ICM283

HOT SURFACE IGNITION

- **Hot surface ignition (HSI) module**
- **Single/dual rod sensing capabilities**
- **For gas fired furnaces, boilers and other heating applications**
- **Configurable lockout times, ignition trials**
- **Works with both Natural and LP gas systems**
- **Diagnostic LED to aid in troubleshooting**

Installation, Operation & Application Guide

For more information on our complete range of American-made products – plus wiring diagrams, troubleshooting tips and more, visit us at **www.icmcontrols.com**

Warning

WARNING! ***IMPORTANT SAFETY INFORMATION!***

Fire or Explosion Hazard! **This control should only be installed by a trained, qualified service technician capable of working with liquid propane, natural gas and high voltage electricity. Failure to comply with this warning may cause damage to the control or other property, and could result in severe personal injury, or death.**

Specifications

- **Hot Surface Igniter Voltage:** 120 VAC, 60 Hz
- **Control Voltage:** 24V, 60 Hz
- **Ignition Sequence:** Determined by system setup combination
- **Prepurge:** 32 seconds.
- **Igniter Warm up:** 34 seconds
- **Flame Failure Response Time:** 1.5 seconds maximum
- **Between Trial Purge:** 96 seconds (three trial setting only)
- **Sensor:** A separate sensor is required for remote sensing applications
- **Contact Rating At 120 VAC:** 5A
- **Maximum Valve Contact Rating:** 2A
- **Current Draw:** .4A plus valve load
- **Ambient Operating Temperature:** -40°F to +175°F (-40°C to +79°C)

Application

The **ICM283** Universal Hot Surface Ignition Module is a replacement for an array of flame rectification type HSI ignition control modules with the following characteristics:

- 120 VAC (up to 5A) timed hot surface ignition
- Single rod (local sense) or dual rod (remote sense) hot surface ignition systems
- One or three ignition trials per heat call
- Four-second or seven-second ignition trials
- Prepurge ≤32 seconds
- Up to 96 seconds between trial purge times (three-trials)
- Natural or LP gas

The **ICM283** package contains the **ICM283** control module, the application guide, and the accessories required to adapt to older systems.

ICM283 Terminal Cross References

ICM283	S89/S890	HS780
GND (Burner)	GND (Burner)	TR (GND Clip)
24 VAC (GND)	24 VAC (GND)	GND
Valve (GND)	Valve (GND)	–
24 VAC	24 VAC	TH
Valve	Valve	Valve
L2	L2	L2
L1	L1	L1
HSI	HSI	IGN
HSI	HSI	IGN
Sense	SEN	RS

Installation Warnings

WARNING! ***IMPORTANT SAFETY INFORMATION!***

Electrical Shock Hazard! **Turn off all power sources before servicing this control. Be sure to shut power off at the main service panel by removing the fuse or switching the appropriate circuit breaker to the off position. More than one disconnect may be involved. Failure to comply with this warning may cause damage to the control or other property, and could result in severe personal injury, or death.**

1. Please read and follow these instructions carefully. Failure to do so can result in damage to the control, or could lead to severe personal injury.
2. Ensure that the **ICM283** is the correct replacement control for your application. Review all timings and specifications on the product label and packaging before installing.
3. Only a trained, experienced service technician should attempt to install this control.
4. After installing the control, thoroughly test it and verify it is operating correctly.
5. This control should not be installed where there is the presence of moisture or danger of flooding. If needed, use a waterproof enclosure and mount the control with the terminals facing down to minimize the risk of water coming into contact with the control. In the event the control does come into contact with water or another liquid substance, replace the control immediately. Never attempt to open or repair the control. This may result in severe property damage, personal injury, or death.
6. Ensure the power supply is disconnected before servicing this control.
7. Make sure the gas supply is turned off before starting the installation process. If you smell gas or suspect a gas leak, turn off gas at the manual service valve and evacuate the building. Do not try to light any appliance; do not touch any electrical switch or telephone in the building until you are sure no gas remains.
8. Do not light the pilot or operate electric switches, lights or appliances until you are sure the appliance area is free of gas
9. Avoid wiring errors by labeling all wires prior to disconnecting. Failure to do so may result in the bypassing of important safety features that can lead to control damage or other severe and hazardous situations.
10. Improper location of the 120 VAC hot surface igniter or any flame sensing rod can result in appliance malfunction. Never attempt to relocate the 120 VAC hot surface igniter or the flame sensing rod from the original position established by the appliance manufacturer. Be sure the 120 VAC hot surface igniter or the flame sensing rod is replaced in exactly the original position after removal for inspection, service or replacement.

Remove Old Module

Before removing the old unit, make sure all power to the control is disconnected and that the gas is turned off at the shut off valve. Label all wires before disconnecting them from the old module. Remove the old unit.

ICM283 Mounting Instructions

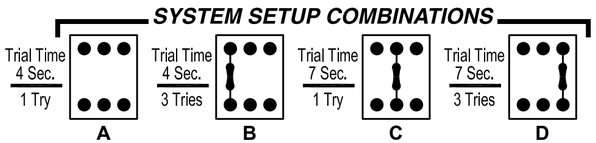
If possible, it is always preferred to mount the **ICM283** replacement module in the same location as the old module. If you need to mount the control in a different location, use the **ICM283** replacement control as a template to mark the new mounting holes and pre-drill the holes before wiring. Fasten securely with four No. 6-32 machine or No. 8 sheet metal screws.

Be certain the control is protected against exposure to water, moisture, corrosive chemicals and excessive dust and grease. Use a suitable, waterproof enclosure if necessary. Also check that the ambient temperature at the mounting location is within the specified range.

To minimize the risk of dripping water or dust build up damaging the control, mount the module with the terminals facing down (preferred) or on either side. Do not mount with the terminals facing in an upright position.

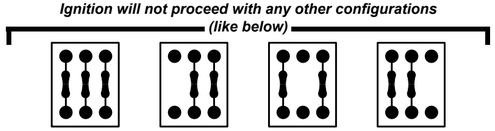
System Setup Combinations

You must set this correctly to match your system. See ICM283 Cross Reference Chart on other side.



IMPORTANT: *It is best to remove the jumpers before installing the **ICM283**. Do not cut the jumpers with power applied to the control. Completely remove unneeded jumpers. Carefully cut the jumper with wire cutters and discard the jumper.*

Ignition will not proceed with any other configurations (like below)



ICM283 Wiring Diagrams

WARNING! ***IMPORTANT SAFETY INFORMATION!***

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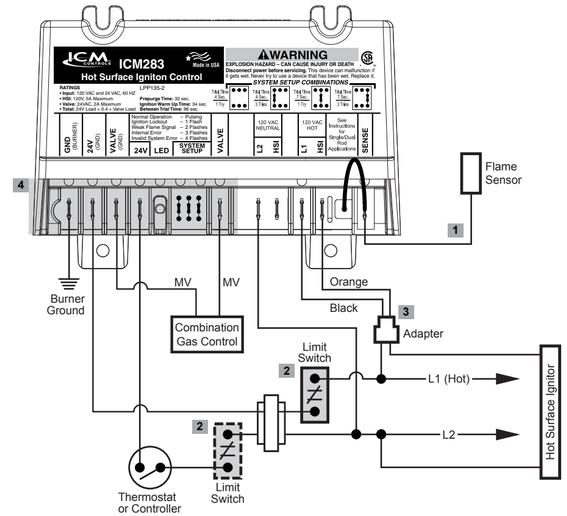
IMPORTANT:

1. All state and local electrical codes and ordinances must be adhered to when installing this control.
2. Avoid bringing HSI lead wires into contact with grounded metal surfaces.
3. Important Grounding Information:
   - The **ICM283** and main burner require a common ground.
   - The 24V (GND) terminal internally grounds one side of the transformer.
   - Auxiliary controls or limits must not be in the grounded leg.
   - Make sure the system is adequately earth-grounded.
4. Make sure the transformer has a VA rating equal to or larger than the total load (a Class II Transformer may be required). To determine the minimum transformer VA rating, add together the VA ratings of the following:
   - The **ICM283** ignition module (0.4A @ 24 VAC) = 9.6 VA
   - Total current draws of all other devices in the control circuit x 24 VAC
5. Verify **L1** (hot) and **L2** (neutral) are properly wired to the correct terminals.
6. Use the diagrams below to connect the wires to the **ICM283** Ignition Module. If replacement of a quick-connect is required, use the quick-connect supplied.

Notes: Do not try to work on or light this appliance if *a smell of gas is present or you suspect a gas leak. Instead, turn off the gas at the manual service valve and evacuate the building immediately. Do not touch any electrical switch or telephone in the building until you are sure no gas remains. A gas leak test is required for initial installation and any time work is done involving the gas lines or equipment.*

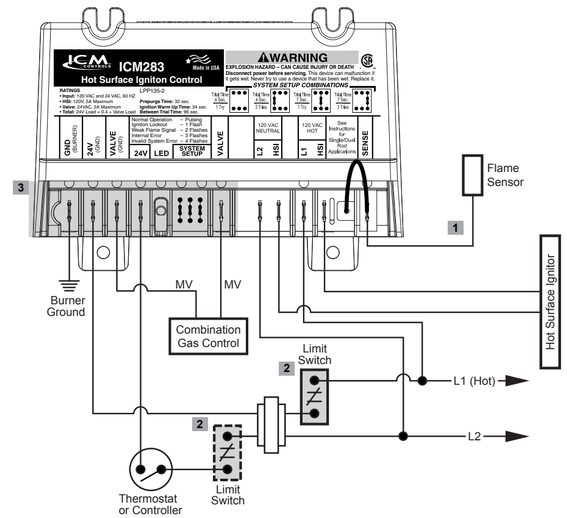
Typical hookup when ICM283 replaces White-Rodgers 50E/F47.

1. For remote sensor systems only. Connect remote flame sense to **SENSE** terminal. Cut black **REMOTE** wire off at the circuit board and discard it.
2. Only one limit switch will be in your system.
3. Supplied adapter must be installed.
4. Use supplied crimp on connectors where needed.



Typical hookup when ICM283 replaces Robertshaw HS780 and S89/S890.

1. For remote sensor systems only. Connect remote flame sense to **SENSE** terminal. Cut black **REMOTE** wire off at the circuit board and discard it.
2. Only one limit switch will be in your system.
3. Use supplied crimp on connectors where needed.



Gas Leak Test

Coat the gas control gasket edges and all the pipe connections upstream of the gas control with a soap and water solution. Bubbles indicate gas leaks. Tighten the joints and screws and repair or replace any component where a gas leak is evident. Recheck area with soap and water solution.

Start Up – Operation – Safety Check

1. **Perform a visual inspection**
   a. With power off, make sure all wiring connections are clean and tight.
   b. Turn on the power to the appliance and the **ICM283** and open the manual shutoff valves in the gas line.
   c. If the piping looks like it has been disturbed, be sure to conduct a gas leak test by following the instructions in the above section.

2. **Check safety lockout operation**
   a. With the thermostat or controller set at the lowest setting, turn on the system power. Wait approximately 60-seconds and then turn OFF the gas supply.
   b. Using the thermostat or controller, initiate a call for heat.
   c. Several seconds after the prepurge time period, the igniter should start to glow.
   d. Apply an AC voltmeter across the gas valve terminals to determine the length of time the gas control is energized.
   e. When using a three-trial ignition set up, confirm the 96-second purge time between trials for ignition. This should be followed by a 34-second igniter warm up and a second try for ignition. At the end of the third trial for ignition, the **ICM283** should lock out and the status LED will flash once.
   f. Verify that there is no gas flowing to the burner by opening the manual gas control knob.
   g. Reset the thermostat or controller to its lowest setting and wait 60-seconds before continuing.

3: **Check normal operation**
   a. Using the thermostat or controller, initiate a call for heat.
   b. Make sure the main burner lights and operates smoothly. Check carefully to ensure there are no signs of flashback, floating, lifting, or flame rollout to the furnace vestibule or heat buildup in the vestibule.
   c. Make sure the igniter-sensor or sensor is constantly immersed in flame. (Note: Do not relocate the hot surface igniter or flame rod.)
   d. Reset the thermostat or controller to its lowest setting. The main burner and pilot flames should go out.

Mode of Operation

The **ICM283** provides one or up to three trials for ignition, depending on which set up is selected. Once the inducer fan air flow is established, the air proving switch closes and the cycle begins.

The **ICM283** initiates a 32-second prepurge cycle, after which, the hot surface igniter is energized and begins a 34-second warm up period. During this time, the gas valve remains closed.

Following the warm up period, the gas valve opens for the duration of the ignition trial time as determined by the system setup combination. During the ignition trial time, the hot surface igniter will stay powered for either one- or four-seconds, depending on how the unit is configured (one-second for a 4-second ignition trial time and four-seconds for a 7-second ignition trial time).

If the flame sensing circuit senses that the main burner is lit, then the gas valve will stay open and the burner will initiate its run cycle. The flame is monitored throughout the run cycle, until the call for heat ends, at which time, the gas valve is closed.

Flame Failure During Single Trial for Ignition Setting

In the event that a flame is not sensed by the end of the trial for ignition period, the gas valve will close and the unit initiates a lockout. In order for the unit to be reset, power must be removed from the unit, or the heat call must cease. This can be done by adjusting the thermostat setting to the lowest ambient temperature for at least 30 seconds.

Should the flame go out during the run cycle, then the gas valve will close and the unit will enter a new 34-second warm up period, followed by a single trial for ignition. If the burner fails to light, the control will lockout the system and need to be reset (see instructions in paragraph above).

Flame Failure During Three Trials for Ignition Setting

In the event that a flame is not sensed by the end of the first trial for ignition period, the gas valve will close and the unit will enter a 96 second “between trial purge” period. At the end of this delay, the unit will enter its 34-second warm up period before attempting a second trial for ignition. If a flame is still not established after the second trial for ignition attempt, the cycle will repeat one final time. Following a third unsuccessful trail for ignition, the gas valve will close and the unit will initiate a lockout. In order for the unit to be reset, power must be removed from the unit, or the heat call must cease. This can be done by adjusting the thermostat setting to the lowest ambient temperature for at least 30 seconds.

Should the flame go out during the run cycle, the gas valve will close. The unit will then calculate the number of ignition trials attempted during the current heat call and determine whether to enter a “between trial purge” period (if less than three attempts were made), or initiate a lockout.

Ignition System Checks

STEP 1: Check all connections of the igniter wire harness to make sure they are clean and tight, and that the ignition cable provides good electrical continuity. Also make certain that the ignition cable does not touch or can come into contact with any metal surface.

STEP 2: Check the ignition system grounding to minimize the risk of nuisance shutdowns. The control module, igniter, flame sensor and main burner require a common ground.

- Verify that there is sufficient metal/metal contact between the igniter bracket and the main burner.
- Inspect the ground path from the GND (BURNER) terminal on the module to the main burner. Replace the wire if signs of wear, damaged or deterioration are evident. (Quick Tip: Connect a temporary lead wire between the GND (BURNER) terminal and the main burner to help confirm if there is a ground path problem.)
- Verify that the temperature at the igniter ceramic or flame sensor insulator does not exceed the appliance manufacturer’s rating of the igniter or sensor.
- Make sure the flame sensor or bracket is not bent out of position. If it is bent out of position, restore it to the correct position.
- Replace the igniter and sensor or igniter sensor with an identical unit if the insulator is cracked.

STEP 3: Check the flame sensing circuit for a strong rectification signal.

⁂ **Note:** *For the best signal, the flame sensor or igniter-sensor should be continuously immersed in the flame - about 3/4” to 1”).*

To avoid a short to ground caused by excessive temperatures, check for excessive (higher than 1000°F [538°C]) temperature at the ceramic insulator on the flame sensor. Also ensure that there are no cracks in the igniter-sensor or a sensor ceramic insulator. If a crack is evident, replace the unit.

Replace any damaged wire with moisture-resistant No. 18 wire rated for continuous duty up to 221°F (105°C).

Troubleshooting

The **ICM283** contains a status LED that shows the system status for the current call for heat only. When the call for heat ends, or there is a loss of power to the control, the LED goes off and the status information is lost.

- ***Status LED pulses***: Indicates normal operation during the duration of a call for heat.
- ***One flash***: Indicates lockout mode. Check to see if the burner is lit or if a flame is present. If necessary, initiate a call for heat. If the burner does not light, check the:
  – Gas supply
  – Input voltage
  – Hot surface igniter
  – Gas valve
  – Wiring

  If the main burner lights initially, but then the flame is extinguished prior to completing the ignition trial, check the:
  – Igniter/sensor
  – Flame rod
  – Burner ground connections
  – Wiring
- ***Two flashes***: Weak flame rectification signal. Check for:
  – Faulty or incorrectly located igniter/sensor or flame rod
  – Worn flame sense lead wire insulation or faulty connections
  – Insufficient gas pressure

If the strength of the flame rectification signal deteriorates from the time the appliance initially lights to the when heat is being delivered, check for overheating of the:

  – Igniter/sensor
  – Flame rod ceramic
  – Flame sense lead wires

- ***Three flashes***: Indicates an unusual gas valve response. Check gas valve thoroughly. If gas valve is OK and error continues, replace the ICM control.
- ***Four flashes***: System setup combination is not correct. See “System Setup Combinations” section.

After successfully troubleshooting any problem, perform each checkout procedure again in its entirety to ensure proper system operation.

ICM283 Cross Reference Chart

Model Numbers	ICM283 System Setup Combo	ICM283 Remove Black jumper	Local (L) or Remote (R) Sensing	Lockout Time (sec)	Ignition Trials	Pre Purge (sec)	Igniter Warm Up (sec)	Between Trial Purge (sec)
ICM283 Specifications	***A***	–	*Local or Remote*	***4***	***1***	***32***	***34***	***NA***
	B				***3***			***96***
	C			***7***	***1***			***NA***
	D				***3***			***96***
50E47-1 thru 9	A	Yes	R	4	1	0	17	NA
50E47-10 thru 19	A	Yes	R	4	1	0	45	NA
50E47-20 thru 29	A	Yes	R	4	1	30	17	NA
50E47-30 thru 39	A	Yes	R	4	1	30	45	NA
50E47-40 thru 49	B	Yes	R	4	3	30	17	90
50E47-50 thru 59	B	Yes	R	4	3	30	45	90
50E47-60 thru 69	B	Yes	R	4	3	0	17	60
50E47-70 thru 79	B	Yes	R	4	3	0	45	60
50E47-101 thru 109	C	Yes	R	7	1	0	17	NA
50E47-110 thru 119	C	Yes	R	7	1	0	45	NA
50E47-120 thru 129	C	Yes	R	7	1	30	17	NA
50E47-130 thru 139	C	Yes	R	7	1	30	45	NA
50E47-140 thru 149	D	Yes	R	7	3	30	17	90
50E47-150 thru 159	D	Yes	R	7	3	30	45	90
50E47-160 thru 169	D	Yes	R	7	3	0	17	60
50E47-170 thru 179	D	Yes	R	7	3	0	45	60
50E47-201 thru 209	A	Yes	R	4	1	0	17	NA
50E47-210 thru 219	A	Yes	R	4	1	0	45	NA
50E47-220 thru 229	A	Yes	R	4	1	30	17	NA
50E47-230 thru 239	A	Yes	R	4	1	30	45	NA
50E47-240 thru 249	B	Yes	R	4	3	30	17	90
50E47-250 thru 259	B	Yes	R	4	3	30	45	90
50E47-260 thru 269	B	Yes	R	4	3	0	17	60
50E47-270 thru 279	B	Yes	R	4	3	0	45	60
50E47-301 thru 309	C	Yes	R	7	1	0	17	NA
50E47-310 thru 319	C	Yes	R	7	1	0	45	NA
50E47-320 thru 329	C	Yes	R	7	1	30	17	NA
50E47-330 thru 339	C	Yes	R	7	1	30	45	NA
50E47-340 thru 349	D	Yes	R	7	3	30	17	90
50E47-350 thru 359	D	Yes	R	7	3	30	45	90
50E47-360 thru 369	D	Yes	R	7	3	0	17	60
50E47-370 thru 379	D	Yes	R	7	3	0	45	60
50F47-1 thru 9	A	Yes	R	4	1	0	17	NA
50F47-10 thru 19	A	Yes	R	4	1	0	45	NA
50F47-20 thru 29	A	Yes	R	4	1	17	17	NA
50F47-30 thru 39	A	Yes	R	4	1	17	45	NA
50F47-40 thru 49	B	Yes	R	4	3	17	17	77
50F47-50 thru 59	B	Yes	R	4	3	17	45	77
50F47-60 thru 69	B	Yes	R	4	3	0	17	60
50F47-70 thru 79	B	Yes	R	4	3	0	45	60
50F47-101 thru 109	C	Yes	R	7	1	0	17	NA
50F47-110 thru 119	C	Yes	R	7	1	0	45	NA
50F47-120 thru 129	C	Yes	R	7	1	17	17	NA
50F47-130 thru 139	C	Yes	R	7	1	17	45	NA
50F47-140 thru 149	D	Yes	R	7	3	17	17	77
50F47-150 thru 159	D	Yes	R	7	3	17	45	77
50F47-160 thru 169	D	Yes	R	7	3	0	17	60
50F47-170 thru 179	D	Yes	R	7	3	0	45	60
50F47-201 thru 209	A	Yes	R	4	1	0	17	NA
50F47-210 thru 219	A	Yes	R	4	1	0	45	NA
50F47-220 thru 229	A	Yes	R	4	1	17	17	NA
50F47-230 thru 239	A	Yes	R	4	1	17	45	NA
50F47-240 thru 249	B	Yes	R	4	3	17	17	77
50F47-250 thru 259	B	Yes	R	4	3	17	45	77
50F47-260 thru 269	B	Yes	R	4	3	0	17	60
50F47-270 thru 279	B	Yes	R	4	3	0	45	60
50F47-301 thru 309	C	Yes	R	7	1	0	17	NA
50F47-310 thru 319	C	Yes	R	7	1	0	45	NA
50F47-320 thru 329	C	Yes	R	7	1	17	17	NA
50F47-330 thru 339	C	Yes	R	7	1	17	45	NA
50F47-340 thru 349	D	Yes	R	7	3	17	17	77
50F47-350 thru 359	D	Yes	R	7	3	17	45	77
50F47-360 thru 369	D	Yes	R	7	3	0	17	60
50F47-370 thru 379	D	Yes	R	7	3	0	45	60
HS780-17NL-104A	A	No	L	4	1	0	17	NA

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ICM283 Specifications	***A***	–	*Local or Remote*	***4***	***1***	***32***	***34***	***NA***
	B				***3***			***96***
	C			***7***	***1***			***NA***
	D				***3***			***96***
HS780-17NL-108A	C	No	L	8*	1	0	17	NA
HS780-17NL-304A	B	No	L	4	3	0	17	17
HS780-17NL-308A	D	No	L	8*	3	0	17	17
HS780-17NR-104A	A	Yes	R	4	1	0	17	NA
HS780-17NR-306*	D	Yes	R	6*	3	0	17	17
HS780-17NR-308A	D	Yes	R	8*	3	0	17	17
HS780-34NL-108A	C	No	L	8*	1	0	34	NA
HS780-34NL-304A	B	No	L	4	3	0	34	34
HS780-34NL-306*	D	No	L	6*	3	0	34	34
HS780-34NL-308A	D	No	L	8*	3	0	34	34
HS780-34NL-312A	D	No	L	12**	3	0	34	34
HS780-34NR-104A	A	Yes	R	4	1	0	34	NA
HS780-34NR-306*	D	Yes	R	6*	3	0	34	34
HS780-34NR-308A	D	Yes	R	8*	3	0	34	34
HS780-34NR-312A	D	Yes	R	12**	3	0	34	34
HS780-34PL-308A	D	No	L	8*	3	34	34	34
S89C1004	C	No	L	6*	1	0	34	NA
S89C1012	C	No	L	6*	1	0	34	NA
S89C1046	A	No	L	4	1	0	34	NA
S89C1087	C	No	L	6*	1	0	34	NA
S89C1103	A	No	L	4	1	0	34	NA
S89D1002	C	Yes	R	6*	1	0	34	NA
S89G1005	B	No	L	4	3	0	34	30
S89G1013	D	No	L	6*	3	0	34	30
S89G1021	D	No	L	11**	3	0	34	30
S89G1047	D	No	L	6*	3	0	34	30
S89H1003	B	Yes	R	4	3	0	34	30
S89H1011	D	Yes	R	6*	3	0	34	30
S89H1029	D	Yes	R	11**	3	0	34	30
S89J1008	C	No	L	6*	1	0	34	NA
S890C1007	C	No	L	6*	1	30	34	NA
S890D1006	C	Yes	R	6*	1	30	34	NA
S890G1003	B	No	L	4	3	30	34	30
S890G1011	D	No	L	6*	3	30	34	30
S890G1029	D	No	L	11**	3	30	34	30
S890G1037	D	No	L	6*	3	30	34	30
S890H1002	B	Yes	R	4	3	30	34	30
S890H1010	D	Yes	R	6*	3	30	34	30
S890H1028	D	Yes	R	11**	3	30	34	30

⁂ **Notes:** * *Lockout times are different between the **ICM283** and the original control, but within acceptable design tolerances.*

** *Lockout times of the **ICM283** are shorter than the original control. Test and monitor system thoroughly after installation to ensure proper operation in accordance with appliance manufacturer’s specifications.*

White-Rodger’s information was obtained from the 1991 White-Rodger’s Product Catalog (R3700).
Robertshaw information was obtained from the 1993-1994 Robertshaw Uni-Line Catalog (2-064).

ONE-YEAR LIMITED WARRANTY

The Seller warrants its products against defects in material or workmanship for a period of one (1) year from the date of manufacture. The liability of the Seller is limited, at its option, to repair, replace or issue a non-case credit for the purchase prices of the goods which are provided to be defective. The warranty and remedies set forth herein do not apply to any goods or parts thereof which have been subjected to misuse including any use or application in violation of the Seller’s instructions, neglect, tampering, improper storage, incorrect installation or servicing not performed by the Seller. In order to permit the Seller to properly administer the warranty, the Buyer shall: 1) Notify the Seller promptly of any claim, submitting date code information or any other pertinent data as requested by the Seller. 2) Permit the Seller to inspect and test the product claimed to be defective. Items claimed to be defective and are determined by Seller to be non-defective are subject to a $30.00 per hour inspection fee. This warranty constitutes the Seller’s sole liability hereunder and is in lieu of any other warranty expressed, implied or statutory. Unless otherwise stated in writing, Seller makes no warranty that the goods depicted or described herein are fit for any particular purpose.

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