



PXVC

Specifications, Applications, Service Instructions & Parts

PXVC UNIVERSAL CONTROLLER

**PXVC-PT, PXVC-DX, PXVC-T,
PXVC-L, PXVC-P, PXVC-CI**

INTRODUCTION

The PXVC Intelligent, single loop, PID controller is a stand-alone cabinet mounted electronic universal controller.

The Hansen PXVC controller can be configured for several different applications. The controller, with factory defaults, will give reasonably good control. If control difficulties occur during startup, it is recommended first to thoroughly check system and components for proper installation, operation, and sensor location before attempting to tune the PXVC controller.

Field alteration of the controller configuration is not recommended. Controller tuning of the P-I-D is performed in the "parameters" section and are the only parameters the user may need to optimize.

GENERAL DESCRIPTIONS

PXVC-PT (Pressure Temperature) Superheat/Subcooling Controller

The PXVC-PT controller is used in applications where the system temperatures are not less than -20°F (-28.9°C). It is factory programmed to provide precise control of the Hansen PXV pulse width expansion valve for direct expansion evaporators. The 2 inputs, pressure transducer and temperature probe, are used to determine the amount of Superheat or Subcooling in a controlled refrigeration system. The PXVC-PT pulses the PXV valve open and closed at a rate equal to the refrigerant flow necessary to maintain a set-for superheated gas leaving the evaporator. For wiring diagram refer to Hansen drawing 7000-93, -94.

PXVC-DX Control of Evaporator

The Hansen PXVC-DX Controller is used with system temperatures less than -20°F (-28.9°C). It is factory programmed to provide precise control of the Hansen PXV pulse width expansion valve for direct expansion evaporators. A 4-20 mA input signal from the Hansen HPT superheat sensor or computer output of superheat to the PXVC-DX controller which pulses the Hansen PXV valve. The valve opens and closes at a rate equal to the refrigerant flow necessary to maintain a set-for superheated gas leaving the evaporator. For wiring diagram, refer to Hansen drawings 7000-79, -80, -81, -87.

PXVC-T Temperature Control

The Hansen PXVC-T Controller is factory programmed to provide precise control of temperature in applications such as Liquid Injection or screw compressors. A temperature sensor, included, provides an input to the Hansen PXVC-T controller which pulses the Hansen PXV valve. The valve opens and closes at a rate equal to the refrigerant flow necessary to maintain a set for discharge gas temperature. For wiring diagram, refer to Hansen drawing 7000-84, -99.

PXVC-L Level Control of Flooded Evaporators

The Hansen PXVC-L Controller is factory programmed to provide precise control of liquid level in flooded evaporators, small liquid recirculators, and other refrigerant level vessels. A 4-20 mA input signal from the Hansen VLT level probe, Hansen Vari-Level with 4-20 mA, or other liquid level device to the Hansen PXVC-L controller which pulses the Hansen PXV valve. The valve opens and closes at a rate equal to the refrigerant flow necessary to maintain a set-for liquid level in the vessel. For wiring diagram, refer to Hansen drawing 7000-85.

PXVC-P Pressure Control

The Hansen PXVC-P Controller is factory programmed to provide precise control of pressure in applications such as hot gas bypass to suction of a compressor. A pressure sensor, available from Hansen, provides an input to the Hansen PXVC-P controller which pulses the Hansen PXV valve. The valve opens and closes at a rate equal to the refrigerant flow necessary to maintain a set for pressure. For wiring diagram, refer to Hansen drawing 7001-00.

PXVC-CI Control Interface

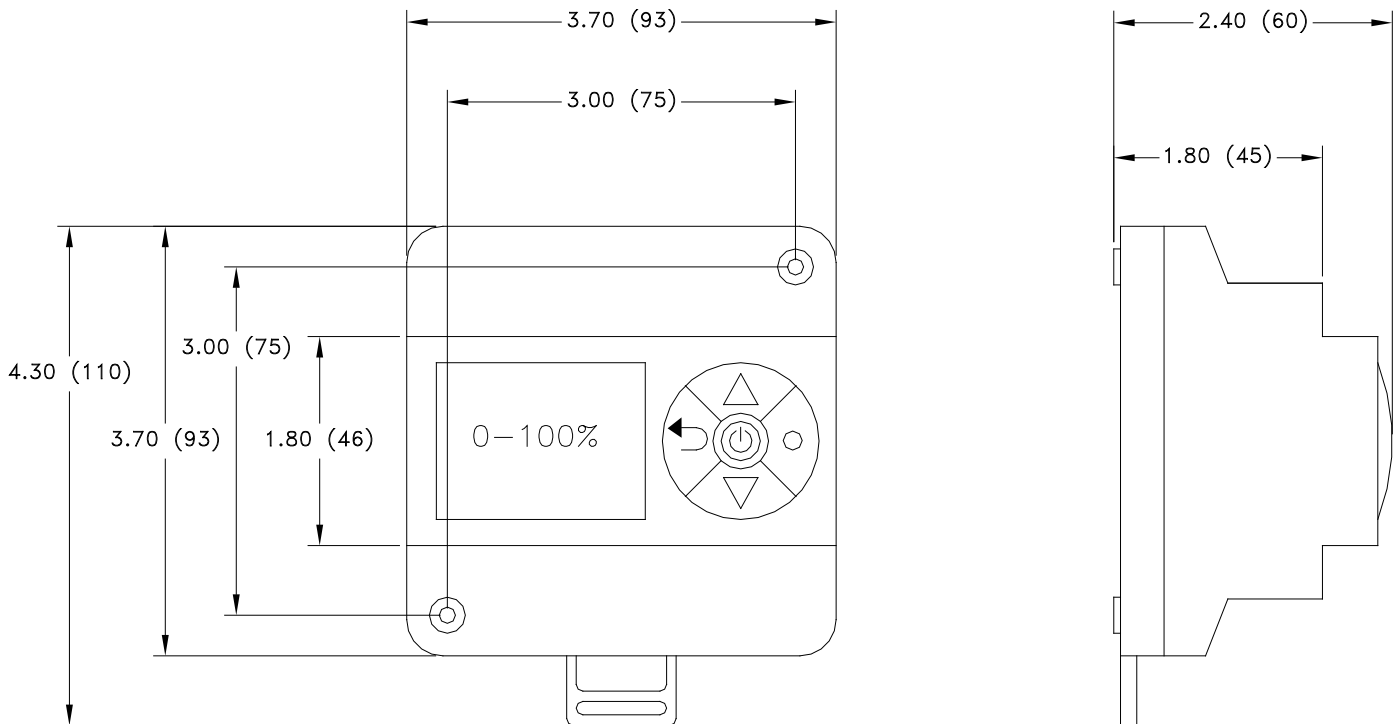
The Hansen PXVC-CI Controller is factory programmed as a signal converter for 4-20 mA input, direct acting, PWM output were 20mA = 100% ON, 12mA = 50% PWM and 4mA = 0% OFF. Allows an existing system with 4-20 mA output to be fitted with PWM valve control. For wiring diagram, refer to Hansen drawing 7000-89.

TECHNICAL SPECIFICATIONS

		PXVC-PT	PXVC-P, PXVC-T, PXVC-CI, PXVC-DX, PXVC-L
POWER SUPPLY	Operating Voltage	24V AC, 50/60 Hz $\pm 10\%$ (OR) 24VDC	
	Power Consumption	Max. 3 VA	
	Electrical Connection	Terminal Connectors, Removable AWG 24...12	
SIGNAL INPUTS	Input #1	Pressure Transducer	Model Dependent, See Wiring Diagram
	Input #2	Temperature Sensor	Dry Contact Closure
	Input #3	Dry Contact Closure	Not Available
SIGNAL OUTPUTS	Output #1	PWM*, 24...250VAC, 1A max	
	Output #2	On/Off, 24...250VAC, 1A max (Alarm)	
	Output #3	4-20 mA @ 24VDC	
ENVIRONMENT	Temperature	32...122°F (0...50°C)	
	Humidity	< 95% r.H. non-condensing	
STANDARDS	 conform according to EMC Standard 89/336/EEC EMEI Standard 73/23/EEC	EN 61 000-6-1/EN 61 000-6-3	
	Degree of Protection	NEMA1, IP30 to EN 60-529	
	Safety Class	I1 (IEC 60536)	
	Cover, back part	Fire proof ABS plastic (UL94 class V-O)	
GENERAL	Dimensions (HxWxD)	2.4x3.7x3.7" (60x93x93 (110*)mm)	
	Weight (including package)	8.5 oz (240 g)	

*Pulse width modulation

DIMENSIONS (IN, MM)



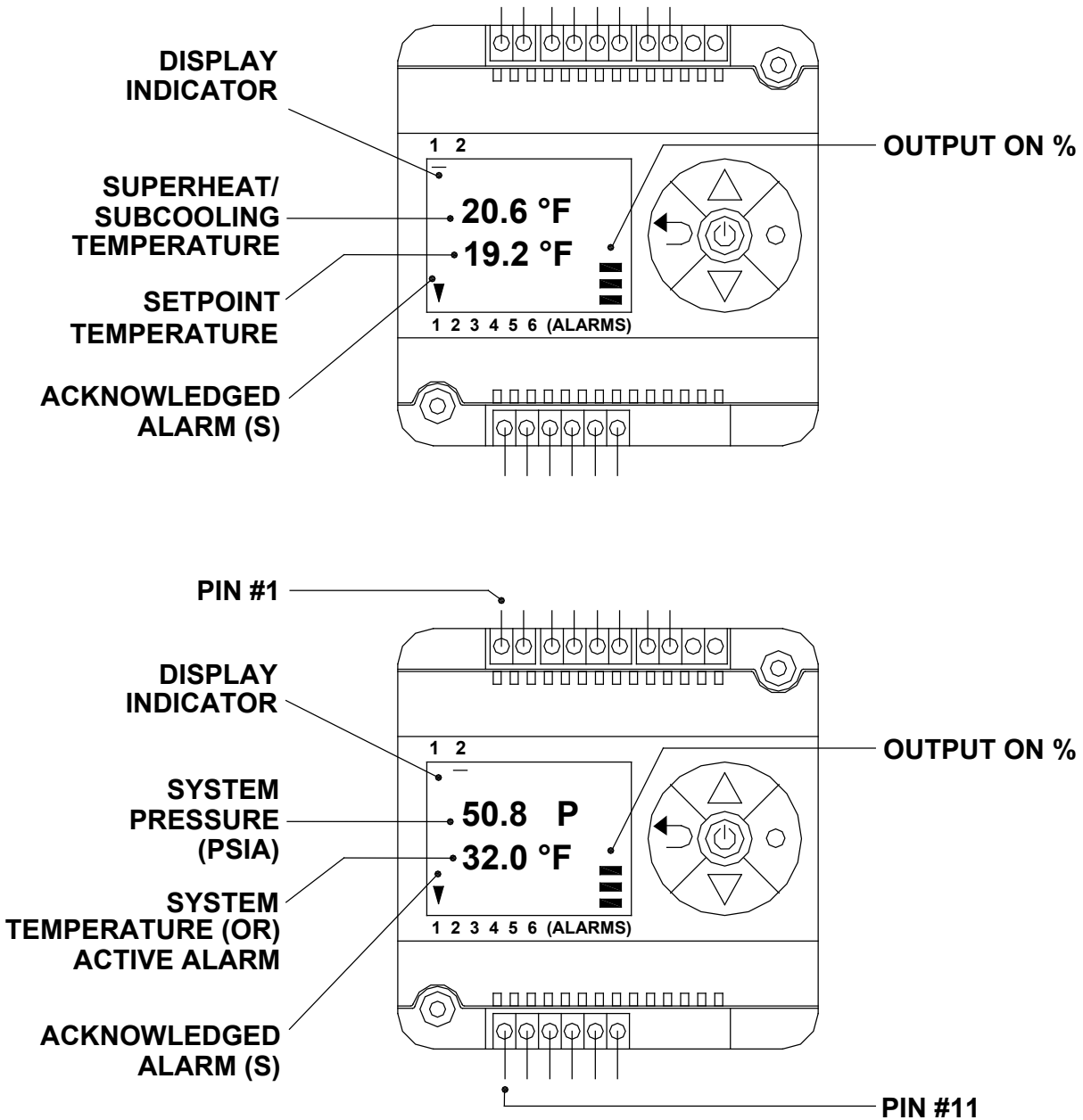
MECHANICAL DESIGN AND INSTALLATION

The controller may be mounted in any orientation by surface mounting on a wall or in a cabinet.

When mounting note the following

- The controller should not be freely accessible after mounting. A protective housing must be used if mounted outside.
- Ensure adequate air circulation to dissipate heat generated during operation.
- Local installation regulations must be observed.

DISPLAY AND KEYPAD OPERATION



PXVC-PT FUNCTION KEYS

- Center (POWER) Key: Press > 2 seconds to TURN OFF the controller; Remote Interlock must be disabled. Parameter Setting: ENTER to select menu option and ACCEPT parameter change.
- UP Key: Increase SETPOINT. Parameter Setting: SCROLL menu options and parameters.
- DOWN Key: Decrease SETPOINT. Parameter Setting: SCROLL menu options and parameters.
- Right (OPTIONS)Key: Acknowledge alarm conditions. Alarm message disabled for 15 seconds, priority 1–6. Parameter Setting: Enter to select menu options, and ACCEPT parameter change.
- Left (ESC) Key: Toggle between screens 1 and 2. Parameter Setting: Escape, menu option, discard parameter setting.

JUMPER CONFIGURATION

Jumpers are mounted vertically only. Jumpers are located on the back side of the controller. Factory defaults.

1. UI1 – Selection of input signal type:
(Pressure Transducer)
 - Middle position: current input (0...20 mA), *factory default 4-20mA*
2. UI2 – Selection of input signal type:
(Temperature Transducer)
 - Right position: RT dry-contact input, *factory default is RT*
2. UI3 – Selection of input signal type: (Interlock)
 - Right position: RT dry-contact input, *factory default is dry contact*
4. AO1 – *Selection of the analog output signal (optional 4-20mA output for SMV valve control)
 - Left position: 0...20mA analog output, *factory default is 4-20mA*

*Not normally used with Pulse Width Modulation control

SELECTION OF CONTROL VALVES AND SENSORS

Temperature Probe

- TS2, temperature sensor, PT-1000, length 2' with 6.5' cable
- IMW, temperature probe immersion well, length 4'

Pressure Transducer

- PT2, pressure transducer, -14.7–85 psig, 24VDC, 4-20mA output
- PT3 pressure transducer, -14.7–285 psig, 24VDC, 4-20mA output

PXV Control Valves

- Hansen PXV5, PXV15 or PXVW60
- Hansen HMMR/V, HA4AM, HA4AQ

POWER FAILURE

Upon power-interruption, all parameters and set-points are memorized in non-volatile memory, and therefore do not have to be re-entered.

ERROR MESSAGES

Err1: Temperature sensor faulty or missing.

Err3: A function refers to a disabled input. Disable the function or enable the input.

Err4: Failure of an internal component required for operation. Product must be replaced.

ELECTRICAL CONNECTIONS

In an extremely impaired EMC environment use only shielded cables for input/output connections.

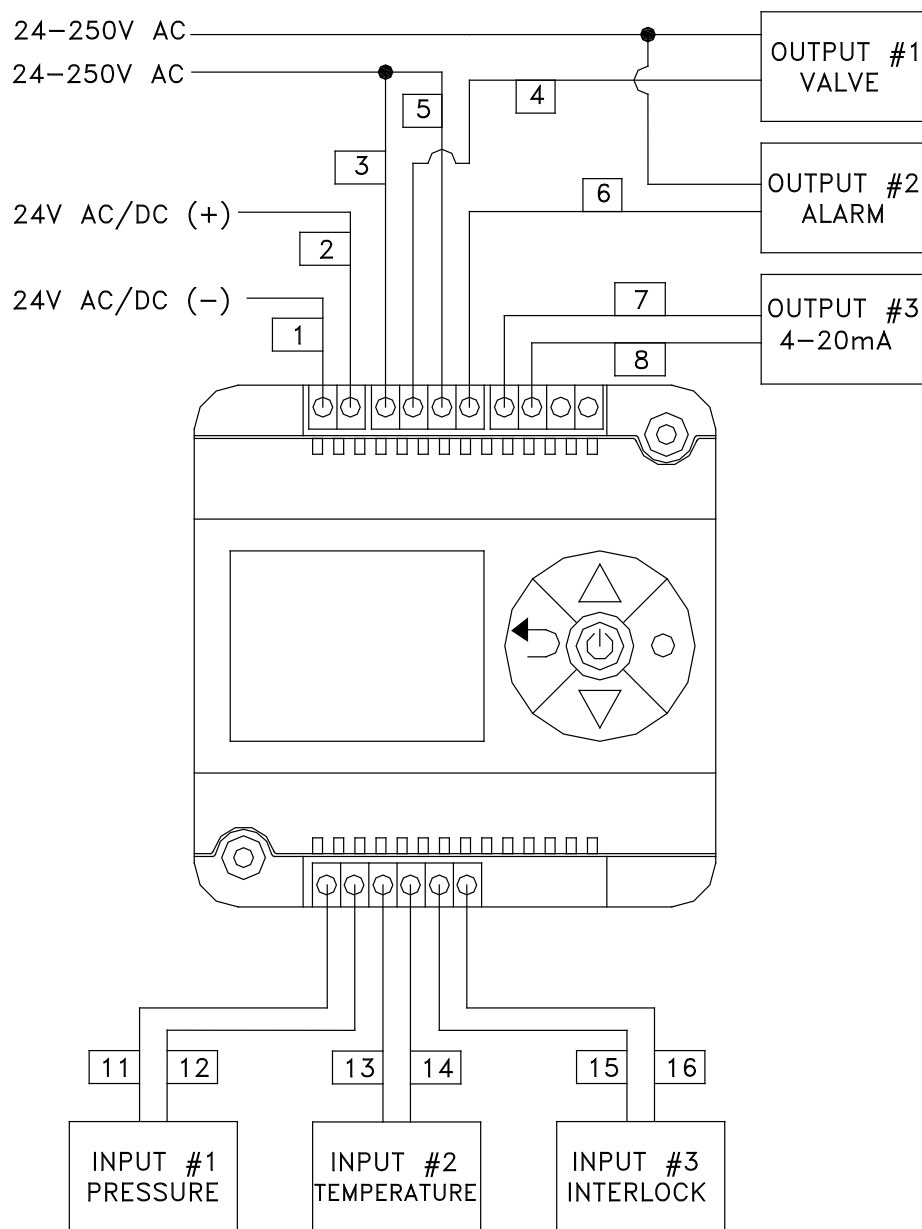
Use safety insulating transformers with double insulation; they must be designed for 100% ON-time.

No PWM control for VDC coils.

OPTIONAL REMOTE INTERLOCK

The remote interlock is designed to disable flow thru the PXV5, PXV15 or PXVW60 valve when the interlock is connected to an external dry contact, normally open device, such as a thermostat or shut-down switch. Pre-programmed on input pins (15, 16). Disconnecting power to the controller for the purpose of disabling flow is not recommended.

WIRING DIAGRAM

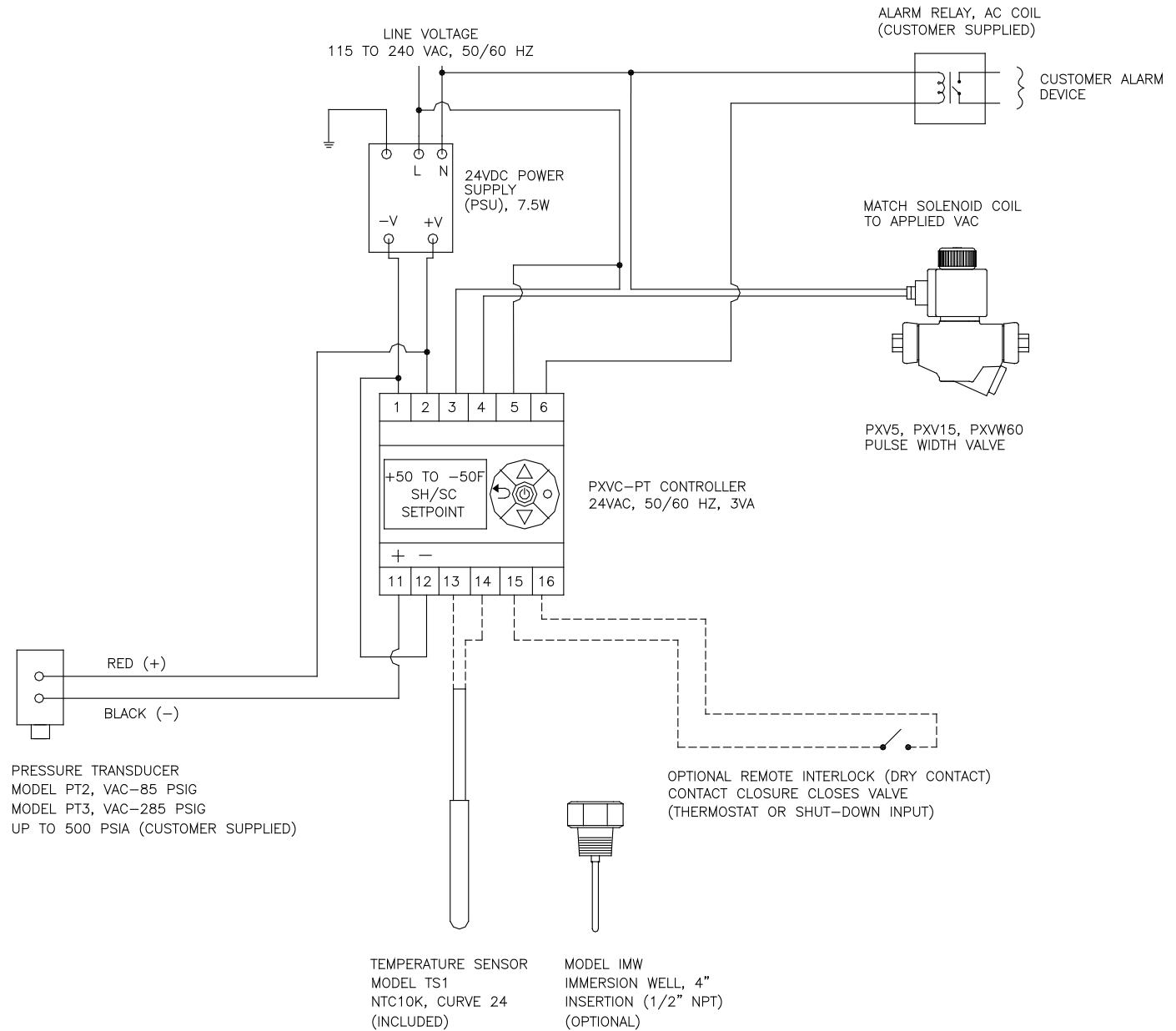


PXVC-PT TERMINAL DESCRIPTIONS

Terminal 1	Power Supply	24V AC/DC (-)
Terminal 2	Power Supply	24V AC/DC (+)
Terminal 11, 12	Input 1:	Hansen PT2 (-14.7 to 85 psig/6.8 bar) <i>Default</i> OR Hansen PT3 (-14.7 to 285 psig/20.6 bar) (+24VDC Loop Power Source needed)
Terminal 13, 14	Input 2:	Temperature Probe, Hansen TS2 (PT1000 included)
Terminal 15, 16	Input 3:	Optional Remote Interlock, Dry Contact
Terminal 3, 4	*Output 1, Triac:	Pulse-Width Modulated Valve Output for Hansen PXV Valve
Terminal 5, 6	*Output 2, Triac:	Alarm(s)
Terminal 7, 8	Output 3, 4-20mA:	Alternate 4-20mA Output for Hansen SMV Valve (No Loop Power Source needed)

* INTERNAL SNUBBERS

TYPICAL WIRING DIAGRAM **DX Evaporator Control (PXVC-PT)**



FACTORY DEFAULT USER PARAMETERS (PASSWORD 0009)

PARAMETER	DESCRIPTION	RANGE	DEFAULT
UP 00	Enable access to operation modes	ON, OFF	ON
UP 01	Enable access to set points	ON, OFF	ON
UP 02	OFF = Not Active	OFF	OFF
UP 03	OFF = Not Active	OFF	OFF
UP 04	OFF = Not Active	OFF	OFF
UP 05	State after power failure: 0 = Off, 1 = On, 2 = State before power failure	0, 1, 2	2
UP 06	OFF = Not Active	OFF	OFF
UP 07	Celsius or Fahrenheit: ON = Fahrenheit, OFF = Celsius	ON, OFF	ON (°F)
UP 08	Show standard display while no key is pressed	ON, OFF	ON
UP 09	Select contents of large LCD display in standard mode: 00 = OFF 03 = Analog Output 01 = Input 1 04 = Binary Output 02 = Setpoint	0...4	1
UP 10	Select ID of contents of upper digit display	0...4	1
UP 11	Select contents of lower digit display in standard mode	0...5	1
UP 12	Select ID of contents of lower digit display	0...4	2
UP 13	Select analog output for display in vertical bar: 00 = OFF 03 = FO1 01 = AO1 04 = Output Ip1 02 = AO2 05 = Output Ip2	0...5	0
UP 14	OFF=Not Active	OFF	OFF
UP 15	ON = Alarms blink after being active and need to be confirmed OFF = Alarms are only shown when they are active	ON, OFF	ON
UP 16	OFF = Not Active	OFF	OFF
UP 17	0 = Not Active	0	0
UP 18	Backlight 0 = OFF 1 = ON 2 = timeout 30 seconds	0...2	2
Fu 12	Remote Interlock: 0 = Disabled, 1 = Enabled	0, 1	1

PID (PASSWORD 0005)

PARAMETER	DESCRIPTION	RANGE	DEFAULT
PId0	P-band	PER INPUT	20°F
PId1	Integral gain (0, 1 steps) low = slow reaction, high = fast reaction	0-25.5	0.1
PId2	Measuring Interval Integral (seconds) low = fast reaction, high value = slow reaction	0-255	1.5 sec.

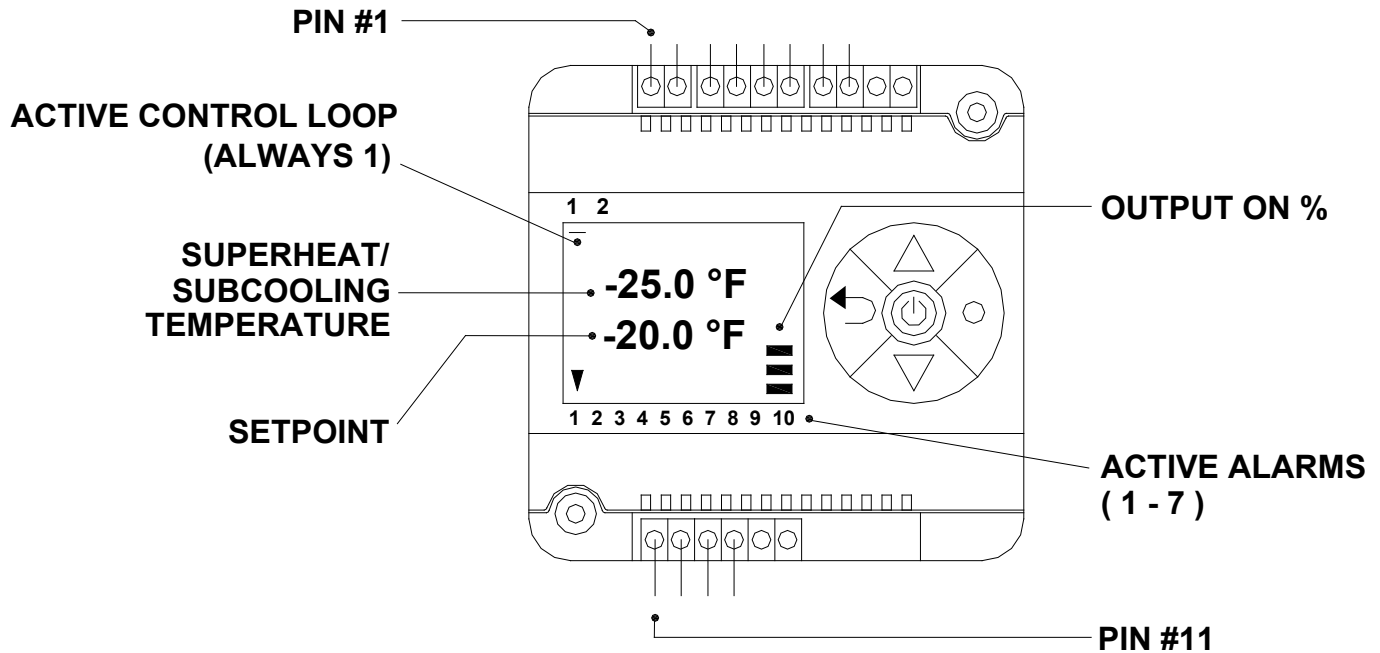
ALARMS (PASSWORD 0015)

PARAMETER	DESCRIPTION	RANGE	DEFAULT
AL00	Alarm 1 superheat/subcooling too low enable	OFF, ON	OFF
AL01	Alarm 1 superheat/subcooling too low limit	-70...250°F	40°F
AL02	Alarm 2 superheat/subcooling too high enable	OFF, ON	OFF
AL03	Alarm 2 superheat/subcooling too high limit	-70...250°F	130°F
AL04	Alarm 1 & Alarm 2 differential sub cooling alarms	0...100°F	10°F
AL05	Alarm 3 process pressure too low enable	OFF, ON	OFF
AL06	Alarm 3 process pressure too low limit	0...300	25
AL07	Alarm 4 process pressure too high enable	OFF, ON	OFF
AL08	Alarm 4 process pressure too high limit	0...300	300
AL09	Alarm 3 & Alarm 4 differential process pressure alarms	0...100°F	10°F
AL10	Alarm 5 process temperature too low enable	OFF, ON	OFF
AL11	Alarm 5 process temperature too low limit	-70...250°F	56°F
AL12	Alarm 6 process temperature too low enable	OFF, ON	OFF
AL13	Alarm 6 process temperature too high limit	-70...250°F	124°F
AL14	Alarm 5 & Alarm 6 differential process temperature alarms	0...100°F	20°F

DIAGNOSTICS (PASSWORD 0020)

PARAMETER	DESCRIPTION	RANGE	DEFAULT
diA0	PWM manual control	0...100%	0%
diA1	Alarm output manual control	ON, OFF	OFF
diA2	4-20mA output manual control	0...100%	0%
diA3	UI1: display pressure input	0...100PSI	-
diA4	UI2: display temperature input	-70...250°F	-
diA5	UI3: display stale of interlock input to disable do1	0...100°F	-
diA6	UI4: display superheat temperature	-70...250°F	-

DISPLAY AND KEYPAD OPERATION



PXVC FUNCTION KEYS

- Center button (POWER): Pressing the button for more than 2 seconds switches the unit off — with Remote Interlock disabled.
- Up button: Increment set points and parameters, select menu options.
- Down button: Decrement set points and parameters, select menu options.
- Right button: Access for different control modes. Advance setting.
- Left button: Access for different control modes. Acts as escape to leave menu levels or discard parameters.

JUMPER CONFIGURATION

Jumpers are mounted vertically only. Jumpers are located on the back side of the controller. Factory defaults.

1. UI1 – Selection of input signal type:
(Pressure Transducer)
 - Middle position: current input (0...20 mA), *factory default 4-20mA*
2. UI2 – Selection of input signal type:
(Temperature Transducer)
 - Right position: RT dry-contact input, *factory default is RT*
3. UI3 – Selection of input signal type: (Interlock)
 - Right position: RT dry-contact input, *factory default is dry contact*
4. AO1 – *Selection of the analog output signal control
(optional 4-20mA output for SMV valve control)
 - Left position: 0...20mA analog output, *factory default is 4-20mA*

*Not normally used with Pulse Width Modulation control

SELECTION OF CONTROL VALVES AND SENSORS

Temperature Probe

- TS1, temperature sensor, NTC10K, length 2' with 6.5' cable
- IMW, temperature probe immersion well, length 4'

Pressure Transducer

- PT2, pressure transducer, -14.7–85 psig, 24VDC, 4-20mA output
- PT3 pressure transducer, -14.7–285 psig, 24VDC, 4-20mA output

PXV Control Valves

- Hansen PXV5, PXV15 or PXVW60

Subheat/Subcooling

- Hansen HPT

Level Control

- Hansen VLT probe or similar
- Hansen HMMR/V, HA4AM, HA4AQ

POWER FAILURE

Upon power-interruption, all parameters and set-points are memorized in non-volatile memory, and therefore do not have to be re-entered.

ERROR MESSAGES

Err1: Temperature sensor faulty or missing.

Err3: A function refers to a disabled input. Disable the function or enable the input.

Err4: Failure of an internal component required for operation. Product must be replaced.

ELECTRICAL CONNECTIONS

In an extremely impaired EMC environment use only shielded cables for input/output connections.

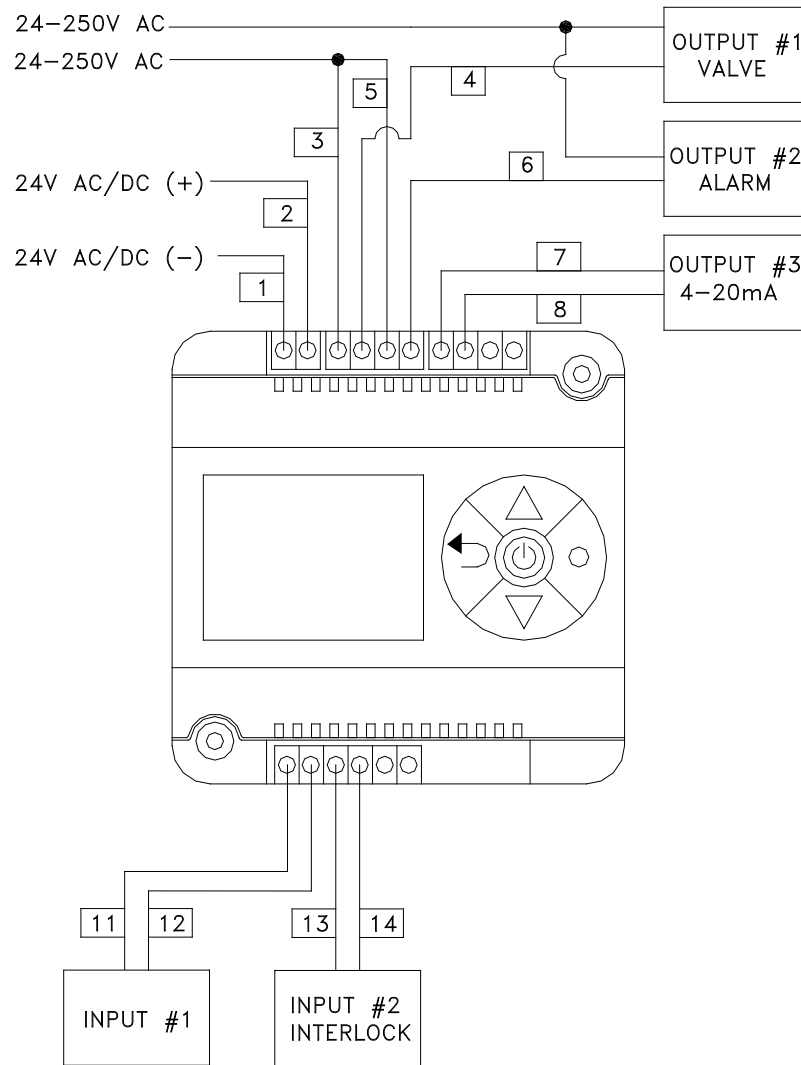
Use safety insulating transformers with double insulation; they must be designed for 100% ON-time.

No PWM control for VDC coils.

OPTIONAL REMOTE INTERLOCK

The remote interlock is designed to disable flow thru the PXV5, PXV15 or PXVW60 valve when the interlock is connected to an external dry contact, normally open device, such as a thermostat or shut-down switch. Pre-programmed on input pins (13, 14). Disconnecting power to the controller for the purpose of disabling flow is not recommended.

PXVC-DX, PXVC-T, PXVC-L, PXVC-P, PXVC-CI



PXVC TERMINAL DESCRIPTIONS

Terminal 1	Power Supply	24V AC/DC (-)
Terminal 2	Power Supply	24V AC/DC (+)
Terminal 11, 12	Input 1:	- P: Hansen PT2 (-14.7 to 85 psig/6.8 bar) OR Hansen PT3 (-14.7 to 285 psig/20.6 bar) <i>Default</i> Loop Power Source needed (+24VDC) - T: Temperature, Hansen TS1 Sensor (Included) Hansen IMW, 4" Immersion Well (Purchase Separately) - CI: System Controller (Custom Supplied) - DX: Hansen HPT717 (+24VDC Loop Power Source needed) - L: Hansen VLT or Similar (+24VDC Loop Power Source needed)
Terminal 13, 14	Input 2:	Optional Remote Interlock, Dry Contact
Terminal 3, 4	*Output 1, Triac:	Pulse-Width Modulated Valve Output for Hansen PXV Valve
Terminal 5, 6	*Output 2, Triac:	Alarm(s)
Terminal 7, 8	Output 3, 4-20mA:	Alternate 4-20mA Output for Hansen SMV Valve (No Loop Power Source needed)

* INTERNAL SNUBBERS

PXVC-DX, PXVC-T, PXVC-L, PXVC-P, PXVC-CI**FACTORY DEFAULT USER PARAMETERS (PASSWORD 09)**

PARAMETER	DESCRIPTION	RANGE	DX	LEVEL	TEMP
UP 07	Celsius or Fahrenheit, ON for Fahrenheit, OFF for Celsius	ON, OFF	ON	ON	ON

FACTORY DEFAULT CONTROL PARAMETERS (PASSWORD 241)

PARAMETER	DESCRIPTION	RANGE	DX	LEVEL	TEMP
1u 00	Input signal type: 0 = input not active 1 = 0...10V or 0...20mA 2 = 4...20mA 3 = Temperature	0 – 3	2	2	3
1u 01	Signal display minimum value	-50...205	-30	0	-40°F
1u 02	Signal display maximum value	-50...205	+30	100	284°F
1u 04	Unit of universal input (For analog inputs only): 0 = no unit 1 = % 2 = °C/ °F 3 = Pa	0 – 3	2	1	2
1u 05	Samples taken for averaging control signal	0...100	3	3	3

PARAMETER	DESCRIPTION	RANGE	DX	LEVEL	TEMP
1L 10	Offset for cooling PI sequence	Acc Input	0	0	0
1L 11	P – band heating XPH	Acc Input	0.5°F	0.5%	0.5°F
1L 12	P – band cooling XPC	Acc Input	10.0°F	10.0%	10.0°F
1L 13	KIH, Integral gain heating, in 0.1 steps low value = slow reaction high value = fast reaction	0...25.5	0.1	0.1	0.1
1L 14	KIC, Integral gain cooling, in 0.1 steps	0...25.5	8.0	0.1	0.1
1L 15	TI, measuring interval integral low value = fast reaction high value = slow reaction	0...255 sec	30	15	30

(OPTIONAL REMOTE INTERLOCK)

PARAMETER	DESCRIPTION	RANGE	DX	LEVEL	TEMP
Fu 00	Remote Interlock 0 = disable 2 = enable	0 or 2	2	2	2

Note: PWM cycle time (1d 05) change is not recommended. Keep factory default value of 6 seconds.

CHANGING THE PARAMETERS

1. Press UP and DOWN button simultaneously for three seconds. The display will switch to indicate the firmware version and the revision. Press the CENTER key to start login.
2. CODE is shown in small display.
3. The codes for accessing the parameters are:
PXVC-PT
PID (Password 0005)
User Parameters (Password 0009)
Alarms (Password 0015)
Diagnostics (Password 0020)
PXVC-
PID (Password 0241)
User Parameters (Password 0009)
4. Set the access code by using the UP or DOWN keys.
5. Press the CENTER key to enter.
6. Navigate the parameters with the UP/DOWN buttons. Change a parameter by pressing the CENTER key. Three arrows show up to indicate that the parameter may be modified now. Use UP or DOWN keys to adjust the value.
7. After you are done, press CENTER key in order to save the new value of the parameter and return to the selection level. Pressing LEFT key will discard the value and return to the selection menu without saving.
8. Press the LEFT key to leave the parameter menu and return to the group selection. Press LEFT key again while in the group selection to return to normal operation.
9. The unit will return to normal operation if no key is pressed in 5 minutes.

MANUAL TUNING

The controller, with factory defaults, will give reasonably good control. If control difficulties occur during startup, it is recommended first to thoroughly check system and components for proper installation, operation, and sensor location before attempting to tune the controller.

If the default parameters settings do not provide acceptable loop control then manual loop tuning is necessary. The PID parameters are used to manually tune the controller. The procedure listed below is a trial and error method and after making a change allow the system ample time to stabilize.

Proportional Control:

The proportional part is defined through the P-band, PId0 (IL12).

Integral & Derivative Control is defined by two parameters:

The time integral, PId2 (IL14), specifies how fast the control sequence correction reacts. A low value (short integral) increases the swinging tendency and with it the risk of an instable loop. A high value (long integral) slows the reaction time.

The integral gain factor, PId1 (IL14), specifies how strong the control sequence correction reacts. Opposite to PId2 (IL15), a high gain factor increases instability and a low factor delays the response of the controller.

Do not tune at low load condition. Always tune the system at normal load.

1. Set PId1 (IL14) (Integral) and PId2 (IL15) (Derivative) = 0.
2. A lower PId0 (IL12) setting will control the valve more aggressively.
A higher PId0 (IL12) setting will control the valve more slowly.
Set PId0 (IL12) so at load, the control is slightly slow.
3. Set PId2 (IL15) to the time value, in seconds, equal to 1.5x the time it takes for a set-point change to effect the superheat bulb. Reset PId1 to the factory default value.

CAUTION

These instructions must be completely read and understood before selecting, using or servicing Hansen valves and electronics. Only knowledgeable, trained refrigeration mechanics should install, operate, or service. Stated temperature and pressure limits should not be exceeded. Bonnets, solenoid tubes, etc. should not be removed from valves unless system has been evacuated to zero pressure. See also Safety Precautions supplied with product.

WARRANTY

All Hansen products, except electronics, are guaranteed against defective materials or workmanship for one year F.O.B. factory. Electronics are guaranteed against defective materials or workmanship for 90 days F.O.B. factory. No consequential damages or field labor is included.

H HANSEN

Hansen Technologies Corporation

400 Quadrangle Drive, Suite F

Bolingbrook, Illinois 60440 USA

Tel: 630.325.1565 Fax: 630.325.1572 Toll: 866.4HANSEN

Email: sales@hantech.com Web: www.hantech.com

USA • Asia • Europe • India • Latin America • Middle East

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