshield Valve	8-28 [1]
013G710500	15mm Reversible Angle c/w Built-in Sensor and Lockshield Valve	
RTW Thermostatic Sensor Only		
013G711000	Built-in Sensor includes 'Positive Off'	8-28 [1]

Angled Bi-Directional Valve Bodies c/w Fittings, Reversible for 2-Pipe Systems				
Code No	**Pattern**	**Connections**		**Kv Value (Xp=2k)**
		Pipe	**Radiator Tail**	
013G628300	RA-FS Angle	10mm	1/2"BSP	0.55
013G628100	RA-FS Angle	15mm	1/2"BSP	0.55

Accessories	
003L010500	Drain-off Tailpiece for use with RLV-D Valve and RA-FS Valves

Notes:
(1) Allowing for influence of flow temperature and radiation.
(2) All valves have 1/2" connection to radiator.

Versions with lockshield are available on request.

RTW Combi Pack

Intelligent Radiator Thermostats
ECO

Code No.	Description - Combi Pack
014G005500	Eco® sensor, RA adaptor pre-mounted to sensor, bi-directional valve, 10/15mm
014G006200	Eco® sensor, RA adaptor pre-mounted to sensor, bi-directional valve, RLV-D Angle 10/15mm
Code No.	**Description - Sensor**
014G006400	Eco® stand-alone sensor (with 2 adaptors loose in the box (RA and M30 adaptor)

Technical Data - Eco® Sensor	Code No.
Screen/display	Grey digital with backlight
Actuator type	Electro-mechanical
Software classification	A
Control	Proportional Integral Derivative Control
Power supply	2x1.5V AA alkaline, class III (SELV)
Battery life	2 years
Low battery signal	Battery icon and alarm bell will flash in display - if the battery level is critical, the whole display will flash
Ambient temperature	0 to 40°C
Temperature setting range	6 to 28°C
Open-window function	Yes
Safety classification	Type 1
Maximum water temperature	90°C
Movement type	Linear
Spindle movement	2-3 mm on valve
Maximum extension	4.5 mm
Temperature sampling	Measures temperature every minute
Speed of adjustment	1 mm/s
Power consumption	3 mW in standby, 1.2 W when active

- Energy saving
- Provides high comfort
- Open window function
- Valve exercise function
- PID control
- Adaptive learning
- 7-day programmes with adjustable temperature set-backs and up to 3 set-back periods per day
- Min./max. temp. limitation
- Child lock
- Holiday function

All Eco® Combi Packs comprise of an Eco® sensor and a RA-FS angled bi-directional valve.

Eco® is a stand-alone, intelligent, electronic programmable radiator sensor for residential use. It is easy to install and operate with only three buttons on the front.

Eco® comes with three pre-installed programmes (P0, P1 and P2) designed to suit most people. These programmes allow the selection of different temperatures in the home at different times of the day. P0 maintains the same temperature all day, whereas, P1 and P2 will lower the temperature at predefined periods of the day to save energy and will regulate the heating when the home is occupied to suit the lifestyle of the family.

RA-FS valve bodies are reversible and bi-directional and include a flow-selectable feature to ensure trouble free installation without any risk of water hammer. For optimum performance, Danfoss recommends the sensor to be mounted horizontally.

The valves have a ½" BSP (R½") tail piece connection to the radiator and are available with 15, 10 or 8 mm compression fitting or an elbow with 10 mm push-fit connection to the pipe work.
All valves are supplied with a protective cap, which can be used for manual regulation during the construction phase. The cap must not be used as a manual shut of device.
living eco® Combi Packs are also available with a RLV-D lockshield valve.

Additional Information:

Lockshield Valves p.14
Compression Fittings p.27

Domestic Lockshield Valves
RLV-D

- Matching valve body, fully interchangeable with radiator thermostat valve bodies
- Available in 15mm and 10mm with compression fittings
- Available in 15mm version with 10mm push-fit elbow
- Available as separates or in convenient packs with radiator thermostats

The range of domestic lockshield valves are engineered to extremely high standards, and finished to match the range of radiator thermostat valve bodies.

The RLV-D range of domestic lockshield valves are identical in finish and dimensions to the RA-FS valve bodies used with the RAS-D² and RAS-C² radiator thermostat combi packs. All of the fittings, including the tailpieces, are fully interchangeable for total ease of installation.

Available in angled pattern 15mm and 10mm sizes with conventional compression fittings and in a version incorporating a 10mm push-fit elbow, the valves are ideal for new build, repairs and system upgrades.

Adjustment of the lockshield valve is by means of a 6mm Allen key. The setting cover is nickel-plated brass, which is screwed onto the valve body.

An accessory pack which converts the valve into a conventional wheelhead valve is also available.

The valves can be purchased separately or in easy to buy combi packs, which include a lockshield and wheelhead valve. Versions are also available with RAS-C², RAS-D² and ECO sensors, please refer to pages 10, 11 and 13 for further details.

Additional information:

Compression fittings p.27

Code No	Domestic Lockshield Valves, Nickel Finish (1)
003L020300	15mm angled pattern lockshield valve with compression fitting
003L020400	10mm angled pattern lockshield valve with compression fitting
003L020500	15mm angled pattern lockshield valve with 10mm push-fit elbow (2)
Code No	**Matching Lockshield and Wheel Head, Nickel Finish(3)**
003L023400	Angled 10mm
003L023500	Angled 15mm
003L023600	Straight 10mm
003L023700	Straight 15mm
Code No	**Matching Lockshield and Wheel Head, Chrome Finish(3)**
003L023800	Angled 10/15mm
003L023900	Straight 10/15mm
Code No	**Accessories**
013G491300	Collet clip to prevent accidental de-mounting of push-fit fitting (10 pieces)
013G491200	Decorative cover for push-fit fitting (10 pieces)
003L010500	Drain-off tailpiece for use with RA-FS and RLV-D valves, nickel
003L010600	RLV-D wheel head kit, colour soft white (can be used as lockshield valve cover)
003L010800	RLV-D cover cap in white (50 pieces)

Notes: (1) All valves have 1/2" connection to radiator.
(2) For use with PB and PEX plastic pipes complying with BS7291 including Hep$_2$0, Osmagold, Polyplumb and Equator - correct insert must be used.
(3) For lockshield options with matching RAS-C² , RAS-D² and ECO please refer to pages 10, 11 and 13.

Specification	
Maximum Working Pressure	10 bar
Maximum Water Temperature	120°C
Finish	Chrome or Nickel Plated
Screw on Cover Cap	Plastic

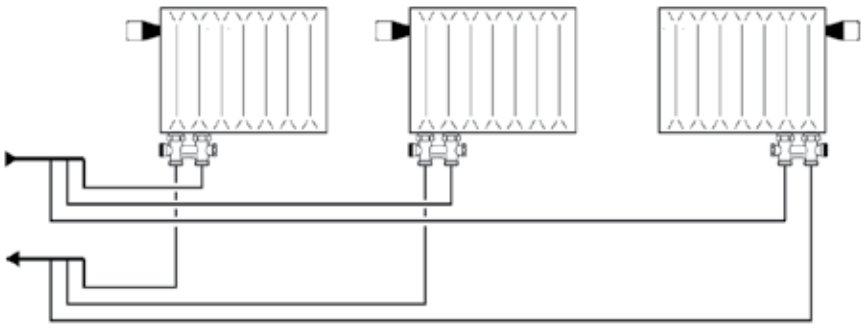
Nickel Drain Off Tail Piece

For Built-In Valves
H-Pieces and Sensors

RLV-KD H-Pieces with Drain Facility [1]	
Code No	**Description**
003L024000	Bottom Connection for use with Radiators having 1/2" Internal Connections
003L024200	Back Connection for use with Radiators having 1/2" Internal Connections
003L024100	Bottom Connection for use with Radiators having 3/4" External Connections
003L024300	Back Connection for use with Radiators having 3/4" External Connections
RLV-KS H-Pieces without Drain Facility [1]	
003L022000	Bottom Connection for use with Radiators having 1/2" Internal Connections
003L022200	Back Connection for use with Radiators having 1/2" Internal Connections
003L022100	Bottom Connection for use with Radiators having 3/4" External Connections
003L022300	Back Connection for use with Radiators having 3/4" External Connections
Accessories for H-Pieces	
003L015200	Drain-Cock adaptor for use with RLV-KD H-Pieces

(1) Order pipe fittings separately, see page 27.

Sensors for use with Built-In Valves with Danfoss Sensor Connections	
Code No	**Description**
013G617600	RAS-D² white/chrome built-In Temperature Sensor Range 8-28°C
013G617000	RAS-D² all chrome built-In Temperature Sensor Range 8-28°C
013G604000	RAS-C² Built-In Temperature Sensor Range 8-28°C
013G291000	RA2910 Built-In Temperature Sensor Range 5-26°C
013G291400	RA2914 Built-In Temperature Sensor Range 5-22°C



RAS-D² Sensor

- Convenient connections to radiators with 50mm centre connections
- Available with ½" internal and ¾" external connections to the radiator
- Wide range of fittings to connect to copper, PEX and ALUPEX pipe
- Isolation valves built-in as standard

Special add-on components for valve radiators where the need for conventional radiator thermostat bodies and lockshield valve bodies has been eliminated.

RLV-KS and RLV-KD H-pieces

H-pieces are used to interconnect system pipework in 2-pipe systems and radiators with 50mm spaced connections. All include isolation valve facilities. In addition RLV-KD models incorporate a radiator drain-off facility.

They are available with bottom connections for pipes coming from below, and back connections for pipes coming from behind. Two radiator connection standards are in use: one in which the radiator incorporates a 1/2" internal thread and another a 3/4" external thread. H-pieces are available for both connection methods.

Sensors for Built-in Valves

Valve radiators fitted with Danfoss built-in valves can be fitted with any of the sensors in the RAS-C², RAS-D² or RA2000 ranges. In situations where radiators are pre-fitted with inserts, which have a M30 x 1.5mm union nut connection to the sensor, the special purpose RAS-DK sensor is available.

Please note: A full range of compression fittings for copper, PEX and ALUPEX pipe are available, see page 27 for details.

Additional information:

Compression fittings.....p.27

Bathroom Solutions
RA-URX, RA-RTX and VHS-UN

027

- Valve screws directly into towel rail, completely hiding the tail piece from view
- Valve is self-sealing, reducing installation time
- Lockshield valve offers a drain-off feature and matching cap
- Standard Danfoss drain-cock can be used

Thermostatic Towel Rail Valves

This luxury valve range is specifically designed for towel rails. Its innovative self-sealing ½" valve to radiator connection makes for a seamless, elegant and easy installation.
Valves and sensors are available in white and chrome, matching the most common towel rail colours. The elegant range provides the perfect finishing touch for towel rails. The aesthetically pleasing and compact design allows the sensor to be mounted underneath the towel rail, parallel with the wall, avoiding the risk of accidentally knocking the sensor.

Room Temperature Sensor

A room temperature sensor, developed with the purpose of controlling the room temperature in bathrooms where the towel rail is the primary source of heating. Both towel rail valve sets include a matching lockshield valve with drain-off function.

Return Temperature Limiter

Ideal for applications where the towel rail is the secondary source of heating and where keeping the towel rail warm, disregarding the room temperature, is a priority. To ensure that towels are always warm and dry, the RTX measures the temperature on the return flow, which can be adjusted independent of the room temperature.

VHS-UN

The VHS valve is specifically designed for use with towel rails or designer radiators, having 50mm spaced connections. The VHS valve, which is available in versions with either bottom connections for pipes rising from the floor or with back connections for pipes coming from behind, integrates the functions of radiator thermostat, lockshield valve and connection system into one compact, easy to install unit.
The valve can be used together with RAS-C² or RAS-D² sensors. In addition a snap-on cover can be added to enhance the aesthetic appearance.

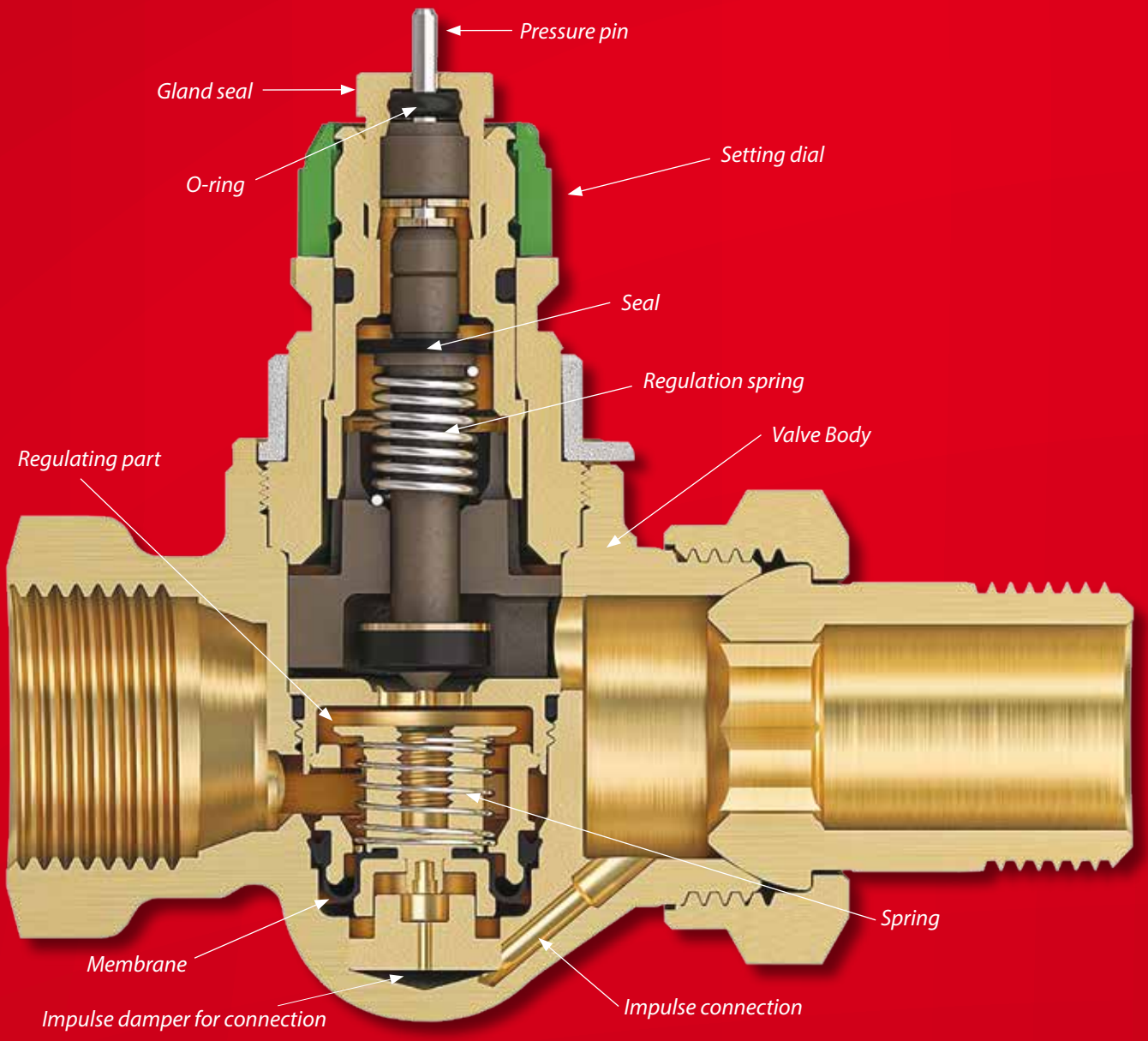
Set [1] complete with TRV valve body and sensor plus lockshield valve	Chrome	Bright White RAL 9016	Temp. Range Xp = 2°C
RA-URX Left Mounted RAS-D² Sensor [2]	**013G400400**	**013G400800**	8 - 28°C
RA-URX Right Mounted RAS-D² Sensor [2]	**013G400300**	**013G400700**	
Return Temperature Limiter			
RA-URX Left Mounted RTX Limiter [2]	**013G413300**	**013G413700**	10 - 50°C
RA-URX Right Mounted RTX Limiter [2]	**013G413200**	**013G413600**	
Accessories		**Code No**	
Drain-Cock for the Lockshield Valve		**003L015200**	

Notes:
(1) Order fittings separately, see page 27.
(2) All RA-URX radiator thermostat valve bodies must be mounted in return.

VHS-UN H-Piece with Integrated Radiator Thermostat Valve and Lockshield Valve [1]	
Code No	**Description**
013G474100	Valve with Back Connections for use with Radiators with 1/2" Internal Connections
013G474200	Valve with Bottom Connections for use with Radiators with 1/2" Internal Connections
(1) Order fittings separately, see page 27	
Sensors for use with VHS-UN Valve Bodies	
013G617600	RAS-D² Built-In Sensor, Chrome/White, range 8-28°C
013G617000	RAS-D² Built-In Sensor, All Chrome, range 8-28°C
Optional Valve Covers	
013G475100	Soft White Cover for use with Back Connection VHS-UN Valve (Round Design)
013G478000	Chrome Cover for use with Bottom Connection VHS-UN Valve (Square Design)
013G477900	Chrome Cover for use with Back Connection VHS-UN Valve (Square Design)
Accessories	
003L015200	Drain-Cock Adaptor for use with VHS-UN & RA-URX Valve

Commercial
Radiator Thermostats

Working Principle
RA-DV



Pressure Independent Thermostatic Radiator Valve

RA-DV

027

Description	Model	Version	Connection	Flow (l/h)*	Code Number
RA-DV 10	UK (Axial)	DIN	3/8"	25-125	**013G770900**
RA-DV 10	Angle	DIN	3/8"	25-125	**013G772100**
RA-DV 10	Straight	DIN	3/8"	25-125	**013G772200**
RA-DV 15	UK (Axial)	DIN	½"	25-125	**013G771000**
RA-DV 15	Angle	DIN	½"	25-125	**013G772300**
RA-DV 15	Straight	DIN	½"	25-125	**013G772400**
RA-DV 20	Angle	DIN	¾"	25-125	**013G772500**
RA-DV 20	Straight	DIN	¾"	25-125	**013G772600**

* 20-125 l/h including a gas filled RA2000 sensor

Description	Code Number
Pre-setting tool For easy pre-setting of a Dynamic Valve	**013G783000**

Description	Code Number
ΔP tool For simple verification of sufficient differential pressure and pump optimisation	**013G785500**

- Fast consistent and comfortable heating
- Reduced system noise
- Reduced costs

Automatic balancing provides instant benefits under full and partial load conditions. It is quick and easy to achieve and is a one-off investment with a fast payback time.

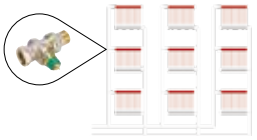
Eliminating pressure fluctuations is the key to both successful balancing and removing the source of user complaints about over or under-heating, noise and excessive energy costs.

At the same time, the temperature control will benefit from the optimised system conditions, making room temperature more stable and precise.

RA-FN valves are suitable for use with all RA2000 sensors and may also be used with RAS-D² and RAS-C² sensors. Please refer to our technical department for capacity information if using RAS-D² or RAS-C² sensors.

Additional Information:

Compression Fittings p.27

Solutions	Pressure	Radiator	System	Economy
Radiator fitted with RA-DV 	Max. differential pressure = 60 kPa	Max. flow = 125 l/h P = 3140 W at ΔT = 20K P = 4700 W at ΔT = 30K	• Best choice for complex riser designs • Best choice when main risers/ return pipes are difficult to access • Best choice when main riser/ return pipes are distant from each other	Best choice for risers with few radiators

Commercial Radiator Thermostats
RA2000

- Superb performance
- Robust construction
- Fits RA-FS, RA-FN, RA-N and RA-G valve bodies
- Special tamperproof versions
- Four convenient pack based solutions available

For the commercial market, Danfoss offers a range of valves and sensors, suitable for practically all types of systems and installation conditions.

Sensors and valve bodies, which are packed separately, can be mixed and matched by the specifier and installer to meet the specific needs of each and every installation.

RA2000 sensors are robustly constructed to withstand the misuse and abuse often found in the commercial and industrial sectors. The range includes high strength, tamperproof models, ideal for use in public buildings, including schools.

All models offer locking and limiting as standard and are compatible with RA-FS, RA-FN, RA-N and RA-G valve bodies.

Approved to European Standard EN215, and manufactured under IS09002 Quality Systems.

Please note: If using RA2000 sensors with RA-FS bi-directional valve bodies, valve flow selector must be commissioned.

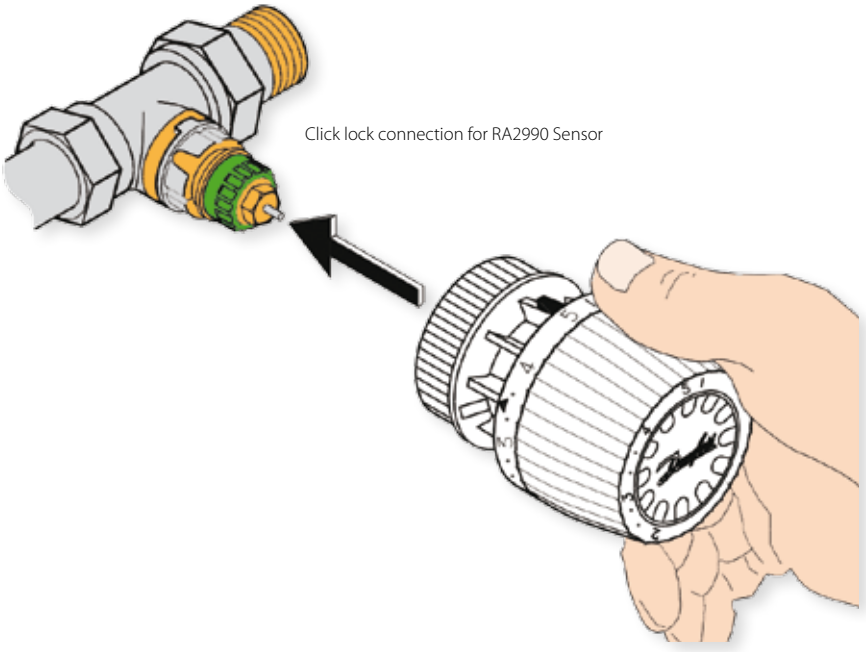
A separate catalogue covering the full range of RA2000 radiator thermostats is available on request.

Additional Information:

TRV Valve Bodies p.22-23
Lockshield Valves p.24
Locking and Limiting Tool..... p.26

Code No	Type	Description	Temp Range °C (Xp=2k)
RA2000 Built-in Sensors			
013G291000	RA2910	Includes Locking and Limiting	5-26 (1)
013G299000	RA2990	Click on coupling(4) includes Locking and Limiting	5-26 (1)
013G291400	RA2914	Low Temperature Range Model includes Locking and Limiting	5-22 (1)
RA2000 Built-in Sensors with Click Coupling			
013G292000	RA2920	Tamperproof Model includes Locking and Limiting (2)	5-26 (1)
RA2000 Remote Sensors (0-2m capillary) (2)			
013G291200	RA2912	Includes Locking and Limiting	5-26
013G292200	RA2922	Tamperproof Model includes Locking and Limiting (2)	5-26
013G291600	RA2916	Low Temperature Range Model includes Locking and Limiting	5-22
RA2000 Remote Temperature Adjusters (3)			
013G506200	RA5062	2m Capillary includes Locking and Limiting	6-28
013G506500	RA5065	5m Capillary includes Locking and Limiting	6-28
013G506800	RA5068	8m Capillary includes Locking and Limiting	6-28
013G507500	RA5075	15m Capillary includes Locking and Limiting	6-28
Remote Temperature Adjuster with Remote Sensor			
013G546600	FEV-FF	2 x 2m Capillary Includes Locking and Limiting	17-27

Notes:
(1) Allowing for influence of temperature and radiation.
(2) Remote sensor capillary coiled inside sensor housing, extend as required on installation.
(3) Remote sensor capillary coiled inside temperature adjuster housing, extend as required on installation.
(4) Easy installation without the use of tools.



Click lock connection for RA2990 Sensor

Combi and Radiator Packs
RA2000

027

Description	Contains	Code No
Vertical Angle ½" / 15mm Combi pack	1 x RA2910 Thermostatic Head 1 x RA-FN15 Valve (inc 15mm compression fitting)	**013G602100**
Vertical Angle ¾" Combi Pack	1 x RA2910 Thermostatic Head 1 x RA-FN20 Valve	**013G602200**
Vertical Angle + Lockshield Valve ½" / 15mm Radiator Pack	1 x RA2910 Thermostatic Head 1 x RA-FN15 Valve (inc 15mm compression fitting) 1 x RLV-S15 ½"/15mm Lockshield	**013G602300**
Vertical Angle + Lockshield Valve ¾" Radiator Pack	1 x RA2910 Thermostatic Head 1 x RA-FN20 Valve 1 x RLV-S20 ¾" Lockshield	**013G602400**

- Convenient pack based solution
- Packs available with or without lockshield
- Four unique valve combinations covering the most popular RA2000 combinations

Complementing the range of individual separates available in the RA2000 range are the RA2000 Combi and Radiator Packs.

The range of four packs brings together the most popular RA2000 components into a convenient package allowing for simple ordering of all components with one code number.

Packs come complete with a standard RA2910 thermostatic head and are available in either ½" (complete with 15mm compression adaptors) or ¾" variations and with or without a lockshield valve.

Valve Bodies Without Pre-Setting
RA-FN and RA-G

027

- Wide range of sizes from 3/8" to 1"
- Valves available in straight, vertical angle and horizontal angle patterns
- Valves available for 2-pipe and 1-pipe systems
- Compatible with all RA2000, RAS-C^2 and RAS-D^2 sensors

The choice and variety of radiator thermostat valve bodies available from Danfoss allows the specifier and installer to choose the right valve for the job.

RA-G - for 1-pipe systems

For use in conventional 1-pipe systems, where circulation through the radiator relies on gravity. RA-G valves have capacities optimised for this type of system which requires high flow rates at low pressure drops to function correctly.

Available in straight and angled pattern versions in 1/2", 3/4" and 1" sizes, RA-G valves can be used with the whole range of RA2000 sensors.

RAS-C^2 and RAS-D^2 sensors are not recommended as these reduce the valve capacity.

RA-FN - for 2-pipe systems, without presetting

For use in commercial 2-pipe systems using steel pipe. RA-FN valves are available in 3/8", 1/2", 3/4" and 1" sizes in angled and straight pattern versions. RA-FN valves can be used with all RA2000, RAS-D^2 and RAS-C^2 sensors, although valve capacity is reduced if RAS-C^2 or RAS-D^2 sensors are used.

If pre-setting is required, RA-N valves should be specified, otherwise radiators must be balanced using conventional lockshield valves.

Approved to European standard EN215 and manufactured assessed and certified by Bureau Veritas against ISO 9001 / 2008 Quality Management Systems.

A full range of compression fittings for copper and plastic pipe are available for use with RA-FN valves, see page 27 for details.

Additional Information:

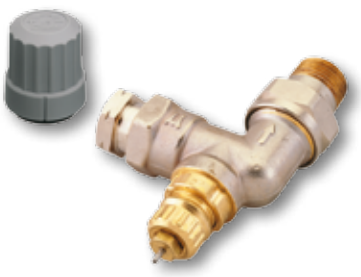
RA2000 Sensors p.20
Compression Fittings p.27

RA-FN Valve Bodies for 2-Pipe Systems, without Pre-Setting					
Pattern	Type	Code No	Connections		Kv Value Xp = 2k (2)
			Pipe	Radiator Tail	
Straight	RA-FN 10	**013G002200**	3/8"BSP	3/8"BSP	0.56
	RA-FN 15	**013G002400**	1/2"BSP	1/2"BSP	0.73
	RA-FN 15	**013G008400**	15mm or 1/2"BSP	1/2"BSP	0.73
	RA-FN 20	**013G002600**	3/4" BSP	3/4" BSP	1.04
	RA-FN 25	**013G002800**	1"BSP	1"BSP	1.04
Vertical Angle (1)	RA-FN 10	**013G002100**	3/8"BSP	3/8"BSP	0.56
	RA-FN 15	**013G002300**	1/2"BSP	1/2"BSP	0.73
	RA-FN 15	**013G0023AA**	15mm or 1/2"BSP	1/2"BSP	0.73
	RA-FN 20	**013G002500**	3/4" BSP	3/4"BSP	1.04
	RA-FN 25	**013G002700**	1"BSP	1"BSP	1.04
Horizontal Angle	RA-FN 10 UK	**013G014100**	3/8"BSP	3/8"BSP	0.56
	RA-FN 15 UK	**013G014900**	15mm or 1/2"BSP	1/2"BSP	0.73
	RA-FN 20 UK	**013G014500**	3/4"BSP	3/4"BSP	0.80
RA-G Valve Bodies for 1-Pipe Systems (3)					
Straight	RA-G 15	**013G167500**	1/2"BSP	1/2"BSP	1.63
	RA-G 20	**013G167700**	3/4"BSP	3/4"BSP	2.06
	RA-G 25	**013G167900**	1"BSP	1"BSP	2.27
Vertical Angle (1)	RA-G 15	**013G167600**	1/2"BSP	1/2"BSP	2.06
	RA-G 20	**013G167800**	3/4"BSP	3/4"BSP	2.20
	RA-G 25	**013G168000**	1"BSP	1"BSP	2.41

(1) For optimum performance we recommend the use of a remote sensor.
(2) Kv values when used with RA2000 sensors.
(3) Not suitable for use with fittings listed on page 27.

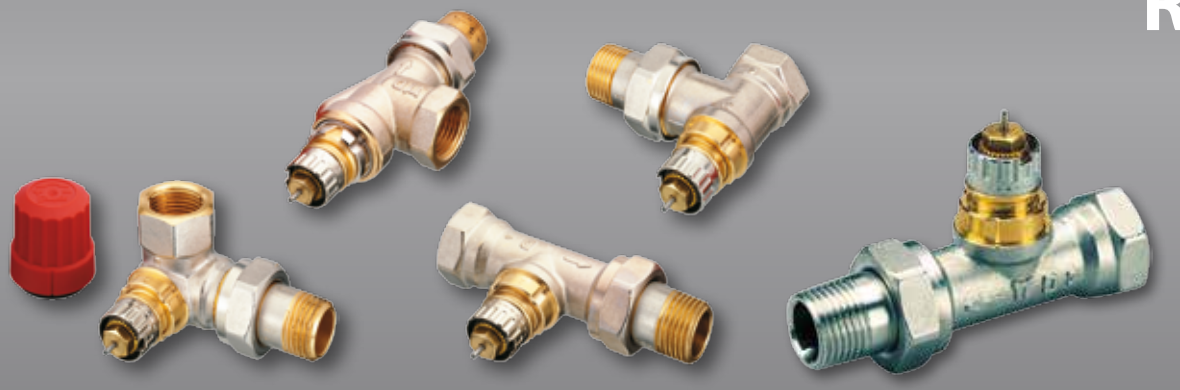
Technical Specifications			
Max. Operating Temperature	120°C	Max. Diff. Pressure (RA-FN)	0.6 Bar
Max. Working Pressure	10 Bar	Max. Diff. Pressure (RA-G 25)	0.16 Bar
		Max. Diff. Pressure (RA-G 15 & 20)	0.2 Bar

RA-G



RA-FN 15UK Horizontal

Valve Bodies With Pre-Setting
RA-N



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RA-N Valve Bodies for 2-Pipe Systems, with Pre-Setting						
Pattern	Type	Code No	Connections		Kv Value Xp = 2k (1)&(3)	
			Pipe	Radiator Tail		
Straight	RA-N 10	**013G003200**	3/8"BSP	3/8"BSP	0.04	0.56
	RA-N 15	**013G003400**	1/2"BSP	1/2"BSP	0.04	0.73
	RA-N 15	**013G0034AA**	15mm or 1/2"BSP	1/2"BSP	0.04	0.73
	RA-N 20	**013G003600**	3/4" BSP	3/4" BSP	0.10	1.04
	RA-N 25	**013G003800**	1"BSP	1"BSP	0.10	1.04
Vertical Angle (2)	RA-N 10	**013G003100**	3/8"BSP	3/8"BSP	0.04	0.56
	RA-N 15	**013G003300**	1/2"BSP	1/2"BSP	0.04	0.73
	RA-N 15	**013G0033AA**	15mm or 1/2"BSP	1/2"BSP	0.04	0.73
	RA-N 20	**013G003500**	3/4" BSP	3/4"BSP	0.10	1.04
	RA-N 25	**013G003700**	1"BSP	1"BSP	0.10	1.04
Horizontal Angle	RA-N 10	**013G015100**	3/8"BSP	3/8"BSP	0.04	0.56
	RA-N 15	**013G153000**	1/2"BSP	1/2"BSP	0.04	0.73
	RA-N 15	**013G0153AA**	15mm or 1/2"BSP	1/2"BSP	0.04	0.73
	RA-N 20	**013G015500**	3/4"BSP	3/4"BSP	0.16	0.80
Side Angle (4)	RA-N 10R	**013G023100**	3/8"BSP	3/8"BSP	0.04	0.56
	RA-N 10L	**013G023200**	3/8"BSP	3/8"BSP	0.04	0.56
	RA-N 15R	**013G023300**	1/2"BSP	1/2"BSP	0.04	0.73
	RA-N 15L	**013G023400**	1/2"BSP	1/2"BSP	0.04	0.73

(1) Kv value at Xp=2 when used with RA2000 sensors.
(2) For optimum performance we recommend the use of a remote sensor.
(3) Refer to setting table supplied with valves to adjust Kv.
(4) L = Left, R = Right

Technical Specifications	
Max. Operating Temperature	120°C
Max. Working Pressure	10 Bar
Max. Differential Pressure	0.6 Bar

RA-N Calibrated Setting Scale

- Provides accurate flow regulation in 2-pipe systems
- Range of valve body sizes available
- Easy to set adjustment, does not affect valve lift
- Concealed setting, prevents unauthorised adjustment
- Compatible with all RA2000 RAS-C² and RAS-D² sensors

RA-N radiator thermostat valve bodies are designed to assist balancing in large heating systems.

For use in commercial 2-pipe systems. RA-N valves are available in 3/8", 1/2" and 3/4" sizes in angled and straight pattern versions. RA-N valves can be used with all RA2000, RAS-D² and RAS-C² sensors, although valve capacity is reduced if RAS-C² or RAS-D² sensors are used.

Valves with pre-setting allow the commissioning engineer to precisely set the calculated flow of water to individual radiators without the need for costly and inaccurate temperature measurements. They also reduce the function of the lockshield valve to one of isolation rather than regulation.

In the Danfoss range, pre-setting is achieved by means of a separate pre-setting device integrated into the valve body, and does not interfere in any way with the degree of opening of the valve cone, as seen with other pre-setting systems.

Pre-setting is achieved by means of a calibrated setting ring on the valve body, which is covered once the radiator thermostat is mounted.

Approved to European standard EN215 and manufactured assessed and certified by Bureau Veritas against ISO 9001 / 2008 Quality Management Systems.

A full range of compression fittings for copper and plastic pipe are available, see page 27 for details.

Additional Information:

RA2000 Sensors p.20
Compression Fittings p.27

Commercial Lockshield Valves

RLV

027

- Robust construction
- Body finish matches all Danfoss radiator thermostat valve bodies
- Available in 3/8", 1/2" and 3/4" BSP sizes, and 15mm compression
- Available in straight or vertical angle patterns
- Unique drain-cock accessory available for use with RLV model

The RLV range of lockshield valves provides a matching return mounted lockshield/isolation valve for use in commercial heating systems.

The valve body design and finish matches all RA2000 series valve bodies, including RA-FN, RA-G and RA-N.

RLV lockshield valves combine the functions of isolation and regulation into a single valve body. Selected models are available with an integrated drain-cock connection that can be used together with a drain-cock accessory, which is purchased separately. Please refer to the ordering table for details.

Adjustment of the lockshield valve is by means of a 6mm Allen key. The setting cover is nickel-plated brass, which is screwed onto the valve body.

The drain-cock adaptor also provides a convenient way of re-filling a radiator or radiator circuit by means of a filling hose.

Available in straight or angled pattern in sizes 3/8", 1/2" and 3/4" BSP and 15mm compression.

Approved to European standard EN215 and manufactured assessed and certified by Bureau Veritas against ISO 9001 / 2008 Quality Management Systems.

Please note: A range of compression fittings, for use with copper, PEX and ALUPEX pipe, are available - see page 27 for details.

Additional information:

Compression fittings p.27

RLV Commercial Lockshield Valves						
	With Drain-Cock Adaptor Connection		Without Drain-Cock Adaptor Connection		Connection Sizes	
Pattern	Type	Code No	Type	Code No	Pipe	Radiator
Vertical Angle	RLV 10	**003L014100**	RLV-S 10	**003L012100**	3/8"	3/8"
	RLV 15	**003L014300**	RLV-S 15	**003L012300**	1/2"	1/2"
	RLV 15	**003L014315**	RLV-S 15	**003L012315**	15mm	1/2"
	RLV 15	**003L182500**	-	-	Press Fit	1/2"
	RLV 20	**003L014500**	RLV-S 20	**003L012500**	3/4"	3/4"
Straight	RLV 10	**003L014200**	RLV-S 10	**003L012200**	3/8"	3/8"
	RLV 15	**003L014400**	RLV-S 15	**003L012400**	1/2"	1/2"
	RLV 15	**003L014415**	RLV-S 15	**003L012415**	15mm	1/2"
	RLV 15	**003L182400**	-	-	Press Fit	1/2"
	RLV 20	**003L014600**	RLV-S 20	**003L012600**	3/4"	3/4"

Drain-Cock Adaptor and Compression Fittings for RLV Series Valves	
Code No	Description
003L015200	Drain-cock adaptor for use with RLV models only, not RLV-S

Specification	
Maximum Working Pressure	10 Bar
Maximum Working Temperature	120°C
Test Pressure	16 Bar
Valve Body Finish	Nickel Plated
Gland Seal Type	Double O-ring
Supplied with LSV Cap (nickel plated brass)	Yes
Supplied with Wheel Head Cap	No

Drain-Cock Adaptor

Fittings
and Accessories

Replacement Sensors, Gland Seals and Accessories

Gland Seal

- Just two gland seals cover the whole range of Danfoss valves
- Can be replaced without draining down the system

Replacement Sensor

- Allows easy upgrade of old valves without the need to drain down
- Versions available for RAVL and RAV valve bodies
- Available in built-in and remote sensor versions

As part of our commitment to service, Danfoss produces a range of built-in and remote sensors that fit directly to older RAV and RAVL valve bodies.

Replacement Sensors

Replacement sensors incorporate RA2000 sensor technology and design, and provide a simple and straight forward way to upgrade older radiator thermostats without the need to drain down the system.

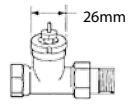
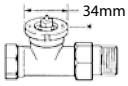
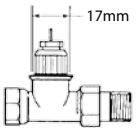
Gland Seals

As part of any upgrade, Danfoss recommends that the valve gland seal also be replaced. These can be replaced without draining down the system.

Selecting a suitable replacement sensor

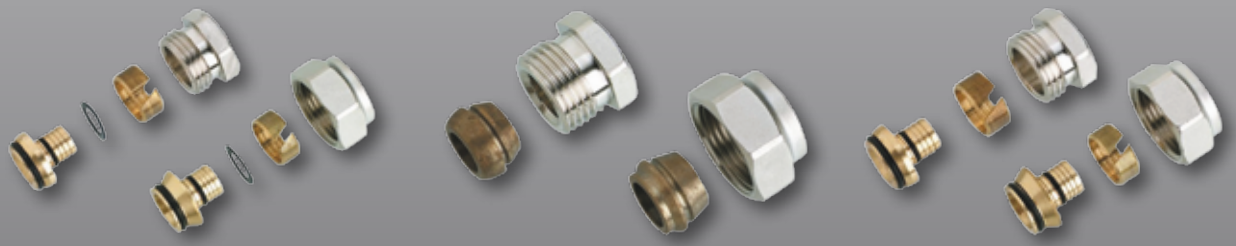
RAVL thermostats are replaced by RA/VL

RAV thermostats are replaced by RA/V

RA2000 Replacement Sensors and Gland Seals						
Existing Valve Body Dimensions	Existing Valve Body Type	Replacement Sensor - please note: the Code No's have changed				
		New Code No	Old Code No	Sensor Type	Description	Temp Range (Xp = 2k)
 26mm	RAVL	**013G295000**	**013G221000**	RA/VL	Built-In Sensor	5 - 26°C
		013G295200	**013G221200**	RA/VL	Remote Sensor 2m Capillary	
 34mm	RAV	**013G296000**	**013G231000**	RA/V	Built-In Sensor	5 - 26°C
		013G296200	**013G231200**	RA/V	Remote Sensor 2m Capillary	
 17mm	RA-FR RA-FS	Refer to RAS-C² and RAS-D² Sensors on page 10 and 11. For more information visit www.heating.danfoss.co.uk				
	RA-FN RA-G RA-N	Refer to RA2000 Sensors on page 20. For more information visit www.heating.danfoss.co.uk				

Gland Seals					
Code No	Description				
013G029000	Gland Seal Assembly for RA-FS, RA-FR, RA-FN, RA-N and RA-G Valves				
013U007000	Gland Seal Assembly for RAV and RAVL Valves				
Accessories for RAS, RAS-D² & RA2000 Sensors and Valves					
Code No	**Description**	**RAS-C²**	**RAS-D²**	**RA2000**	
013G123200	Anti-Theft for Sensors (50 pieces)			•	
013L123400	Range Displacement Caps (20 pieces)	•	•	•	
013G123700	Threaded Range Limiting pins (30 pieces)			•	
013G123300	RA2020 Scale Cover (20 pieces)			•	
013G123600	Toolkit, comprising Allen Key & Locking Pin Tool			•	
013G123000	Accessory Bag for RA2000 Remote Sensor Base, Fixing Screw and Capillary Caps				
013G524000	Accessory Bag for RAS-D² Remote Sensors, incl. Sensor Base, Fixing Screw and Capillary Caps				
Accessories for RA2000 Remote Adjusters					
013G519300	Adaptor for RA5062, 5065 & 5068 for RAV Valves				
013G519200	Adaptor for RA5062, 5065 & 5068 for RAVL Valves				
Accessories for RA-FS, RA-FN, RA-N & RA-G Valves					
Code No	**Description**	**RA-FS**	**RA-FN**	**RA-N**	**RA-G**
013G500200	Manual Positive Shut-Off Knob	•	•	•	•
013G500100	Blanking Cap for Valve Outlet	•			
013G027500	Spare Protective Cap	•	•	•	•

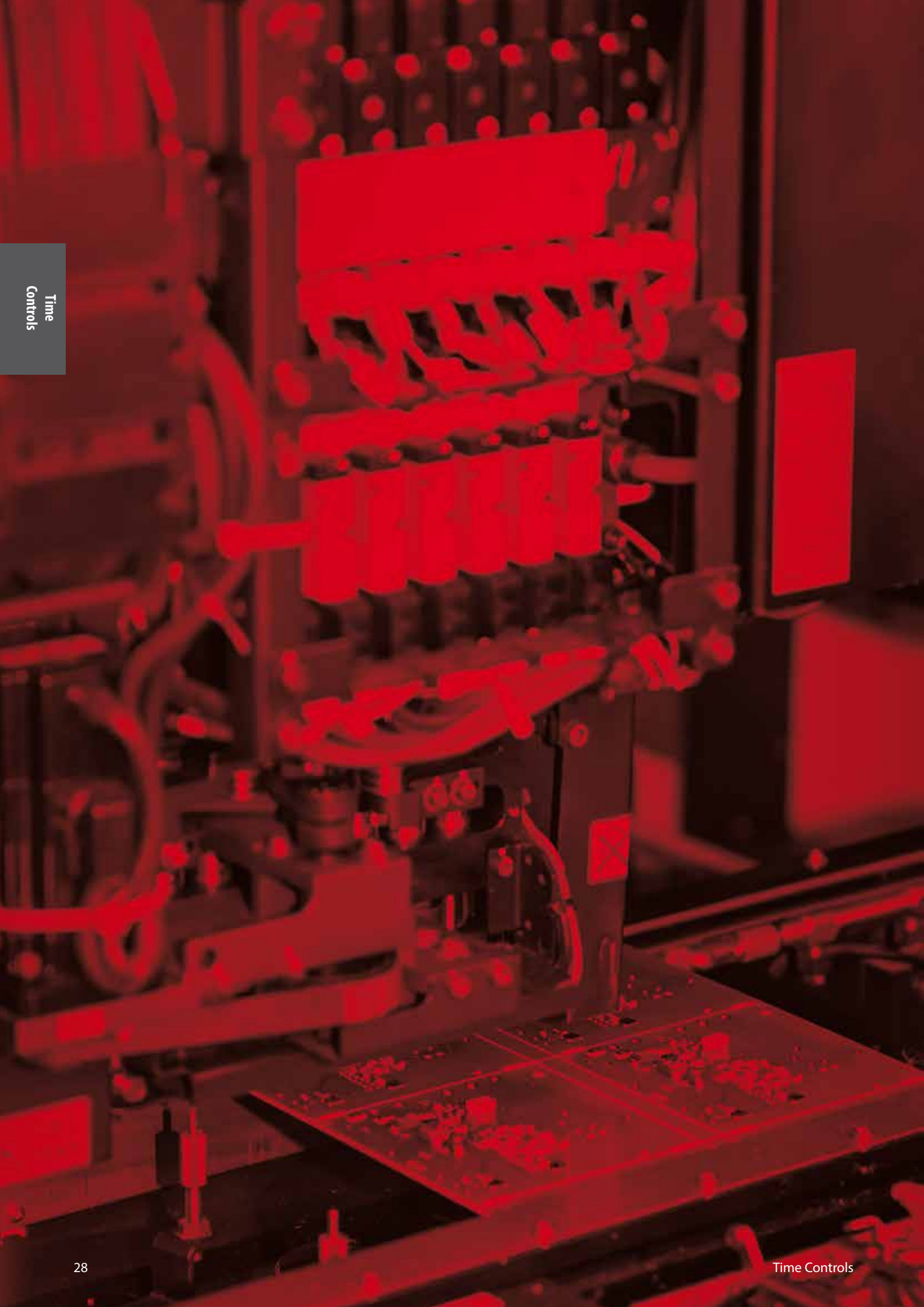
For Copper, PEX and ALUPEX Pipe
Compression Fittings



Spare Fittings	
for:	RAS-C² and RAS-D² Radiator Thermostat Combi Packs, RA-FR & RA-FS Radiator Thermostat Valve Bodies, RLV-D Lockshield Valves
Pipe Type:	**Copper**
013G028000	15mm fittings set, complete with olives, tailpiece and nuts
013G028100	10mm fittings set, complete with olives, tailpiece and nuts
013G084800	15mm olive
013G081700	10mm olive
013G081600	8mm olive
Please note: Copper pipe must be in accordance with BS2871 part 1/BSEN1057. It is recommended to use supporting bushes with soft copper pipes.	
Design: For use with reversible angled pattern valve bodies, fitting have 1/2" internally threaded compression nut.	

For Valves with Female Threaded Connections	
Compression Fittings for:	RA-FN & RA-N Radiator Thermostat Valve Bodies, RLV and RLV-D Lockshield Valve Bodies, RA-URX Towel Rail Valve Bodies, FJVR Return Temperature Limiter Valve Bodies and KOVM 3-Port Valve Bodies
Pipe Type:	**Copper**
013G419500	1/2" x 15mm (chrome)
013G410000	3/8" x 10mm
013G410200	3/8" x 12mm
013G411000	1/2" x 10mm
013G411200	1/2" x 12mm
013G411500	1/2" x 15mm
Pipe Type:	**PEX**
013G414400	1/2" x 14 x 2.0mm
013G414700	1/2" x 15 x 2.5mm
Pipe Type:	**ALUPEX**
013G417400	1/2" x14 x 2mm
Please note: Copper pipe must be in accordance with BS2871 part 1/BSEN1057. It is recommended to use supporting bushes with soft copper pipes. PEX pipe must be in accordance with DN16892/16893 or BS7291 part 1:1990 or part 3:1990. Maximum operating pressure and temperature are given by the pipe manufacturer. However, 6 bar and 95°C must not be exceeded.	
Design: For use with valves having a female threaded connection. Fitting comprises olive and externally threaded compression nut, dimension of female thread is included in the description. For PEX and ALUPEX a pipe support insert is also included.	

For Valves with Male Threaded Connections	
Compression Fittings for:	RLV-KD AND RLV-KS H-Pieces, VHS H-Pieces, FHV-R and FHV-A Underfloor Heating Valves, FHF-F Manifolds, RA-C Climate Valves and VMT- 2-Port Valves
Pipe Type:	**Copper**
013G412000	3/4" x 10mm
013G412200	3/4" x 12mm
013G412500	3/4" x 15mm
Pipe Type:	**PEX**
013G415500	3/4" x 15mm x 2.5mm
013G415600	3/4" x 16mm x 2.0mm
013G416300	3/4" x 16mm x 2.2mm
013G415900	3/4" x 18mm x 2.5 mm
013G416100	3/4" x 20mm x 2.5mm
Pipe Type:	**ALUPEX**
013G418400	3/4" x 14mm x 2.0mm
013G418600	3/4" x 16mm x 2.0mm
013G418800	3/4" x 18mm x 2.0mm
013G419000	3/4" x 20mm x 2.0mm
Please note: Copper pipe must be in accordance with BS2871 part1/BSEN1057. It is recommended to use supporting bushes with soft copper pipes. PEX pipe must be in accordance with DN16892/16893 or BS7291 part 1:1990 or part 3:1990. Maximum operating pressure and temperature are given by the pipe manufacturer. However, 6 bar and 95°C must not be exceeded.	
Design: For use with valves having a 3/4" male threaded connection. Fitting comprises olive and internally threaded compression nut. For PEX and ALUPEX a pipe support insert is also included.	



Time
Controls

Contents

Time Controls
Selection Guide

	Electronic					
Model	**SET1E**	**SET2E**	**SET3E**	**102E7**	**103E7**	
Ordering Data/Tech Spec.	Page 33	Page 37	Page 37	Page 35	Page 32	
Single Channel Timeswitch	•				•	
2 Channel Programmer (common timebase)		•	•	•		
2 Channel Full Programmer (independent timebase)						
3 Channel Full Programmer (independent timebase)						
Service Interval Timer						
7 Day Operation				•	•	
5/2 Day Operation				•	•	
24 Hour operation	•	•	•			
On/Offs per day	2	2	2	3	3	
1 hour override	•	•	•	•	•	
2 hours override						
3 hours override						
Pumped/Gravity option			•			
Output channels	Single	Independent HW & CH		HW or HW & CH	Single	
Operating modes	Off/Timed/On	Off/Timed/On (HW or HW & CH)		On/Off, Auto All Day [2]		
Automatic BST/GMT change						
Factory set clock						
Holiday mode						
Switching action	1 x SPDT (volt free)	2 x SPDT (volt free)		SPST (volt free)		

	Electro-Mechanical			
Model	**103**	**102**	**3020P**	
Ordering Data/Tech Spec.	Page 32	Page 35	Page 36	
Single Channel Timeswitch	•			
2 Channel Programmer (common timebase)		•	•	
2 Channel Full Programmer (independent timebase)				
24 Hour operation	•	•	•	
On/Offs per day	2	2	2	
Pumped/Gravity option				
Operating modes	Off/Timed/On	Off/Timed/On (HW or HW & CH)		
Switching action	1 x SPDT (volt free)	2 x SPDT (volt free)	2 x SPST	

	Timeswitches			
Model	**811**	**851**	**852**	
Ordering Data/Tech Spec.	Page 43	Page 43	Page 43	
1-channel	•	•		
2-channel			•	
Up to 200 on or off outputs per week	•	•	•	
Up to 200 intermittent or continuous PULSED outputs per week				
EXTEND override(s)	•	•	2	
CROP override(s)	•	•	2	
Different pulse type possible for each channel				
Pulse duration (select on installation)				
MANUAL momentary override				
Contact Type	SPST	SPDT	2 x SPDT	

	TS715Si	CP715Si	FP715Si	FP975	FP975-2H	FP735Si
	Page 34	Page 38	Page 40	Page 41	Page 41	Page 42
	•					
		•				
			•	•	•	
						•
	• [1]	• [1]	• [1]			• [1]
	• [1]	• [1]	• [1]	• [1]	• [1]	• [1]
	• [1]	• [1]	• [1]	• [1]	• [1]	• [1]
	• [1]	• [1]	• [1]			• [1]
	3	3	3	3	3	3
	•	•	•	•	•	•
						•
						•
		• [1]	• [1]			
	Single			Independent HW & CH	Two independent CH zones	3 independent (e.g. 2 x CH, 1 x HW)
	On/Off, Auto All Day [2]					
	•	•	•	•	•	•
	•	•	•	•	•	•
						•
	1 x SPDT (volt free)		2 x SPDT (commons linked internally)		2 x SPDT (volt free)	1 x SPST, 2 x SPDT

[1] Select at installation
[2] Per channel on CP and FP models

	3060	SET3M	4033
	Page 39	Page 37	Page 39
	•	•	•
	•	•	•
	2	2	2
		•	
	2 x SPST	2 x SPDT (volt free)	2 x SPDT

	Bell-Ringers	
	841	842
	Page 43	Page 43
	•	•
	•	•
		•
	1 to 15 seconds	1 to 15 seconds per channel
	•	• [1]
	SPST	2 x SPDT

Domestic Timeswitches
103 and 103E7

- Proven reliability
- Easy to use
- All units interchangeable on the same wallplate
- Available in 24 hour and 5/2 day / 7 day versions
- Available in electro-mechanical and electronic version

Ideal for systems where heating and domestic hot water are required at the same time.

This range of general-purpose timeswitches provides a single output circuit.

The range includes easy to use 24-hour electromechanical models, plus an electronic model which offers 7-day day operation.

Both units fit the GP wallplate and have an identical wiring configuration, allowing systems to be upgraded without the need for rewiring.

The electro-mechanical 103 timeswitch has a thumbwheel, which allows early selection of future switching operations.

Both models show clearly the current state of the output.

The electronic unit has extra programmes and overrides, and incorporates a battery to provide back up of time and programme.

Additional Information:

Wallplate Information p.88
Wiring Information p.89

Features	103	103E7
Code No.	**087N652300**	**087N653800**
Electro-mechanical	24 hour	
Electronic		7 day or 5/2 day
Programmes selectable	Timed Off On	Off Auto Allday On
Factory pre-set programmes (all changeable)		•
On/Offs per day	2	3
Advance override	•	•
+1 hour override		•
Voltage rating	230 Vac ±15%, 50/60 Hz	
Contact rating	6 (2.5) A	3 (1) A
Switching action	SPST (voltage free)	
Maximum ambient temperature	55°C	45°C
Memory back-up	N/A	min. of 24 hours
Dimensions (mm)	106 wide x 135 high x 63 deep	102 wide x 136 high x 47 deep

103E7

Domestic Timeswitch
SET1E

Features	SET1E
Code No.	**087N654000**
Timeswitch	•
Electronic	24 hour
Programmes selectable	Off Timed On
Factory pre-set programmes	•
On & offs per day	2
Advance override	•
+1hour override	•
Voltage rating	230 Vac ± 15%, 50/60 Hz
Contact Rating	3 (1) A
Switching action	1 x SPDT (voltage free)
Maximum ambient temperature	45°C
Memory back-up	Up to 24 hours
Dimensions (mm)	158 wide x 98 high x 36 deep

- Easy to operate
- 24 hour control
- Easy to use rocker switches
- British Gas standard wallplate

For situations where simplicity of control is paramount.

The SET1E has been designed with simplicity of programming and use in mind.

The SET1E offers 24 hour control and is designed to fit the British Gas Standard Wallplate used by earlier SET models and some models from the Horstmann range.

This model has LED status indicators and easy to use rocker switches for programme selection.

Using the slider switch the on/off times are shown on the large, clear display.

Programmes can be manually overridden, by the ADVANCE and +1HR buttons on the electronic models.

Additional Information:

Wallplate Information p.88
Wiring Information p.89

Domestic Timeswitch with Service Interval
TS715 Si

- Optional service interval function
- 7 day, 5/2 day or 24 hour
- Permanent back lit display
- AM/PM or 24 hour display
- Built-in programmes
- Automatic BST/GMT time change
- Convenient user overrides
- Holiday function
- 'Industry standard' wallplate
- Factory set clock

For use in any domestic heating and hot water function the MK18 range has a model for any situation, offering unrivalled flexibility of control.

The MK18 range offers flexibility and reliability, with an elegant look and some handy features. All models have a slim, modern enclosure and a large LCD with a convenient back light.

Employing the latest technology, the TS715 Si is reliable and easy to use. They are the installer's first choice due to their ready interchangeability with most other existing controls.

The TS715 Si has real time and date set in the factory and automatically display the correct time when powered up. The time and date information is used to automatically change between summer and wintertime on the right day each year without user intervention, substantially reducing the number of call backs.

The model also incorporates an optional installer set service interval timer for use in tenanted properties where the landlord is responsible for gas safety. This feature allows the service due date to be set and starts to remind the user 28 days before the due date.

The TS715 Si can be configured by the installer at time of installation to provide 7 day, 24 hour or 5 day/2 day operation and can also be configured to provide either 2 ON/OFFs or 3 ON/OFFs per day.

Additional Information:

Wallplate Information p.88
Wiring Information p.89

Features	TS715 Si	TS715 Si-CB
Code No.	**087N789900**	**087N790700**
Single channel timeswitch	•	
Service interval timer available, select at time of installation	•	
7 day, 24 hour or 5/2 day operation, select at installation	•	
2 on/offs or 3 on/offs per day, select at installation	•	
Permanent back lit display	•	
Output channels	Single	Independent HW
Programmes selectable	On/Off/Auto/Allday[1]	
Programmable holiday function	Up to 99 days	
Factory set real time clock	•	
Automatic BST/GMT change	•	
Service interval timer	Programmable between 56-365 days	
Factory pre-set on/off time	•	
Advance override	•	
+1hour override	•	
Voltage rating	230 Vac ± 15%, 50/60 Hz	
Contact Rating	3 (1) A	
Switching action	1 x SPDT (voltage free)	2 x SPDT (commons linked internally)
Battery backup on power failure	Time and all other settings - indefinitely	
Maximum ambient temperature	45°C	
Dimensions (mm)	137 wide x 93 high x 29 deep	

2-Channel Programmers with Common Timebase
102 and 102E7

Features	102	102E7
Code No.	**087N652100**	**087N653600**
Electro-mechanical	24 hour	
Electronic		7 day or 5/2 day
HW only or HW and CH	•	•
Programmes selectable	Water only Off Water & Heating	Off Auto Allday On
Factory pre-set programmes (all changeable)		•
On/Offs per day	2	3
Advance override	•	
+1 hour override		•
Voltage rating	230 Vac ±15%, 50/60 Hz	
Contact rating	6 (2.5) A	3 (1) A
Switching action	SPST (voltage free)	
Maximum ambient temperature	55°C	45°C
Memory back-up	N/A	min. of 24 hours
Dimensions (mm)	106 wide x 135 high x 63 deep	102 wide x 136 high x 47 deep

- Proven reliability
- Easy to use
- All units interchangeable on the same wallplate
- Available in 24 hour, 5/2 day or 7 day versions
- Available in electro-mechanical and electronic version

Ideal for systems where heating and domestic hot water are required at the same time. The 102 and 102E7 provide linked outputs for water and heating.

The range include an easy to use 24-hour electromechanical model, plus an electronic model which offers 5/2 or 7-day operation.

Both units fit the GP wallplate and have an identical wiring configuration, allowing systems to be upgraded without the need for rewiring.

The electro-mechanical 102 programmer has a thumbwheel, which allows early selection of future switching operations.

Both models show clearly the current state of the output.

The electronic unit has extra programmes and overrides, and incorporates a battery to provide back up of time and programme.

Additional Information:

Wallplate Information p.88
Wiring Information p.89

Please note:

The 102E5 is no longer in manufacture. Please refer to the 102E7.

102E7

2-Channel Programmer with Common Timebase
3020P

- Easy to operate
- Factory replacement units are available

Ideal for situations where simplicity of control is paramount, this basic electro-mechanical time control, for heating and domestic hot water systems, is noted for it's ease of operation.

The control modules plug into a separate wallplate/terminal block, making installation and servicing as simple as possible.

The 3020P features a 24 hour clock with colour coded ON and OFF tappets, which are simply moved to the desired position on the dial to provide 2 On and Off periods per day.

Programme selection is made by means of easy to understand rotary switch or toggle switches.

MK3 Factory Replacement Units
MK3 models, minus the wallplate/terminal block, for fast in-service replacement. Just plug the module into the existing wallplate and fit the new outer casing.

Additional Information:
Wallplate Information p.88
Wiring Information p.89

Features	3020P
Code No.	**087N652600**
Type	Mini-programmer
Electro-mechanical	24 hour
Programmes selectable	Timed Off On Water only Water and heating
On/offs per day	2
Voltage rating	230 Vac ±15%, 50/60 Hz
Contact rating	3 (1) A
Switching action	2 x SPST
Maximum ambient temperature	55°C
Dimensions (mm)	102 wide x 210 high x 60 deep

Notes
(1) Once = all day between 1st On and last Off
(2) Twice = 2 ons and 2 offs per day

FRUs	Description	Code No.
Factory Replacement Units (standard units without backplate)	3020P FRU replacement module and case	**087N655700**
	3060 FRU replacement module and case	**087N655900**
	4033 FRU replacement module and case	**087N656000**
	3022 FRU replacement module and case This module is for optional water priority or heating priority 3 port diverter valve control systems	**087N655800**

Note: Specification as non-FRU models

2-Channel Programmers with Common Timebase **SET2E, SET3E and SET3M**

Features	SET2E	SET3E	SET3M
Code No.	**087N654100**	**087N654200**	**087N653200**
Mini-programmer	•		
Two channel programmer, with common timebase		•	•
Electronic	24 hour	24 hour	
Electro-mechanical			24 hour
Pumped/Gravity option		•	•
Programmes selectable	Off Timed On	Off Timed On (Water)	Off Timed On (Water)
	HW or HW & CH	Off Timed On (Heating)	Off Timed On (Heating)
Factory pre-set programmes	•	•	
On & offs per day	2	2	2
Advance override	•	•	•
+1hour override	•	•	
Voltage rating	230 Vac ± 15%, 50/60 Hz		
Contact Rating	3 (1) A		
Switching action	2 x SPDT (voltage free)		2 x SPDT (voltage free)
Maximum ambient temperature	45°C		
Memory back-up	Up to 24 hours		N/A
Dimensions (mm)	158 wide x 98 high x 36 deep		158 wide x 98 high x 63 deep

- Easy to operate
- 24 hour control
- Easy to use rocker switches
- British Gas standard wallplate
- Available in electro-mechanical and electronic versions

For situations where simplicity of control is paramount.

The SET range of time controls has been designed with simplicity of programming and use in mind.

The range includes an electronic timeswitch, a mini-programmer and a programmer, as well as an electro-mechanical programmer.

All models offer 24 hour control and are designed to fit the British Gas Standard Wallplate used by earlier SET models and some models from the Horstmann range.

All models have LED status indicators and have easy to use rocker switches for programme selection.

The On/Off times can be seen at a glance on the SET3M. Using the slider switch on the electronic models the on/off times are shown on the large, clear display.

Programmes can be manually overridden, by the thumbwheel on the SET3M and by the ADVANCE and +1HR buttons on the electronic models.

Additional Information:

Wallplate Information p.88
Wiring Information p.89

SET3M

2-Channel Programmer with Common Timebase
CP715 Si

- Optional service interval function
- 7 day, 5/2 day or 24 hour
- Permanent back lit display
- AM/PM or 24 hour display
- Built-in programmes
- Automatic BST/GMT time change
- Convenient user overrides
- Holiday function
- 'Industry standard' wallplate
- Factory set clock

For use in any domestic heating and hot water function the CP715 Si is a model for any situation, offering unrivalled flexibility of control.

The CP715 Si offers flexibility and reliability, with an elegant look and some handy features. It has a slim, modern enclosure and a large LCD with a convenient back light.

Employing the latest technology, the versatile CP715 Si is reliable and easy to use. It is the installer's first choice due to it's ready interchangeability with most other existing controls.

The CP715 Si has real time and date set in the factory and automatically displays the correct time when powered up. The time and date information is used to automatically change between summer and winter time on the right day each year without user intervention, substantially reducing the number of call backs.

This model also incorporates an optional installer set service interval timer for use in tenanted properties where the landlord is responsible for gas safety. This feature allows the service due date to be set and starts to remind the user 28 days before the due date.

The CP715 Si can be configured by the installer at time of installation to provide 7 day, 24 hour or 5 day/2 day operation and can also be configured to provide either 2 ON/OFFs or 3 ON/OFFs per day.

Additional Information:

Wallplate Information p.88
Wiring Information p.89

Features	CP715 Si
Code No.	**087N789700**
Two channel programmer, with common timebase	•
Service interval timer available, select at time of installation	•
7 day, 24 hour or 5/2 day operation, select at installation	•
2 on/offs or 3 on/offs per day, select at installation	•
Pumped or gravity hot water option, select at installation	•
Permanent back lit display	•
Output channels	independent HW & CH
Programmes selectable	On/Off/Auto/Allday(1)
Programmable holiday function	Up to 99 days
Factory set real time clock	•
Automatic BST/GMT change	•
Service interval timer	Programmable between 2 and 12 months
Factory pre-set on/off time	•
Advance override	per channel
+1hour override	per channel
Voltage rating	230 Vac ± 15%, 50/60 Hz
Contact Rating	3 (1) A
Switching action	2 x SPDT (commons linked internally)
Battery backup on power failure	Time and all other settings - indefinitely
Maximum ambient temperature	45°C
Dimensions (mm)	137 wide x 93 high x 29 deep

(1) Per channel

2-Channel Programmers with Common Timebase **3060 and 4033**

Features	3060		4033	
Code No.	**087N652800**		**087N653000**	
Type	6 position programmer		Two channel programmer	
Electro-mechanical	24 hour			
Programmes selectable	Heating	Water	Heating	Water
	Off Twice Once(1) On Twice(2) Off	Off Twice Once(1) On Once(1) Twice(2)	Timed Off On	Timed Off On
On/offs per day	2			
Voltage rating	230 Vac ±15%, 50/60 Hz			
Contact rating	3 (1) A			
Switching action	2 x SPST		2 x SPDT	
Maximum ambient temperature	55°C			
Dimensions (mm)	102 wide x 210 high x 60 deep			

Notes
(1) Once = all day between 1st On and last Off
(2) Twice = 2 Ons and 2 Offs per day

FRUs	Description	Code No.
Factory Replacement Units (standard units without backplate)	3020P FRU replacement module and case	**087N655700**
	3060 FRU replacement module and case	**087N655900**
	4033 FRU replacement module and case	**087N656000**
	3022 FRU replacement module and case This module is for optional water priority or heating priority 3 port diverter valve control systems	**087N655800**

Note: Specification as non-FRU models

- Easy to operate
- Factory replacement units are available

For situations where simplicity of control is paramount.

This range of basic electro-mechanical time controls, for heating and domestic hot water systems, is noted for its ease of operation.

The control modules plug into a separate wallplate/terminal block, making installation and servicing as simple as possible.

Both models feature a 24 hour clock with colour coded ON and OFF tappets, which are simply moved to the desired position on the dial to provide 2 On and Off periods per day.

Programme selection is made by means of easy to understand rotary switch or toggle switches.

MK3 Factory Replacement Units
MK3 models, minus the wallplate/terminal block, for fast in-service replacement. Just plug the module into the existing wallplate and fit the new outer casing.

Additional Information:
Wallplate Information p.88
Wiring Information p.89

4033

2-Channel Programmer with Independent Timebase
FP715 Si

- Optional service interval function
- 7 day, 5/2 day or 24 hour
- Permanent back lit display
- AM/PM or 24 hour display
- Built-in programmes
- Automatic BST/GMT time change
- Convenient user overrides
- Holiday function
- 'Industry standard' wallplate
- Factory set clock

For use in any domestic heating and hot water function the FP715 Si offers unrivalled flexibility and reliability, with an elegant look and some handy features. It has a slim, modern enclosure and a large LCD with a convenient back light.

Employing the latest technology, the FP715 Si is reliable and easy to use. It is the installer's first choice due to it's ready interchangeability with most other existing controls.

This model has real time and date set in the factory and automatically displays the correct time when powered up. The time and date information is used to automatically change between summer and wintertime on the right day each year without user intervention, substantially reducing the number of call backs.

The FP715 Si also incorporates an optional installer set service interval timer for use in tenanted properties where the landlord is responsible for gas safety. This feature allows the service due date to be set and starts to remind the user 28 days before the due date.

This model can be configured by the installer at time of installation to provide 7 day, 24 hour or 5 day/2 day operation and can also be configured to provide either 2 ON/OFFs or 3 ON/OFFs per day.

Additional Information:

Wallplate Information p.88
Wiring Information p.89

Features	FP715 Si
Code No.	**087N789800**
Two channel full programmer, with independent timebase	•
Service interval timer available, select at time of installation	•
7 day, 24 hour or 5/2 day operation, select at installation	•
2 on/offs or 3 on/offs per day, select at installation	•
Pumped or gravity hot water option, select at installation	•
Permanent back lit display	•
Output channels	Independent HW & CH
Programmes selectable	On/Off/Auto/Allday(1)
Programmable holiday function	Up to 99 days
Factory set real time clock	•
Automatic BST/GMT change	•
Service interval timer	Programmable between 2 and 12 months
Factory pre-set on/off time	•
Advance override	per channel
+1hour override	per channel
Voltage rating	230 Vac ± 15%, 50/60 Hz
Contact Rating	3 (1) A
Switching action	2 x SPDT (commons linked internally)
Battery backup on power failure	Time and all other settings - indefinitely
Maximum ambient temperature	45°C
Dimensions (mm)	137 wide x 93 high x 29 deep

Please note: (1) Per channel on CP and FP models.

2-Channel Programmers with Independent Timebase

FP975 and FP975-2H

Features	FP975	FP975-2H
Code No.	**087N654300**	**087N759900**
7 day or 5/2 day	•	•
Two channel programmer, with independent timebase	•	•
Output channels	Independent HW & CH	Two independent CH zones
Pumped gravity option available	•	•
Direct replacement for 922, 972 & SET5	•	•
Programmes selectable	On/Off/Auto/Allday	On/Off/Auto/Allday
Factory pre-set on/off times	•	•
On and Offs per day	Up to 3	Up to 3
Advance override	per channel	per channel
+1hour override	per channel	per channel
Voltage rating	230 Vac ± 15%, 50/60 Hz	230 Vac ± 15%, 50/60 Hz
Contact Rating	3 (1) A	3 (1) A
Switching action	2 x SPDT (voltage free)	2 x SPDT (voltage free)
Maximum ambient temperature	45°C	45°C
Memory back-up	Lithium - minimum of 24 hours	Lithium - minimum of 24 hours
Dimensions (mm)	150 wide x 99 high x 42 deep	150 wide x 99 high x 42 deep

Notes:
For replacement of the TS975 please refer to the TS715 Si model - code number 087N789900, alternatively use FP975 and disregard HW channel.

- Fits SET and MK9 wallplates
- Ideal for service replacement
- 'Industry standard' wallplate
- Convenient user overrides
- Simple GMT/BST time change
- AM/PM or 24 hour display
- Day programme copy facility
- Built-in programmes
- Battery back up

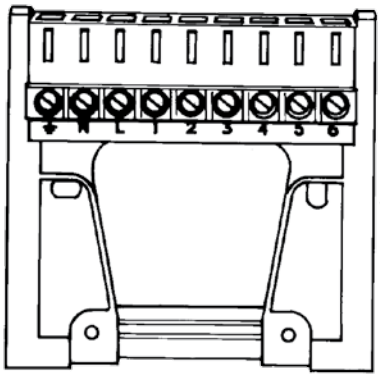
A convenient upgrade from MK9, SET5 or any model using British Gas standard wallplate.

The FP975 full programmer offers a direct plug-in replacement to the Danfoss MK9 range (types 922 and 972), the Danfoss SET5, or any other timeswitch or programmer based on the British Gas standard wallplate.

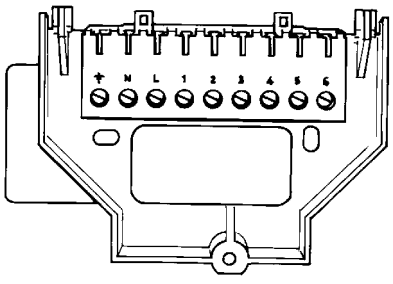
The FP975 is supplied complete with SET wallplates but is designed to also mount directly onto existing MK9 wallplates without the need for wiring changes. Each unit, which when supplied is configured as a SET replacement, can be re-configured as a MK9 replacement by means of a switch on the rear of the unit.

Additional Information:

Wallplate Information p.88
Wiring Information p.89



SET Wallplate (As supplied)



MK9 Wallplate (Discontinued)

3-Channel Programmer with Independent Timebase

FP735Si

- Three independent channels
- 24 hours, 5/2 day or 7 day programming
- Factory set clock
- Automatic summer/winter time change
- Holiday function
- Optional service interval timer

The FP735Si programmer is a three channel programmer providing outputs for controlling ON and OFF periods for room heating and hot water. Each output channel can operate independently of the others, having its own separate timing.

The FP735Si is fully Part L compliant, and provides a single unit solution to fulfil the timing requirements for controlling a Hot Water zone together with two Room Heating zones.

The FP735Si offers up to six "ON-to-OFF" or "OFF-to-ON" changes each day. Independently set for each zone.

Programming Modes

Several programming modes are available for selecting "ON" and "OFF" periods that can suit many domestic needs. 7-day mode allows each day to be programmed individually. 5/2 day mode allows different "ON" and "OFF" periods to be set for the weekend. 24 hour mode for the same settings each day.

Holiday

The FP735Si allows the user to switch off the Hot Water and the Heating for a programmed holiday period. When the end of holiday date has been reached, the Hot Water and Room Heating will return to normal operation.

+ Hour Override

The FP735Si provides the user the ability to override the running programme. By pressing a key the user can extend a current "ON" time by 1, 2, or 3 hours. Or switch on the selected channel, when an "OFF" period is active.

Service Interval Timer

The service interval timer allows the installer to select a service due date for the boiler, this can be set at between 28 days and 366 days from the current date.

Additional Information:

Wiring Information p.89

Features	FP735Si
Order code	**087N789000**
Factory set calendar clock	•
Automatic summer/winter time change	•
Fully independent Hot Water and Room Heating times	•
Room heating and hot water ON/OFF changes	up to 6 per day per zone
Selectable 7 day, 5/2 day or 24 hour operating mode	•
+1, +2, +3 hour hot water and/or room heating override	•
Move to next event	•
Holiday mode	•
Optional service interval operation	•
Power supply	230 Vac, 50 Hz
Switching action of output relay	1 x SPST, 2 x SPDT, type 1B
Switch rating of relay contact	3(1) A, 10-230 Volts
Rated impulse voltage	2.5 kV
Dimensions (mm)	140 wide x 91 high x 28 deep
Ball pressure test	75°C
Temperature range	5-30°C
Design standard	EN 60730-2-7
Control pollution situation	Degree 2
Memory backup	Retained for the life of the product
Time accuracy	+/- 1 minute per month

Commercial Time and Bell Ringing Controls

811, 851, 852, 841 and 842

Features	811	851	852	841	842
Code No.	087N656600	087N657200	087N657500	087N656800	087N657100
Single channel	•	•		•	
Two independent channels			•		•
Up to 200 on or off outputs per week	•	•	•		
Up to 200 intermittent or continuous PULSED outputs per week				•	•
EXTEND override(s)	•	•	2		
CROP override(s)	•	•	2		
Different pulse type possible for each channel					•
Pulse duration (select on installation)				1 to 15 seconds	1 to 15 seconds per channel
MANUAL momentary override				•	• (3)
Voltage rating	230 Vac ± 15%, 50/60 Hz Other voltages made to special order				
Switching current rating Resistive:	30A	10A	10A(1)	15A	3A(3)
Switching current rating Inductive:	10A	4A	4A	5A	1A
Contact type (2)	SPST	SPDT	2 x SPDT	SPST	2 x SPDT
Dimensions (mm)	228 wide x 115 high x 50 deep				

Notes:
(1) Total rating for both channels
(2) All contacts are voltage free
(3) Per channel

- 7 day operation
- 200 event memory
- Key protection
- Battery back-up
- EXTEND or CROP overrides
- Volt-free contacts

The MK8 range of 7 day commercial and industrial controls includes On/Off units for boiler control, lighting, bell ringing and siren-sounding applications, i.e. class change bell-ringing in schools or for breaks and shift changes in factories.

Programme entry is via a membrane keypad with audible feedback. For security it is only possible to enter or change the time, programme and extend duration with the removable key in place and turned to the setting position.

The On/Off units 811, 851 and 852 feature a programmable 0 to 8 hour extend or continuous override and a crop override to cancel the remainder of an On period. The Auto/Off rocker switches allow outputs to follow the programmed events or to be switched off.

The pulsed units 841 and 842 feature programmable duration and pulse type, continuous or intermittent. The Auto/Off/Man rocker switches allow the outputs to follow the programmed events, to be switched off, or to be manually on while the switch is held down in this position.

Additional Information:
Wiring Information p.93

851

841

Thermostats

Contents

Thermostats
Selection Guide

Programmable Room Thermostats for Heating Applications - Electronic Models

Hard Wired Models	TP5000 Si	TP5000A Si	TP5000M Si	TP5000MA Si	TP7001
Ordering Data/Tech Spec	Page 58	Page 58	Page 58	Page 58	Page 59
Wireless Models	**TP5000-RF Si**	**TP5000A-RF Si**			**TP7000-RF**
Ordering Data/Tech Spec	Page 58	Page 58			Page 61
Heating thermostat	•	•	•	•	•
DHW time control					
DHW time control events					
7 day operation					•
5/2 day operation	•	•	•	•	•
24 hour operation	•	•	•	•	•
Number of events per day	2, 4 or 6	2, 4 or 6	2, 4 or 6	2, 4 or 6	2, 4 or 6
On/Off control	•	•	•	•	•
Chrono-proportional control	•	•	•	•	•
Delayed Start	•				• (unavailable on TP7000-RF)
Automatic BST/GMT change	•	•	•	•	•
Clock display	AM/PM or 24 Hr	AM/PM or 24 Hr	AM/PM or 24 Hr	AM/PM or 24 Hr	AM/PM or 24 Hr
Room temperature override	•	•	•	•	•
Factory pre-set programmes	•	•	•	•	•
Service interval timer	•	•	•	•	•
Built-in sensor	•		•		•
Remote sensor		•		•	
Optimum start function					•
Holiday mode					•
Power supply	2 x AA / MN1500 / LR6 alkaline batteries	2 x AA / MN1500 / LR6 alkaline batteries	230 Vac, 50 Hz	230 Vac, 50 Hz	2 x AA / MN1500 / LR6 alkaline batteries

Dial Setting and Digital Room Thermostats for Heating Applications - Electronic Models

Model		RET 24	RET 24VF	RET 24 NSB	RET 230P	RET 230 NSB	RET B NSB	RET B NSB RF	FMT 230D
Ordering Data/Tech Spec.		Page 53	Page 53	Page 53	Page 53	Page 53	Page 53	Page 53	Page 55
Wireless							•	•	
Operating voltage		24 Vac	24 Vac	24 Vac	230 Vac	230 Vac	Battery	Battery	230 Vac
Volt free switching			•	•	•	•	•	•	
LCD Display							•	•	•
LED Status Indicators	Power On					•			
	Stat Calling					•			
Chrono-proportional control							•	•	•
Opentherm									
Night set back				•		•	•	•	
Delayed start								•	
Switch Type		SPDT	SPDT	SPDT	SPDT	SPDT	SPDT	SPDT	SPDT

Dial Setting and Digital Room Thermostats for Heating Applications - Electro-Mechanical Models

Model	RMT 24	RMT 24T	RMT 230*	RMT 230	RMT 230T
Ordering Data/Tech Spec.	Page 52	Page 52	Page 52	Page 52	Page 52
Operating voltage	24 Vac	24 Vac	230 Vac	230 Vac	230 Vac
Built-in thermometer		•			•
Night Set Back		•			
Switch Type	SPDT	SPDT	SPDT	SPDT	SPDT

Dial Setting Room Thermostats with Function Switches

Model	Heating/Cooling			Heating	Cooling	
	RET 230-C01	RET 230-C02	RET230-C03	RET230-H3	RET230-C3	RET230-C32
Ordering Data/Tech Spec.	Page 54	Page 54	Page 54	Page 54	Page 54	Page 54
Operation selector	Heat/Cool	Heat/Cool	Heat/Cool/Off	Auto/Continuous/Off	Auto/Continuous/Off	Auto/Off
Fan speed selector	Auto/Continuous	Auto/Off	3 Speed	3 Speed	3 Speed	3 Speed
LED indication					•	•

TP7001A	TP7001M	TP7001MA	TP9000	TPOne-B	TPOne-M
Page 59	Page 59	Page 59	Page 60	Page 57	Page 57
				TPOne-B RF	
				Page 57	
•	•	•	•	•	•
			•		•
			Up to 3 per day		Up to 3 per day
•	•	•	•	•	•
•	•	•	•	•	•
•	•	•	•	•	•
2, 4 or 6	2, 4 or 6	2, 4 or 6	2, 4 or 6	2, 4 or 6	2, 4 or 6
•	•	•	•	•	•
•	•	•	•	•	•
•	•	•	•	•	•
•	•	•	•	•	•
AM/PM or 24 Hr	AM/PM or 24 Hr	AM/PM or 24 Hr	24 Hr	AM/PM or 24 Hr	AM/PM or 24 Hr
•	•	•	•	•	•
•	•	•	•	•	•
•	•	•	•	•	•
	•		•	•	•
•		•		Optional	Optional
•	•	•	•	•	•
•	•	•	•	•	•
2 x AA / MN1500 / LR6 alkaline batteries	230 Vac, 50 Hz	230 Vac, 50 Hz	2 x AA / MN1500 / LR6 alkaline batteries	2 x AA / MN1500 / LR6 alkaline batteries	230 Vac, 50 Hz

ORT-01	ORT-10	RET 1000MS	RET 1000M	RET 1000B	RET 1000MD	RET 2000MS	RET 2000M	RET 2000B	RET 2000MD	RET 2000B-RF
Page 56	Page 56	Page 50	Page 50	Page 50	Page 50	Page 51	Page 51	Page 51	Page 51	Page 51
										•
24 Vdc	24 Vdc	230 Vac	230V AC	Battery	230 Vac	230 Vac	230 Vac	Battery	230 Vac	Battery
			•	•	•		•	•	•	•
	•					•	•	•	•	•
		•	•	•	•					
		•	•	•	•					
•	•	•	•	•	•	•	•	•	•	•
•	•									
					•				•	
2 wire bus	2 wire bus	SPDT	SPDT	SPDT	SPDT	SPDT	SPDT	SPDT	SPDT	Wireless

Other Thermostats

Model	Frost			Pipe	Cylinder				
	Room		Pipe		Immersed			Surface mounted	
	RET 230 F	RET 230 F5	ATF	ATP	ITC	ITL	ITD	CET2000B-RF	ATC
Ordering Data/Tech Spec	Page 62	Page 62	Page 62	Page 62	Page 63	Page 63	Page 63	Page 62	Page 62
Wireless								•	
Dual control and limit							•		
Temperature range (control)	5-10°C	5°C (fixed)	10-90°C	40-65°C	0-90°C	0-90°C	0-90°C	40-65°C	30-90°C
Temperature range (limit)						90-110°C	90-110°C	90-110°C	
Tamperproof version					•				
Limit function						•	•		
Dual control and limit function							•		
Switching differential	< 1°C	< 1°C	8°C	6-10°C	4 ± 1K		4 ± 1K	4 ± 1K	8 ± 3°C
Max. ambient temp.					65°C	80°C	80°C	45°C	
Clamp-on sensor/Fixing Strap			•	•				•	•
Switch type	SPST	SPST	SPDT	SPDT	SPDT	SPST	SPST	Wireless	SPDT

What is Chrono-Proportional Control?

Load Compensator Control Technology

Reducing energy costs and carbon emissions is achievable through fitting chrono-proportional controls.

Chrono-proportional control (sometimes known as TPI) is a load compensator as it ensures that the boiler 'on' time is reduced to a minimum and matches the boiler heat output with the heat loss. This reduces the net temperature of the return water to the boiler.

If a property only has a simple mechanical thermostat installed, then the energy-saving benefits of a replacement high-efficiency condensing boiler will not be realised as the boiler will rarely be running in condensing mode.

Switching to an On/Off electronic room thermostat produces reductions of over 2% in both energy cost and carbon emissions.

The use of an electronic thermostat with chrono-proportional capability provides closer temperature control plus possible reductions of 10% in both fuel cost and carbon emissions.

These results are from tests using Danfoss controls. Tests carried out with other manufacturers' On/Off controls produced similar figures.

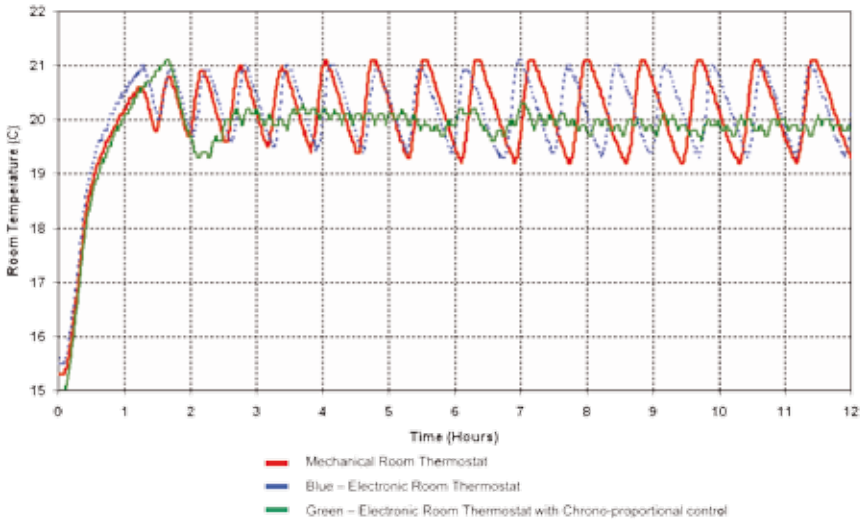
Conclusions

Changing the boiler alone from non-condensing to condensing in a domestic central heating system will not necessarily optimise potential energy and carbon emission savings.

An electronic room temperature control, preferably with chrono-proportional capability, is often needed to make the cost of replacing the boiler worthwhile.

Impact of Control Technology on Condensing Boilers

Standard A-Rated Condensing Boiler



Control	Energy Cost (£)	Energy Saving (%)	Carbon Emissions (kg CO˝)	Carbon Saving (%)
Mechanical On/Off	**2.39**	-	**13.56**	-
Electronic On/Off	**2.34**	**2.10**	**13.25**	**2.31**
Chrono-Proportional	**2.14**	**10.35**	**12.11**	**10.71**

Danfoss Controls and
ErP Product Class Labelling

From 26th September 2015, whenever a boiler is installed with temperature controls, it will be necessary to produce a 'package label'.
Heating controls are split into eight classes depending on the level of control they are deemed to have over the efficiency of the system:

Class		Correction Factor %
I	On/Off Room thermostat	1
II	Weather compensator control (modulating heaters) *	2
III	Weather compensator control (on/off heaters) *	1.5
IV	Chrono-proportional room thermostat (on/off heaters)	2
V	Modulating room thermostat (modulating heaters)	3
VI	Weather compensator and room sensor (modulating heaters)	4
VII	Weather compensator and room sensor (on/off heaters)	3.5
VIII	Multi-sensor room temperature control (modulating heaters)	5

* Control Classes II & III do not fulfil the current Part L requirements for new build due to the lack of a room sensor.
You will find this information on the pages for all controls that this applies to in this document as well as at www.heating.danfoss.co.uk

Intelligent Room Thermostats
RET1000

ErP Product Class 4

- Selectable chrono-proportional or On/Off control
- User set upper and lower temperature limits
- Output 'ON' indication
- Power indication

RET1000 smart room thermostats combine a sleek modern design with high performing energy saving controls.

The well-proportioned dial and clear temperature scale makes setting easy, including an easy to set upper and lower temperature limiting feature.

All RET1000 thermostats include stylish backlit LED icons providing clear indication of power and output status.

As well as standard On/Off control the user can select to benefit from chrono-proportional control. Chrono-proportional control significantly improves comfort and generally improves boiler efficiency by optimising flow/return temperature.

Additional Information:

Wiring Information ..... p. 91

Mains Powered Models

Features	RET1000MS	RET1000M	RET1000MD
Code No.	**087N645200**	**087N645000**	**087N645400**
Power Supply	230Vac, 50/60Hz		
Output	230 Vac	Volt free	
Delay Start			•
Setting Temperature Range	5-30 °C		
Operating Temperature Range	0-45 °C		
Switch Rating (Hard-wired models)	3A at 230 Vac		
Switch Type (Hard-wired models)	SPDT type 1B		
IP Rating	IP20		
On/Off Control	•		
Chrono-proportional Control	•		
Dimensions (mm)	H84 x W84 x D37		

Battery Powered Model

Features	RET1000B
Code No.	**087N645100**
Power Supply	2xAA batteries
Output	Volt free
Setting Temperature Range	5-30 °C
Operating Temperature Range	0-45 °C
Battery Lifetime	Min. 2 years
IP Rating	IP20
On/Off Control	Yes
Chrono-proportional Control	Yes
Dimensions (mm)	H84 x W84 x D37

Please note: The RET2000B-RF is not compatible with RX1, RX2, RX2C or RX3.

Replacements for discontinued RET Thermostats

Discontinued Product	Old Code No.	Replacement Product	New Code No.
RET 230VF2	**087N700801**	RET1000M	**087N645000**
RET 230	**087N700400**	RET1000MS	**087N645200**
RET 230L	**087N700600**		
RT51	**087N699600**	RET2000B	**087N644100**
RET B	**087N725100**		
RET B-LS	**087N725500**		
RET M	**087N726400**	RET2000M	**087N644000**
RET-MD	**087N726400**	RET1000MD	**087N645400**
		RET2000MD	**087N644500**
RET 230LS	**087N700700**	RET2000MS	**087N644200**
RET B-RF	**087N727000**	RET2000B-RF	**087N644300**
RET B-RF-LS	**087N727200**		
RT51-RF	**087N699900**		
RET B-RF + RX-1	**087N727600**	RET2000B-RF + RX1-S	**087N644400**

Intelligent Room Thermostats

RET2000

ErP Product Class 4

Mains Powered Models

Features	RET2000MS	RET2000M	RET2000MD
Code No.	**087N644200**	**087N644000**	**087N644500**
Power Supply	230 Vac, 50/60Hz		
Output	230 Vac	Volt free	
Delay Start			•
Setting Temperature Range	5-30 °C		
Operating Temperature Range	0-45 °C		
Switch Rating	3A at 230 Vac		
Switch Type	SPDT type 1B		
IP Rating	IP20		
On/Off Control	•		
Chrono-proportional Control	•		
Dimensions (mm)	H84 x W84 x D37		

Battery Powered Models

Features	RET2000B	RET2000B-RF
Hard-wired models - Code No.	**087N644100**	
Wireless model - Code No. without receiver		**087N644300**
Wireless model - Code No. for set RET2000B-RF c/w single channel receiver		**087N644400**
Power Supply	2xAA batteries	
Output	Volt free	
Setting Temperature Range	5-30 °C	
Operating Temperature Range	0-45 °C	
Switch Rating (Hard-wired models)	3A at 230Vac	
Switch Type (Hard-wired models)	SPDT type 1B	
Transmitter Frequency (Wireless models only)		433.92MHz
Transmitter Range (Wireless models only)		30 metres [1]
Battery Lifetime	Min. 2 years	
IP Rating	IP20	
On/Off Control	•	
Chrono-proportional Control	•	
Remote Sensor Input		•
Dimensions (mm)	H84 x W84 x D37	

[1] Ensure there are no large metal objects between then thermostat and receiver as this will interfere with radio signal. Range within a building typically 30 metres dependent on construction.

Receiver	RX1-S
Code No.	**087N777300**
Number of zones receiver covers	1
Power supply	230 Vac 50/60Hz
Output Relay	SPDT type 1B
Relay Rating	3A (1) at 230 Vac
IP Rating	IP40
Dimensions (mm)	H84 x W84 x D28

- Chrono-proportional or On/Off control
- User set upper and lower temperature limits
- Output 'ON' indication
- Push button lock
- Cooling option with compressor delay
- °C or °F selectable display

RET2000 digital room thermostats combine a sleek modern design with high performing energy saving controls and are available as either hard-wired or wireless versions.

Incorporating a generous, easy to read display that clearly shows the room temperature and output status of the thermostat. Further enhanced by an inbuilt backlight, this thermostat is also ideal for those with poorer eyesight or where the location is dimly lit. The RET2000 also benefits from selectable on/off and chrono-proportional control. Chrono-proportional control significantly improves comfort and generally improves boiler efficiency by optimising water temperature.

Additional features include settable upper and lower temperature limits as well as push button lock to avoid tampering. If preferred the temperature display can also be set to show °F. The RET2000 also has the option to be set as a cooling device, reversing the output logic and including compressor delay settings.

Included in the RET2000B-RF is a remote sensor input which can be configured for a number of applications.

Additional Information:

Wiring Information ..... p. 91

RET2000B-RF and RX1-S

Electro-Mechanical Room Thermostats with Setting Dial

RMT

ErP Product Class 1

- Models available for 24V and 230V operation
- Large, easy to read scale
- Locking and limiting as standard

Providing accurate and reliable temperature control for a wide range of applications, from radiator based heating applications to underfloor heating.

A stylish range of electro-mechanical room thermostats for use in 24V and 230V systems. All models, with the exception of RMT230*, have an accelerator heater to improve control accuracy. Models are available with thermometer and night set-back facility, activated by an external time control.

Additional Information:

Wiring Information p.91

RMT Electro-Mechanical Room Thermostats						
Type	**Code No.**	**Operating Voltage**	**Built-in Thermometer**	**5K Night Set-back (1)**	**Switch Type**	**Comments**
RMT230*	**087N111000**	230 Vac			SPDT	no accelerator
RMT230	**087N110000**	230 Vac			SPDT	
RMT230T	**087N112500**	230 Vac	•	•	SPDT	
RMT24	**087N119600**	24 Vac			SPDT	
RMT24T	**087N119700**	24 Vac	•	•	SPDT	

(1) Night set-back is achieved using external time control.

Specifications		RMT24	RMT230
Switching differential		<1°C	<1°C
Operating voltage (±15%)		24 Vac	230 Vac
Contact rating		10 (4) A	10 (4) A
Temperature		8-30°C	8-30°C
Dimensions	Wide	80mm	80mm
	High	80mm	80mm
	Deep	40mm	40mm

Electronic Room Thermostats with Setting Dial

RET

ErP Product Class 1

RET Electronic Room Thermostats						
Type	Code No.	Operating Voltage	LED Status Indicators		Switch Type	Comments
			Power on (1)	Stat Calling (2)		
RET230P	**087N743000**	230 Vac			SPDT	Volt-free contacts
RET230NSB	**087N701000**	230 Vac	•	•	SPDT	5K night set-back volt-free contacts (3)(4)
RET24	**087N701400**	24 Vac		•	SPDT	
RET24VF	**087N701600**	24 Vac		•	SPDT	Volt-free contacts
RET24NSB	**087N701800**	24 Vac		•	SPDT	5K night set-back volt-free contacts (4)(5)

Specifications		RET24	RET230
Switching differential		<1°C	<1°C
Operating voltage (±15%)		24 Vac	230 Vac
Contact rating		3 (1) A	3 (1) A
Temperature		5-30°C	5-30°C
Dimensions	Wide	85mm	85mm
	High	86mm	86mm
	Deep	42mm	42mm

RET Electronic Room Thermostats with Night Set-Back		
Hard-wired Versions	RET B-NSB (Hard Wired Model)	RET B-NSB-RF (Wireless Model)
Code No.	**087N725800**	**087N727400**
Day/Night selector switch (4°C set-back)	•	
Temperature range	5-30°C	
Setting dial and LCD display	•	
Chrono-proportional or on/off control	•	
Heat or cool operation, inc. compressor time delay	• (6)	
Selectable °F or °C scaling	•	
Low battery indicator	•	
Transmitter frequency		433.92 MHz
Transmitter range		Typically 30 metres line of sight (7)
Power supply	2 x AA/LR6/MN1500 alkaline batteries	
Maximum ambient temperature	45°C	
Dimensions (mm)	85 wide x 86 high x 42 deep	

Receivers (RF models)	RX-1	RX-2	RX-2C	RX-3
Code No.	**087N747600**	**087N747700**	**087N747900**	**087N747800**
Number of zones	1	2	2	3
Power supply (receivers)	230 Vac, ±15%, 50/60 Hz			
Contact details	1-SPDT	1-SPDT, 1-SPST	2-SPDT	1-SPDT, 2-SPST
Contact rating	10-230 Vac, 3(1)A			
Dimensions (mm)	138 wide x 88 high x 32 deep			

(1) Power on indicator is lit when power is applied to thermostat.
(2) Calling indicator is lit when thermostat relay is energised and calling for heat.
(3) In night set-back version, power on LED changes colour during night set-back period.
(4) Night set-back is achieved by using external time control.
(5) Second LED is lit during night set-back periods.
(6) Compressor delay only available if thermostat is set to cool operation.
(7) Ensure there are no large metal objects between the thermostat and receiver as this will interfere with radio signal.

- Modern stylish design
- Electronic accuracy
- Large, easy to use setting dial
- LCD displays set temperature and actual temperature
- Wallplate construction for ease of installation
- Chrono-proportional or On/Off Control

Providing accurate and reliable temperature control for a wide range of applications, from radiator based heating applications to underfloor heating.

RET Electronic Room Thermostats

The RET range is based upon a wallplate construction, allowing for ease of installation. This range of electronic thermostats is available in 24V and 230V versions. All models incorporate an electronic anticipator heater to improve thermal performance. The thermostats are available in various configurations, including versions with voltage free contacts and LED status indication.

All RET24 and RET230 thermostats require a live and neutral power supply of the appropriate voltage.

RET-B-NSB Night Set-Back Room Thermostat

RET-B-NSB is a battery powered room thermostat which offers the advantage of an easy to use setting dial plus the convenience of an LCD to display temperature.

The design utilises a micro-processor which provides accurate temperature control and drives a small LCD display which displays actual room temperature and which changes briefly, to show setting temperature, whenever the setting dial is moved. This micro-processor also brings many sophisticated functions such as optional chrono-proportional regulation and cycle rate adjustment, heat or cool operation, compressor delay timer if cooling operation is selected and Fahrenheit or Centigrade temperature scale.

The special night set-back thermostats can be used to control overnight temperatures at a level 5K below normal day operation by means of an external time clock.

Additional Information:

Wiring Information.....p. 91

Room Thermostats with Setting Dial and Function Switches

RET230

ErP Product Class 1

- Stylish, modern design
- Large easy to read setting dial
- Wide range - covers most applications
- Locking and limiting as standard

Suitable for the commercial heating and air conditioning market.

All models in the range feature up to two supplementary switches, the functions of which vary between models. Most models incorporate a separate fan output terminal making them ideal for use in fan coil unit systems.

RET230 C01 - For use in 2-pipe or 4-pipe systems. One switch provides manual Heat/Cool selection; a second switch provides Fan Auto/Continuous and system off selection.

RET230 C02 - For use in 2-pipe or 4-pipe systems. One switch provides manual Heat/Cool selection; a second switch provides system Auto/Off selection.

RET230 C03 - For use in 2-pipe changeover systems. One switch provides manual Heat/Off/Cool selection; a second switch provides 3-speed fan selection.

RET230 H3 - For use in heating systems. One switch provides Fan/Auto/Continuous and system off selection; a second switch provides 3-speed fan selection.

RET230 C3 - For use in cooling systems. One switch provides Fan Auto/Continuous and system off selection; a second switch provides 3-speed fan selection.

RET230 C32 - For use in cooling systems. One switch provides system Off/Auto selection; a second switch provides 3-speed fan selection.

RET230 LS - For use in heating or cooling systems. A manual switch is provided for Off/Auto selection.

Additional Information:

Wiring Information .....p. 92

	RET230-C01	RET230-C02	RET230-C03
Code No.	**087N702100**	**087N702200**	**087N703200**
Thermostat with manual heat/cool selection	•	•	•
Fan/Auto/Continuous switch with system Off selector	•		
System Off/Auto Selector		•	
Heat/Cool/Off (Winter/Off/Summer) selector			• [1]
Heat/Cool (Winter/Summer) selector	•	•	
3-speed fan switch			•
Single speed fan output	•	•	

[1] Switch label based on symbols

	RET230-H3	RET230-C3	RET230-C32
Code No.	**087N702400**	**087N702300**	**087N702700**
Heating thermostat	•		
Cooling thermostat		•	•
Heating or cooling thermostat			
Fan Auto/Continuous switch with system off selector	•	•	
System Off/Auto selector			•
Power on and thermostat calling LEDs	•	•	•
3-speed fan switch	•	•	•

3) RET230-LS has SPDT contacts and can be used in heating or cooling systems
4) RET230-LS2 has an additional voltage free manual switch, order code number 087N700900

Specification	
Switching differential	<1°C
Operating voltage	230 Vac, ±15%, 50/60 Hz
Switch rating	2 (1) A
Temperature range	5-30°C
Dimensions (mm)	85 wide x 86 high x 42 deep

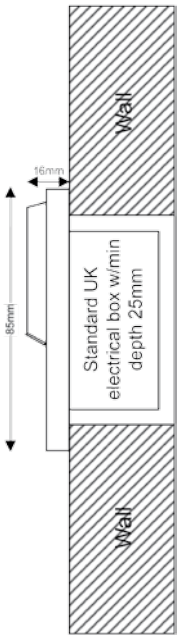
(24V models are available on request)

Flush Mounted Room Thermostat

FlatStat FMT230D

ErP Product Class 4

Features	FMT230D
Code No.	**087N774400**
Temperature Range	5-30°C
Setting dial and LCD display	•
Chrono-proportional or on/off control	•
Heat or cool operation	•
Output relay contact rating	10-250 Vac, 50/60 Hz, 3 (1) A
Switching action	1 SPDT
Power supply	230 Vac, ± 15%, 50/60 Hz
Maximum ambient temperature	45°C
Dimensions (mm)	85 wide x 85 high x 35 deep



- Modern stylish design
- Intelligent heating control for increased fuel economy
- Setting dial with LCD temperature display
- Micro-processor accuracy
- Low profile flush mounted style
- LED power and output indicator
- Chrono-proportional or On/Off Control

Stylish, flush mount room thermostat with LED output indicator and chrono-proportional control option.

Unique in Danfoss' range of thermostats, the low-profile, flush mounted design of the FMT230D blends in seamlessly with existing electrical fittings such as light switches and electrical outlets. Fitted into a standard single gang UK electrical accessory box, the thermostat has an installed profile of just 16mm.

This newly designed flush thermostat combines the ease of use benefits of an easy to set dial, with a simple to read LCD display to provide accurate temperature control in all situations. The LCD display, that normally shows current room temperature, momentarily changes to show the required set temperature whenever the dial is turned. An LED light to indicate power supply, and another LED light to indicate when the output is active makes checking whether the heating is on straight forward. A simple indication of either a flame or a snowflake(*) on the LCD provides visual confirmation of which operating mode as been selected.

The FMT230D allows selection of traditional on/off control, or advanced chrono-proportional control. By using the chrono-proportional control method, compared to standard electronic on/off control, energy and carbon emission savings of over 10% are achievable.

Options for setting up the thermostat are selected at time of installation by easy to set switches on the rear of the unit allowing selection of heating/cooling modes, on/off or chrono-proportional control and 3/6/9/12 cycles for chrono-proportional control.
(*) If cooling mode has been selected

Additional Information:

Wiring Information ..... p. 92
Chrono-Proportional Technology ..... p. 48

For use with OpenTherm Boilers
ORT Modulating Thermostats

- Suitable for use with any OpenTherm boiler
- Provides direct modulation of boiler
- Significantly improves boiler efficiency
- Accurate room temperature control
- Easy to understand interface

OpenTherm technology allows a thermostat to control a boiler more precisely, achieving more accurate room temperature control and reducing energy consumed. A traditional room thermostat controls the temperature by switching a relay that turns the heating on or off. An OpenTherm system allows the thermostat to control the room temperature by telling the boiler to modulate the boiler flame. Rather than using a relay, an OpenTherm thermostat 'talks' to the boiler via a simple low voltage two-wire connection.

The OpenTherm Association have agreed a standard so that all OpenTherm products are guaranteed to work with any OpenTherm Boiler. Tests undertaken show that energy used to maintain a room at 20°C are significantly less using a modulating OpenTherm thermostat over a conventional electronic thermostat when combined with an OpenTherm boiler. One reason is that an OpenTherm boiler with a modulating control spends longer in condensing mode by keeping the return temperature lower.

The ORT room thermostats provide modulating control of OpenTherm equipped condensing gas boilers. This type of control ensures that the flow temperature from the boiler is modulated down to as low a level as prevailing load permits, thus significantly increasing the proportion of the boiler operating time that is spent in condensing mode. These thermostats are fully compliant with OpenTherm communications protocol including low load regulation and domestic hot water keep hot feature now in common use in many combination boilers.

The ORT-01 has a setting dial and status LED indicator providing information on boiler output. The ORT-10 benefits from a LCD display showing current temperature and a button to switch off the hot water store for energy saving.

Additional Information:

Wiring Information ..... p. 92

Features	ORT-01	ORT-10
Code Number	**087N774300**	**087N773800**
Temperature range	8-30°C	
Maximum ambient temperature	45°C	
Control type	P + I	
OpenTherm software version	2.3	
LCD Display		•
Domestic hot water keep hot feature	•	
Domestic hot water off feature (holiday mode)	•	
Hot water store switch off function		•
ID 14 low load control	•	
Thermostat output	Data	
Construction	EN60730-2-9	
IP rating	IP20	
Supply voltage	24V DC from boiler	
Wiring, non-polarised 2 wire bus	•	

OpenTherm®

Programmable Room Thermostat

TPOne™

Intelligent Controls Made Easy

ErP Product Class 4

Thermostat Features	TPOne-M	TPOne-B	TPOne-RF + RX1-S
Ordering Codes	**087N785200**	**087N785100**	**087N785400**
Code without receiver	-	-	**087N785300**
Type	Programmable Thermostat		RF Programmable Thermostat
Power Supply TPOne	230Vac, 50/60Hz	2.5 - 3VDC (2 x AA Alkaline Batteries)	
Battery Life	-	Min 2 years	Min 2 years
Power Supply RX1-S	-	-	230Vac, 50/60Hz
Output Channel 1	Volt free, SPDT type 1B		Volt free, SPDT type 1B (RX1-S)
Switch Rating Channel 1	3A at 230Vac	3A at 230Vac	3A at 230Vac (RX1-S)
Output Channel 2	3A at 230Vac	-	-
Operating Frequency	-	-	433.92MHz
Maximum Range	-	-	30 metres
Setting Temperature Range	5-35 °C		
Operating Temperature Range	0-45 °C		
IP Rating	IP20		
On/Off Control	Yes		
Chrono-proportional control	Yes		
Dimensions (mm)	H66 x W155 x D30		
Dimensions (mm) RX1-S	-	-	H84 x W84 x D28

Accessories	Code No.
TS2-A Remote Air Sensor	**087N774800**
TS3 Remote Floor Sensor	**087N678400**
Decor Plate	**087N786900**

Quick access comfort modes to easily change **home comfort settings**.

Home Away Asleep Standby

- Homeowners can easily access comfort modes or change settings
- Intuitive user interface with clear icons
- Quick-start setup wizard and separate installer menu with lock
- Up to 3 On/Offs per day
- Versatile and simple 7-day programming
- Standby with Frost Protection
- Chrono-proportional control offering energy saving benefits
- Selectable domestic hot water channel (TPOne-M only)
- Standard, delayed or optimised start-up
- Available in battery, wired or wireless versions

With our new TPOne programmable room thermostat, Danfoss has made intelligent heating control easier than ever before. Packed with practical and easy-to-use innovations, TPOne has been designed to suit almost any domestic heating control application. Easy to install and beautifully simple to live with, TPOne elegantly combines all the functionality of our existing TP models into one stylish unit.

Danfoss TPOne features four dedicated comfort modes that can be activated at the touch of a button.

As a programmable room thermostat, heating is conveniently controlled by preset schedules. But should the user's needs change at short notice, the comfort buttons make it simple to adjust the settings.

The comfort mode buttons manually override the existing setting and stay in place until the next scheduled heating change – so there's no need to remember to switch back to automatic control.

Additional Information:

Wiring Information ..... p. 90

Programmable Room Thermostat
TP5000 Si (24 Hour or 5/2 Day)

ErP Product Class 4

- Chrono-proportional or on/off
- Large easy to read LCD display
- Available in mains, battery-powered and wireless versions
- Easy to programme and operate
- Battery powered models for ease of installation
- Thermostat mode and frost protection
- Optional service interval function

Programmable thermostats provide different temperatures at different times of the day; ideal for Combi boiler and floor heating installations. The TP5000 Si range of programmable room thermostats offers easy to install and use 5/2 day thermostats with up to six time and temperature changes each day with different programmes for weekdays and weekends. Mains or battery powered for ease of installation, the TP5000 Si has an easy-to-read LCD display. It is easy to programme and operate because of a built-in programme that the user can easily change to suit individual heating requirements. The TP5000 Si is also available in wireless (RF) versions.

A big plus with the TP5000 Si is that it incorporates a real time clock and calendar function which eliminates the need for time-setting and BST/GMT time changes. Time and date are factory-set.

Chrono-proportional control is the standard setting for the TP5000 Si but advanced conventional On/Off control is an installer-set option. This modulating control mode uses a cycling pattern within which boiler on/off percentages are varied to satisfy heating requirements. Chrono-proportional cycling rates of 3, 6, 9 or 12 per hour can be selected.

The optional Service Interval function incorporated into the TP5000 Si helps landlords meet the boiler servicing requirements of Gas Safety Regulation 36. The unit provides audible and visual warnings from 28 days before servicing is due and ultimately reduces the heating output should the due date pass. Full operation can only be restored by an authorised installer.

Additional Information:

Wiring Information ..... p. 90
Chrono-Proportional Technology ..... p. 48

Hard-wired versions	**TP5000 Si**	**TP5000A Si**	**TP5000M Si**	**TP5000MA Si[3][4]**
Code No.	**087N791000**	**087N791100**	**087N791700**	**087N791800**
Wireless versions	**TP5000-RF Si**	**TP5000A-RF Si**		
Code without receiver	**087N791200**	**087N791300**		
Code for set c/w single channel receiver	**087N791400**			
Programmable operation	24 hour or 5/2 day			
Number of events per day	6, 4 or 2			
Temperature range	Off, 5-30°C			
Clock display	24 hour			
Factory pre-set programmes	•			
Room temperature override	•	Adjustable	•	Adjustable
Display time or temperature option	•			
Thermostat mode and frost protection	•			
Weekend into weekday override	•			
Control Type	Chrono-proportional or on/off control			
Power supply, thermostats	2 x AA/MN1500/LR6 alkaline batteries [1]		230 Vac, 50Hz	
Maximum ambient temperature	45°C			
Contact type and rating (hard-wired models)	10-230 Vac, 3(1)A			
Transmission frequency (RF models)	433.92 MHz		–	
Transmission range (RF models)	30 metres max. [2]		–	
Dimensions (mm)	110 wide x 88 high x 28 deep			

Notes:
(1) Memory is retained for 1 minute during battery change.
(2) Please ensure there are no large metal objects between thermostat and receiver as these will interfere with radio signal.
(3) Can be configured for remote temperature sensor, limit sensor, window contact or telephone activated switch contact.
(4) Remote sensor is supplied as an accessory, if remote sensor is required order TS2 sensor, code 087N681100.

Receivers (RF models)	**RX-1**	**RX-2**	**RX-2C**	**RX-3**
Code No.	**087N747600**	**087N747700**	**087N747900**	**087N747800**
Number of zones receiver covers	1	2	2	3
Power supply (receivers)	230 Vac, ±15%, 50/60 Hz			
Contact details	1-SPDT	1-SPDT, 1-SPST	2-SPDT	1-SPDT, 2-SPST
Contact rating	10-230 Vac, 3(1)A			
Dimensions (mm)	138 wide x 88 high x 32 deep			

Accessories	**Code No.**
TS2 Remote Air Sensor	**087N681100**
TS3 Remote Floor Sensor	**087N678400**
Table Stand - For TP4000RF, TP5000Si-RF and TP7000RF thermostats	**087N710700**

Programmable Room Thermostat
TP7001 (7 Day, 5/2 Day or 24 Hour)

ErP Product Class 4

Thermostat Features	TP7001	TP7001A	TP7001M	TP7001MA
	Built-in sensor	Remote sensor	Built-in sensor	Remote sensor
Order codes	**087N800200**	**087N800900**	**087N800300**	**087N801000**
Control type - On/Off or Chrono-proportional, 3/6/9/12 cycles per hour	•			
Hard wired thermostat	•		•	
Digital clock type	24 hour (can be set to AM/PM mode by user)			
Selectable 24 hour, 5/2 day, A/B day or 7 day operation	•			
Number of events per day	Up to 6			
Control temperature range	Off, 5-30°C (can be set to Fahrenheit by user)			
Total switching differential (On/Off mode)	0.1°C			
Factory pre-set programme	•			
Programmable holiday mode	Yes, up to a year			
Service Interval Timer	•			
Installer selectable optimum start control	Yes - Off, 0:15, 0:30, 0:45, 1:00, 1:15, 1:30, 1:45 or 2:00 minutes early switch on at set-point minus 4K			
Thermostat mode and frost mode	Yes, set to 5.0°C, but adjustable between 5-30°C			
Power supply	2 x AA/MN1500/LR6 alkaline batteries		230V, 50 Hz	
Memory back-up	Capacitor during battery change for 1 minute		3V battery (10 year lifetime)	
Switching action of output relay	SPDT			
Switch rating of relay contact, voltage and current	3 (1) A, 10-230 Vac			
Dimensions (mm)	140 wide x 91 high x 28 deep			
Pollution situation	Degree 2			
Rated impulse voltage	2.5Kv			
Ball pressure test	75°C			
Remote Sensor	**087N774800** (The remote sensor is included with TP7001A and TP7001MA)			

- Optional service interval function
- 7 day or 5/2 day operation
- Large back-lit display
- Built-in holiday function
- Optimum Start Control
- Chrono-proportional or On/Off Control
- Delayed Start
- Convenient user overrides

For situations where a higher flexibility of control is required.

The TP7001 series combines the functions of a time clock and room thermostat into a stylish, easy to use controller with a large backlit display, which allows the user to programme different temperatures at different times of the day to match lifestyle demands.

The TP7001 offers 7-day programming, allowing each day to be set differently if so required.

In addition, the unit can be set to 5/2-day mode allowing one set of programmes to be used for weekdays with a different set being available for the weekends.

TP7001 series offers up to six temperature changes each day and includes the option of programming an "Off".

The range includes battery and mains powered versions in both built-in and remote sensor types, please refer to the data table for details and ordering codes.

The optional Service Interval function incorporated into the TP7001 helps landlords meet the boiler servicing requirements of Gas Safety Regulation 36. The unit provides audible and visual warnings from 28 days before servicing is due and ultimately reduces the heating output should the due date pass. Full heating operation can only be restored by an authorised installer.

Additional Information:

Wiring Information ..... p. 90
Chrono-Proportional Technology ..... p. 48

Please note:

For 7 day or 5/2 day wireless programmable room thermostat - TP7000RF - see page 61.

Programmable Room Thermostat With Hot Water

TP9000

(7 Day, 5/2 Day or 24 Hr)

ErP Product Class 4

- Built-in hot water time control
- 7-day, 5/2 day or 24 hour control
- Remote room temperature sensor available
- Advanced copy functions
- Holiday Mode
- Chrono-proportional or On/Off Control
- +1/+2/+3 hours boost
- Optional service interval function

The TP9000 programmable room thermostat includes an extra timed circuit for controlling domestic hot water on/off times.

The TP9000 combines the benefits of a programmable room thermostat and a hot water timer in one unit.

Providing full 7 day control, as well as 5 day/2 day and 24 hour control, the TP9000 is suited for almost any timing requirement. Add to this an advanced copy function and A+B programming functionality and you have a truly versatile unit.

Holiday function, frost protection, optimum/ delayed start and many more options are all selectable using the advanced programming mode allowing total control of your heating and hot water system.

Chrono-proportional control is available as well as traditional on/off control providing energy saving benefits.

The optional Service Interval function incorporated into the TP9000 helps landlords meet the boiler servicing requirements of Gas Safety Regulation 36. The unit provides audible and visual warnings from 28 days before servicing is due and ultimately reduces the heating output should the due date pass. Full heating operation can only be restored by an authorised installer.

Additional Information:

Wiring Information ..... p. 90
Chrono-Proportional Technology ..... p. 48

Features	TP9000
Code No.	**087N789200**
Room time and temperature changes	Up to 6 per day
Room temperature control range °C	Standard 5-30°C range Fully adjustable higher/lower limits
Remote room temperature sensor included	•
Control Type	Chrono-proportional or on/off control
Selectable 5/2 or 24 hr operating modes	•
Selectable 7 day operating mode	•
A+B day copy mode	•
Advanced copy mode	(copy to next day or any day of week)
DHW time control events	Up to 3 per day
Suitable for pumped systems	•
DHW only mode	•
Frost protection	•
Manual overrides (+/- hr)	+1, 2, or 3hr
Holiday mode	•
Optional Service Interval Timer	•
Auto/All Day/On/Off selection	•
Optimised or Delayed Start	•
Audible button press	•
Advanced programming mode	• (1)
Power supply	230 Vac, ±15%, 50/60 Hz
Voltage and current rating of output contacts	230 Vac, 50/60 Hz, 3 (1) A max
Switching action	2 x SPDT (commons linked internally)
Maximum ambient temperature	45°C
Dimensions (mm)	137 wide x 93 high x 29 deep

Note:
(1) Provides access to APM mode which contains numerous installer selectable options
(2) Provides display of outside temperature on unit only – not used for optimisation functions

Accessories	Code No.
TS2 Remote Air Sensor	**087N681100**
TS3 Remote Floor Sensor	**087N678400**

Radio Frequency
Heating Controls

Wireless thermostat system sets	Type	Code No
Digital room thermostat (RET2000B-RF + RX1-S)	RET2000B-RF	**087N644400**
5/2 day programmable thermostat set (TP5000-RF Si + RX1)	TP5000-RF Si	**087N791400**
7 day programmable thermostat set (TPOne-RF + RX1-S)	TPOne-RF	**087N785400**
Cylinder thermostat with clamp-on sensor (CET2000B-RF + RX1-S)	CET2000B-RF	**087N727900**
Individual wireless thermostats	**Type**	**Code No**
Digital thermostat	RET2000B-RF	**087N644300**
5/2 day programmable thermostat	TP5000-RF Si	**087N791200**
Thermostat Specification		
Room thermostat functions and features as per hard-wired models - refer to p. 51, 57, 58 and 59. For CET2000B-RF see p. 62		
Transmitter frequency	433.92 MHz	
Transmitter range	30 metres line of sight [1]	
(1) Ensure there are no large metal objects between thermostat and receiver as these will interfere with radio signal.		

Receiver features	RX1	RX1-S	RX2	RX2C	RX3
Code No	**087N747600**	**087N777300**	**087N747700**	**087N747900**	**087N747800**
Single channel receiver works with 1 thermostat	•	•			
Two channel receiver works with 2 thermostats			•	•	
Three channel receiver works with 3 thermostats					•
Transmitter code self learning feature	•				
Receiver operating frequency	433.92 MHz				
Supply voltage	230 Vac, ± 15%, 50/60 Hz				
Contact rating	10-230 Vac, 3(1)A				
Output relay configuration, commons linked internally	1 x SPDT	1 x SPDT	1 x SPDT 1 x SPST	2 x SPDT	1 x SPDT 2 x SPST
Memory retention	Memory retained electronically on power down				
Dimensions (mm)	132 wide x 88 high x 32 deep	84 wide x 84 high x 28 deep	132 wide x 88 high x 32 deep	132 wide x 88 high x 32 deep	132 wide x 88 high x 32 deep

Please note: The RET2000B-RF, TPOne-RF and CET2000B-RF are not compatible with RX1, RX2, RX2C or RX3

Accessories	Description	Code No.
TS2	Remote Air Sensor	**087N681100**
TS3	Remote Floor Sensor	**087N678400**
	Table Stand - For TP5000Si-RF thermostats	**087N710700**

- Available with set-back and programmable functions
- Secure digital communication
- Thermostats are battery powered
- Receivers available in 1, 2 or 3 channel versions
- Chrono-proportional or On/Off

Ideal for use in situations where it is impractical to run wiring between the thermostat location and other controls in the system.

Using secure digital radio communication, the thermostats communicate with an RX receiver unit, which can be mounted up to 30 metres away from the thermostat.

The thermostats, all of which are battery powered, each have their own unique digital identity code, which is learnt by the RX receiver unit during commissioning. Receivers are available in 1, 2 or 3 channel versions, making them ideally suited to zoning applications. A two-zone receiver with a shared output heat demand relay is available for use where a common output is required for the control of a pump or boiler.

Thermostats in this range, include:

RET2000B-RF
Digital room thermostat

TP5000Si-RF
5/2 day programmable room thermostat
Includes optional service interval function

TPOne-RF
7-day programmable room thermostat

CET2000B-RF
Digital cylinder thermostat
With clamp-on sensor

Most models are available in convenient system sets comprising a thermostat and single channel receiver - see table for details.

Additional Information:
Wiring Information ..... p. 91
Chrono-Proportional Technology ..... p. 48

Cylinder, Pipe and Frost Thermostats

ATC, ATP, ATF, RET230F and CET2000B-RF

- Wide range of electro-mechanical and electronic thermostats
- For cylinder, pipe and frost protection applications
- Range includes hard-wired and wireless cylinder thermostats

ATC Cylinder Thermostat

The ATC is an electro-mechanical surface mounting cylinder thermostat, which is clamped to the cylinder wall by means of a spring clamping band.

ATP Pipe Thermostat

The ATP is an electro-mechanical surface mounting pipe thermostat, which can be clamped onto steel or copper pipes which have a diameter of between ½" (15mm) and 2" (50mm). Typical applications include return temperature control in oil-fired systems.

RET230F Room Frost Thermostat

The RET230F is an electronic room mounting frost thermostat with an adjustable range of 5-10°C. Once set the thermostat can be locked and limited to the desired value. RET230 frost thermostats require a 230 Vac live and neutral supply to operate.

RET230F5 Room Frost Thermostat

For situations where a fixed setting frost thermostat is required, the RET230F5 is available and is factory set to 5°C.

ATF Pipe Frost Thermostat

The ATF is an electro-mechanical surface mounting pipe thermostat for use in frost protection applications. It can be clamped onto steel or copper pipes which have a diameter of between ½" (15mm) and 2" (50mm).

CET2000B-RF wireless cylinder thermostat

Ideal for applications where it is difficult to wire between the cylinder and the control valve or boiler. A clamp-on sensor, which is hard-wired to the CET2000B-RF thermostat, measures the stored temperature. Requests for heat are transmitted using secure digital FM radio signals to an RX1-S receiver unit mounted adjacent to the boiler or control valve. Time control is provided using a programmer or timeswitch mounted adjacent to the receiver unit.

Additional Information:

Wiring Information ..... p. 93

AT Cylinder and Pipe Thermostats - Hard Wired						
Type	**Code No.**	**Temp. Range °C**	**Switching Differential**	**Switch Type**	**Switch Rating**	**Comments**
ATC Cylinder	**041E001000**	30-90	8 ±3°C	SPDT	6 (2) A	c/w fixing strap
ATP Pipe	**041E000000**	30-90	6-10°C	SPDT	6 (2) A	c/w fixing strap
Frost Thermostats - Room						
RET230F	**087N701200**	5-10	<1°C	SPST	3 (1) A	Requires 230V live and neutral
RET230F5	**087N701300**	5 (fixed)	<1°C	SPST	3 (1) A	Requires 230V live and neutral
Frost Thermostats - Pipe						
ATF	**087N671200**	10-90	8°C	SPDT	6 (2) A	c/w fixing strap

Note: All thermostats are suitable for 230V operation.

Wireless Cylinder Thermostat with Digital Display	CET2000B-RF
Code No. (with single channel receiver RX-1)	**087N727900**
Temperature range	40-65°C
Clamp-on temperature sensor	•
Operating frequency	433.92 MHz <1mW ERP
Maximum range	30 metres line of sight (1)
Power supply	2 x AA/LR6/MN1500 alkaline batteries
Maximum ambient temperature (setting module)	45°C
IP Rating	IP20
Dimensions, setting module (mm)	84 wide x 84 high x 35 deep
Dimensions, clamp-on sensor (mm) (2)	49 wide x 49 high x 45 (or 79) deep

Notes:
(1) Ensure no large metal objects are between thermostat and receiver as these will interfere with radio signal.
(2) 80mm depth is with spacer for use with high insulation cylinder.

Receiver (RF model)	RX1-S
Type	Single channel receiver
Power supply	230 Vac, 50/60 Hz
Contact details	1 x SPDT
Output	Volt Free
Contact rating	3A (1) at 230 Vac
IP Rating	IP40
Dimensions (mm)	84 wide x 84 high x 28 deep

Please note: The CET2000B-RF is not compatible with RX1, RX2, RX2C or RX3.

ATF

ATC

Immersion Thermostats
ITC, ITL and ITD

Specifications	ITC Control Thermostat	ITC Control Thermostat	ITL Limit Thermostat	ITD Dual Thermostat	ITD Dual Thermostat
Code No.	**099-105700**	**099-105800**	**099-105900**	**099-106100**	**099-106200**
Control Function (thermal re-set)	•			•	•
Control Function (thermal re-set) with concealed, tamper-proof adjustment		•			
Limit function (manual re-set)			•	•	•
Dual control and limit function				•	•
Temperature range (Control)	0-90°C	0-90°C		0-90°C	0-90°C
Temperature range (Limit)			90-110°C	90-110°C	90-110°C
Limit temperature factory setting			90°C	90°C	80°C
Switching differential	4 ± 1K	4 ± 1K		4 ± 1K	4 ± 1K
Switch configuration - Control	SPDT	SPDT		SPDT	SPDT
Switch configuration - Limit			SPST	SPST	SPST
Switch voltage rating	10-240 Vac, 50/60 Hz				
Switch current rating	10 (2.5) A				
Max. ambient temperature (Switch Head)	65°C	65°C	80°C	80°C	80°C
Maximum Temperature (Medium)	150°C				
Pocket dimensions (mm) (all have ½" BSP connections)	100	100	120	100	100
Dimensions Thermostat head - wide	54mm	54mm	54mm	100mm	100mm
Dimensions Thermostat head - high	110mm	110mm	110mm	110mm	110mm
Dimensions Thermostat head - deep	55.5mm	55.5mm	56.5mm	56.5mm	56.5mm

Used for control and limitation of water temperature in the hot water cylinder and other applications requiring immersion thermostats.

ITC100 Immersion Control Thermostat

The ITC100 is an immersion thermostat having a 100mm insertion length. The thermostat, which is supplied with a ½"BSP/100mm pocket, is suitable for the control of applications which require accurate immersion sensing, e.g. unvented hot water systems.

The thermostat, which has an adjustment range of 0-90°C, has SPDT contacts making it suitable for the control of all types of motorised valves.

A tamperproof version with concealed setting dial is also available.

ITL100 Immersion Limit Thermostat

The ITL100 is an immersion limit thermostat having an insertion length of 117mm.

The thermostat which is supplied with a ½"BSP/117mm pocket is suitable for applications which demand an immersion thermostat offering manual re-set facility.

The thermostat is factory pre-set to 90°C and has SPST contacts.

ITD100 Immersion Dual Control and Limit Thermostat

The ITD100 is an immersion thermostat which incorporates a separate limit and control function.

The control function set point can be varied between 0°C and 90°C. The limit function, which requires manual re-setting after activation, is factory pre-set to 80° or 90°C, dependent on code number when ordered.

The thermostat is supplied with a ½"BSP/100mm pocket.

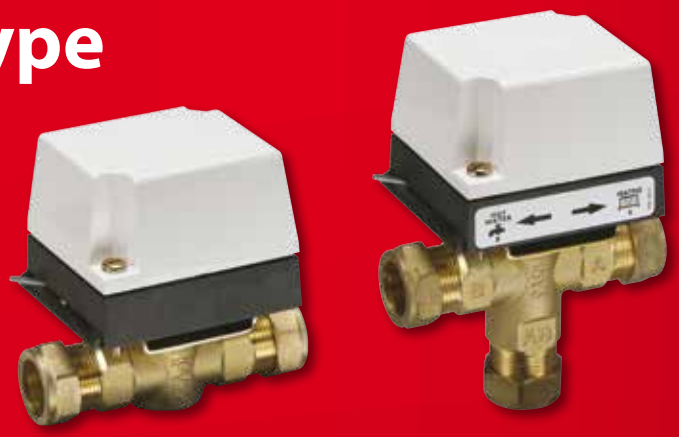
Additional Information:

Wiring Information .....p. 93

Motorised Control Valves and Other Controls

Contents

Motorised Control Valves
H-Series - Shoe Type



- Available in 2-port, 3-port diverter and 3-port mid-position versions
- Wide range of valve body sizes
- Interchangeable actuators

For central heating and hot water circulation in wet domestic central heating systems.

H-series 'shoe' valves are available in 2-port and 3-port versions in a wide range of sizes for both copper and iron pipework. Actuators for mid-position, diverter and 2-port on/off applications complete the range.

Valve bodies and actuators may be purchased separately or in convenient sets. For ease of installation and serviceability, assembly of the actuator to the valve body is made on site, using the screws provided.

The high capacity bodies incorporate two self-cleaning positive shut-off shoes. Flow through the 2-port valves can be in either direction.

The spring return actuators have auxiliary switches and one metre of cable with industry standard wire colours. A lever enables the valves to be opened manually, useful when filling the system.

Danfoss valve actuators are designed for direct in-service replacement of actuators on other makes of motorised valves (see compatibility chart).

Additional Information:

Wiring information ..... p. 92

3-Port Shoe Valves (Spring Return to Heating Closed) [4]

Valve Size and Connection Details	Complete Valve Body & Actuator				Valve Body Only	
	Mid Position [1]		Diverter [2]			
	Type	Code No	Type	Code No	Type	Code No
22mm (ext. compression)	HS3	**087N661300**	HS3D	**087N661400**	HSV3	**087N659900**

Notes: (1) Includes HSA3 Actuator
(2) Includes HSA3D Actuator

2-Port Shoe Valves (Spring Return to Closed)[5]

Valve Size and Connection Details	Complete Valve Body & Actuator		Actuator Only		Valve Body Only	
	Type	Code No	Type	Code No	Type	Code No
22mm (ext. compression)	HP22	**087N660900**	HPA2	**087N657900**	HPV22	**087N659700**
28mm (ext. compression)	HP28	**087N661100**	HPA2	**087N657900**	HPV28	**087N659800**
28mm (ext. compression)	HP28C[3]	**087N661200**	HPA2C	**087N658000**	HPV28	**087N659800**
15mm (int. compression)	HP15	**087N660800**	HPA2	**087N657900**	HPV15	**087N659600**
3/4" BSP (female)	HP0.75	**087N660200**	HPA2	**087N657900**	HPV0.75	**087N659400**
1"BSP (female)	HP1.0	**087N660400**	HPA2	**087N657900**	HPV1.0	**087N659500**

Notes: (3) For Gravity Hot Water Systems

Motorised Valve Actuators

Description	Code No	Type	Voltage	Aux. Switch Detail
3-Port Mid-Position Valve Actuator	**087N658700**	HSA3	230 Vac ±15%	SPST[4]
3-Port Diverter Valve Actuator	**087N658900**	HSA3D	230 Vac ±15%	SPST Aux. Sw.
2-Port Valve Actuator (normally closed)	**087N657900**	HPA2	230 Vac ±15%	SPST (volt free)
2-Port Valve Actuator (normally closed)	**087N658000**	HPA2C	230 Vac ±15%	SPDT Aux. Sw.

Notes:
(4) Linked Internally
(5) Max flow temp 95°C, max working pressure 10 bar, max differential pressure 15mm, 22mm, 1/2" & 3/4" = 1.0 bar; 28mm & 1" = 0.7bar

Compatibility Chart *Danfoss Actuators & Valve Bodies are interchangeable with other makes*

Danfoss Code	Landis & Gyr (ext.)	Landis & Gyr (int.)	Pegler Sunvic	Potterton
HSA3 Actuator	SK3	SK3	SD1701/2701	PMV3
HSV3 Valve - 22mm	LT8322	LT2701[6]	EDT1702	PMV3
HPA2 Actuator	SK2	SK2	SZ1301/2301	PMV2
HPV22 - 22mm	LL8222	LL4453[6]	EML3454	PMV2
HPV28 - 28mm	-	33 4501	EML3503	-

Notes: (6) These references are for older types of L&G valve bodies, having internal compression fittings - some pipework change will be required.

Motorised Control Valves
H-Series - Paddle Type

3-Port Paddle Valves (Spring Return to Heating Closed) [4]						
Valve Size and Connection Details	Complete Valve Body & Actuator				Valve Body Only	
	Mid Position [1]		Diverter [2]		Type	Code No
	Type	Code No	Type	Code No		
22mm (ext. compression)	HS3B	**087N664600**	HS3DB22	**087N665300**	HSV3B22	**087N662500**
28mm (ext. compression)	HS3B28	**087N665100**	HS3DB28	**087N666000**	HSV3B28	**087N663000**
15mm/½" BSP (int. compression)	HS3B15	**087N665000**	HS3DB15	**087N665900**	HSV3B15	**087N662900**
3/4" BSP (female)	HS3B0.75	**087N664800**	HS3DB0.75	**087N665400**	HSV3B0.75	**087N662600**
1" BSP (female)	HS3B1.0	**087N664900**	HS3DB1.0	**087N665800**	HSV3B1.0	**087N662800**

Notes:
(1) Includes HSA3 Actuator
(2) Includes HSA3D Actuator

2-Port Paddle Valves (Spring Return to Closed)[4]						
Valve Size and Connection Details	Complete Valve Body & Actuator		Actuator Only		Valve Body Only	
	Type	Code No	Type	Code No	Type	Code No
22mm (ext. compression)	HP22B	**087N664200**	HPA2	**087N657900**	HPV22B	**087N662200**
28mm (ext. compression)	HP28B	**087N664400**	HPA2	**087N657900**	HPV28B	**087N662400**
28mm (ext. compression)	HP28BC[3]	**087N664500**	HPA2C	**087N658000**	HPV28B	**087N662400**
15mm/½" BSP (int. compression)	HP15B	**087N664000**	HPA2	**087N657900**	HPV15B	**087N662100**
3/4" BSP (female)	HP0.75B	**087N663400**	HPA2	**087N657900**	HPV0.75B	**087N661800**
1"BSP (female)	HP1.0B	**087N663700**	HPA2	**087N657900**	HPV1.0B	**087N662000**

Notes:
(3) For Gravity Hot Water Systems
(4) Max flow temperature 95°C, max working pressure 10 bar, max differential pressure 15mm, 22mm, 1/2" & 3/4" = 1.0 bar; 28mm & 1" = 0.7bar

Motorised Valve Actuators				
Description	Code No	Type	Voltage	Aux. Switch Detail
3-Port Mid-Position Valve Actuator	**087N658700**	HSA3	230Vac ±15%	SPST[5]
3-Port Diverter Valve Actuator	**087N658900**	HSA3D	230Vac ±15%	SPST Aux. Sw.
2-Port Valve Actuator (normally closed)	**087N657900**	HPA2	230Vac ±15%	SPST (volt free)
2-Port Valve Actuator (normally closed)	**087N658000**	HPA2C	230Vac ±15%	SPDT Aux. Sw.

Notes: (5) Linked Internally

- Available in 2-port, 3-port diverter and 3-port mid-position versions
- Wide range of valve body sizes
- Interchangeable actuators

For central heating and hot water circulation in wet domestic central heating systems.

H-series 'paddle' valves are available in 2-port and 3-port versions in a wide range of sizes for both copper and iron pipework.
All valves offer 100% tight shut-off. Actuators for mid-position, diverter and 2-port on/off applications complete the range.

Valve bodies and actuators may be purchased separately or in convenient sets.

For ease of installation and serviceability, assembly of the actuator to the valve body is made on site, using the screws provided.

The spring return actuators have auxiliary switches and one metre of cable with industry standard wire colours. A lever enables the valves to be opened manually, useful when filling the system.

Danfoss valve actuators are designed for direct in-service replacement of actuators on other makes of motorised valves (see compatibility chart).

Additional Information:
Wiring information .....p. 92

Automatic Bypass Valves
AVDO

- Easy to set, self acting solution
- Reduces risk of noise in systems fitted with radiator thermostats
- Improves system efficiency
- Maintains minimum flow rates through boiler and pump
- Essential in low water content boiler systems

Boiler manufacturers may recommend that a bypass be fitted in all installations in order to ensure that the volume of water circulating through the boiler does not fall to below a predefined minimum, regardless of the load on the system.

Recognising the energy efficiency advantage of such controls the Building Regulations now require that in both new-build and boiler replacement contexts, where a bypass is specified by the boiler manufacturer, that an automatic bypass is fitted.

Automatic bypass valves improve system efficiency by opening only when there is a need to bypass water, this usually occurs at times of part load when radiator thermostats in the system are partly closed and water flow around the boiler is restricted.

In addition to ensuring adequate flow around the boiler, automatic bypass valves also prevent pump pressure from climbing significantly above design levels, thus significantly reducing the risk of noise in the system.

AVDO Range
These straight pattern valves are available in 15, 22 and 28mm sizes. The carrying capacity of this range of valves is very high with large but linear changes in water throughput for relatively small increases in differential pressure. This allows a 15mm valve to be used in situations where 22mm valves are normally required.

ARV22
This valve is a compact angled pattern design available only in 22mm. The ARV22 is a well engineered solution, competitively priced and provides a sufficient bypass for most small to medium sized domestic heating systems.

AVDO Automatic Bypass Valves			
Model	Code No	Straight Pattern Valves - Connections	
		Inlet	Outlet
AVDO 15	**003L611500**	15mm	15mm
AVDO 20	**003L612200**	22mm	22mm
AVDO 25	**003L612800**	28mm	28mm
AVDO 15	**003L601800**	1/2"BSP (Female)	1/2" BSP (Male)
AVDO 20	**003L602300**	3/4" BSP (Female)	3/4" BSP (Male)
AVDO 25	**003L602800**	1" BSP (Female)	1" BSP (Male)

AVDO Automatic Bypass Valve Spares	
Code No	Description
013U412500	Spare 15mm Compression Fitting
013U013500	Spare 22mm Compression Fitting
013U014000	Spare 28mm Compression Fitting

Specification	AVDO	ARV22
Setting Range	0.05 - 0.5 Bar	0.05 - 0.5 Bar
Maximum Working Pressure	10 Bar	4 Bar
Maximum Temperature	100°C	100°C

Please Note: AVDO may be operated at 120°C for short periods

ARV22 Automatic Bypass Valve			
Model	Code No	Angled pattern valve, Connections	
		Inlet	Outlet
ARV22	**099-106300**	22mm	22mm

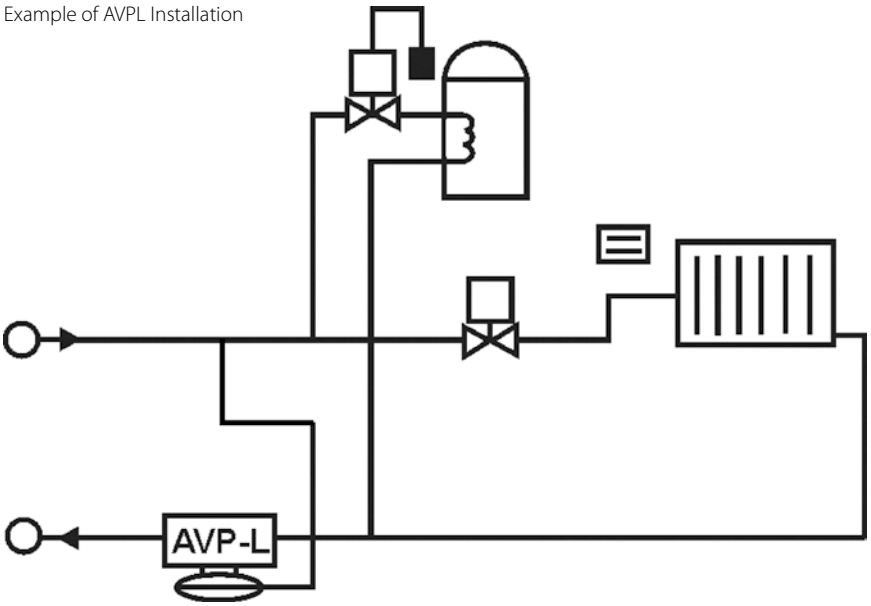
ARV22

Differential Pressure Controls
AVPL
For District Heating Consumer Units

Differential Pressure Control Valve					
Type	**Code No**	**Size**	**Set Range (Bar)**	**Kv (m^3/h)**	**Comments**
AVPL 1.0[1]	**003L503001**	½" [2]	0.05 - 0.25	1.0	Supplied complete with impulse tube and nipple
AVPL 1.6[1]	**003L503101**	½" [2]	0.05 - 0.25	1.6	

Notes:
(1) Valve must be mounted in return, observing flow direction arrow
(2) Supplied complete with 2 x ½" BSP male connections
Max. working pressure: 10 Bar, Max. operating temperature: 110°C, Max. differential pressure: 4.5 Bar.

Example of AVPL Installation



- Maintains constant differential pressure, regardless of flow rates
- Establishes and maintains system balance
- Compact design, ideal for consumer units
- Self-acting controls, no external power required

AVPL differential pressure controls are used in group and district heating systems to control differential pressure within a dwelling.

This type of control is essential in such systems where high pump pressures are the norm. These valves perform the function of reducing the pump pressure present within the dwelling from the relatively high level normally present in district heating systems to the substantially lower level required within the dwelling.

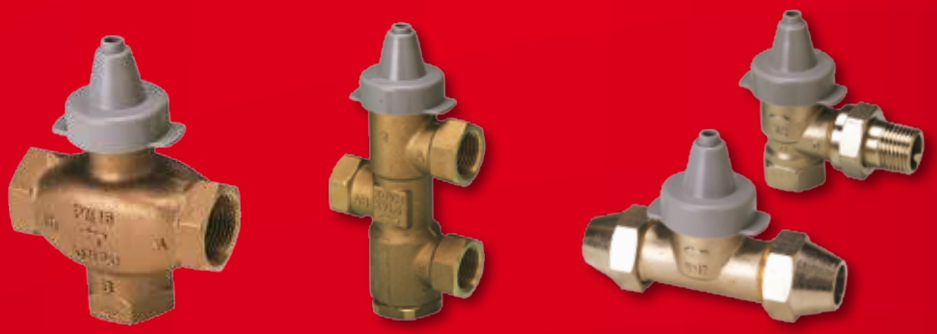
Unlike conventional static pressure balancing valves, differential pressure controllers are able to maintain the differential pressure within the dwelling at a constant figure, regardless of the flow rate within the dwelling which is constantly changing as radiator thermostats and other control valves vary the water flow dependent upon load.

AVPL valves are mounted in the return pipework from the dwelling, immediately prior to the connection to the district heating return.

Danfoss produce a wide range of automatic bypass valves, differential pressure controllers and flow regulators for use on medium to large systems. The range includes valve sizes up to 250mm for use on systems operating up to 40 bar working pressure and 150°C.

Please note:
AVPL differential pressure regulators supersede earlier AVDL models. Functionality is more or less the same, although it is important to note that AVPL models can only be mounted in the system return. Please refer to the cross reference table to select a replacement product.

Small Seated Valves
RAV, VMT, KOVM and VMV



- Wide range of sizes and capacities
- Available in 2-port and 3-port versions
- Suitable for use with self-acting and electric actuators
- High operating temperature and pressure limits

Small seated valves are used with a wide range of self-acting temperature controls and electric actuator applications.

Available in two or three port versions, small-seated valves can be used with a wide range of self-acting temperature controls and electric actuators.

Applications include control of Hot Water Systems, Blending Circuits for Underfloor Heating, Heating Zones and Fan Coil & Induction Units.

RAV/VMT 2 Port Seated Valves

The RAV and VMT 2-port, high capacity seated valves can be used with a wide range of self-acting temperature controls and electric actuators.

Applications include injection mixing circuits for floor heating applications.

VMV/KOVM 3 Port Seated Valves

VMV and KOVM 3-port high capacity mixing valves can be used with a wide range of self-acting temperature controls and electric actuators.

Typical applications include mixing circuits for floor heating and diverting applications, or any zone control application where circulating water volumes in the system must remain constant.

2-Port Seated Valves

Pattern	Type	Code No	Connections		Kvs (m^3/h)	Max. Diff Press (Bar)
			Inlet	Outlet		
Angled	RAV 10/8	**013U001100**	3/8"BSP (F)	3/8"BSP(M)	1.2	0.8
	RAV 15/8	**013U001600**	1/2"BSP(F)	1/2"BSP(M)	1.5	0.8
	RAV 20/8	**013U002100**	3/4"BSP(F)	3/4"BSP(M)	2.3	0.8
	RAV 25/8	**013U002600**	1"BSP(F)	1"BSP(M)	3.1	0.8
Straight	RAV 10/8	**013U001200**	3/8"BSP (F)	3/8"BSP(M)	1.2	0.8
	RAV 15/8	**013U001700**	1/2"BSP(F)	1/2"BSP(M)	1.5	0.8
	RAV 20/8	**013U002200**	3/4"BSP(F)	3/4"BSP(M)	2.3	0.8
	RAV 25/8	**013U002700**	1"BSP(F)	1"BSP(M)	3.1	0.8
	VMT 15/8	**065F011501**	15mm	15mm	1.5	0.8
	VMT 20/8	**065F012001**	22mm	22mm	2.3	0.8
	VMT 25/8	**065F012501**	28mm	28mm	3.1	0.8
	VMT 15/2	**065F011401**	15mm	15mm	2.8	0.2
	VMT 20/2	**065F011901**	22mm	22mm	5.0	0.2
	VMT 25/2	**065F012401**	28mm	28mm	8.0	0.2

Maximum working temperature 120°C. Maximum operating pressure 10 Bar.

***Compression Fittings** - VMT supplied c/w fittings for copper pipe see p. 27 for plastic pipe options. Not available for RAV.*

3-Port Seated Valves (Mixing)

3-Port Mixing Valves	KOVM	**013U301500**	1/2"BSP(F)	1/2"BSP(F)	1.5	0.8
	KOVM	**013U302000**	1/2"BSP(F)	1/2"BSP(F)	2.0	0.8
	VMV 15	**065F001500**	1/2"BSP(F)	1/2"BSP(F)	2.5	0.6
	VMV 20	**065F002000**	3/4"BSP(F)	3/4"BSP(F)	4.0	0.5
	VMV 25	**065F002500**	1"BSP(F)	1"BSP(F)	6.3	0.3
	VMV 32	**065F003200**	1 1/4"BSP(F)	1 1/4"BSP(F)	10.0	0.2
	VMV 40	**065F004000**	1 1/2"BSP(F)	1 1/2"BSP(F)	14.0	0.2

Maximum working temperature RAV, VMT & VMV120°C, KOVM 90°C. Maximum operating pressure 10 Bar.

***Compression Fittings** - refer to p. 27 for fittings available for KOVM. Not available for VMV.*

Valve/Actuator Compatibility Chart

Valve	Sensor/Actuator Type							
	RA/V	RA 5062	TWA-V(NO)	TWA-V(NC)	ABV(NO)	ABV(NC)	RAVI	RAVK
RAV/8	•	•*	•	•	•	•	•	•
VMT/8	•	•	•	•	•	•	•	•
VMT/2	•	•			•	•	•	•
VMV 15-20			•	•	•	•	•	•
VMV 25-40					•			
KOVM			•	•	•	•	•	•

* Adaptor required. Please order 013G5193

Thermal Actuators
TWA and ABV

Thermal Actuator Valve Compatibility Table											
Type Code	Code No	Compatible Valve Bodies [1]								Volt.	Power Cons (mean)
		RA-FN	RA-N	RAV-/8	VMT-/8	VMT-/2	VMV 15-20	VMV 25-40	KOVM		
TWA-A (NC)	**088H311200**	•	•							230V	2W
TWA-A (NO)	**088H311300**	•	•							230V	2W
TWA-A (NC)	**088H311000**	•	•							24V	2W
TWA-A (NO)	**088H311100**	•	•							24V	2W
TWA-A (NC) AUX	**088H311400**	•	•							24V	2W
TWA-V (NO)	**088H312300**			•	•				•	230V	2W
TWA-V (NC)	**088H312200**			•	•				•	230V	2W
TWA-V (NO)	**088H312100**			•	•				•	24V	2W
TWA-V (NC)	**088H312000**			•	•				•	24V	2W
ABV (NO)	**082F000100**			•	•	•	•	•	•	230V	9W
ABV (NC)	**082F005100**			•	•	•	•		•	230V	9W
ABV (NO)	**082F000200**			•	•	•	•	•	•	24V	9W
ABV (NC)	**082F005200**			•	•	•	•		•	24V	9W

Note (1)
When mounted on a 2-port valve, Normally Open (NO) versions are closed when power is applied.
When mounted on a 2-port valve, Normally Closed (NC) versions are open when power is applied.

- Simple two wire operation
- Can be used with a wide variety of small seated valves
- Available in Normally Open and Normally Closed configurations
- Available in 230V and 24V versions
- Suitable for use on AC and DC circuits
- Position indicator on TWA models

Electrical control of radiators, heating zones and hot water service control, where other control devices provide simple on/off regulation.

TWA Series Thermal Actuators

These low-cost wax filled thermal actuators are suitable for many zoning applications, including floor heating. They are available in either normally open (N.O.) or normally closed (N.C.) models, in both 230 Volt and 24 Volt versions. All models have a very low power consumption of just 2 Watts.
TWA-A models are equipped with the standard Danfoss RA2000 connection, allowing them to be used on any of the Danfoss valve range having a 17mm RA2000 neck - this includes RA-FS, RA-FN, RA-N and RA-G radiator thermostat valve bodies, and high capacity RA-C 2-port valves. Used together with electric room thermostats, the combination of TWA-A and any of the aforementioned valve bodies can provide cost effective electric control for individual radiators, or small groups of radiators, for example in hotel rooms. TWA-A can also be used together with floor heating manifolds, type FHF-F, and electric room thermostats to provide zone control of floor heating circuits.
TWA-V models are equipped with the Danfoss RAV connection, allowing them to be used on all Danfoss valves having a 34mm neck connection. This includes RAV, VMT and KOVM 3-port valves. Applications include on/off control of small heating zones and fan coil units, including cooling coils, where on/off control is specified.

ABV Series Actuators

These models offer greater power than the TWA series and will fit all Danfoss valves with a 34mm neck connection - these include RAV, VMT, KOVM and VMV 3-port valves. Some restrictions do apply - please refer to the table opposite for compatibility. Applications include on/off control of heating or zones and fan coil units, including cooling coils, where on/off control is specified.

Thermostatic Cylinder Controls
RAVI and RAVK

- Self acting control, requires no wiring
- Versions available for pumped and gravity systems
- 2-port pumped versions in 15mm and 22mm sizes
- 2-port gravity versions in 22mm and 28mm sizes
- 3-port pumped versions in 15mm or 1/2" BSP sizes

Ideal for system upgrade situations where consumers want the benefits of temperature controlled hot water, without the inconvenience of lifting floor boards.

The RAVI offers a simple non-electric alternative to the more traditional motorised valve and electric cylinder thermostat, and is available in 2-port versions for pumped and gravity systems, and in a 3-port version for pumped systems.

To ease installation, the sensor is designed for 'clamp-on' mounting, using a strap and adhesive pad provided. For situations that demand immersion sensing, an immersion pocket or capillary gland seal is also available.

The low temperature version, type RAVK is particularly suited to under floor heating applications - please refer to 'small-seated valves' section for suitable valve bodies.

RAVI Thermostatic Cylinder Controls			
Model	**Code No**	**Description**	**Kv Xp = 6K**
Complete 2-port Valve & Thermostat Assemblies			
RAVI - VMT 15/8	**013U808100**	15mm for pumped primaries	1.3
RAVI - VMT 20/8	**013U808200**	22mm for pumped primaries	2.4
RAVI - VMT 20/2	**013U808500**	22mm for gravity primaries	4.1
RAVI - VMT 25/2	**013U808600**	28mm for gravity primaries	5.6
Complete 3-port Valve & Thermostat Assembly			
RAVI - KOVM	**013U808700**	15mm or ½" BSP for pumped primaries	2.0

Accessories, Spares & Alternative Sensors		
Model	**Code No**	**Description**
RAVI	**013U801300**	Thermostatic element and sensor with 1.5m capillary tube. Setting range 43°C - 65°C (1)
RAVK	**013U806300**	Thermostatic element and sensor with 2m capillary tube. Setting range 25°C - 65°C (1)
	013G412500	Spare 15mm compression fitting for VMT 15/8 valves.
	013U013500	Spare 22mm compression fitting for VMT 20/8 & VMT 20/2 valves.
	013U014000	Spare 28mm compression fitting for VMT 25/2 valves.
	013G411500	Spare 15mm compression fitting for KOVM valves.
	013U007000	Spare Gland Seal for 2-port & 3-port valves.
	017-436766	½" BSP sensor pocket.

Note:
(1) RAVI and RAVK elements can be used with other valve bodies - see page 70.

RAVI VMT

RAVI KOVM

Heating Efficiency Packs and Control Packs

Contents

2013 Building Regulations
Part L

Since 6th April 2014, Part L Building Regulations have required zone control for the heating systems in dwellings under 150m^2. TRVs (Thermostatic Radiator Valves) should be installed on all radiators except those in the room with the room thermostat.

The Domestic Building Services Compliance Guide now contains specific recommendations for minimum standards when only part, or parts of an existing system are being replaced, the following are considered good practice:

I. **Hot water cylinder** – Install a boiler interlock and separate timing for space heating and hot water
II. **Boiler** – Fit individual radiator controls such as TRVs on all radiators except those in the room with a room thermostat
III. **Radiator** – Fit individual radiator controls such as TRVs on all radiators except those in the room with a room thermostat
IV. **New heating system (existing pipework)** – Minimum standard to fit individual radiator controls such as TRVs on all radiators except those in the room with a room thermostat

In addition to this, recent research at the University of Salford has shown that adding a room thermostat and TRVs to a heating system reduced the running costs by up to 40% as well as ensuring that the system operates effectively to deliver comfortable temperatures in every room. Every opportunity should therefore be taken to ensure that all homes in the UK have effective controls, whether the boiler is replaced or not.

Test Carried Out	24 Hour Heating Cost [1]	Reduced Cost from Controls
1. No temperature control	£5.31	0%
2. Control by room thermostat only	£4.68	12%
3. Control by room thermostat and TRVs	£3.15	40.7%

[1] Based on British Gas Clear & Simple cash / card payment (4.274p/kWh gas, 12.797p/kWh electric) not including standing charge (24.439p per day gas, 15.979p per day electric)
Prices taken on 07/05/2013 from http://www.britishgas.co.uk/products-and-services/gas-and-electricity/our-energy-tariffs/clear-and-simple/clear-and-simple-rates.html

2013 Building Regulations: Part L
Compliant Control Packs

Vented Systems	Dwellings up to 150m²				
Code	**087N8500JG**	**087N8500KE**	**087N6500V4**	**087N8500KF**	**087N8517KJ**
Pack Type	2 Zone Pack	2 Zone	2 Zone (Wireless)	2 Zone Pack	2 Zone Pack
Boiler Type	Standard	Standard	Standard	Standard	Standard
Cylinder Type	Standard	Standard	Standard	Standard	Standard
Zone Time Control Type	Independent CH & DHW	Independent CH & DHW	Independent CH & DHW	Independent CH & DHW	Independent CH & DHW
Programmer / Timeswitch	FP715Si x1	FP715Si x1	FP715Si x1	FP715Si x 1	TS715Si x1
Room Thermostat	RET1000MS x1	RET2000MS x1	RET2000B-RF x1	RET1000MS x1	TP5000Si x1
Zone Valves	HP22 x2	HP22 x2	HP22 x2	HS3 x1	HS3 x1
Cylinder Thermostat	ATC x1	ATC x1	CET2000B-RF x1	ATC x1	ATC x1
Receiver Unit			RX1-S x2		
Wiring Centre	WC4B x1	WC4B x1	WC4B x1	WC4B x1	WC4B x1

Vented Systems	Dwellings above 150m²		
Code	**087N9501JV**	**087N9501JW**	**087N6518CG**
Pack Type	3 Zone	3 Zone	3 Zone (Wireless)
Boiler Type	Standard	Standard	Standard
Cylinder Type	Standard	Standard	Standard
Zone Time Control Type	Independent CH Zones & DHW	Independent CH Zones & DHW	Independent CH Zones & DHW
Programmer / Timeswitch	FP735Si x1	FP735Si x1	TS715Si x1
Room Thermostat	RET1000MS x2	RET2000MS x2	TP5000RF Si x2
Zone Valves	HP22 x3	HP22 x3	HP22 x3
Cylinder Thermostat	ATC x1	ATC x1	CET2000B-RF x1
Receiver Unit			RX1-S x1, RX2C x1
Wiring Centre	WC4B x1	WC4B x1	WC4B x1

Unvented Systems	Dwellings up to 150m²			Dwellings above 150m²	
Code	**087N8500KK**	**087N8500KL**	**087N6517CY**	**087N9501JY**	**087N9501KA**
Pack Type	2 Zone	2 Zone	2 Zone (Wireless)	3 Zone	3 Zone
Boiler Type	Standard	Standard	Standard	Standard	Standard
Cylinder Type	Unvented	Unvented	Unvented	Unvented	Unvented
Zone Time Control Type	Independent CH & DHW	Independent CH & DHW	Independent CH & DHW	Independent CH Zones & DHW	Independent CH Zones & DHW
Programmer / Timeswitch	FP715Si x1	FP715Si x1	FP715Si x1	FP735Si x1	FP735Si x1
Room Thermostat	RET1000MS x1	RET2000MS x1	TP5000RF-Si x1	RET1000MS x2	RET2000MS x2
Zone Valves	HP22 x1	HP22 x1	HP22 x1	HP22 x2	HP22 x2
Receiver Unit			RX1 x1		
Wiring Centre	WC4B x1	WC4B x1	WC4B x1	WC4B x1	WC4B x1

Combi Systems	Dwellings above 150m²			
Code	**087N6520H4**	**087N9501JY**	**087N9501KA**	**087N6520DG**
Pack Type	2 Zone	2 Zone	2 Zone	2 Zone (Wireless)
Boiler Type	Combi	Combi	Combi	Combi
Zone Time Control Type	Independent	Independent	Independent	Independent
Programmer / Timeswitch		FP735Si x1	FP735Si x1	
Room Thermostat	TP5000Si x2	RET1000MS x2	RET2000MS x2	TP5000RF-Si x2
Zone Valves	HP22 x2	HP22 x2	HP22 x2	HP22 x2
Receiver Unit				RX2C x1
Wiring Centre	WC4B x1	WC4B x1	WC4B x1	WC4B x1

Convenient Controls
Heating Efficiency Packs

Danfoss offers a range of Heating Efficiency Packs, a handy new way to buy high efficiency home heating controls. Each pack contains 6 x TRVs, a lockshield and wheel head pack and a choice of digital room thermostat – everything you need to give your customers much better control of room temperature and energy use.

Heating Efficiency Packs are available in a choice of eight product combinations to suit different applications and budgets, when upgrading controls in an existing heating system.

Heating Efficiency Packs For Updating Systems	Code No.
1 x RET2000B, 6 x RTW, 1 x Lockshield and Wheel Head Pack	**087N9520HW**
1 x RET2000B-RF with RX1, 6 x RTW, 1 x Lockshield and Wheel Head Pack	**087N9520HX**
1 x TPOne-B, 6 x RTW, 1 x Lockshield and Wheel Head Pack	**087N9520HY**
1 x TPOne-B RF with RX1-S, 6 x RTW, 1 x Lockshield and Wheel Head Pack	**087N9520HZ**
For New Radiator Installations	**Code No.**
1 x RET2000B, 6 x RTW with matching lockshields, 1 x Lockshield and Wheel Head Pack	**087N9520JA**
1 x RET2000B-RF with RX1, 6 x RTW with matching lockshields, 1 x Lockshield and Wheel Head Pack	**087N9520JB**
1 x TPOne-B, 6 x RTW with matching lockshields, 1 x Lockshield and Wheel Head Pack	**087N9520JC**
1 x TPOne-B RF with RX1-S, 6 x RTW with matching lockshields, 1 x Lockshield and Wheel Head Pack	**087N9520JD**

Underfloor Heating Controls

Contents

Underfloor Heating Controls
Selection Guide

Hard Wired Controls

Model	Hard Wired			
	FH-WT	FH-WP	FH-WS	FH-WT
Ordering data/Tech spec	Page 80	Page 80	Page 80	Page 81
Supply voltage	24V / 230V	24 V	24V	230V
Dial	•	•	•	•
Display				
Tamper proof		•		
Auxiliary switch				
Floor sensor			•*	
Away/ set-back button			•	
Night Set Back	•	•	•	•
Week schedule option				
Flush mounted				
Wall mounted	•	•	•	•
Master Controller	FH-WC 24V / 230V	FH-WC 24V	FH-WC 24V	FH-WC 230V

Wireless Controls

Model	Wireless			
	CF-RS	CF-RP	CF-RD	CF-RF
Ordering data/Tech spec	Page 82	Page 82	Page 82	Page 82
Supply voltage	2 x 1.5 AA Batteries	2 x 1.5 AA Batteries	2 x 1.5 AA Batteries	2 x 1.5 AA Batteries
Dial	•	•		
Display			·	•
Tamper proof		•		
Auxiliary switch				
Floor sensor				•**
Away/set-back button				
Week schedule option				
Flush mounted				
Wall mounted	•	•	•	•
Master Controller	FH-MC	FH-MC	FH-MC	FH-MC

* *Hard wired (Optional)*
** *Infra-red*

	Hard Wired		
	WT-T	**WT-D/DR**	**WT-P/PR**
	Page 81	Page 81	Page 81
	230V	230V	230V
	•		
		•	•
		•	•
		•*	•*
		•	•
		•	•
		•	•
	•		
	FH-WC 230V	FH-WC 230V	FH-WC 230V

Hard Wired Controls - 24V Output

FH-WC 24

- Incorporates separate boiler and pump interlocks
- Convenient and easy to wire floor heating connection box

The central component in the FH-WC 24 hard wired control range is the wiring centre ideal for use in water based floor heating systems.

FH-WC is a connection box for use in hydronic floor heating systems supplied from a manifold.

FH-WC is a wiring centre for connecting up to 10 thermal actuators to the room thermostats. It is provided with two potential-free relays for controlling a circulation pump and a boiler. The relays are activated when one or more thermostats require heat.

FH-WC is connected to 230 Vac/50 Hz. Mounting is made easy due to the symbols printed on the screw terminals.

FH-WT 24 dial setting room thermostat used for single room temperature control and temperature setting can be maximum and/or minimum limited. A LED light behind the front cover indicates heat demand.

FH-WS is a room thermostat with manual night set-back and optional connection for a floor sensor. If a floor sensor is connected min. or max. regulation is selected with a switch depending on the type of floor i.e. wooden floor (max.) or tiles (min.). The thermostat is provided with thermal feedback to improve accuracy. LED behind front cover indicates heat demand. Temperature range is 6 - 30°C.

FH-WP is a tamper proof model of the FH-WS for use in public environments i.e. schools. The thermostat is used for single room temperature control. The thermostat is provided with thermal feedback to improve accuracy. LED behind front cover indicates heat demand. Temperature range is 6 - 30°C.

Additional Information:

Wiring information .....p. 95

Hard-wired Systems Wiring Box - FH-WC 24	
Code No	**088H001701**
Number of zones (thermostats in/thermal actuator zones out)	10
Time channels (requires external 1-channel or 2-channel time control)	2 (1)
Boiler interlock relay, (voltage free) (2)	SPST, 6(2)A
Pump interlock relay, (voltage free) (2)	SPST, 6(2)A
Supply voltage	24 Vac, +/- 15%, 50/60 Hz
Output voltage (to zone thermostats and thermal actuators)	24 Vac
Output per channel	up to 0.5A
Dimensions (mm)	314 wide x 110 high x 61 deep

Notes:
(1) One of two time channels can be assigned at time of installation to each thermostat.
(2) Boiler and pump relays are activated whenever one or more zone thermostats call for heat.

Wired Controls, 24V Output	Code No.
FH-WT, Dial setting room thermostat with setback	**088H002200**
FH-WS, Dial setting room thermostat with manual night setback and optional connection for a floor sensor	**008H002400**
FH-WP, Tamperproof room thermostat	**088H002300**
FH-WF, Floor sensor for FH-WS room thermostat, 30 kohm, 20°C, cable length 3m	**008H002500**

Hard Wired Controls - 230V Output

Basic Plus²

Basic Plus²	WT-T	WT-D	WT-DR	WT-P	WT-PR
Code No	088U062000	088U062200	088U062400	088U062500	088U062600
Type	Dial with LED indicator	LCD display with push buttons		LCD display with push buttons, programmable	
Operating room temperature	Off, 5 - 30° C				
Operating floor temperature	-	Off, 20 - 45° C			
Ambient temperature	-10 - 60° C				
Fault indication	-	•			
Hysteresis	1°C, below the setpoint temperature	1° C, symmetrical around the setpoint temperature			
LCD backlight	-	Yes, white			
Max. load, inductive	< 1 A				
Max. load, resistive	< 3 A				
Auxiliary relay	-	Volt-free relay (WT-DR and WT-PR), e.g. boiler			
Temperature calibration	No	Yes (+/-10° C)			
Power consumption	7 W	2 W			
Power supply	230 Vac ±10 % 50/60 Hz	85–250 Vac 50/60 Hz			
Sensor, room	NTC 10K, accuracy: ±1%	NTC 100K, accuracy: ±1%			
Sensor, floor	-	Optional (FH-CWF) - Code No. 088U061000			
Shell material	ABS, non-inflammable				
Colour	White RAL9010/Dark Grey RAL7024				
Dimensions (mm)	86 × 86 × 30	86 × 86 × 16			

Hard-wired Systems Wiring Box - FH-WC 230	
Code No	088H012801
Number of zones (thermostats in/thermal actuator zones out)	8
Time channels (requires external 1-channel or 2-channel time control)	2 (1)
Boiler interlock relay, (voltage free) (2)	SPST, 6(2)A
Pump interlock relay, (voltage free) (2)	SPST, 6(2)A
Supply voltage	230 Vac, ±15%, 50/60 Hz
Output voltage (to zone thermostats and thermal actuators)	Max 250 Vac
Output per channel	up to 0.5A
Dimensions (mm)	314 wide x 110 high x 81 deep

Notes:
(1) One of two time channels can be assigned at time of installation to each thermostat.
(2) Boiler and pump relays are activated whenever one or more zone thermostats call for heat.

The Basic Plus² room thermostats are used for room temperature control in water-based floor heating systems.

WT-T - Dial Room Thermostat

By turning the dial to the desired setpoint temperature, optimal thermal comfort in the room is achieved. In addition to temperature, the thermostat setting scale includes a frost symbol allowing for minimal energy consumption while avoiding freezing temperatures in the room.
The thermostat is equipped with diodes, which display a green light through the front cover while the thermostat is ON, but without heat demand. A red light is displayed when the thermostat is ON and there is heat demand.

WT- D (display) and WT-P (programmable)

- AWAY function
- Child safety lock
- 3 selectable temperature control modes
- 2 selectable floor temperature control modes
- Max. and min. limit settings for room and floor temperature
- Floor sensor terminals
- Frost protection mode
- Temperature calibration
- Advanced programmable timer

Room Thermostats, WT- DR (display) and WT-PR (display and programmable)

The thermostats have voltage-free auxiliary SPST relay for controlling the external equipment, such as a boiler.
Additional features:

- Programmable 5/2-day feature with 4 time segments (WT-P & WT-PR)
- Clock in 12-hour or 24-hour format (WT-P & WT-PR)

FH-WC Wiring Centre

The central component in the FH-WC 230 hard wired control range is the wiring centre ideal for use in water based floor heating systems.
The wiring centre can be connected to 230 volt thermal actuators mounted on the underfloor heating distribution manifold. The centre can control up to eight zones. The unit is directly powered by standard 230 Vac/50 Hz without the need for an external transformer.

Additional Information:

Wiring information ..... p. 94-95

Wireless Controls - 24V Output

CF2

- Energy saving floor heating
- Individual room temperature control
- Easy wireless installation
- Safe and reliable 2-way wireless communication technology
- Possible temperature override by remote control

Wireless floor heating control system which offers unrivalled ease of installation and an extremely user-friendly approach to controlling hydronic floor heating.

With a range of features for optimal comfort, the energy efficient CF2 system provides individual room or floor temperature control, with the option of wireless remote control.

In addition, the CF2 system has been developed to ensure installation, commissioning, and service is quick and easy for the heating installer. With no electrical installation of the thermostat necessary, the quick installation and easy commissioning saves installers time and reduces their costs.

The CF2 range consists of:

CF-RS - Standard room thermostat with temperature setting dial.

CF-RP - Tamperproof room thermostat with no direct access to settings.

CF-RD - Display room thermostat with LCD which displays actual temperature or setting temperature.

CF-RF - Display and infra-red room thermostat with LCD which displays actual temperature or setting temperature and infrared floor sensor which measures floor surface temperature.

CF-MC Master Controller
Available with 5 or 10 outputs.

CF-RU Repeater Unit
Which extends the transmission range to the master controller from the room thermostats.

CF-RC Remote Controller
Wireless connection to all the CF2 components and offering a range of extended functions and features such as time control of individual room thermostats.

Master Controller	CF-MC Master Controller with 5 outputs	CF-MC Master Controller with 10 outputs
Code No.	**088U024501**	**088U024001**
Supply Voltage	230 Vac	
Output Voltage	24 Vdc	
Transmission Frequency	868.42 MHz	
Transmission Range	Up to 30 metres	
Transmission Power	< 1mW	
Max. running load or actuator output	35VA in total for all outputs	
Max. load for pump relay	230V and 8A/2A (Inductive)	
Max. load for boiler relay	230V and 8A/2A (inductive	

Wireless Room Thermostats	CF-RS Standard Wireless Room Thermostat	CF-RP Tamperproof Wireless Room Thermostat	CF-RD Display Wireless Room Thermostat	CF-RF Display & InfraRed Wireless Room Thermostat
Code No.	**088U021000**	**088U021100**	**088U021400**	**088U021500**
Supply Voltage	2 x 1.5V Alkaline Batteries AA			
Battery Life	CF-RS/P 3-4 years. CF-RD/F 1-2 years			
Transmission Frequency	868.42 MHz			
Transmission Range	Up to 30 metres			
Transmission Power	< 1mW			
Temperature Setting Range	5-35°C			

Wireless Remote Controller	CF-RC (Code No. 088U022101)
Supply Voltage	230 V a.c. and 2 x 1.5V Alkaline AA batteries
Transmission Frequency	868.42MHz
Transmission Range	Up to 30 metres
Transmission Power	< 1mW

Repeater Unit	CF-RU (Code No. 088U023001)
Transmission Frequency	868.42MHz
Transmission Range	Up to 30 metres
Transmission Power	< 1mW

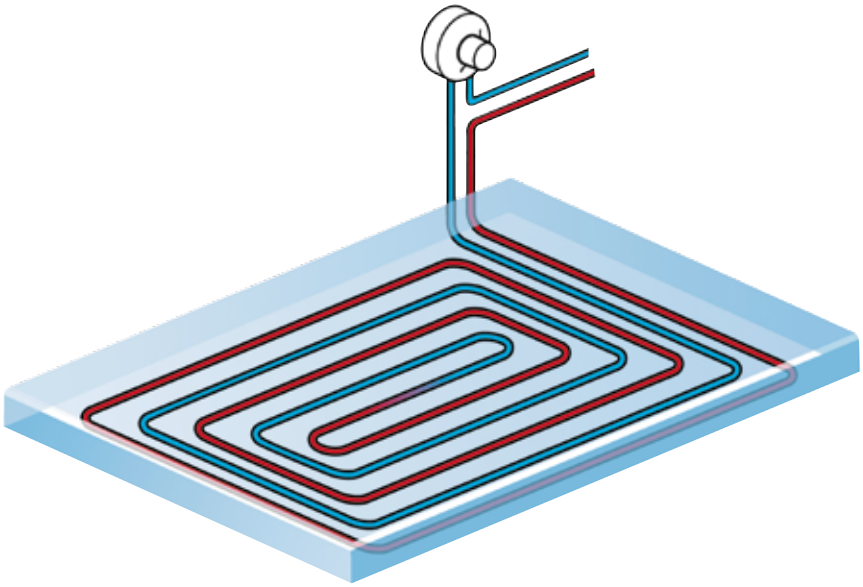
External Antenna	Type	Code No.
External Antenna with 2m cable	CF-EA	**088U025000**
External Cable for Antenna, 5m	CF-EC	**088U025500**

CF-MC

Underfloor Heating Valve
FHV-R

Feature	FHV-R
Code No. for valve and enclosure **(does not include sensor)**	**003L100000**
FJVR sensor (temperature range 10-50°C). Order separately	**003L104000**
Installation position	Return
Connection sizes, see page 19 for pipe fittings options	G3/4", BSP, male
Integrated air-vent and air-vent key	•
Maximum operating pressure	6 bar
Maximum differential pressure	0.6 bar

Compression Fittings - order separately (see page 27)



- Easy to use
- No wiring
- Minimises running costs
- Good performance (self-acting proportional)
- Good value for money

For small floor heating systems, which may include conservatories or bathrooms, Danfoss produce a range of self-acting controls, which are simple to install. The FHV-R comprises of a valve enclosure which is built into a wall or partition, a valve sensor and a fascia plate.

The FHV-R valve utilises a FJVR return temperature limiter sensor, which controls the temperature of the water leaving the floor heating circuit. As there is a good correlation between water and floor temperature, the FHV-R solution also ensures a warm floor is maintained.

The FHV-R is ideal for use in one zone systems and provides the perfect solution for areas with high heat gains, such as conservatories. A mixing valve is needed with this type of control.

Once installed, the user simply has to set the thermostat to the required floor temperature and leave it - the self-acting sensor will automatically limit the floor temperature to around 30°C. If the room is too cold or too hot the user can turn the sensor up or down until the required comfort setting is achieved.

FHV-R Installation Rules

- Solid floor with minimum 75mm screed
- Pipe must be laid down in a snail pattern
- Maximum 15 square metre floor with 15mm pipe
- Maximum 300mm centre distance between pipes
- Maximum flow temperature 45°C

Floor Heating Manifold - Brass

FHF-F

- Flexible and wide range of accessories
- Easy and precise balancing
- Individual shut-off of each circuit
- Individual flowmeter per circuit

The FHF-F Manifold is used for controlling water flow in underfloor heating systems. Each pipe in the floor heating system is connected to the manifold, thus making it possible to control water flow or heat supply to each room in the building individually.

The manifold comprises of a supply and return manifold. The supply manifold includes individual shut-off of each circuit as well as an individual flowmeter per circuit. The return manifold is equipped with integrated Danfoss pre-setting valves securing optimal hydraulic balance in the system.

The valves can be controlled electronically by thermal actuators or act as self-acting units by means of remote temperature adjusters.

The manifold is supplied in modules of up to 12 outlets. Ball valves are available as an option for positive shut-off between the manifold and the system.

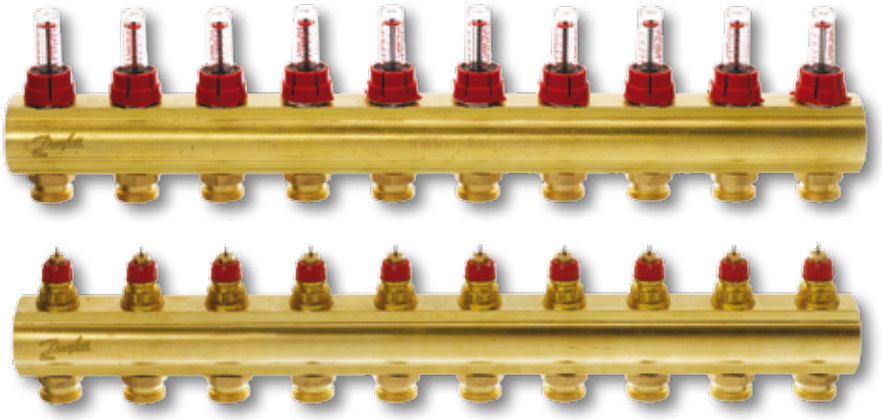
The end pieces FHF-EM and FHF-EA are supplied with manual airvents or alternatively with automatic airvents.

Additional Information:

Full range of TWA actuators.....p.71
Compression Fittings.....p.27

Description	Type	Code No.
FHF Manifold set 2+2, with flowmeter	FHF-2F	**088U052200**
FHF Manifold set 3+3, with flowmeter	FHF-3F	**088U052300**
FHF Manifold set 4+4, with flowmeter	FHF-4F	**088U052400**
FHF Manifold set 5+5, with flowmeter	FHF-5F	**088U052500**
FHF Manifold set 6+6, with flowmeter	FHF-6F	**088U052600**
FHF Manifold set 7+7, with flowmeter	FHF-7F	**088U052700**
FHF Manifold set 8+8, with flowmeter	FHF-8F	**088U052800**
FHF Manifold set 9+9, with flowmeter	FHF-9F	**088U052900**
FHF Manifold set 10+10, with flowmeter	FHF-10F	**088U053000**
FHF Manifold set 11+11, with flowmeter	FHF-11F	**088U053100**
FHF Manifold set 12+12, with flowmeter	FHF-12F	**088U053200**

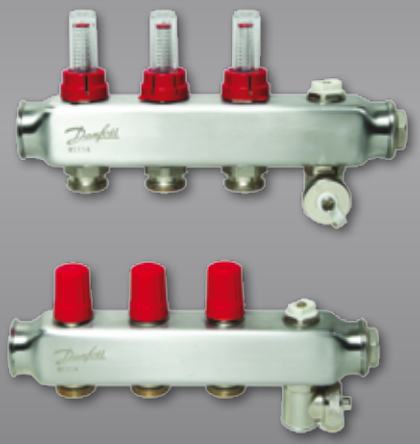
Accessories	Type	Code No.
End section - automatic airvent and purge valve	FHF-EA	**088U058000**
End section - manual airvent and purge valve	FHF-EM	**088U058100**
End caps - set	FHF-E	**088U058200**
Connection pieces - set	FHF-C	**088U058300**
Reduction bushes/pieces - set - 1" - ¾"	FHF-R	**088U058400**
Mounting brackets - set	FHF-MB	**088U058500**
2 x ball valve 1" with tail piece - for connection to manifold and for blocking of floor heating system	FHF-BV	**058U058600**
1 x thermometer 0-60°C, Ø35mm - for flow/return temperature measurement	FHF-T	**088U002900**
Thermal actuator, 24V, NC, Danfoss RA connection to valve	TWA-A	**088H311000**
Thermal actuator, 24V, NO	TWA-A	**088H311100**
Thermal actuator, 230V, NC, Danfoss RA connection to valve	TWA-A	**088H311200**
Thermal actuator, 230V, NO	TWA-A	**088H311300**
Thermal actuator, 24V, NC, with end switch, Danfoss RA connection to valve	TWA-A	**088H311400**



FHF-10F

Floor Heating Manifold - Stainless

SSM



Description	Type	Code No
Stainless steel manifold set, 2+2 with flowmeter	SSM-2F	**088U0752**
Stainless steel manifold set, 3+3 with flowmeter	SSM-3F	**088U0753**
Stainless steel manifold set, 4+4 with flowmeter	SSM-4F	**088U0754**
Stainless steel manifold set, 5+5 with flowmeter	SSM-5F	**088U0755**
Stainless steel manifold set, 6+6 with flowmeter	SSM-6F	**088U0756**
Stainless steel manifold set, 7+7 with flowmeter	SSM-7F	**088U0757**
Stainless steel manifold set, 8+8 with flowmeter	SSM-8F	**088U0758**
Stainless steel manifold set, 9+9 with flowmeter	SSM-9F	**088U0759**
Stainless steel manifold set, 10+10 with flowmeter	SSM-10F	**088U0760**
Stainless steel manifold set, 11+11 with flowmeter	SSM-11F	**088U0761**
Stainless steel manifold set, 12+12 with flowmeter	SSM-12F	**088U0762**

Accessories	Code No.
T1" Manifold Union Nut - Set	**088U0820**
Mounting Brackets - Set	**088U0585**
Ball Valve Prepared Danfoss Thermometer - Set	**088U0586**

- Pre-assembled in sets
- Individual shut-off of each circuit
- Individual flowmeter per circuit

The SSM manifold is used for controlling water flow in under floor heating systems. Each tube of the floor heating system is connected to the manifold, thus making it possible to control water flow or heat supply to each room in the building individually.

The manifold consists of a supply and return manifold. The supply manifold includes possibility for individual shut-off of each circuit on flowmeter or shut-off valve. The return manifold is equipped with integrated Danfoss presetting valves securing optimal hydraulic balance in the system.

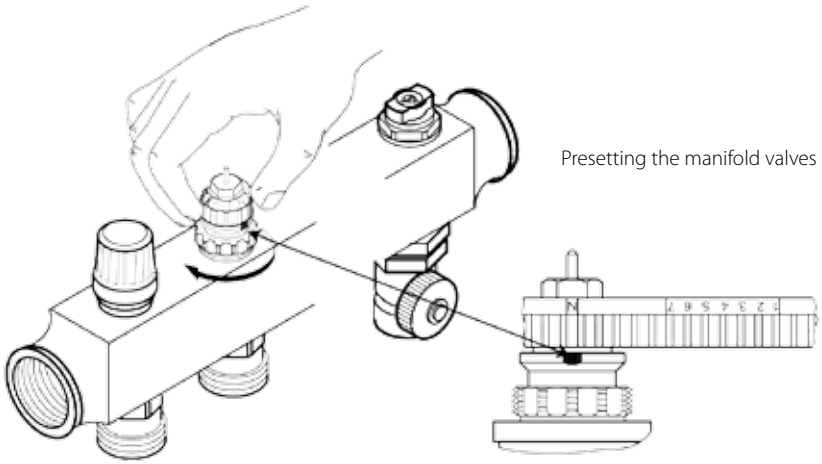
The valves can be controlled electronically by thermal actuators or act as self-acting units by means of remote temperature adjusters.

The manifold is supplied in modules of up to 12 outlets. Ball valves are available as an option for positive shut-off between manifold and system.

The SSM manifold is supplied with a manual airvent and a purge valve.

Additional Information:

Full range of TWA actuators.....p.71
Compression Fittings.....p.27



Presetting the manifold valves

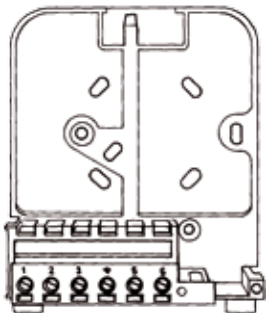
Additional Information

Wallplates and Wiring

Contents

Wallplate Identification and Compatibility

GP Wallplate



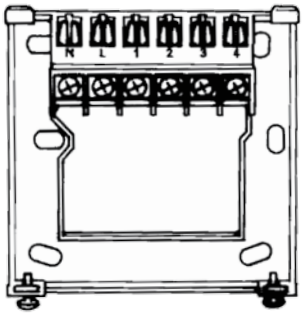
Timeswitches
103
103E7

1	2	3	⏚	5	6
ON	SPARE	COM	E	N	L
			Mains supply (via 3 amp fuse)		

Mini Programmers
102
102E7

1	2	3	⏚	5	6
DHW	HTG	COM	E	N	L
			Mains supply (via 3 amp fuse)		

MK18 Wallplate



Timeswitch
TS715 Si

N	L	1	2	3	4
Mains (via 3 amp fuse)		COM	OFF	SPARE	ON

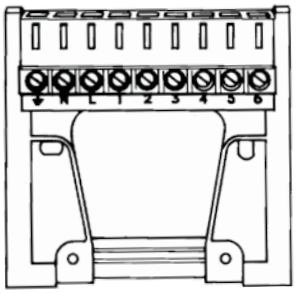
(supersedes TS15 and TS75)

Programmers
CP715 Si
FP715 Si

N	L	1	2	3	4
Mains (via 3 amp fuse)		OFF DHW	OFF HTG	ON DHW	ON HTG

(supersedes MP15, MP75, CP15, CP75, FP15, FP75, FP715 and CP715)

SET Wallplate



Timeswitches
SET1E

⏚	N	L	1	2	3	4	5	6
Mains Supply (via 3 amp fuse)			Spares			Load		
						ON	COM	OFF

Link 1-5 at time of installation

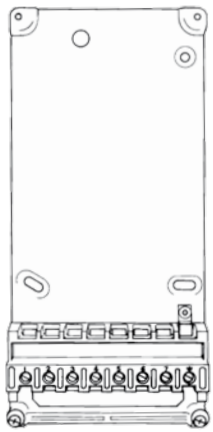
Mini Programmer
SET2E

⏚	N	L	1	2	3	4	5	6
Mains Supply (via 3 amp fuse)			Water			Heating		
			ON	COM	OFF	ON	COM	OFF

Programmers
SET3E
SET3M
FP975*

⏚	N	L	1	2	3	4	5	6
Mains Supply (via 3 amp fuse)			Water			Heating		
			ON	COM	OFF	ON	COM	OFF

MK3 Wallplate



Programmer
4033

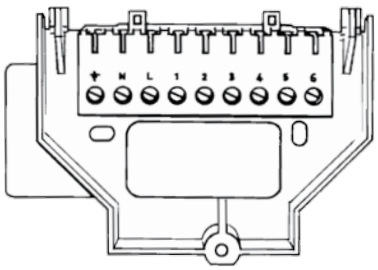
1	2	3	4	5	6	7	⏚
Water	Heating		Water		L	N	E
COM	ON	OFF	ON	OFF	Mains supply (via 3 amp fuse)		

Mini Programmers
3020P
3060

1	2	3	4	5	6	7	⏚
Neutral	Heating		Water		L	N	E
	ON	Spare	ON	Spare	Mains supply (via 3 amp fuse)		

MK9* Wallplate
(discontinued)

FP975 is a plug-in replacement to MK9, but must be set in MK9 mode using the switch on the rear of the unit.

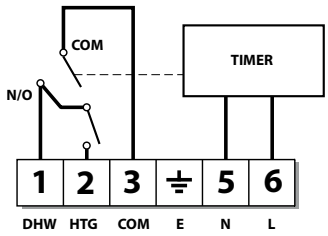


Programmers
FP975
replaces
922 and 972

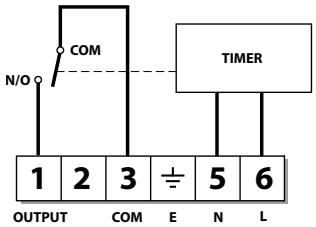
⏚	N	L	1	2	3	4	5	6
Mains Supply (via 3 amp fuse)			Water			Heating		
			OFF	COM	ON	OFF	COM	ON

Additional Information
Wiring Diagrams

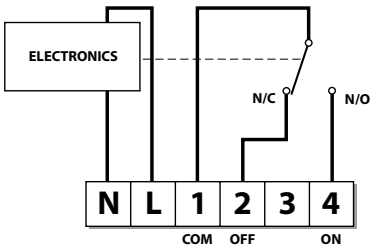
102 & 102E7



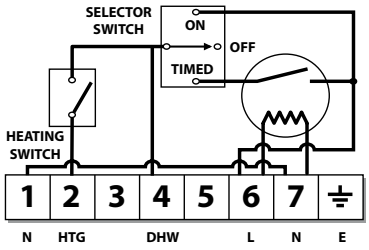
103 & 103E7



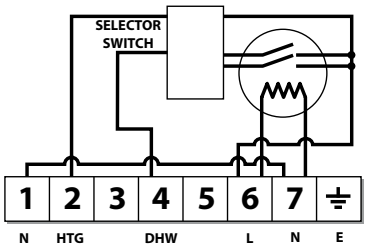
TS715 Si



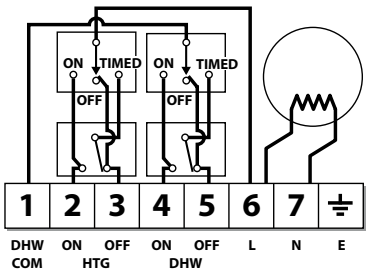
3020P



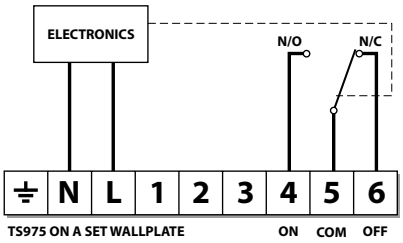
3060



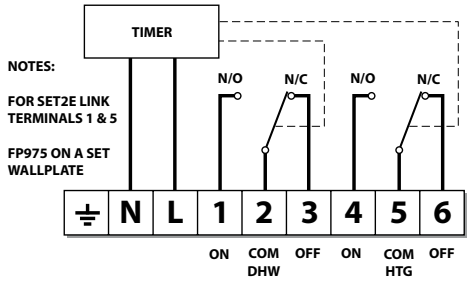
4033



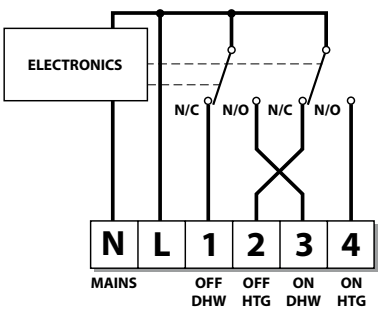
SET1E



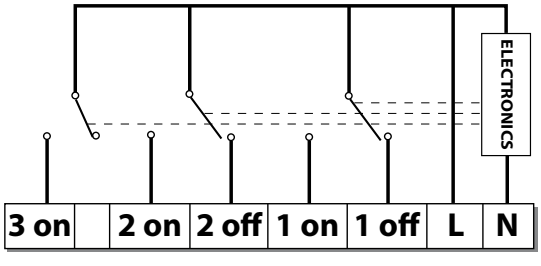
SET2E, SET3E, SET3M & FP975



FP715 Si & CP715 Si

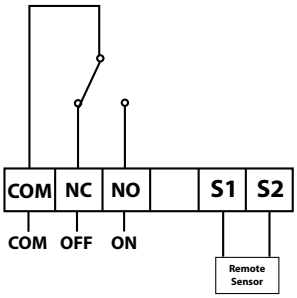


FP735 Si

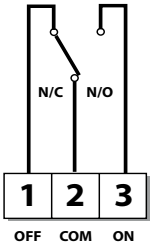


Additional Information
Wiring Diagrams

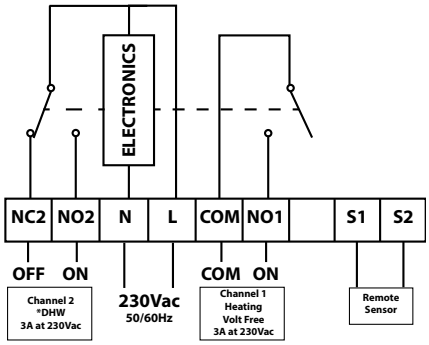
TPOne-B



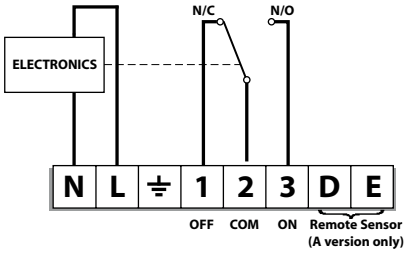
TP5000 Si



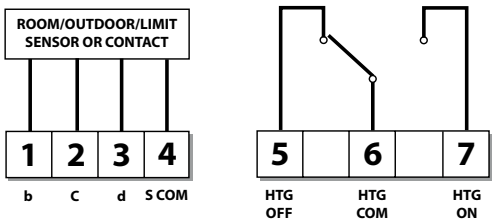
TPOne-M



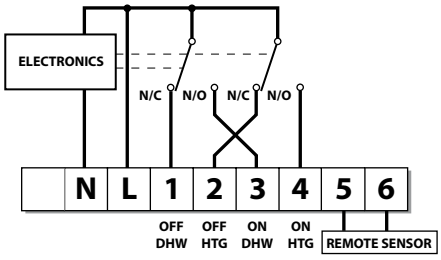
TP5000M Si & TP5000MA Si



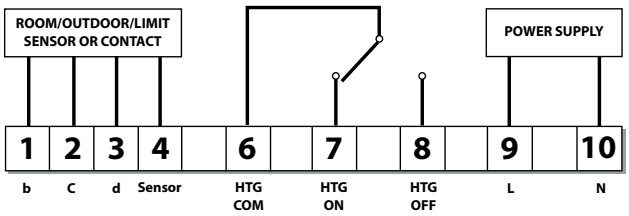
TP7001 & TP7001A



TP9000

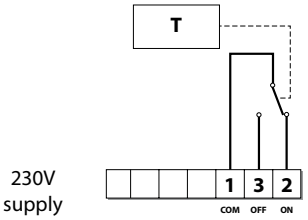


TP7001M & TP7001MA

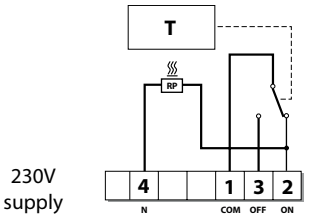


Additional Information
Wiring Diagrams

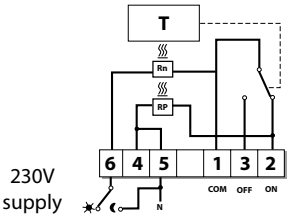
RMT230*



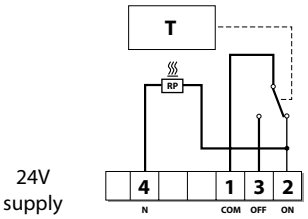
RMT230



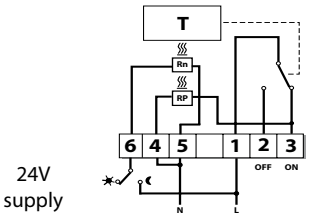
RMT230T



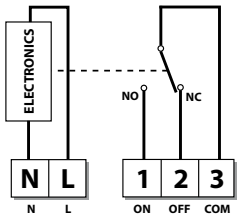
RMT24



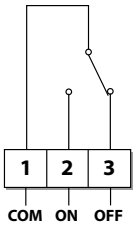
RMT24T



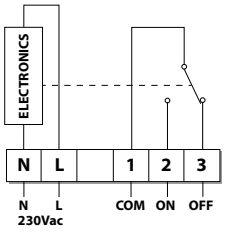
RMT230P



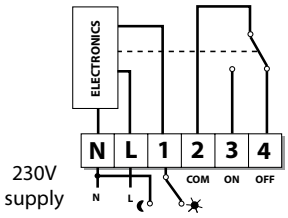
RET1000B & RET2000B



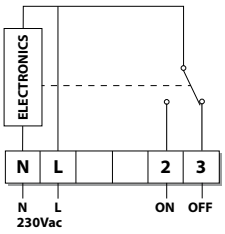
RET1000M & RET2000M



RET230NSB



RET1000MS & RET2000MS



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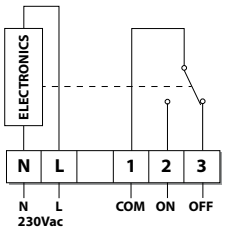
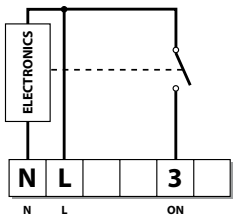
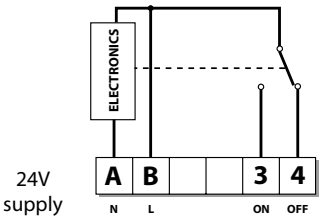


RET230F & RET230F5



RET24



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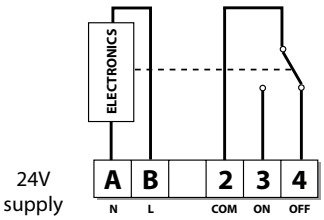

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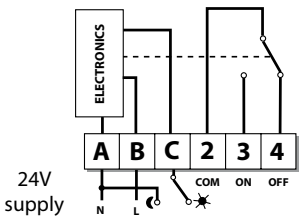
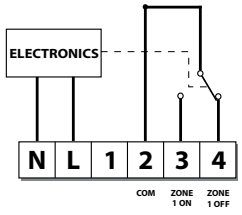
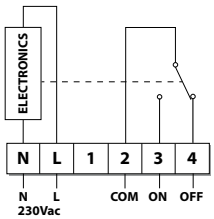


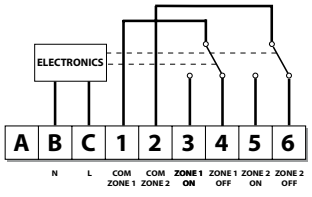
RX1



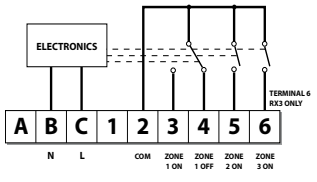
RX1-S



RX2-C

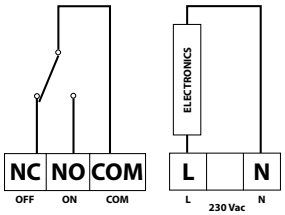


RX2 & RX3

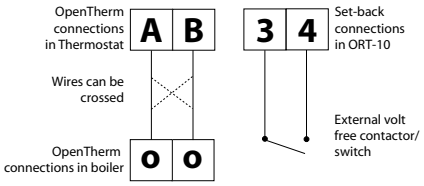


Additional Information
Wiring Diagrams

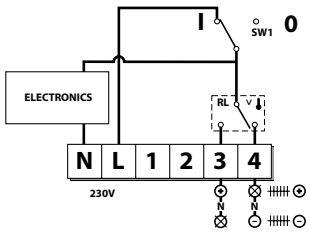
FlatStat - FMT230D



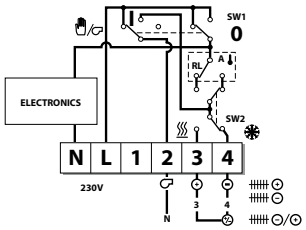
ORT01 & ORT10



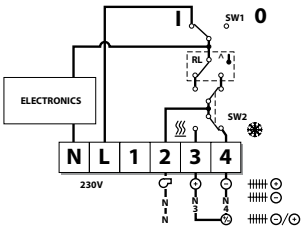
RET230LS



RET230C01



RET230C02



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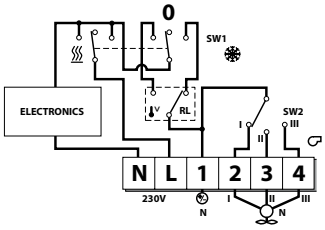
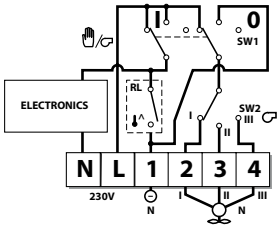
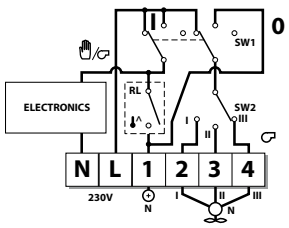


RET230C3



RET230H3



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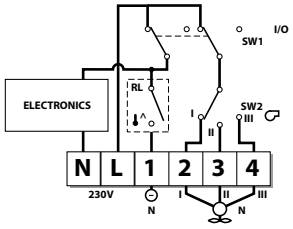
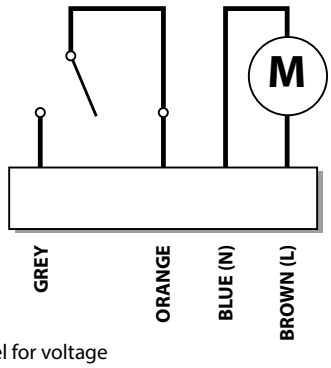
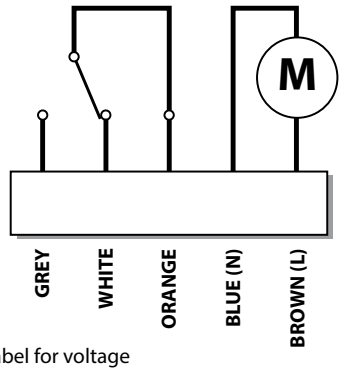


HPA2



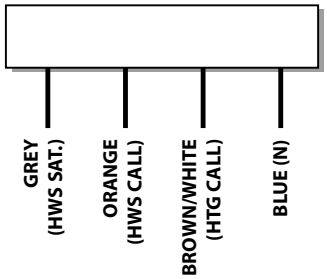
See rating label for voltage

HPA2C



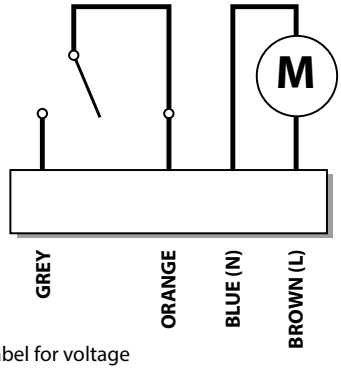
See rating label for voltage

HSA3



See rating label for voltage

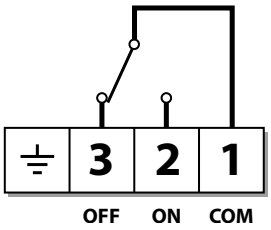
HSA3D



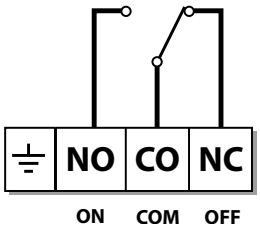
See rating label for voltage

Additional Information
Wiring Diagrams

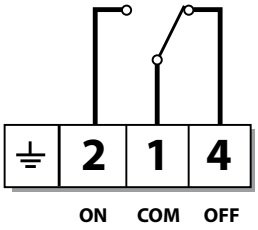
ATC



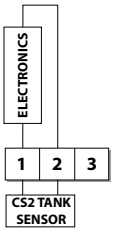
ATP



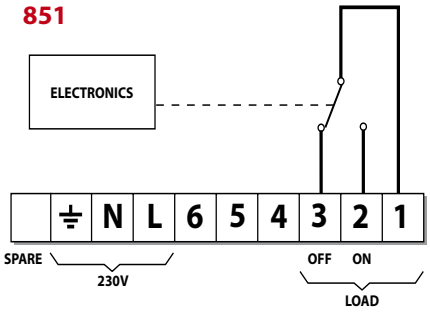
ATF



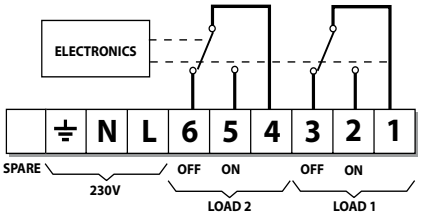
CET2000B-RF



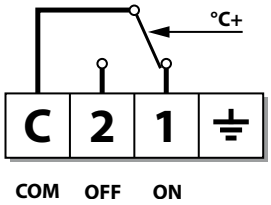
851



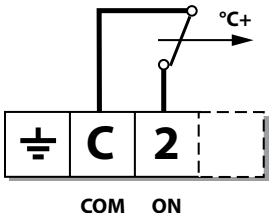
842 & 852



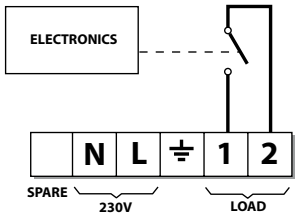
ITC



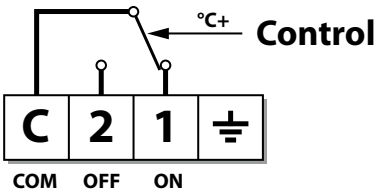
ITL

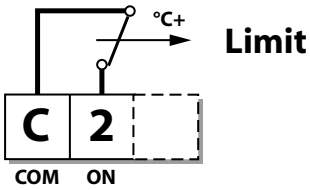


811 & 841



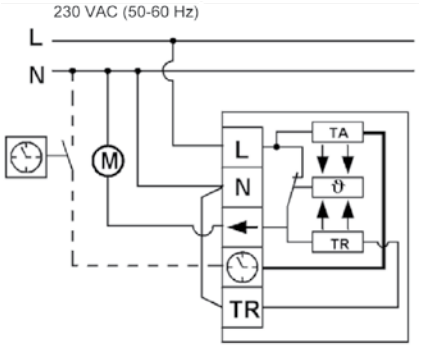
ITD



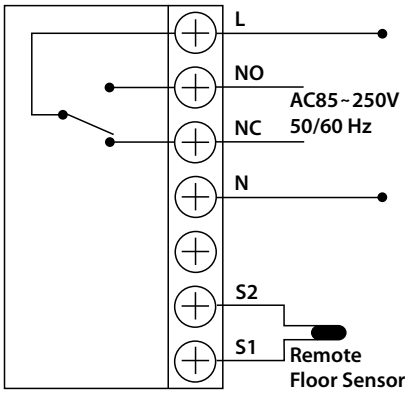


Additional Information
Wiring Diagrams

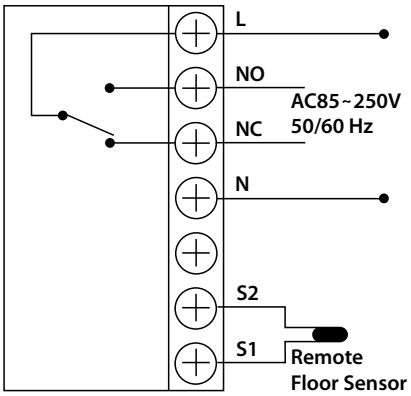
FH-WT230



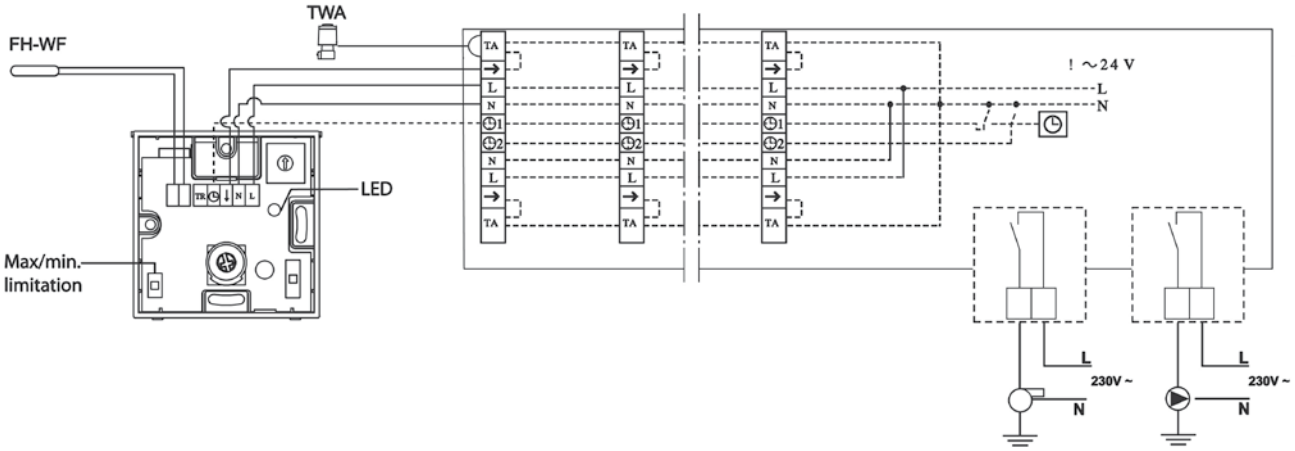
WT-P



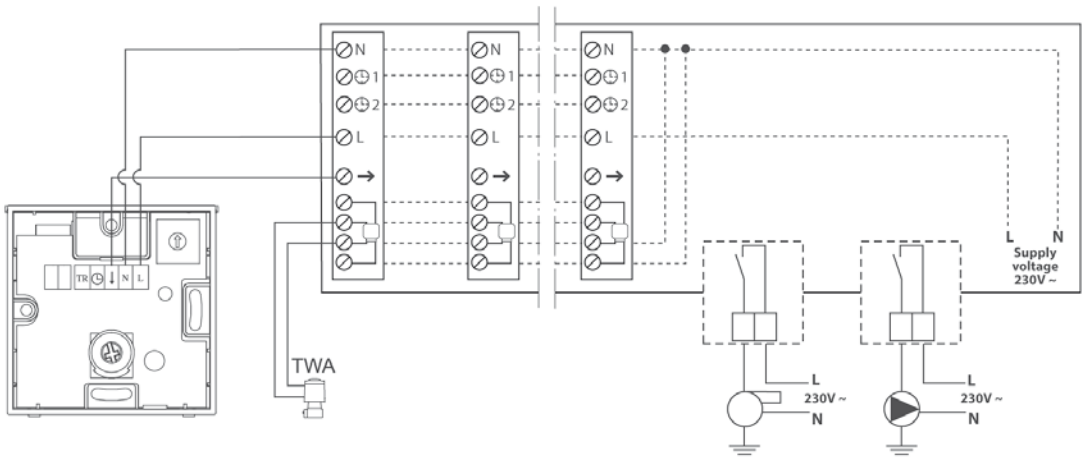
WT-D



FH-WT, FH-WP, FH-WS Hard Wired 24V System

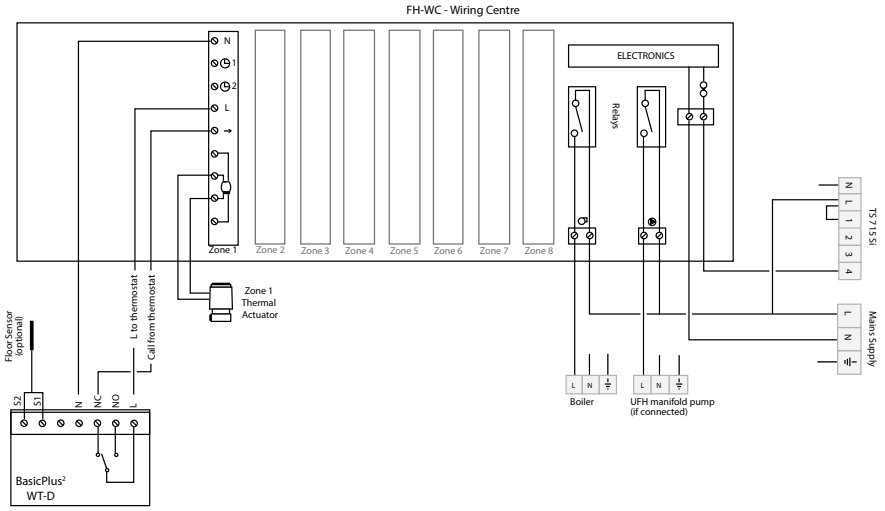


FH-WT Hard Wired 230V System

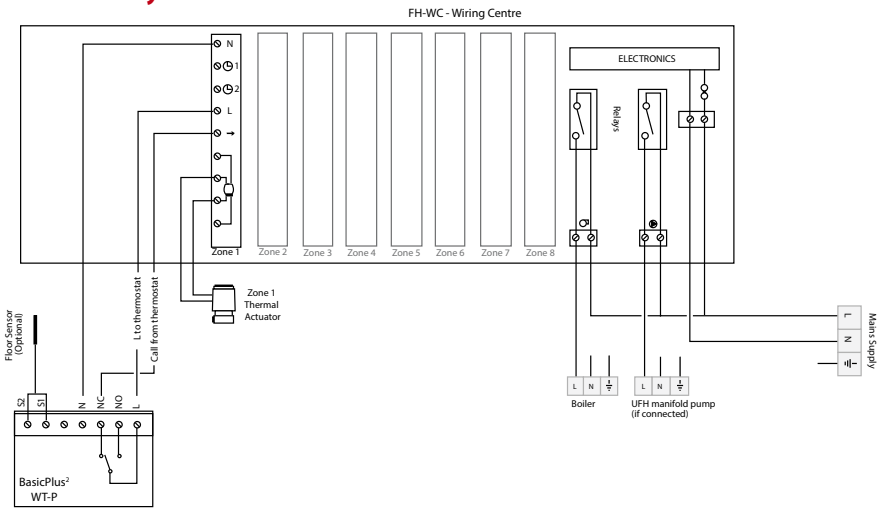


Additional Information
Wiring Diagrams

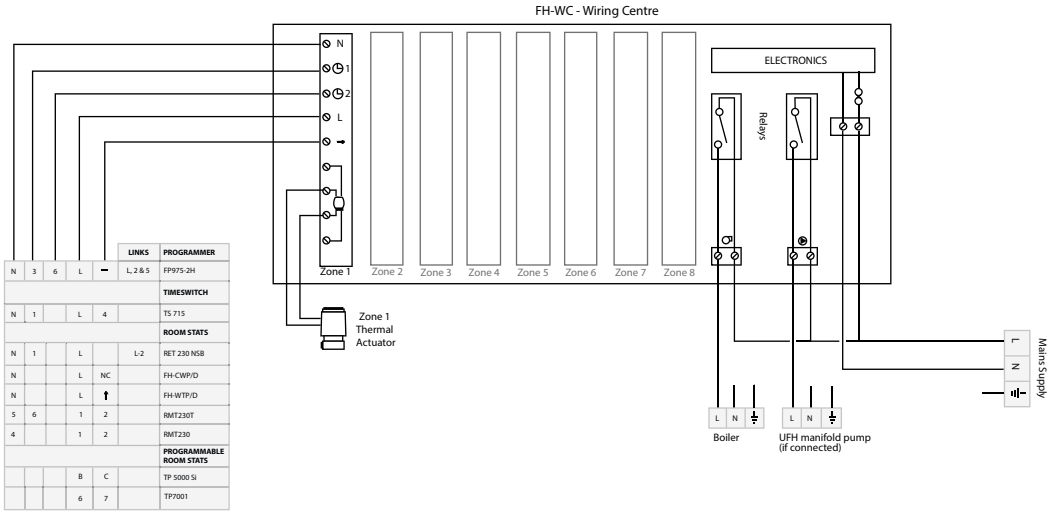
BasicPlus², FH-WD, FH-WC & TS715Si System



BasicPlus², FH-WP & FH-WC System



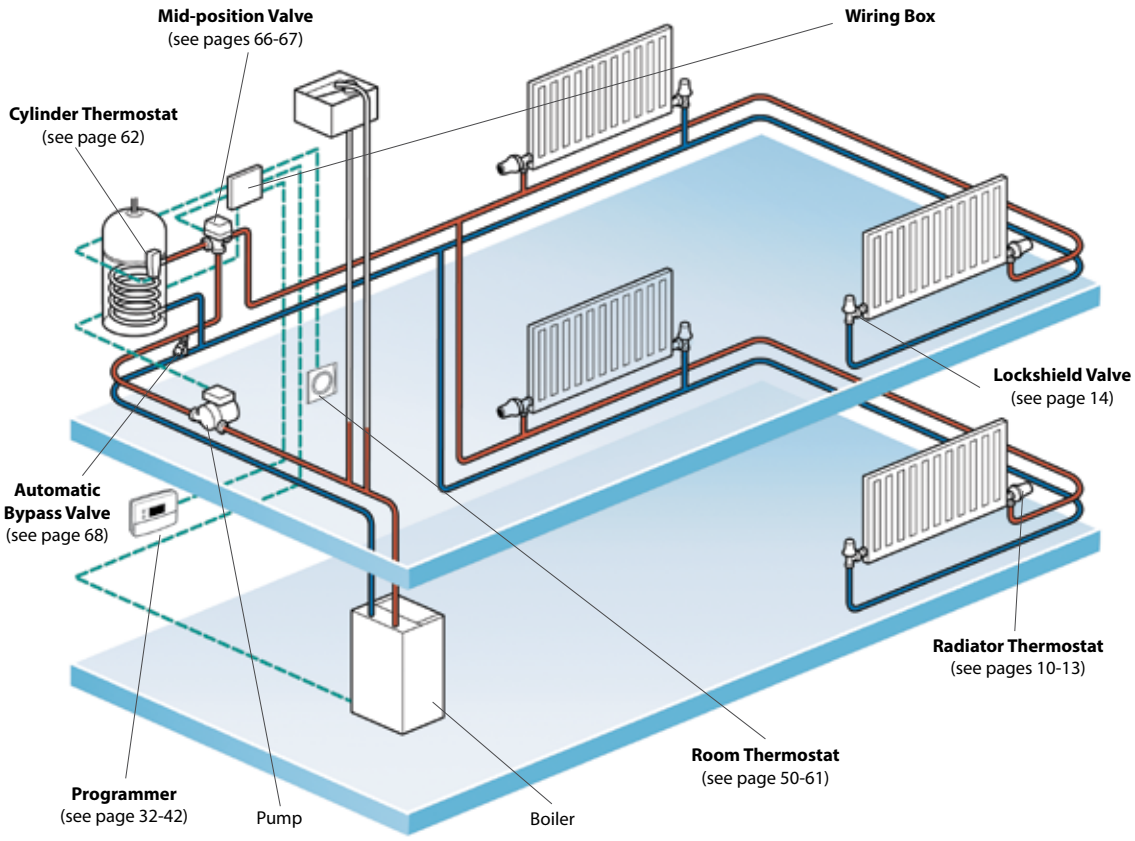
FH-WC Hard Wired System

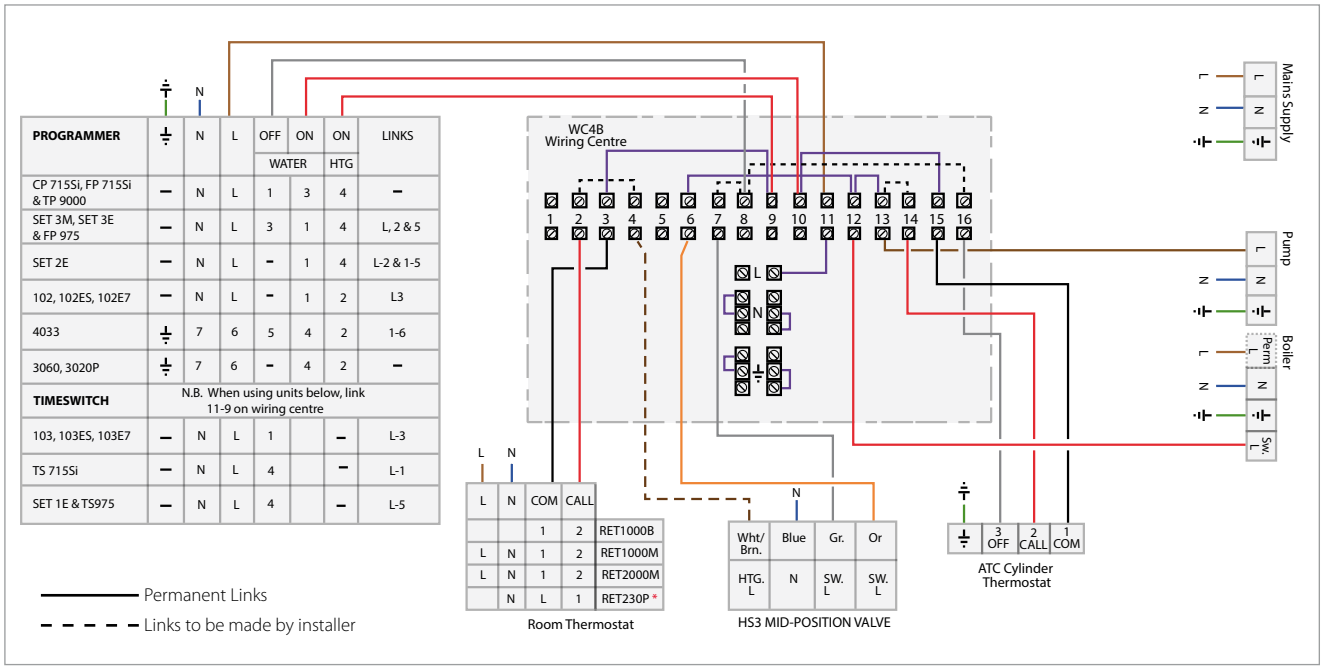


						LINKS	PROGRAMMER
N	3	6	L			L, 2 & S	FP975-2H
							TIMESWITCH
N	1			L	4		TS 715
							ROOM STATS
N	1			L		L-2	RET 230 NSB
N				L	NC		FH-CWP/D
N				L			FH-WTP/D
5	6			1	2		RMT230T
4				1	2		RMT230
							PROGRAMMABLE ROOM STATS
				B	C		TP 5000 Si
				6	7		TP7001

Fully Pumped System

3-Port Mid-Position Valve



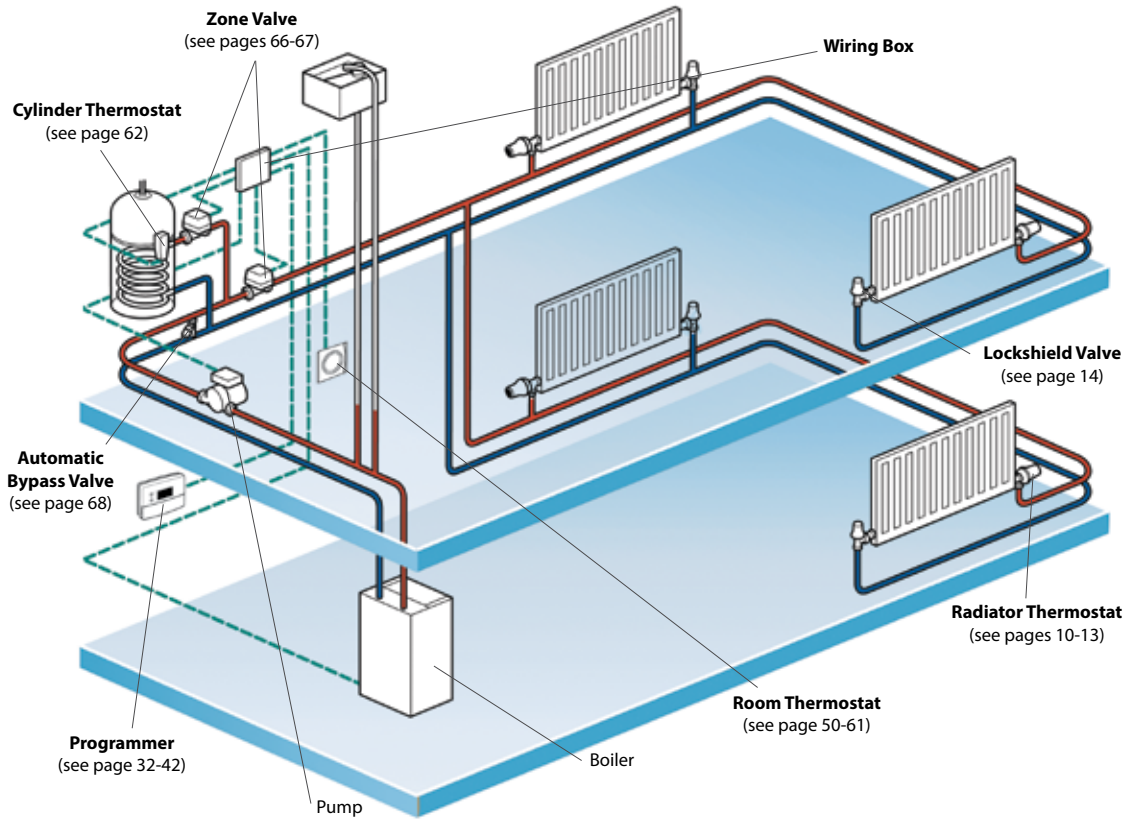


Note:
For boilers with pump overrun, please refer to boiler wiring info.

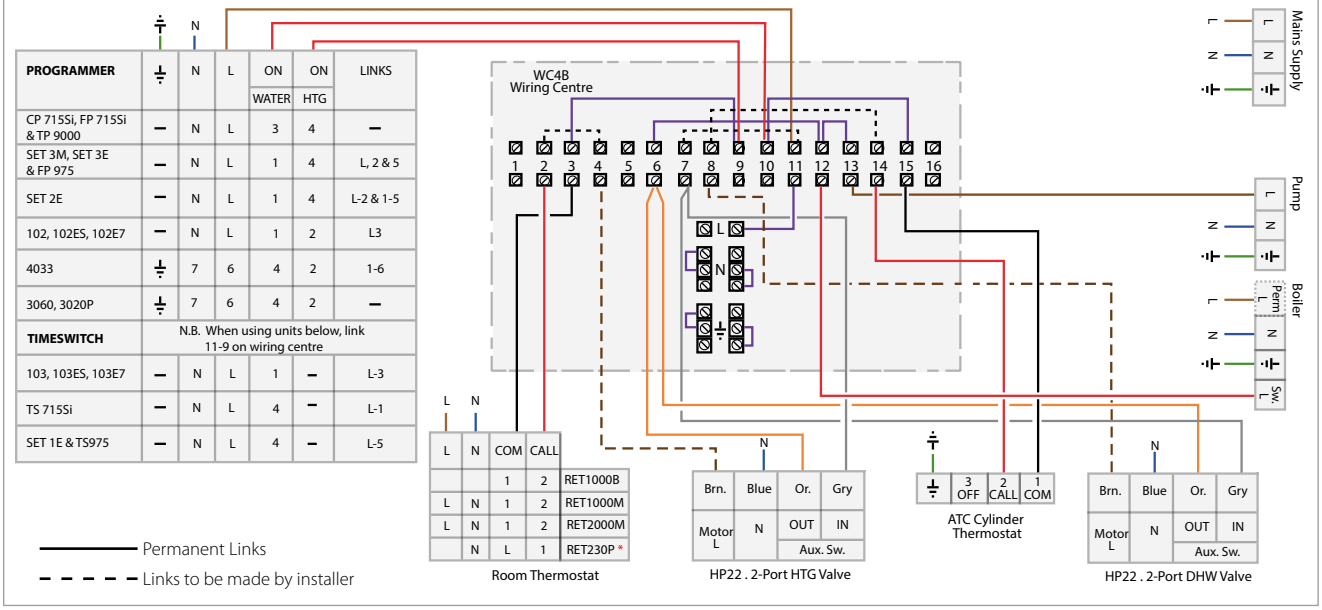
* Link terminals L and COM in the RET 230P for correct operation (see thermostat instructions for further information).

Fully Pumped System

2 x 2-Port Spring Return - Zone Valves



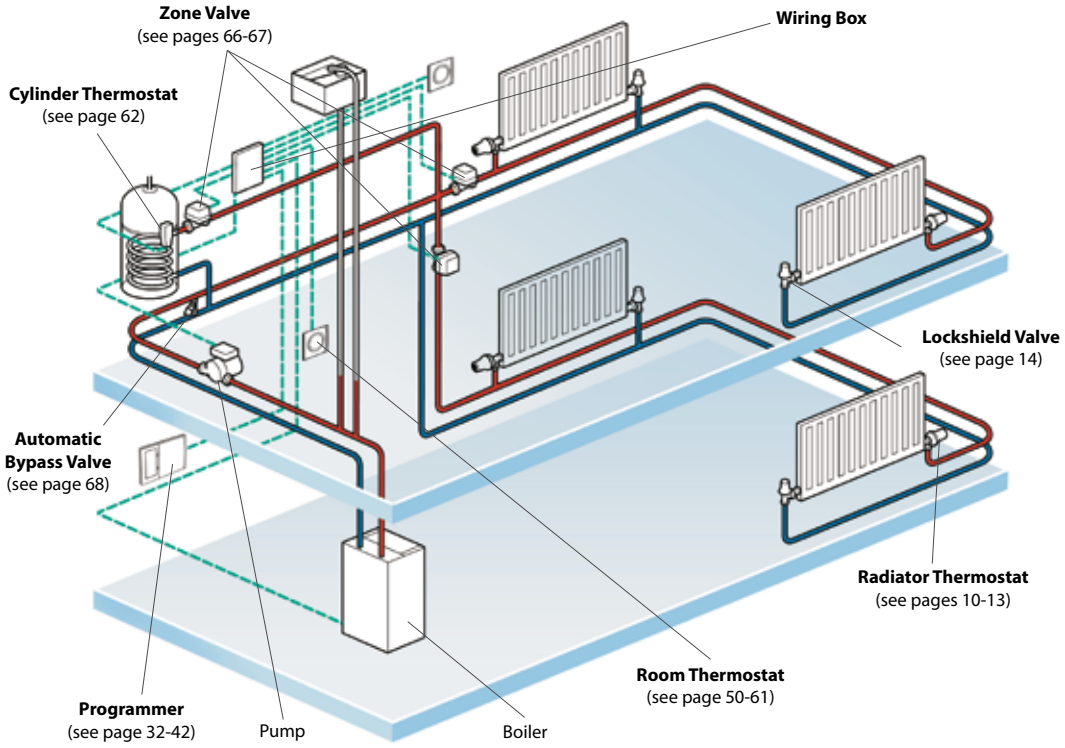
PROGRAMMER	⏚	N	L	ON WATER	ON HTG	LINKS
CP 715Si, FP 715Si & TP 9000	–	N	L	3	4	–
SET 3M, SET 3E & FP 975	–	N	L	1	4	L, 2 & 5
SET 2E	–	N	L	1	4	L-2 & 1-5
102, 102ES, 102E7	–	N	L	1	2	L3
4033	⏚	7	6	4	2	1-6
3060, 3020P	⏚	7	6	4	2	–
TIMESWITCH	N.B. When using units below, link 11-9 on wiring centre					
103, 103ES, 103E7	–	N	L	1	–	L-3
TS 715Si	–	N	L	4	–	L-1
SET 1E & TS975	–	N	L	4	–	L-5



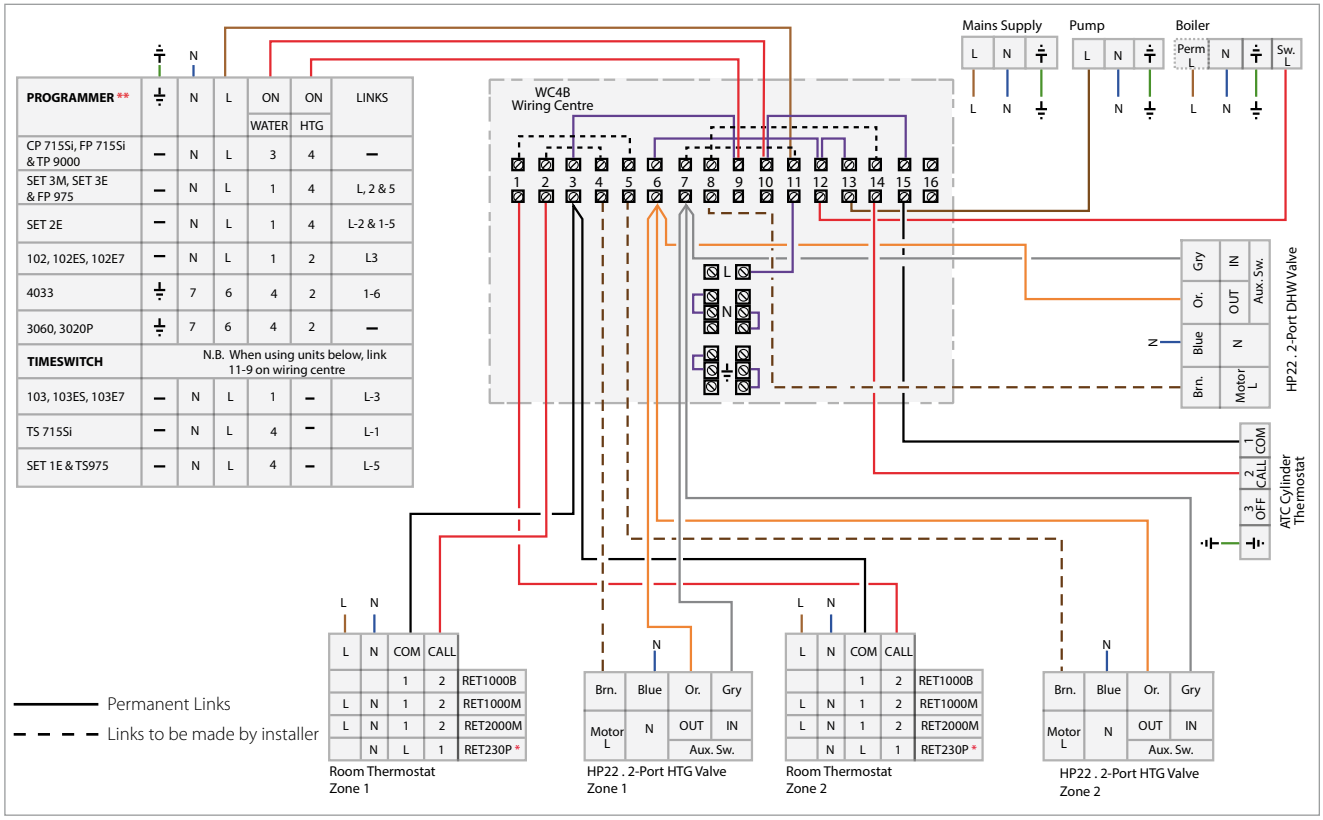
Note: For boilers with pump overrun, please refer to boiler wiring info.
For systems with 230V main switching boilers, fit a link between terminals 7-11 in wiring centre.
For systems with low voltage switching boilers, connect terminal 7 to low voltage feed on boiler (see boiler instructions for information).
* Link terminals L and COM in the RET 230P for correct operation (see thermostat instructions for further information).

Fully Pumped System

3 x 2-Port Spring Return Zone Valves
Common Heating Times



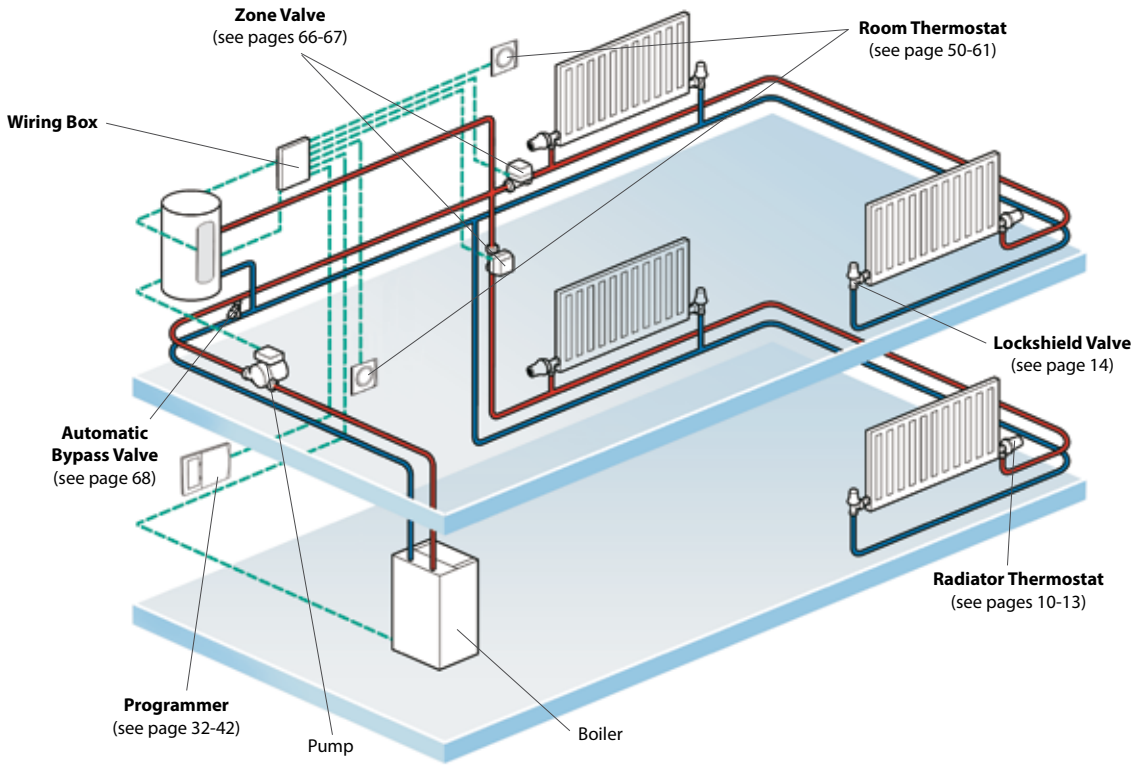
PROGRAMMER **	⏚	N	L	ON WATER	ON HTG	LINKS
CP 715Si, FP 715Si & TP 9000	–	N	L	3	4	–
SET 3M, SET 3E & FP 975	–	N	L	1	4	L, 2 & 5
SET 2E	–	N	L	1	4	L-2 & 1-5
102, 102ES, 102E7	–	N	L	1	2	L3
4033	⏚	7	6	4	2	1-6
3060, 3020P	⏚	7	6	4	2	–
TIMESWITCH	N.B. When using units below, link 11-9 on wiring centre					
103, 103ES, 103E7	–	N	L	1	–	L-3
TS 715Si	–	N	L	4	–	L-1
SET 1E & TS975	–	N	L	4	–	L-5

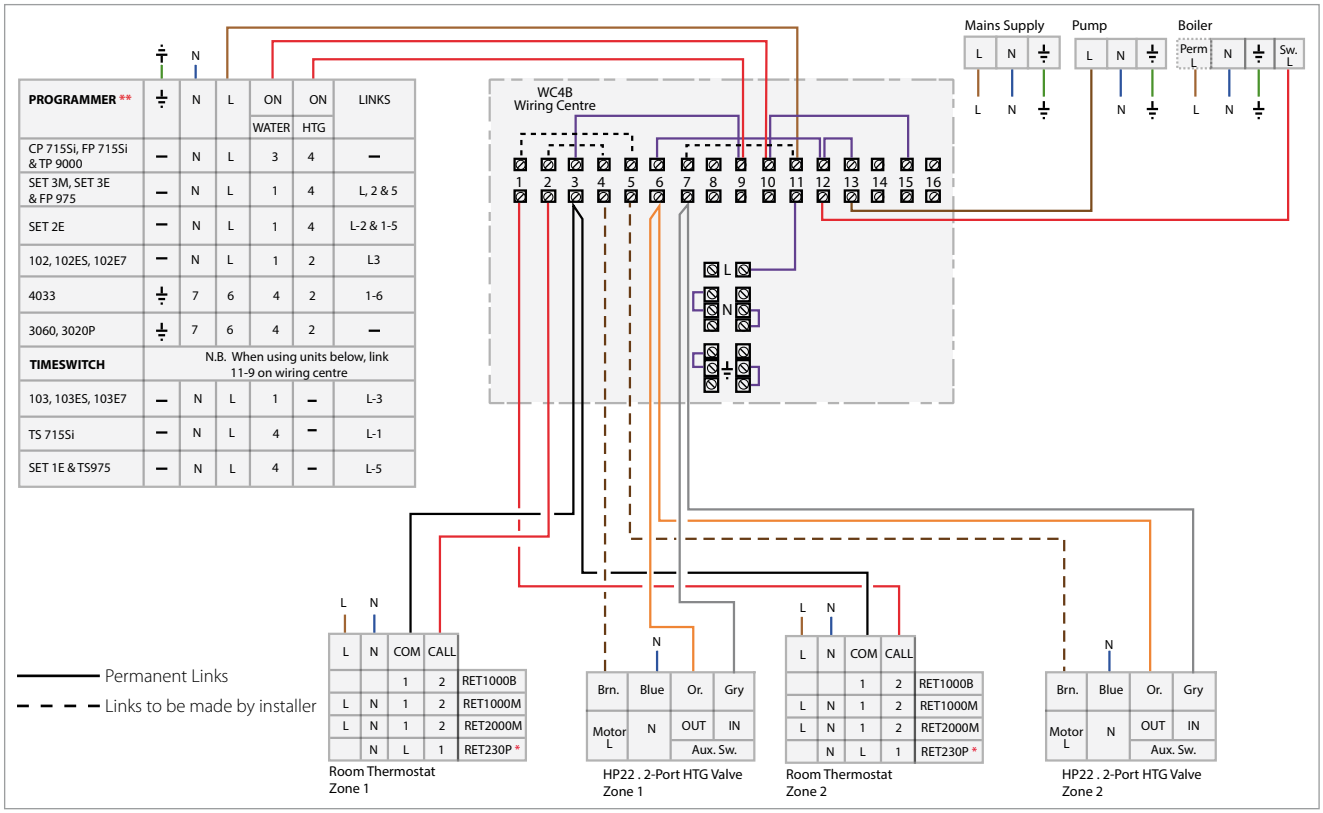


Note: For boilers with pump overrun, please refer to boiler wiring info.
For systems with 230V main switching boilers, fit a link between terminals 7-11 in wiring centre.
For systems with low voltage switching boilers, connect terminal 7 to low voltage feed on boiler (see boiler instructions for information).
* Link terminals L and COM in the RET 230P for correct operation (see thermostat instructions for further information).

Fully Pumped System

3 x 2-Port Spring Return Zone Valves
Common Heating Times, Unvented Cylinder



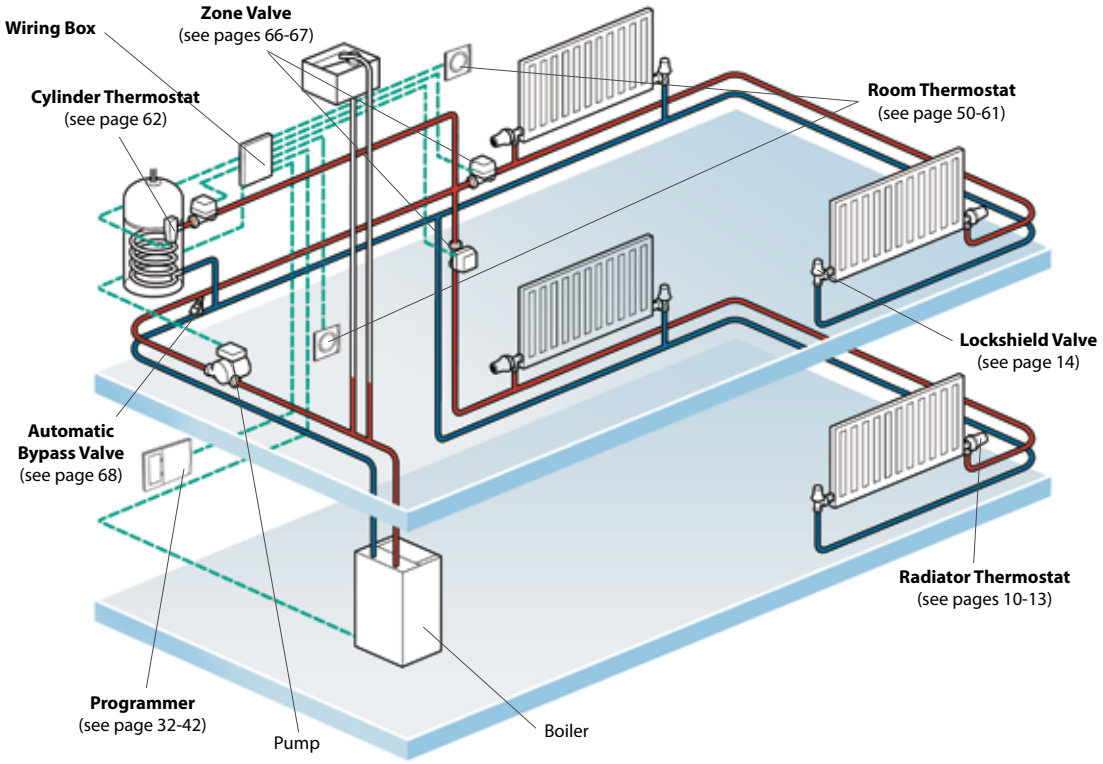


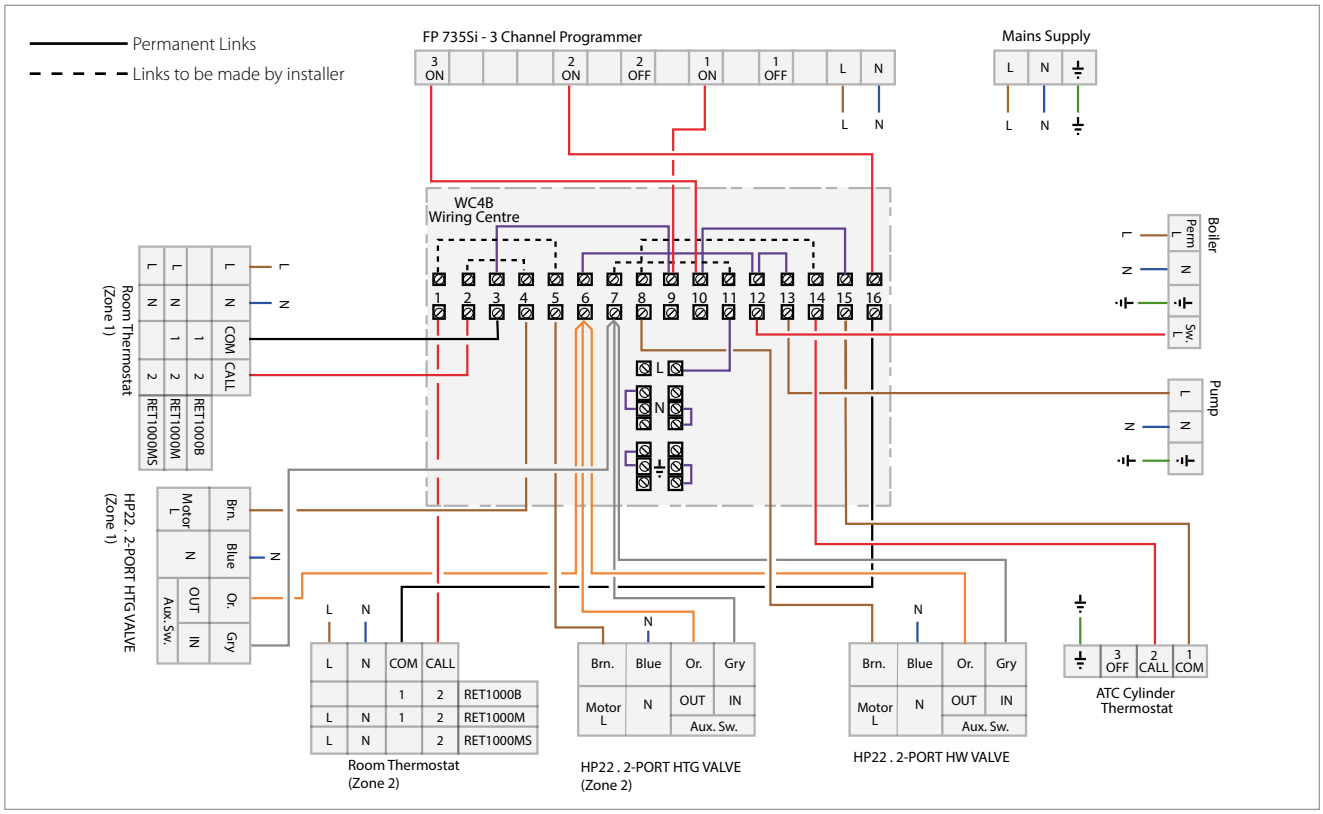
PROGRAMMER **	⏚	N	L	ON WATER	ON HTG	LINKS
CP 715Si, FP 715Si & TP 9000	–	N	L	3	4	–
SET 3M, SET 3E & FP 975	–	N	L	1	4	L, 2 & 5
SET 2E	–	N	L	1	4	L-2 & 1-5
102, 102ES, 102E7	–	N	L	1	2	L3
4033	⏚	7	6	4	2	1-6
3060, 3020P	⏚	7	6	4	2	–
TIMESWITCH	N.B. When using units below, link 11-9 on wiring centre					
103, 103ES, 103E7	–	N	L	1	–	L-3
TS 715Si	–	N	L	4	–	L-1
SET 1E & TS975	–	N	L	4	–	L-5

Note: For boilers with pump overrun, please refer to boiler wiring info.
For systems with 230V main switching boilers, fit a link between terminals 7-11 in wiring centre.
For systems with low voltage switching boilers, connect terminal 7 to low voltage feed on boiler (see boiler instructions for information).
* Link terminals L and COM in the RET 230P for correct operation (see thermostat instructions for further information).

Fully Pumped System

3 x 2-Port Spring Return Zone Valves
Independent Times

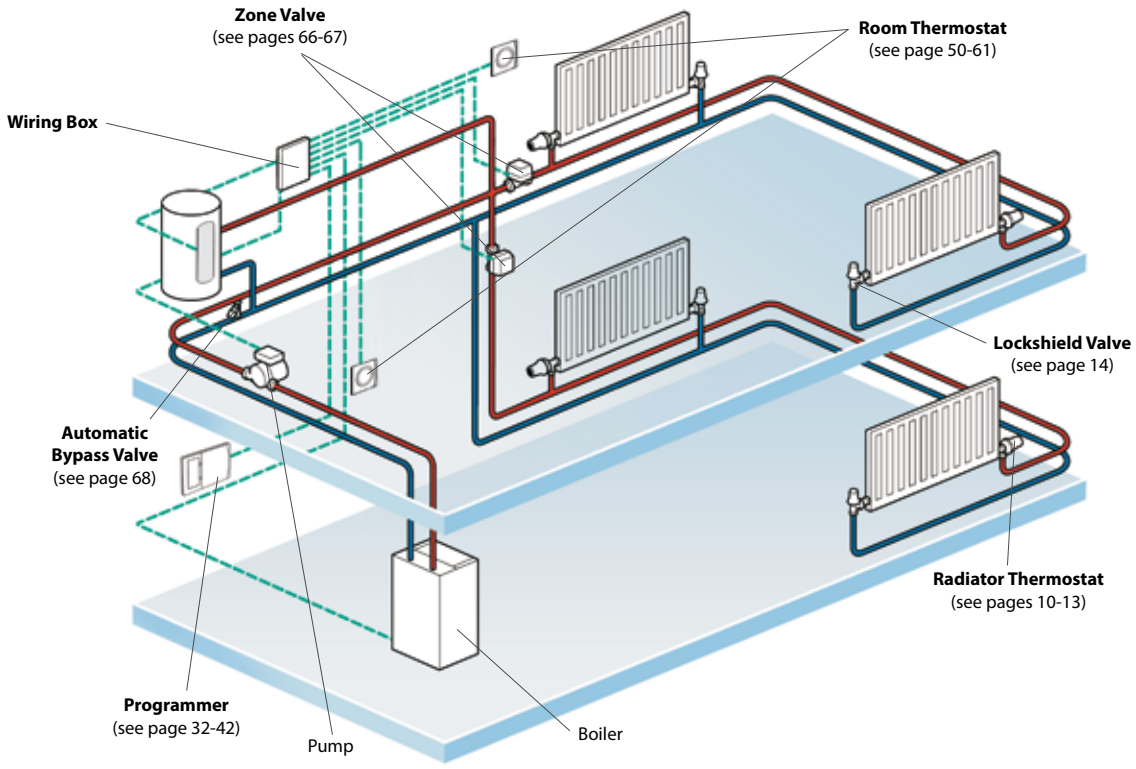


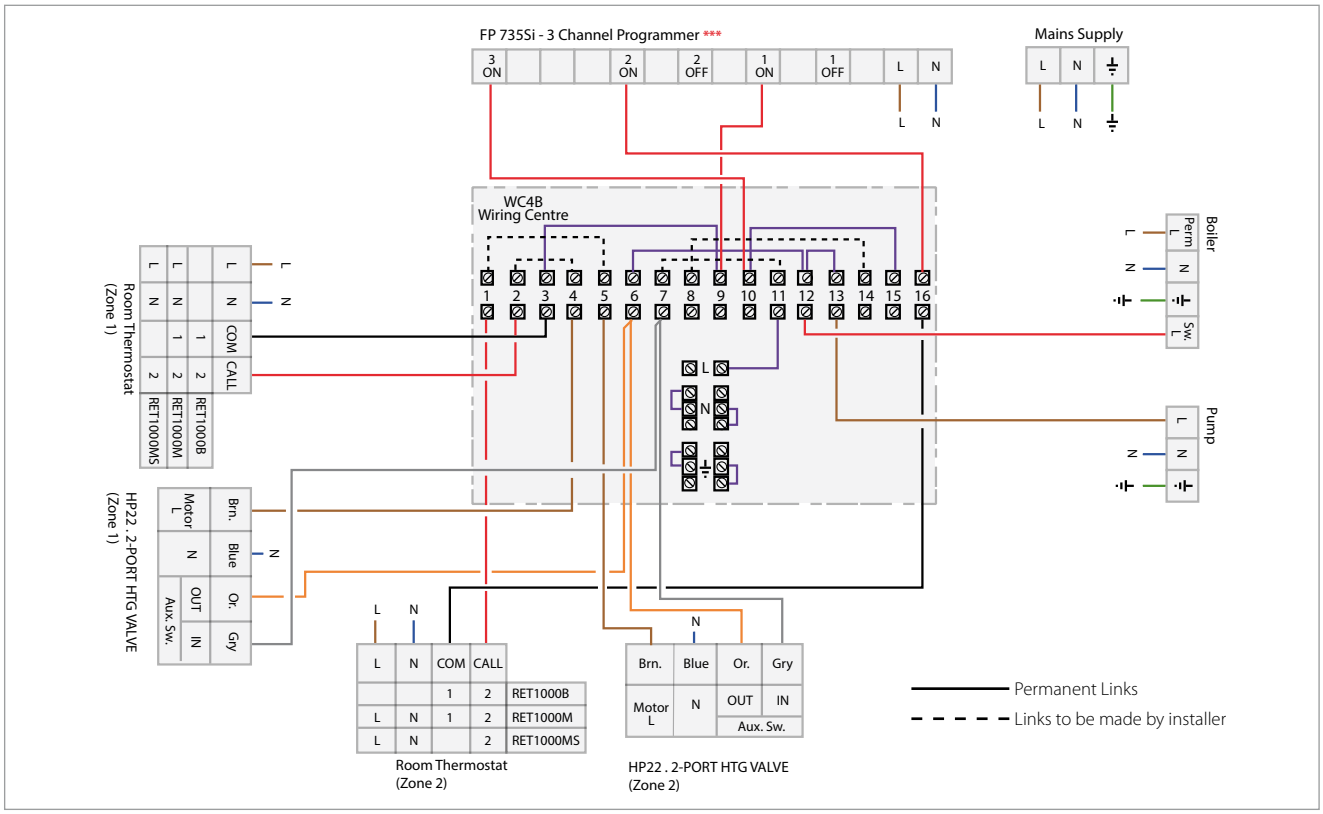


Note: For boilers with pump overrun, please refer to boiler wiring info.
For systems with 230V main switching boilers, fit a link between terminals 7-11 in wiring centre.
For systems with low voltage switching boilers, connect terminal 7 to low voltage feed on boiler (see boiler instructions for information).

Fully Pumped System

2 x 2-Port Spring Return Zone Valves
Independent Heating Times, Unvented Cylinder

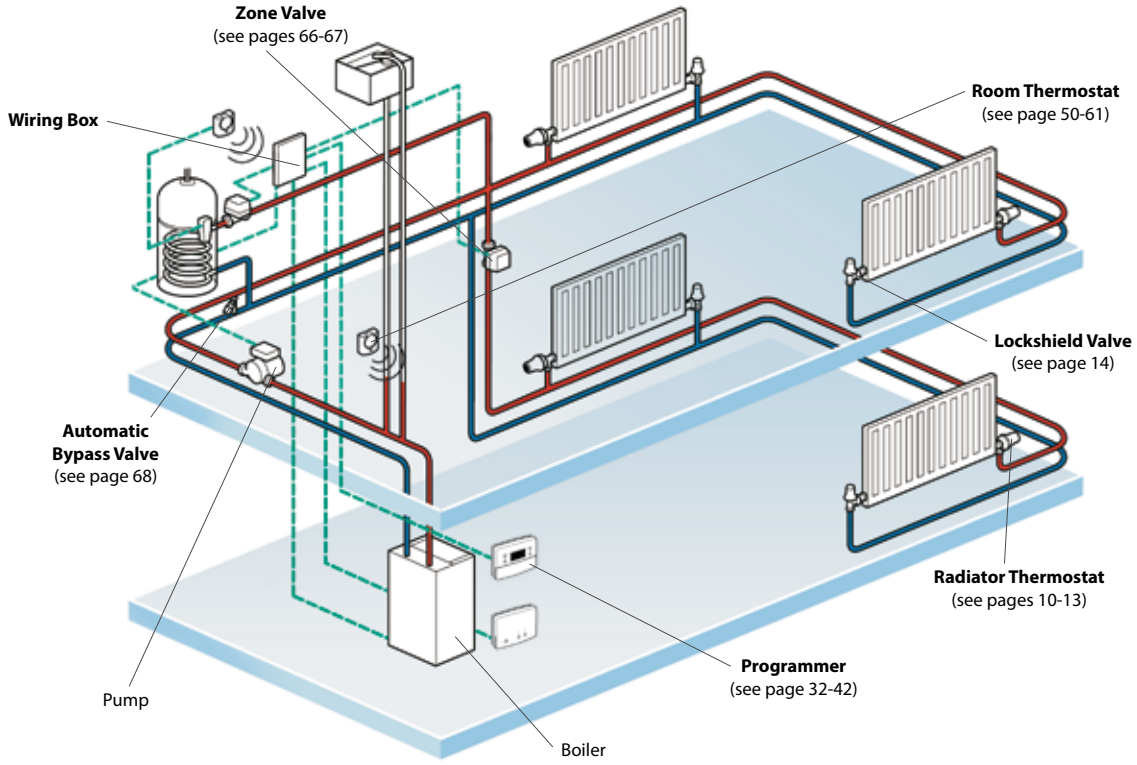


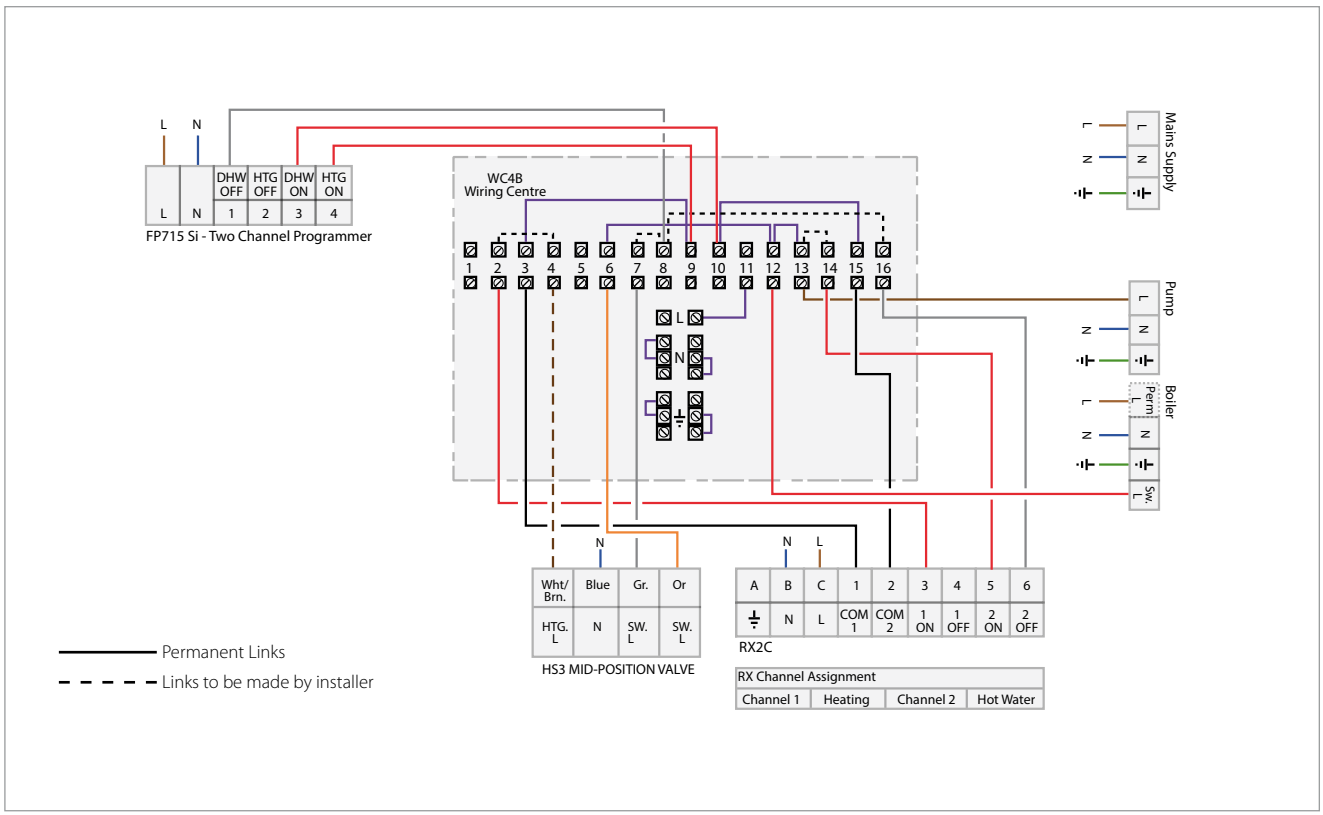


Note: For boilers with pump overrun, please refer to boiler wiring info.
For systems with 230V main switching boilers, fit a link between terminals 7-11 in wiring centre.
For systems with low voltage switching boilers, connect terminal 7 to low voltage feed on boiler (see boiler instructions for information).

Fully Pumped System

3-Port Mid-Position Valve with 2 Channel Programmer and Wireless Thermostats





Note: For boilers with pump overrun, please refer to boiler wiring info.

Radiator Thermostat Selection
and Cross Reference Chart

START

Is this a standard domestic type 2-pipe system using small or microbore copper tube?

Yes → Use a standard combined valve and sensor pack. Max. diff. pressure 0.6 bar

or

Size	Code No.	Description - RTW
15mm	013G671200	Flow selectable angle valve - integral sensor
10mm	013G712500	Flow selectable angle valve - integral sensor

or

Size	Code No.	Description - RAS-C²
15mm	013G605000	Flow selectable angle valve - integral sensor
10mm	013G605500	Flow selectable angle valve - integral sensor
15mm	013G605100	Flow selectable straight valve - integral sensor
10mm	013G605600	Flow selectable straight valve - integral sensor
15mm	013G606000	Flow selectable angle valve c/w 10mm elbow - integral sensor

Size	Code No.	Description - RAS-D²
10/15mm	013G601300	Flow selectable angle valve - integral sensor
10/15mm	013G601500	Flow selectable straight valve - integral sensor

No

Is the installation a 1-pipe or 2-pipe system?

Valve Body → Order the valve body and sensor element separately → Sensor Element

Is the radiator thermostat inaccessible (e.g. behind a panel, at high level etc.)?

Yes → Use a wall adjuster (remote setting) element

Code No.	Capillary Length
013G506200	2m
013G506500	5m
013G506800	8m

1-pipe → RA-G Range

What valve pattern is required - straight or vertical angle?

Size	Straight Code No.	Vertical Angle Code No.
1/2"	013G167500	013G167600
3/4"	013G167700	013G167800
1"	013G167900	013G168000

Refer to pages 5-27 for further ordering details. For full specification please refer to the Danfoss Radiator Thermostats sales brochure and datasheet.

2-pipe → RA-FN Range

What valve pattern is required - straight or vertical angle?

Size	Horizontal Angle Code No.	Straight Code No.	Vertical Angle Code No.
3/8"	013G014100	013G002200	013G002100
1/2"	013G014900	013G008400	013G002300
3/4"	013G014500	013G002600	013G002500
1"	N/A	013G002800	013G002700

Refer to page 22 for further ordering details

RA-N Range

Valves with pre-setting. Options as RA-FN, see page 22.

Is the radiator thermostat likely to be influenced by more than just room temperature (e.g. local heat traps caused by curtains, furniture, etc. or rising heat from a hot vertical angled valve body)?

Yes → Use an remote (0-2m capillary) sensor

Is there a requirement for tamper-proofing?

Yes → Tamperproof 013G292000 / 013G292200

No

Is there a requirement for a low temperature setting range (e.g. commercial applications?)

Yes → Commercial (low temp.) 013G291400 / 013G291600

No

Is there a requirement for range locking and/or limiting?

Yes → Commercial (high temp.) 013G291000 / 013G299000

No

Use the standard integral (built-in) RAS-D² sensor → 013G617600

Use the standard integral (built-in) RAS-C² sensor → 013G604000

No → Use an internal built-in sensor

Is there a requirement for tamper-proofing?

Yes → Tamperproof 013G292000 / 013G292200

No

Is there a requirement for a low temperature setting range (e.g. commercial applications?)

Yes → Commercial (low temp.) 013G291400 / 013G291600

No → 013G291200

Commercial Radiator Thermostat
Selection Guide

Key

★	*Approved combination* *Refer to notes for any restrictions/advice*
1	*Mount sensor horizontally*
2	*Consider use of remote sensor to improve performance*
3	*Remote sensor is recommended*
4	*Valve body flow selector must be commissioned*

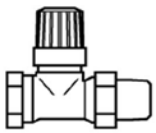
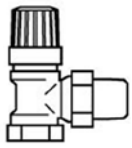
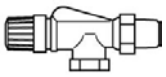
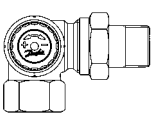
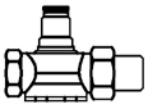
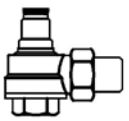
Description

Model

Codes

Temperature Range

Valve Options

			Size	Dynamic Valves		Standard Valves		Valves with pre-setting	
				Type	Code	Type	Code No.	Type	Code No.
2-Pipe System	Straight		8/10mm	-	-	RA-FS 15	**013G628300**	-	-
			15mm	-	-	RA-FS 15	**013G628100**	-	-
			½″	RA-DV 15	**013G772400**	RA-FN 10	**013G002200**	RA-N 10	**013G003200**
			½″ / 15mm	-	-	RA-FN 15	**013G002400**	RA-N 15	**013G003400**
			¾″	RA-DV 20	**013G772600**	RA-FN 15	**013G008400**	RA-N 15	**013G0034AA**
			1″	-	-	RA-FN 20	**013G002600**	RA-N 20	**013G003600**
			⅜″	RA-DV 10	**013G772200**	RA-FN 25	**013G002800**	RA-N 25	**013G003800**
	Vertical Angle		½″	RA-DV 15	**013G772300**	RA-FN 10	**013G002100**	RA-N 10	**013G003100**
			½″ / 15mm	-	-	RA-FN 15	**013G002300**	RA-N 15	**013G003300**
			¾″	-	-	RA-FN 15	**013G0023AA**	RA-N 15	**013G0033AA**
			1″	-	-	RA-FN 20	**013G002500**	RA-N 20	**013G003500**
			⅜″	RA-DV 10	**013G772100**	RA-FN 25	**013G002700**	RA-N 25	**013G003700**
	Horizontal Angle		½″	RA-DV 15	**013G771000**	-	-	-	-
			½″ / 15mm	-	-	-	-	RA-N 10	**013G015100**
			¾″	RA-DV 20	**013G772500**	RA-FN 15	**013G014900**	RA-N 15	**013G015300**
			1″	-	-	RA-FN 20	**013G014500**	RA-N 20	**013G015500**
			⅜″	RA-DV 10	**013G770900**	RA-FN 10	**013G014100**	-	-
	Side Angle		⅜″	-	-	-	-	RA-N 10R	**013G023100**
			⅜″	-	-	-	-	RA-N 10L	**013G023200**
			½″	-	-	-	-	RA-N 15R	**013G023300**
			½″	-	-	-	-	RA-N 15L	**013G023400**
1-Pipe System	Straight		½″	-	-	RA-G 15	**013G167500**	-	-
			¾″	-	-	RA-G 20	**013G167700**	-	-
			1″	-	-	RA-G 25	**013G167900**	-	-
	Vertical Angle		½″	-	-	RA-G 15	**013G167600**	-	-
			¾″	-	-	RA-G 20	**013G167800**	-	-
			1″	-	-	RA-G 25	**013G168000**	-	-

	Built-in Sensors				Remote Sensors (0-2m)			2/5/8m Wall Adjusters
	Standard	Standard Click Mount	Low Temp.	Tamperproof	Standard	Low Temp.	Tamperproof	
	 RA2910	 RA2990	 RA2914	 RA2920	 RA2912	 RA2916	 RA2922	 RA5062 RA5065 RA5068 RA5075
	013G291000	**013G299000**	**013G291400**	**013G292000**	**013G291200**	**013G291600**	**013G292200**	**013G506200 013G506500 013G506800 013G507500**
	5-26°C	5-26°C	5-22°C	5-26°C	5-26°C	5-22°C	5-26°C	6-28°C
	Sensor Options							
	4 ★	4 ★	4 ★	4 ★	4 ★	4 ★	4 ★	4 ★
	1 ★	1 ★	1 ★	1 ★	★	★	★	★
	2 ★	2 ★	3 ★	2 ★	★	★	★	★
	★	★	★	★	★	★	★	★
	★	★	★	★	★	★	★	★
	1 ★	1 ★	1 ★	1 ★	★	★	★	★
	2 ★	2 ★	3 ★	2 ★	★	★	★	★

Literature Service
Order Form

Product Range	Type	Part No.	Quantity
Domestic Product Selection Guide	Catalogue	028	
Commercial Product Selection Guide	Catalogue	026	
Radiator Thermostats			
RTW Revolver Radiator Thermostats	Sales Leaflet*	141	
RAS-C² Revolver Radiator Thermostats, incl. push-fit versions	Sales Leaflet*	250	
RAS-D² Domestic Revolver Radiator Thermostats, incl. push-fit versions	Sales Leaflet*	336	
Dynamic Valve	Sales Leaflet*	127	
RA2000 Commercial Radiator Thermostats	Catalogue	410	
RA2000 Commercial Radiator Sensors	Datasheet	VDVBE122	
RA-FN and RA-G Commercial Valve Bodies	Datasheet	VD51Q102	
RA-N Commercial Valve Bodies	Datasheet	VD51G802	
RLV-D Domestic Lockshield Valves, including push-fit versions	Datasheet	VD35E202	
RLV Commercial Lockshield Valves	Datasheet	VD35D102	
H Pieces and Sensors	Datasheet	VD35C102	
Bathroom Solutions - RA-URX Towel Rail	Sales Leaflet	580	
Bathroom Solutions - RA-URX Towel Rail	Datasheet	VDUVV202	
Replacement Sensors RA-V & RA-VL	Datasheet	VDULY102	
Time Controls			
MK18 Time Controls - TS715 Si, CP715 Si & FP715 Si	Sales Leaflet	334	
MK18 Time Controls, Compatibility Guide	Sales Leaflet	196	
FP975 Replacement Time Controls	Datasheet	208	
FP735Si 3-Channel Programmer	Sales Leaflet	115	
GP Time Controls - 102, 102E7, 103 & 103E7	Sales Leaflet	582	
SET Range - SET1E, SET2E, SET3E & SET3M	Sales Leaflet	188	
MK3 Programmers - 3020P, 3060 & 4033	Datasheet	040	
Commercial Time Controls - MK8	Sales Leaflet	606	
Electric Thermostats			
TPOne Programmable Room Thermostats	Sales Leaflet*	183	
TP5000 Si Programmable Room Thermostats	Sales Leaflet*	296	
TP7001 Programmable Room Thermostats	Sales Leaflet*	057	
TP9000 Programmable Thermostat with Hot Water Time Control	Sales Leaflet*	692	
RET1000/RET2000 Sales Leaflet	Sales Leaflet*	113	
RMT/RET Room Thermostats	Sales Leaflet*	584	
RET230 Electronic Room Thermostats with Function Switches	Sales Leaflet*	592	
RET230 HC and HCW Heat/Cool Thermostats	Datasheet	660	
RET230P Electronic Room Thermostat	Datasheet	752	
FlatStat Flush Mount Thermostat	Sales Leaflet*	720	
ORT Modulating Thermostats	Sales Leaflet*	150	
CET2000B-RF Cylinder Thermostat	Sales Leaflet*	176	
Cylinder, Pipe & Frost Thermostats - ATC, ATP, ATF and RET230F	Datasheet	374	
Immersion Thermostats - ITC, ITL and ITD	Datasheet	374	
Underfloor Heating Controls			
Underfloor Heating Product and System Guide	Catalogue	438	
CF2 2-Way Wireless Floor Heating Control System	Sales Leaflet*	882	
BasicPlus2	Datasheet	VDCUC202	
FH-WC 230V Hard Wired Zone Control	Datasheet	063	
FH-WC 24V Hard Wired Zone Control	Datasheet	065	
FH-BU Wireless Zone Control	Datasheet	622	
FHV Valves for Underfloor Heating	Sales Leaflet*	476	
FHF-F Floor Heating Manifold (Brass)	Datasheet	VDUDO112	
FBH-F Floor Heating Manifold (Stainless Steel)	Datasheet	VDUDR302	
Motorised Valves and Other Controls			
Control Packs	Sales Leaflet*	120	
Part L Catalogue	Catalogue	021	
Wiring Centre WC4B	Instructions	39917	
H Series Motorised Valves	Sales Leaflet*	192	
Domestic Bypass Valves AVDO	Datasheet	062	
Domestic Bypass Valves ARV22	Datasheet	380	
Thermal Actuators TWA	Datasheet	VDSAP112	
AB-QM Balancing Valves	Datasheet	VDA2W712	
AB-QM Balancing Valves	Sales Leaflet	VBA2Z102	
Thermostatic Cylinder Controls RAVI	Datasheet	240	
Climate Control Range - FEK, FEV and FED	Catalogue	346	

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