



SPORLAN

# iCold RCS Controller

Electronic Refrigeration Controller System



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## Introduction

The Sporlan **Electronic Refrigeration Controller System (RCS)** is a micro-processor-based system designed to precisely control refrigeration evaporators in walk-in coolers and freezer applications. Its state-of-the-art design accurately controls refrigerant flow into the evaporator by means of a Sporlan Electric Expansion Valve (EEV). By using precision pressure and temperature sensor inputs, the RCS is able to control evaporator temperature more accurately and consistently than the mechanical thermostatic expansion valves that are employed in traditional systems.

The iCold packages all required sensors and power supply along with a RCS controller for the utmost convenience.

In addition to superheat and temperature control, the RCS is configured to control evaporator fans and defrost heaters. A large alphanumeric LED display and optical encoder interface simplifies system setup, while allowing programming flexibility for full system optimization. Figure 1 provides a general layout of the system.

## iCold Features and Benefits

- Complete package ready to control out of the box
- Integrated digital temperature control
- Conventional and advanced defrost routines
- True Pressure/Temperature Superheat
- Universal compatibility, controls all Sporlan valves (Bipolar and Unipolar)
- Watertight NEMA 12K enclosure
- RS-485 communication port allows remote verification of parameters and control
- Pluggable connectors for quick and easy installation
- Compressor protection algorithms
- Onboard user interface with 3 digit alphanumeric display



## Operation

The RCS controller is a versatile design and can be applied to any application requiring EEV control. The RCS is field configurable and may be used with any of the Sporlan EEVs. The defrost control schemes are possible through the time, quantity, and temperature termination settings. The RCS includes a real-time clock that may be set through the onboard display or through a laptop connection to allow synchronized defrosts.

The integrated display allows the end user to have a digital thermostat mounted to the controlled space. The display alternates between the system status and the room temperature. The display consists of a 3 digit alphanumeric display that allows full configuration of the controller without additional hardware. There

are two levels of settings on the controller. The lower level setting will allow the adjustment of the basic parameters not related to the valve control. While the primary level of setpoints will control the system, the advanced settings allow the skilled technician to configure the board for the optimum control of the evaporator superheat.

## Sensors

All of the required sensors are included in the iCold package. It is supplied with three temperature probes and a pressure transducer to allow the control of superheat, defrost, fans, and space temperature. Each sensor is provided with a 6.5 ft. (2 m) lead and may be extended to 100 ft. (30.5 m) using 18 gage shielded twisted pair. Sensor wires should never be in the same conduit as high voltage lines (>30V). Care

**FOR USE ON REFRIGERATION and/or AIR CONDITIONING SYSTEMS ONLY**

Bulletin 100-50-4, September 2010, supersedes Bulletin 100-50-4, September 2007, and all prior publications.

## Specifications

### RCS GENERAL SYSTEM SPECIFICATION

#### Input voltage

24 AC/DC VAC ( $\pm 10\%$ )  
40 VA minimum

#### Operating ambient temperature

-40°F to 120°F

#### Control temperature range

-20°F to 60°F

#### Control update rate

1 Hz max.

#### True superheat regulation

$\pm 2^\circ\text{F}$

#### LED Display

3 character, 16 element alphanumeric display

### COMMUNICATIONS

#### Remote setting and monitoring

RS485

### BATTERY LIFE

#### Real time clock battery backup

>10 years  
(during active operation)

### PRESSURE TRANSDUCER (Suction Pressure)

#### Maximum seal temperature range

-40°F to 120°F

#### Seal type

Neoprene

#### Pressure range

0 to 150 psi

#### Transducer accuracy

% of F.S. 1%

#### Supply voltage

5 Volts DC  $\pm 0.5$  VDC

#### Output range

0.5 (0 psi) to  
4.5 (150 psi) Volts DC

#### Electrical connection

Mates with Packard 12065287

### THERMISTOR

#### Nominal

3,000 ohms at 25°C  
(two button)

2,000 ohms at 25°C  
(optical encoder)

#### Accuracy

-4°F to 122°F =  $\pm 1^\circ\text{F}$

should be taken to properly attach each probe to the location for its function.

The first temperature sensor is installed on the suction line, with included straps, and the temperature reading allows the RCS to calculate the superheat. When installing the superheat sensor, the same practices should be followed as installing a TEV bulb. The sensor should never go on the top or bottom of the line. It should be located on a horizontal section of line in the 4 or 8 o'clock position. The second temperature sensor is used to control the space temperature. It is also displayed as a process variable. This sensor should be located in the space in a location that will not be affected by the airstream or any heat source, such as a door. The 0-150 psig pressure trans-

ducer allows the controller to convert the suction pressure to a saturated temperature to calculate superheat.

## Relays

The fan and defrost relays on the board can be loaded to 30A in normally closed operation and 40A in the normally open. The fans are primarily engaged when the compressor is running. The fan control may be altered by changing the fan temperature and drain time settings. The defrost relay is controlled by the defrost settings and may be initiated at a specific time of day. Once the time of the first defrost is set, the number per day may be set, determining the number of defrosts required will depend on the system.

The board is also equipped with a solid state liquid line solenoid relay

and external alarm. The power supply for the solenoid should be sized according to the instructions in Bulletin 30-10.

## Communication

Communication software (PERC) is available for free, contact your local Sales Engineer. The PERC software displays all of the setpoints and measurements in a single view to allow the user to rapidly configure the controller for the application. This requires the use of the board's RS-485 output. The RCS may communicate on site through direct connection to the computer. This requires a connection to the PC using an interface cable like a USB to RS-485, or other converter. The controller may also be accessed remotely through a modem. Remotely monitoring the controller allows the technician to diagnose the problem before arriving at the job. This gives the technician the flexibility to monitor the system and potentially fix the problem without requiring a service call.

## Application

The RCS package combines the EEV control with many other system components. Traditional control of refrigeration equipment has relied on a piece meal approach. Each control function is carried out by discrete control components; such as a defrost time clock, thermostat, defrost termination switch, etc. Recent technological advances have integrated these functions into a single device that is easy to use. The RCS is a control solution designed to be used with any system utilizing a single condenser and evaporator. This is a reasonably priced alternative that allows, for the first time, a single point of reference for all control components for these types of systems. The NEMA 12K enclosure allows the controller to be mounted conveniently in almost any location. The 5 prepositioned knockouts provide easy access to the proper locations when wiring the board.

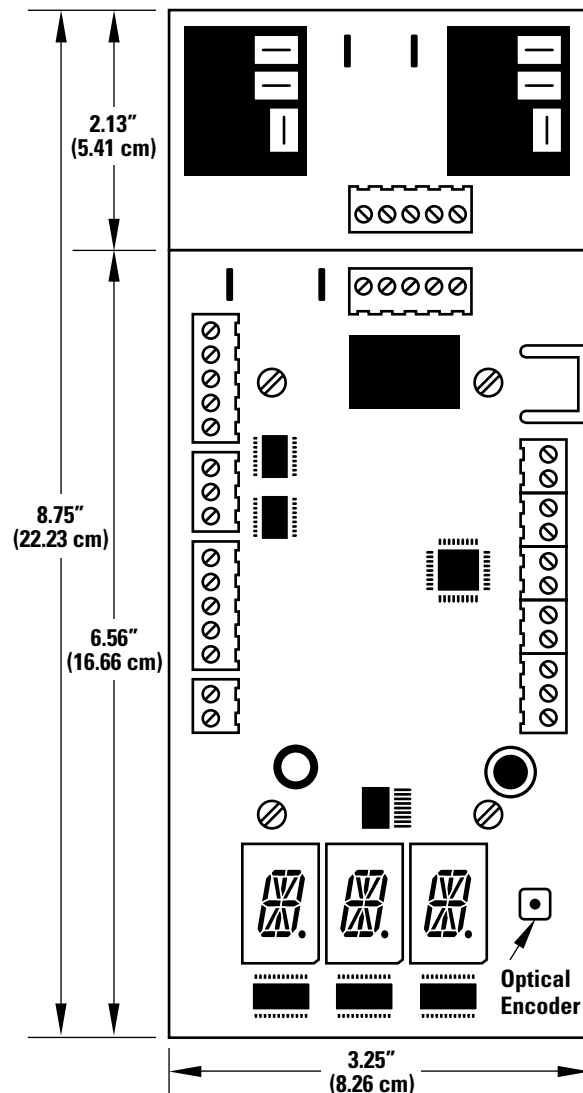
With only the addition of an EEV, the controller is ready to be installed on the system. When selecting the EEV, refer to Bulletin 100-20. This bulletin gives step by step instructions on the selection of the valve.

The selection of the controller is simplified due to the controller's ability to be configured on site. The 24V transformer included in the package is ready to receive 120V or 230V. The power being supplied is simply selected at the flip of a switch.

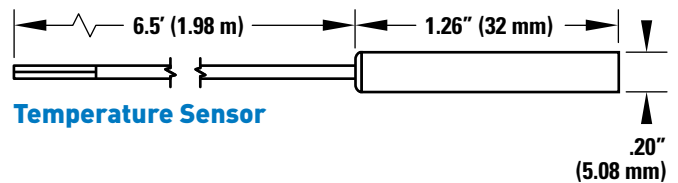
## Service Parts

PART DESCRIPTION	PART NUMBER
<b>RCS Controller</b> (board only)	953161
<b>Pressure Transducer</b> 150 psig, 6.5' (2 m)	953091
<b>Temperature Sensor</b> 6.5' (2 m) 3,000 ohm	952551
12' (4 m) 2,000 ohm	952662
<b>Well Sensor</b>	952795
<b>Relay Board</b>	Available on request

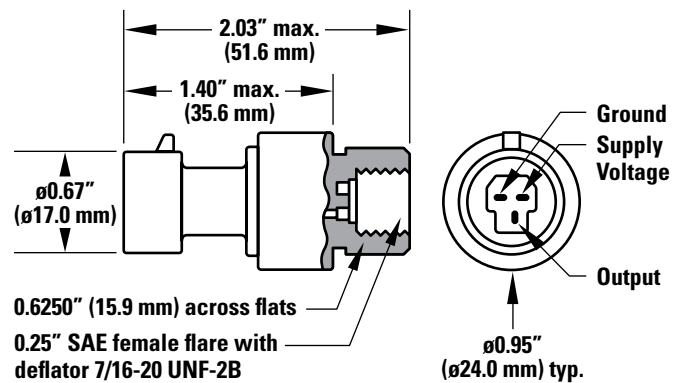
## Dimensions



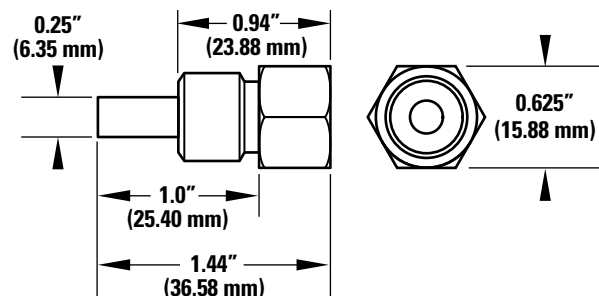
RCS Controller Board



Temperature Sensor



Pressure Transducer



Well Sensor

## Wiring Schematic

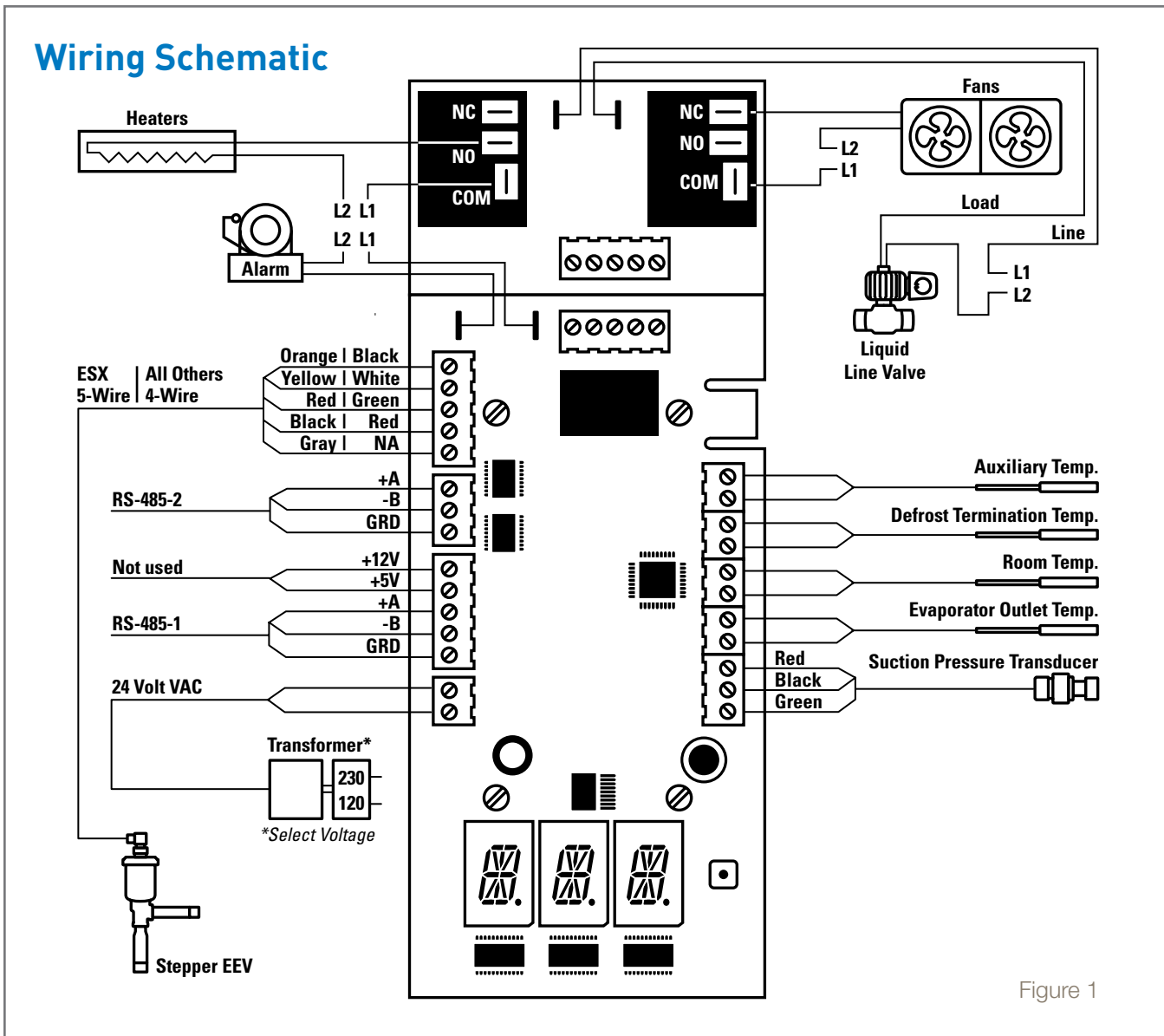


Figure 1

## Installation Instructions

Installation instructions are available for the RCS controller, temperature sensor, pressure transducer and monitoring software disk. Additional product information and updates may be found at [www.sporlan.com](http://www.sporlan.com).

### PRODUCT FORMS

#### RCS Controller

Form SD-302

#### Temperature Sensor

Form SD-245

#### Pressure Transducer

Form SD-245

#### Monitoring Software Disk

Form SD-303

## Ordering Instructions

Each RCS package, Part Number 953170, includes:

- 1 RCS Controller
- 1 Dual Voltage Transformer
- 3 Temperature Sensors
- 1 Temperature Transducer
- 1 NEMA 12K Enclosure



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