

# Installation Guide

## Universal Direct Spark Ignition Module

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### DESCRIPTION

The Robertshaw 780U-DS20 Universal Direct Spark Integrated Ignition Control Module is designed to provide easy field replacement of a wide range of intermittent pilot ignition modules.

#### Features and Compatibility

- Single rod (local sense) or two rod (remote sense) flame sensing.
- Non-100 percent shutoff, 100 percent shutoff/lockout, or 100 percent shutoff/continuous retry.
- Natural or LP gas.
- With or without damper connection.
- Burner ignition using an internally generated high-voltage spark.
- Flame rectification circuit to monitor flame presence.
- Monitoring of 24 VAC, pilot and main gas valve.
- LED indicator for system status/errors.
- Vent Damper connection.
- Connections for flame reading via standard microammeter.

#### Included in the Box

- 1 - 780U-DS20 Ignition Module
- 1 - Double sided tape 3" x 3"
- 1 - Spark plug to 1/4" Quick connect
- 4 - Mounting screws
- 1 - Installation Guide

**CAUTION:** This Direct Spark Ignition System must be used only on appliances equipped with an atmospheric gas burner. Use on direct-vent type appliances and power burners is prohibited. Be sure you have the correct Direct Spark Ignition System for the type of gas used on the application, LP or natural. Using an incorrect system could result in a hazardous condition.

**CAUTION:** Only qualified installers should install or service this 780U Universal Series Direct Spark Ignition System. These instructions are a guide for such installers. Carefully follow all instructions for this product.

**CAUTION:** Installation must comply with all local codes. In the absence of local codes, the latest edition of the National Fuel Gas Code, ANSI Z223 and the National Electrical Code ANSI/NFPA No. 70 must be used.

#### **WARNING: Risk of Electric Shock**

Disconnect power supply before making connections to avoid electric shock.

#### **WARNING: Risk of Explosion or Fire**

Shut off the gas supply at the main manual shutoff valve before installing or servicing this product. Failure to shut off the gas supply can result in the release of gas during installation or servicing, which can lead to an explosion or fire, and may result in severe personal injury or death.

### SPECIFICATIONS

<b>Input Power</b>	Line 24V (20-28 VAC) 50-60 Hz
<b>Input Current</b>	0.25 A plus valve load @ 24 VAC
<b>Flame Current Sensitivity</b>	0.5 Microamperes minimum
<b>Flame Failure Response Time</b>	Maximum 1 second
<b>High Voltage Spark Output</b>	15 KV with 50 pf Load
<b>Spark Gap</b>	0.150 Inches ± 0.050 Inches (3.8mm ± 1.2mm)
<b>LED</b>	Red status LED provides system status and error codes
<b>Operating Temperature</b>	Minimum ambient temperature rating: -40°F (-40°C) Maximum ambient rating when used with 2.0A main valve: 176°F (80°C)
<b>Relative Humidity</b>	0% to 95% non-condensing
<b>Ignitor-Sensor Type</b>	Separate (two rod; remote flame sensing) or Combination (one rod; local flame sensing)
<b>Valve Current Rating @24</b>	2.0 A Pilot and 2.0 A Main
<b>Number of Trials</b>	1 or 3 seconds (field selectable)
<b>Pre-purge Timing</b>	0, 15 or 30 seconds (field selectable)
<b>Trial for Ignition</b>	4, 7, 10, 11, 15 or 21 seconds (field selectable)
<b>Inter-purge Timing</b>	0, 15 or 30 seconds (field selectable)
<b>Auto Restart Time</b>	60 minutes
<b>Ignition Sequence (After pre-purge, if pre-purge is selected)</b>	Spark and pilot gas ON until light off or trial for ignition ends. If established flame is lost, trial for ignition restarts immediately. If pilot fails to light, pilot gas and spark off (100% shutoff). After the retry time selected, a new trial for ignition is initiated. This sequence continues until light off or "Call for Heat" is removed.
<b>Integral Damper Connector</b>	Included for use as needed. If completed 10 successful ignition cycles with damper attached, unit must always have a vent damper connected.

### PLANNING THE INSTALLATION

Direct Spark ignition systems are used on a wide variety of central heating equipment and on heating appliances, such as commercial cookers, agricultural equipment, industrial heating equipment and pool heaters. These applications can stress controls due to frequent cycling, moisture, corrosive chemicals, dust or excessive heat. To avoid shutdowns and premature control failure, special measures may be needed.

### INSTALLATION

#### **WARNING: Risk of Explosion or Fire**

FIRE OR EXPLOSION HAZARD CAN CAUSE PROPERTY DAMAGE, SEVERE INJURY OR DEATH.

#### When Installing This Product...

1. Read these instructions carefully. Failure to follow them could damage the product or cause a hazardous condition.
2. Check the ratings given in these instructions to make sure the 780U-DS20 module is suitable for your application.
3. Installer must be a trained, experienced service technician.
4. After installation is complete, check out operation as provided in these instructions.

#### Remove Old Ignition Control Module

#### **WARNING: Risk of Electric Shock**

Disconnect power supply before making connections to avoid electric shock. Disconnect and tag the wires from the old module and remove it from its mounting location.

#### Mount New Ignition Control Module

The recommended mounting for the 780U-DS20 ignition control module is the same location as the old control module. Otherwise, select a location close enough to the burner to allow a short (3 ft. (0.9 m.) maximum), direct cable route to the pilot burner.

#### **WARNING: Risk of Explosion or Fire**

Do not install in an area that is exposed to water (e.g., dripping, spraying or rain). Do not use this product if it has been exposed to water. Exposure to water may cause malfunction and can lead to an explosion or fire and may result in severe personal injury or death.

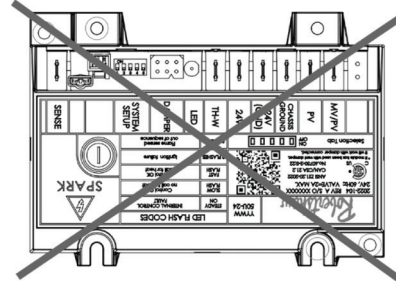
### LOCATION

The mounting location must provide:

- Good, clear access to the field wiring terminals.
- Operating ambient temperatures between -40°F (-40°C) and 176°F (80°C).
- Relative humidity below 95% non-condensing.
- Protection from water, steam or corrosive chemicals used to clean the appliance.
- Protection from dripping water, such as from an overfilled humidifier or from condensation.
- Protection from dust or grease accumulation.

#### IMPORTANT

Do not mount with terminals facing up.



#### Wire the System

All wiring must comply with local codes and ordinances. Refer to Wiring Connections Section for typical wiring connections and wiring diagrams.

#### IMPORTANT

As shown in the wiring diagrams, a common ground is required on: The burner mounting bracket, and the GND (BURNER) terminal on the ignition control module. Make sure the transformer has adequate VA. The ignition control module requires at least 0.25A at 24VAC.

#### Connect Vent Damper

If the control is used without the damper after configuration has started while having a vent damper connected, it will not function, and the LED display will show 3 flashes until the damper is correctly connected or the 10-cycle count resets.

To use the control module with a damper connected to the control's integral damper connector in an atmospheric appliance, follow these steps:

1. Insert the matching 6-pin plug from the appliance's wiring harness into the connector on the control module. Connect the other end to the vent damper. The connector (J2) accepts a Molex 03-03-2061 plug.
2. Once the flame is sensed, the control will recognize the presence of the vent damper. If the damper is connected for 10 successful ignition cycles, the control permanently configures itself to operate only with the damper.
3. If the control is used without the damper after configuration, it will not function, and the LED display will show 3 flashes until the damper is correctly connected.
4. If Pin 5 and Pin 6 of the damper header are shorted at power-up, the 10-cycle count will reset, and the control will not perform any other operations. The LED display will show 4 flashes after the reset.

#### Connect Ignition Cable

Use the existing ignition cable if it is in good condition. If the existing ignition cable lacks a 1/4 in. quick connect on the module end, either use the Rajah adapter or strip the wire and replace it with the supplied 1/4 in. insulated quick connect.

Recommended Ignition Cable for Field Assembly		
CABLE TYPE	VOLTAGE RATING (rms)	TEMPERATURE RATING
UL Style 3217	10000	302°F (150°C)
UL Style 3257	10000	484°F (250°C)

Cable must be no longer than 36 in. (0.9 m.). Solid conductor cable recommended. To construct a cable, fit one end of ignition cable with 1/4 in. diameter Rajah connector receptacle and the other with a 1/4 in. female quick connect. Protect both ends with insulated boots.

#### IMPORTANT

The cable must not run in continuous contact with a metal surface or spark voltage may be greatly reduced. Use ceramic or plastic standoff insulators as required. Resistive spark cable reduces spark voltage and may impact appliance performance.

#### To Install:

1. Connect one end of the cable to the male quick connect SPARK terminal on the ignition module.
2. Connect the other end of the cable to the ignitor or ignitor-sensor stud on the pilot burner/ignitor-sensor.

#### Make Flame Sense Connection

For remote flame-sensing applications (separate ignitor and sensor rods), do not use the sense jumper wire. Follow these steps:

- Clip the sense jumper wire as close as possible to the base of the ignition control module and discard the clipped end.
- Attach the flame sensor wire from the Pilot burner/ignitor to the REMOTE SENSE connector.

For local flame sensing applications (single rod), follow these steps:

- Attach the sense jumper wire to the REMOTE SENSE connector.

#### Connect Gas Control

Use No.18 gauge solid or stranded wire. Use 1/4 in. female quick connects for control connections. Connect to gas control terminals as shown in wiring diagrams, using terminals appropriate to the gas control.

#### Ground the Control System

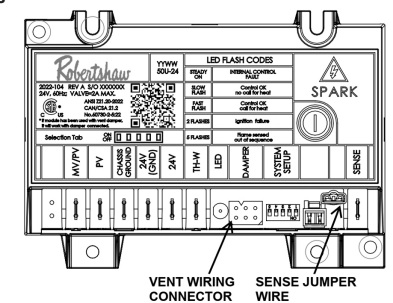
The ignitor, flame sensor and ignition control module must share a common ground with the burner. Use thermoplastic insulated wire with a minimum rating of 221°F (105°C) for the ground wire; asbestos insulation is not acceptable. If necessary, use a shield to protect the wire from radiant heat generated by the burner.

Connect the ground wire as follows:

1. Fit one end of the ground wire with a female 1/4 in. quick-connect terminal and connect it to the male quick-connect CHASSIS GROUND terminal on the ignition control module.
2. Strip the other end of the wire and fasten it under the burner bracket mounting screw. If necessary, use a shield to protect the ground wire from radiant heat.
3. The burner serves as the common grounding area. If there is not good metal-to-metal contact between the burner and ground, run a lead from the burner to ground.

NOTE: Earth ground is not required.

#### Wiring Connections



#### Typical Wiring Connections

Connect Label	Size or Type	Description
MV/PV	1/4 inch	Common terminal for gas valve
PV	1/4 inch	Gas valve connection
CHASSIS GROUND	1/4 inch	Burner ground
24V (GND)	1/4 inch	Return path to transformer
24V	1/4 inch	Optional - 24VAC power connection for vent damper
TH-W	1/4 inch	Connector for "Call for Heat" signal from thermostat
J2	6-pin keyed plug	Connector for vent damper connection (used to control a connected damper in atmospheric appliances)
SENSE JUMPER WIRE	Wire with 3/16 inch quick connect	Connects to the REMOTE SENSE connector for installations with a single spark rod (local flame sensing) NOTE: For installations with remote flame sensing (separate spark and sense rod), this jumper wire is clipped as close to the circuit board as possible, and the wire is discarded.
REMOTE SENSE	3/16 inch	Flame Sense connector For single rod installations, connect the SENSE JUMPER WIRE to this terminal connector. For dual rod installations, connect the flame sense wire from the burner/ignitor to this terminal connector.
SPARK	1/4 inch	High voltage sparking electrode

#### Typical Wiring Connections

##### Local Sense with Damper

