

Issue 3: 10/21

## **Hansen HOT Thermostatic 3-way Valves**

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#### 1. About this Publication

These instructions have been prepared according to the following standards:

- BS EN ISO 11442: Technical product documentation.
   Document management;
- BS EN ISO 12100: Safety of machinery General principles for design - Risk assessment and risk reduction;
- BS EN 62023: Structuring of technical information and documentation;
- BS EN 82079-1: Preparation of instructions for use.
   Structuring, content and presentation. General principles and detailed requirements.

### 1.1. Safety Warnings and Symbols

The system of safety warnings and symbols is based on:

- BS EN ISO 7010: Graphical symbols. Safety colours and safety signs. Registered safety signs;
- BS EN 82079-1: Preparation of instructions for use.
   Structuring, content and presentation. General principles and detailed requirements.



This indicates a hazard with a high level of risk, which if not avoided, will result in death or serious injury if instructions, including recommended precautions, are not followed.

# **WARNING**

This indicates a hazard with a medium level of risk, which if not avoided, will result in death or serious injury if instructions, including recommended precautions, are not followed. In addition, there is a high risk of damage to the component, product or process.

# **A** CAUTION

This indicates a hazard with a low level of risk, which if not avoided, will result in minor or moderate injury if instructions, including recommended precautions, are not followed. In addition, there is a potential risk of damage to the component, product or process.

NOTE: Draws attention to important additional information.

#### 1.2. Units of Measurement

Quantities are expressed in SI units or SI derived units; refer to J & E Hall International Standard JEH-ES-02 Guide to the International System of Units (SI).

#### 1.3. Terminology

Terminology, abbreviations and acronyms are those currently in use throughout the refrigeration and air conditioning industry; refer to J & E Hall International Standard JEH-ES-01 Definition of Terms and Acronyms Used in the Refrigeration Industry.

#### 1.4. Additional Copies

Obtain additional copies of these instructions from J & E Hall International; go to www.jehall.com.

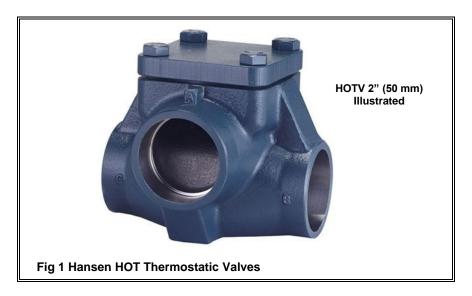
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## 2. Application

The Hansen HOT thermostatic valve is a three-way mixing valve used to accurately control the oil delivery temperature to screw compressors, or for temperature control in other oil cooling circuits within the appropriate design parameters.

The location of the thermostatic valve and the model fitted can be found from the system schematic flow diagram, instrument schedule, or from Part A: Specification in Section 1 of the plant instruction manual.



#### 3. Technical Data

Parameter	Details			
Refrigerants	Refrigeration oils used in systems containing chlorofluorocarbon refrigerants, hydrofluorocarbon refrigerants, R744 (CO <sub>2</sub> ) or R717 (ammonia)			
Safe working pressure	28.0 bar g (standard), 41.0 bar g (special)			
Temperature range	-51.0 °C to +115.0 °C			
Control temperature range	±6.0 °C of nominal temperature			
Table 1 Technical D	ata			

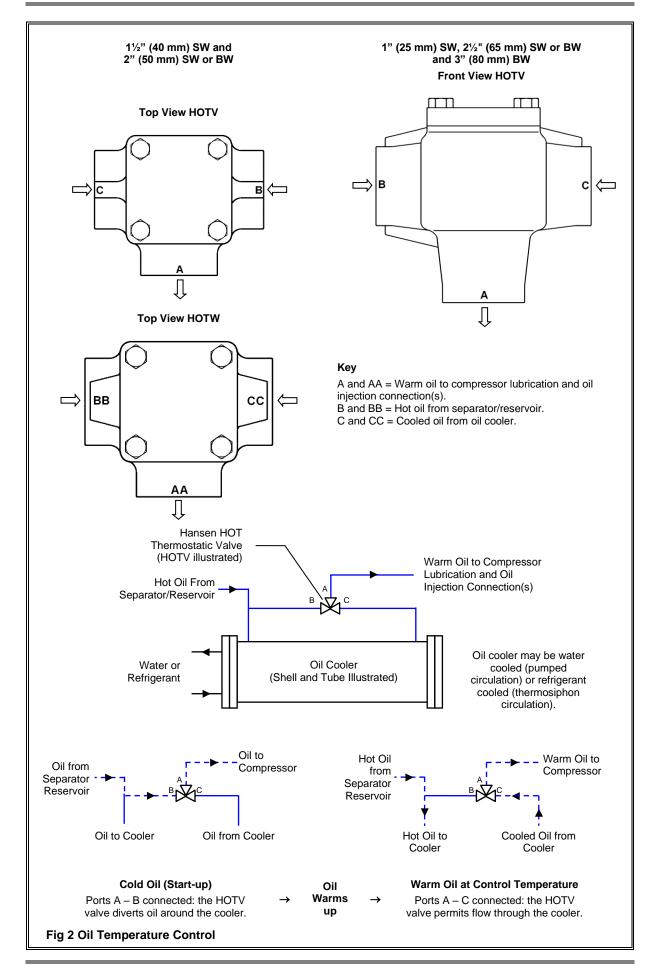
### 4. Operation

Oil for injection and compressor lubrication is cooled to within the design limits by passing through a heat exchanger. A shell and tube oil cooler is illustrated in Fig 2, however, a plate heat exchanger may also be used for this purpose. The heat exchanger may be cooled by water or glycol, or refrigerant cooled (thermosiphon circulation); alternatively an air cooled oil cooler may be used.

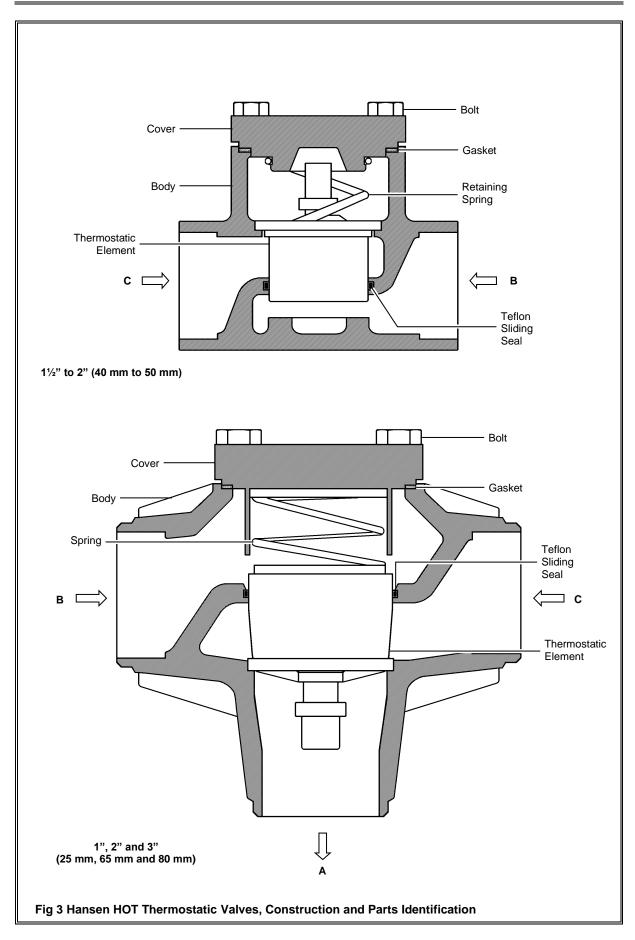
Overcooling the oil, for example, starting the compressor when the oil is relatively cool, is prevented by the HOT thermostatic 3-way valve located in a bypass line between the cooler oil inlet and outlet. There are two flow paths through the valve: B to A and C to A. When the compressor starts and the oil is cold ports A - B are connected, lubricating oil is bypassed around the cooler. After the compressor has had sufficient time to warm up and the oil is hot, the flow path between ports A - C begins to open permitting flow through the cooler. The valve's thermostatic element modulates flow to maintain oil temperature at the design condition.

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Connection			Temperature						
Socket Weld	Butt Weld	Size	Α	В	D	E	F	G	Н
			54.0° C	49.0° C	60.0° C	46.0° C	66.0° C	77.0° C	43.0° C
		1" (25 mm)		Х	Х			Х	Х
ноту		1½" (40 mm)	Х	Х	Х	Х	Х	Х	Х
	LIOTA /D	2" (50 mm)	Х	Х	Х	Х	Х	Х	Х
	HOTVB	2½" (65 mm)	Х	Х	Х			Х	
	HOTV	3" (80 mm)	Х	Х	Х			Х	
LIOTIN		1½" (40 mm)	Х	Х	Х	Х	Х	Х	Х
HOTW		2" (50 mm)	Х	Х	Х	Х	Х	Х	Х

The valve can be specified with a small leak-hole drilled between ports B-C. The leak hole provides limited fluid flow to warm up the cooler at the beginning of the cooling cycle.

#### 5. Installation

Dirt and other foreign matter is prevented from entering the valve by protective covers fitted to the three connections. These covers should remain in place until immediately before the valve is installed.

The valve can be mounted in any position, however, oil spills can be avoided when servicing if the valve is mounted vertically with the cover uppermost. Avoid a location at the high point of the system or a gas pocket may form. Allow 160 mm clear space above the valve cover to permit thermostatic element removal.

Remove the cover, gasket, spring and thermostatic element before welding the valve body into line. Wrap the valve with wet rag to prevent overheating. Remove any dirt, scale or weld from the line; this is an essential precaution to prevent these contaminants entering the system.

Reassemble components. Tighten the cover bolts evenly, alternately and a little at a time to the correct torque value.

1" (25 mm), 11/2" (40 mm) and 2" (50 mm): 80 Nm.

21/2" (65 mm) and 3" (80 mm): 170 Nm.

After installation, check the cover/body joint for leaks.

#### 6. Maintenance

Clean the oil strainer (if fitted) and renew the oil filter element after the first 200 hours operation, then annually, or at intervals of 5,000 operating hours, whichever is the sooner. Experience of running the plant may suggest that more frequent intervals are necessary.

## 7. Servicing



The thermostatic valve is in direct contact with the system environment. DO NOT attempt to dismantle the valve until it has been isolated and that part of the system cleared of oil/refrigerant.

Suitable protective clothing must be worn; this should include goggles, gloves etc., and, on a system using ammonia refrigerant, a suitable respirator.

- (a) Stop the compressor.
- (b) Isolate the electrical supply to the control panel and compressor drive motor to prevent the compressor from accidentally restarting.
- (c) Close stop valves in the line either side of the thermostatic valve.



## **WARNING**

After the thermostatic valve has been isolated, the oil contained inside will remain hot enough to cause burns for some time afterwards.

Always allow sufficient time for the oil to cool down so that it is cool enough not to be a danger (less than 35°C is recommended).

- (d) If a vent valve is provided in the oil line, position a suitable container underneath to catch any escaping oil. Relieve the pressure in the oil line by slowly opening the vent valve.
- (e) Position a suitable container underneath the thermostatic valve to catch the escaping oil.
- (f) If the thermostatic valve is choked with dirt, it may retain liquid refrigerant under pressure inside the valve. This is especially likely if a vent valve is not provided in the line to relieve any residual pressure.

Break the body/cover joint by slackening the cover bolts.

# **WARNING**

As a safety precaution, DO NOT unscrew and remove all the cover bolts at the same time.

Leave two diametrically opposite bolts in place while the rest are unscrewed and removed, then slowly slacken-off the remaining two fastenings and ease the cover from its joint face. This procedure will release any residual pressure at a controlled rate.

Great care MUST be exercised. Suitable protective clothing must be worn; this should include goggles, gloves etc., and on a system using ammonia, a suitable respirator.

- (g) Remove the spring and thermostatic element.
  - Use a wad of lint-free rag to remove dirt, sediment etc., from inside the valve body. Check parts for damage and wear.
  - With the valve dismantled, check the operation of the thermostatic element; refer to 8. Faults and Remedies.
  - Refit the thermostatic element and spring.
- (h) Position a new cover gasket inside the recess in the valve body. Locate the cover onto the body flange. Insert the bolts and tighten finger-tight.

Read step (i) before carrying out the remainder of this step.

Tighten the cover bolts evenly and alternately to ensure the flange and gasket seats square, to one of the following final torques:

- 1" (25 mm), 11/2" (40 mm) and 2" (50 mm): 80 Nm.
- 21/2" (65 mm) and 3" (80 mm): 170 Nm.
- (i) If there is a vent valve in the line downstream from the thermostatic valve, open the isolating stop valve in the inlet line to the valve by a quarter to half a turn. When oil begins to escape from the vent valve connection, close the vent valve.

If a vent valve is not provided, leave the cover bolts fingertight only, then open the isolating stop valve in the inlet line to the thermostatic valve by a quarter to half a turn. When oil begins to escape from the cover/body joint, close the isolating valve then tighten the cover bolts as described in step (h).

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- (j) Fully open stop valves in the line either side of the thermostatic valve.
- (k) Reinstate the electrical supply to the control panel and compressor drive motor.
- (I) Restart the plant. Check the cover/body joint for leaks.
- (m) Recheck for leaks when the plant reaches normal operating temperature.

#### 8. Faults and Remedies

If oil delivery temperature fluctuates, the thermostatic valve may be jammed with dirt. Open and clean the valve as described in 7. Servicing. Clean the oil strainer (if fitted), renew the oil filter element.

If the thermostatic valve is not jammed open or closed, suspect a faulty thermostatic element. This can be confirmed by immersing the element in hot water, checking the temperature with a thermometer and noting when the element begins to open, refer to Table 3. If the element is faulty, fit a new item.

## 9. Spares

Obtain spare parts from the address below:

J & E Hall International Hansard Gate, Fax: +44 (0) 1332-253400
West Meadows, Email: spares@jehall.co.uk
Derby, Website: www.jehall.com

DE21 6JN England

When ordering spares always quote the J & E Hall International contract number and the component serial number (if available).

#### 9.1. Complete Valve Assemblies

For available sizes, connections and part numbers refer to J & E Hall International Engineering Standard JEH-ES-06-002 Hansen Valves and Strainers.

## 9.2. Replacement Thermostatic Elements

Refer to Table 3.

Thermostatic Element Replacement Kit Comprising:  1 thermostatic element and 1 cover gasket					
Range	Nominal Temp	1" (25 mm)	1½" (40 mm) 2" (50 mm)	2½" (65 mm) 3" (80 mm)	
Н	43.0° C	N30270067	N30270079		
Е	46.0° C		N30270080		
В	49.0° C	N30270068	N30270039	N30270071	
Α	54.0° C		N30270078	N30270072	
D	60.0° C	N30270069	N30270077	N30270073	
F	66.0° C		N30270076		
G	77.0° C	N30270070	N30270075	N30270074	

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