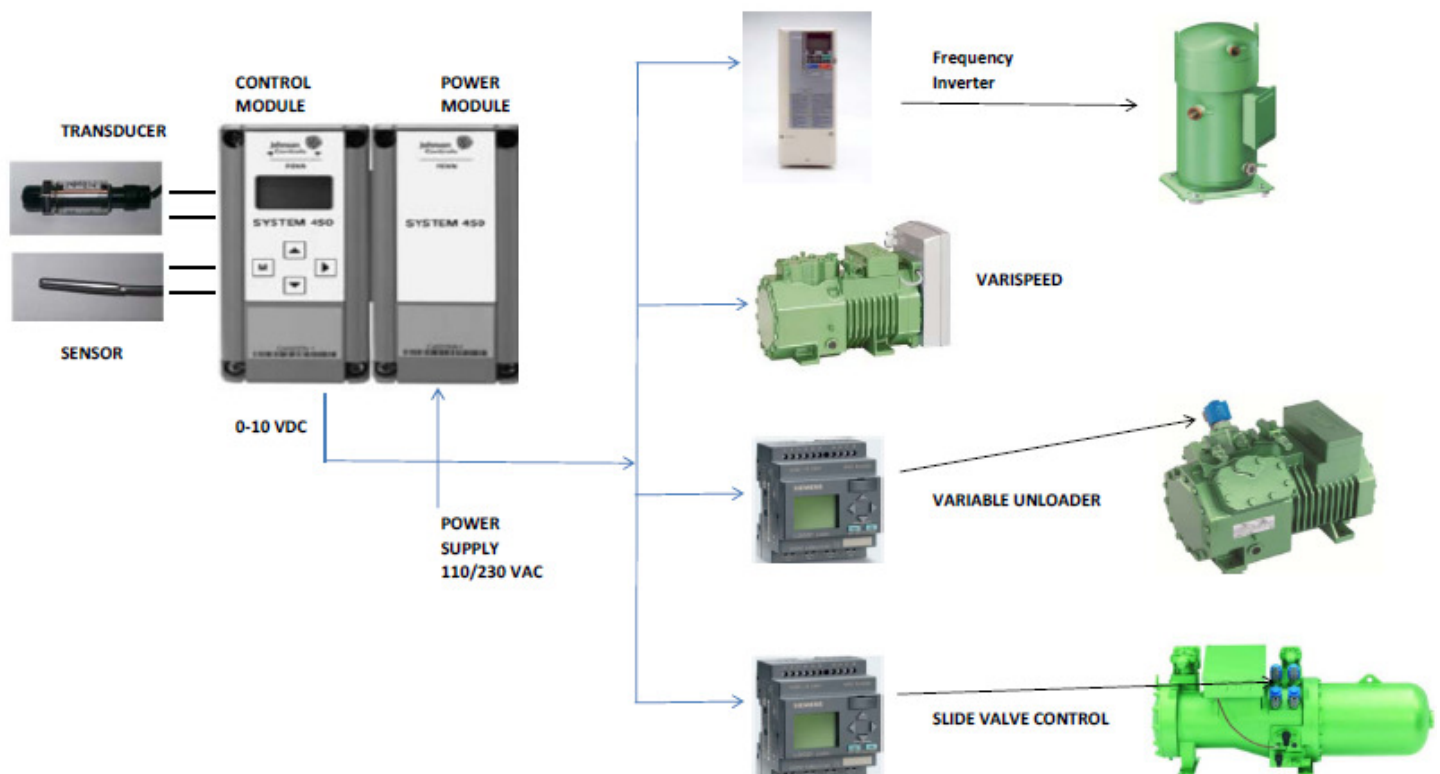# Compressor Capacity Control Module

Purpose & Scope

This document describes a control module that can integrate with a frequency inverter (FI) or other capacity controller to vary the capacity of a BITZER compressor. The control module uses a temperature or pressure input and outputs a 0-10 volt analog signal. This 0-10V signal is utilized by a configured FI to speed up or slow down the compressor to properly match the compressor capacity with the system load. The control module can also be used to control a BITZER VARISPEED compressor which uses an integrated frequency drive. It can also be used with other BITZER controllers to mechanically unload or load the compressor as needed to match system load.

Part Numbers

Item	Part Number	Description
Control Module	855-2001-01	24VAC, pressure/temperature input, 0-10V output
Power Module	837-0015-01	Power supply, 120-240 → 24VAC
Temperature Sensor	860-0010-01	-46°F to 255°F
Pressure Transducer	860-0020-01	0-200 psig

Note: If 24VAC is available, a power module is not required.

	Main Phone:	Web:	Email:	Additional BITZER U.S. Contact Info:
BITZER U.S.:	770-503-9226	www.bitzerus.com	sales@bitzerus.com	techsupport@bitzerus.com
BITZER Canada:	514-697-3363	www.bitzer.ca	sales@bitzer.ca	customerservice@bitzerus.com
BITZER Mexico:	+52 (81)1522 4500	www.bitzermexico.com	ventas@bitzermexico.com	24 Hour Quickship Hotline: (888) 462-4893

Basic Function Description

THIS IS NOT INTENDED TO BE AN ON / OFF CONTROL DEVICE. It is assumed that the compressor and system are engineered to function properly and safely without this control module. Typical standard system controls such as a thermostat, low pressure cut out, and high pressure cut out are still required / recommended as usual.
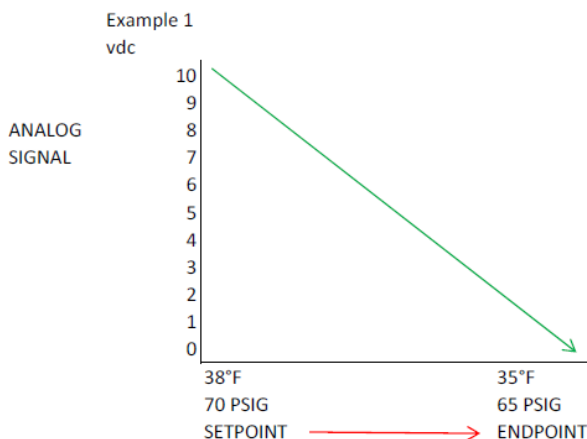
When the compressor is running, the temperature sensor or pressure transducer must measure a reliable value related to the system capacity. For example, the temperature sensor could be used for measuring the outlet process air or process water temperature of an evaporator. The pressure transducer could be used to measure the suction pressure of the compressor. In effectively utilize this control, it is important to know what the target value of this measurement is so that an appropriate set and end point can be programmed into the module.

As an example, consider a target outlet water temperature of 35°F. This would be used as the END POINT and a possible SET POINT could be 38°F which offers a 3° delta for control. With a larger delta, the module can have more precise capacity control with respect to the output signal. However, in this case, it is less likely to guarantee that the system is running at the desired target value.

As the temperature or pressure measurements near the SET POINT and END POINT, the control module will generate a 0-10V linear signal that indicates whether more or less capacity is required. At 10 volts, the control module is requesting that the compressor should be at full speed or fully loaded. At 0 volts, the compressor should be at its lowest capacity available (minimum speed/fully unloaded) per the application limits.

By using a straight line between these two points, the control module will request a certain capacity of the compressor. As an example, if a compressor's minimum capacity is 50%, than 5 volts is 75%, 8 volts is 90% capacity, and so on. See example 1 chart.

A FI or VARISPEED compressor will analyze this signal and speed up the compressor to match this signal. As an example, if the min frequency is 30Hz and the max speed is 60HZ than an 8 volts signal would usually correspond to a speed of 54Hz.

	Main Phone:	Web:	Email:	Additional BITZER U.S. Contact Info:
BITZER U.S.:	770-503-9226	www.bitzerus.com	sales@bitzerus.com	techsupport@bitzerus.com
BITZER Canada:	514-697-3363	www.bitzer.ca	sales@bitzer.ca	customerservice@bitzerus.com
BITZER Mexico:	+52 (81)1522 4500	www.bitzermexico.com	ventas@bitzermexico.com	24 Hour Quickship Hotline: (888) 462-4893

ATTENTION:
All service on compressors and refrigeration systems must be carried out by trained and qualified refrigeration technicians. Follow all safety guidelines found in BITZER literature and any other safety instructions associated with other refrigeration equipment.
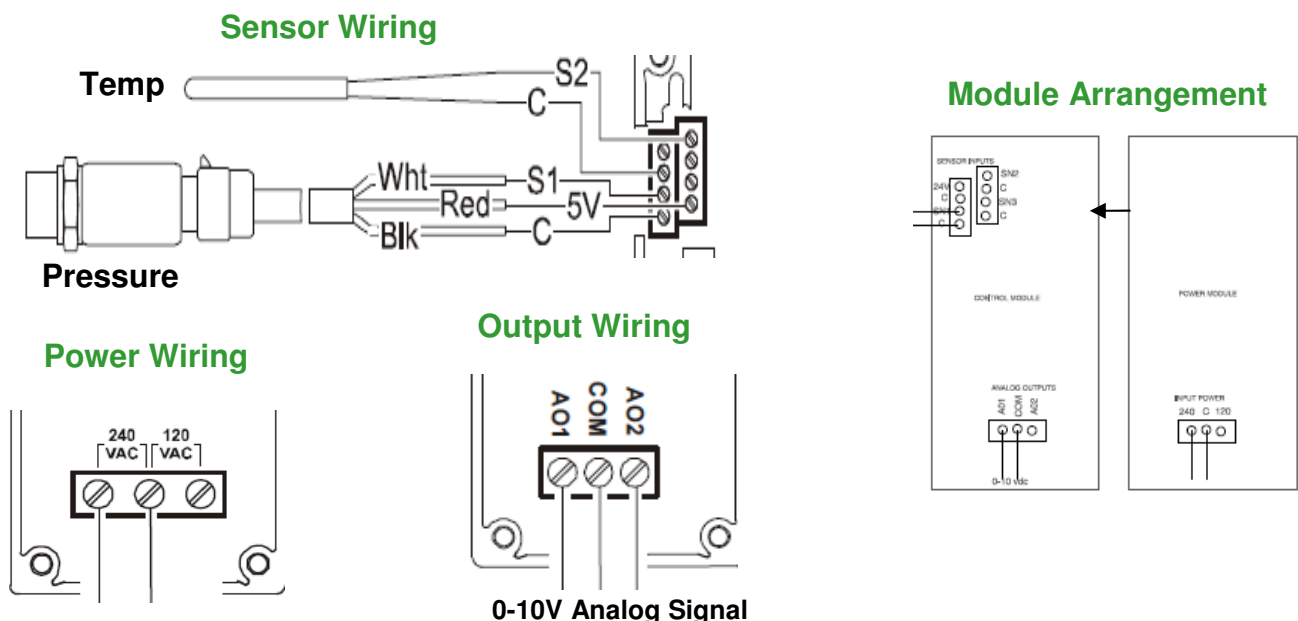
Mounting and Wiring:

The power supply and control module can be mounted to 35mm DIN rail. (Not required but modules must be connected together per step 4.) Please be sure to reference the additional documentation sent with the controllers.

1. Hook the control module onto the top of the DIN rail.
2. Push down the lower end to snap it on. The mounting interlock at the rear must engage.
3. The power supply attaches to the DIN rail in a similar fashion.
4. Snap the modules together using the connections on their sides.
5. Mount the appropriate sensor in a suitable location such as:
    a. Temp. Sensor into the entering / leaving process air stream
    b. Temp. Sensor onto a pipe of entering or leaving process fluid (note: insulate pipe)
    c. Pressure transducer to appropriate suction pipe connection (note: pressure test for leak. Mount in vertical position where possible.)
6. Wire the sensor / transducer to the input terminals on the control module (C-Sn* for temp, C-5v-S* for pressure transducer).
7. Connect output wiring 0-10V to Com – AO1 terminals on the control module.
    This output signal should be supplied to either a FI, VARISPEED compressor or other control device.

NOTE: This signal wire should not run beside or inside the same conduit as high voltage wire as transient signal may alter control performance.

8. Connect main power of 120 or 240 Volts to bottom terminals on power module.

Sensor Wiring

Temp

Pressure

Output Wiring

Power Wiring

0-10V Analog Signal

Module Arrangement

	Main Phone:	Web:	Email:	Additional BITZER U.S. Contact Info:
BITZER U.S.:	770-503-9226	www.bitzerus.com	sales@bitzerus.com	techsupport@bitzerus.com
BITZER Canada:	514-697-3363	www.bitzer.ca	sales@bitzer.ca	customerservice@bitzerus.com
BITZER Mexico:	+52 (81)1522 4500	www.bitzermexico.com	ventas@bitzermexico.com	24 Hour Quickship Hotline: (888) 462-4893

Programming:

1. Double check all wiring and power the unit.

2. Press the up and down arrow [⬆⬇] simultaneously for 5 seconds to enter the program menu.

3. **Sensor Type:** The screen will display SENS --- [SENS]. "---"Indicates that the sensor has not been programmed. Press the right arrow ▶ to address the first sensor. Press the up or down arrow [⬆⬇] to match the type of sensor to the type of sensor installed i.e.: "°F" for temp control or "0-200" psig for pressure control. If more than 1 sensor is installed, each one will need to be addressed individually by pressing the right arrow ▶ and repeating the above procedure. Press [M] button to accept input and advance the menu to next screen. Press the right arrow ▶ to change the offset if the sensor needs to be calibrated or adjusted.

4. Press [M] to advance to outputs.

5. **Sensor Mapping:** [OUTA³] Press the right arrow ▶ until "Out A" is displayed then use up or down arrow [⬆⬇] until the desired sensor (temp or pressure) is selected. Now this sensor is addressed to Output A. This control is being utilized as Analog for 0-10vdc. Press " [M] to accept input and advance the menu to next screen.

6. **Set Point**: Press the ▶ to enter the set point valve [SP]. To set the SET POINT (SP) to the desired control temp press the up or down arrow [⬆⬇] to select the desired SP. This is the starting point for the proportional band and the minimum value for when the compressor should be at 100% or fully loaded. In normal operation this will be higher than the End Point. As an example, +38°F leaving fluid temp may be desired at the "On temp" or 70 psig as the pressure. Press "M' to accept input and advance the menu to next screen.

7. **End Point:** Press the ▶ to enter the endpoint valve [EP] to set the END POINT (EP) to the desired off temp press the up or down arrow to select the desired EP. This is the ending point for the proportional band. In normal operation this will be lower than the End Point. If +35°F leaving fluid temp is desired off temp using the temp sensor enter this desired value. If 65 psig is desired off pressure using the transducer as control, enter this value. Press the up or down arrows [⬆⬇] together to return to the main display screen.

8. **Output Signal strength @ set point**: Press the right arrow ▶ to advance to OSP. [OSP] Press the up or down arrows [⬆⬇] to enter the desired signal strength for the value at set point. This is usually "0" range is from 0-100.

9. **Output Signal strength @ Endpoint:** Press the right arrow ▶ to advance to OEP. `OEP`

   Press the up or down arrows ⬍ to enter the desired signal strength for the value at endpoint. This is usually "100" range is from 0-100.

10. **Integration Constant selection:** Press the right arrow ▶ to advance to I-C. `I-C` **Default "0"**

11. **Sensor failure Mode**: Press the right arrow ▶ to advance to SNF. `SNF` In case of sensor failure, this setting will operate the control in a default manor as selected.
    ON=Output generates the selected OEP signal strength during failure.
    OFF=Output generates the selected OSP signal strength during failure.
    Default is usually "0"

   * Additional set-up details provided in controller manufacturer packaging.

Additional Info / Documents:

Additional information regarding control for BITZER Compressors can be found in the following documents:

TB-0036 - Frequency Inverter Guidelines for GSD Scroll Compressors

TB-0040 – BITZER Frequency Inverter Controller Install & Set-up

KT-210 & KT-220 – Technical Information for VARISPEED Compressors

KT-420 – Application of Frequency Inverters with Reciprocating Compressors

TB-0050 – Variable Unloading for BITZER Reciprocating Compressors

TB-0039 – Capacity Controllers for Slide Valves of BITZER compressors