

COMBUSTION TECHNOLOGY FOR ALL SEGMENTS OF GLASS PRODUCTION.

Advanced Solutions for the Glass Industry.

Thermal Solutions

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MAXON

Honeywell

Honeywell Thermal Solution is the leader in combustion technology for all segments of glass production; offering the most complete portfolio of advanced fuel-fired equipment for the glass industry, worldwide. Our extensive portfolio of combustion products provides fuel-efficient, low emission burners and complete combustion systems for use with air, oxygen, gas or oil. Designed to fire at required capacities and temperatures while meeting the most challenging emissions requirements in a variety of glass melting furnace configurations

Glass Burners

BrightFire 200

The Eclipse BrightFire 200 is a highly flexible, low NO_x air-fuel burner for regenerative glass melting furnaces. It provides superior flame adjustability by splitting the gas inside the burner into two independently variable gas streams. This creates increased flame flexibility to precisely control and optimize the location of heat release into the glass melt; delivering significant reduction in NO_x emissions, improved fuel efficiency and enhanced glass quality. The easily adjustable controls are located on the burner, and the new nozzle design creates some of the most successful technology in the glass industry.

- Superior flame adjustability for precise control of flame geometry
- Easily adjustable controls for both inner and outer gas streams
- Single gas connection for simplified, cost effective application.
- Durable construction
- Compatible with Eclipse mounting bracket and socket plate for easy installation
- Nozzle combinations allow firing to be tailored to furnace requirements
- Low maintenance
- Very low NO_x.



BrightFire 200

Eclipse PrimeFire Forehearth

The low NO_x PrimeFire Forehearth burner utilizes oxygen rather than air, to deliver significant reductions in fuel consumption and emissions in the glass furnace operations. The burner's best feature is its field-proven combustion technology with the ability to reduce fuel consumption by over 60%, reduce NO_x emissions by 80%, and deliver a high glass yield with improved glass quality from the lower surface tension these burners create.

- 80% reduction in NO_x emissions compared to air-fuel burners
- 60% reduction in fuel consumption compared to air-fuel burners
- Improved temperature homogeneity throughout glass.
- Reduced maintenance
- Reduced safety issues
- Ease of set-up and operation
- No blowers required for the combustion process
- Nozzle-mix design



Eclipse PrimeFire Forehearth

Eclipse PrimeFire 300

PrimeFire 300 is an Oxy-fuel burner for glass furnace applications that creates a flat, fan-shaped flame with low momentum; this results in a lower peak flame temperature and lower crown temperatures. The flame shape is adjustable with high luminosity, improved heat transfer, and reduced melting costs; delivering clean combustion and fuel flexibility for high temperature glass applications.

- Improves flame luminosity and furnace efficiency
- Low Velocity/Low Momentum
- Standard for many major customers
- Low flame temperature for lower crown temperatures and lower volatile transport rates
- Flat, adjustable fan shaped flame with low momentum and low mixing rates
- No maintenance design



Eclipse PrimeFire 300

Eclipse PrimeFire 400

The Honeywell Eclipse PrimeFire 400 Series oxygen-fuel burner is an advanced, non-water cooled burner featuring a flat flame geometry which provides enhanced flame coverage over the load. This flat flame shape also provides uniform heat distribution; resulting in improved product quality and extended furnace refractory life. It's patented Gas Cracking technology produces maximum luminosity and high efficiency, using lower peak flame temperatures.

- Oxy-fuel burner
- Natural gas and variety of fuel oils
- Flat, fan shaped flame
- Uniform heat distribution
- Increased product quality
- Extends furnace refractory life



Eclipse PrimeFire 400

Maxon OXY-THERM® FHR

The OXY-THERM® FHR is the next generation in oxy-fuel technology. The burner delivers the ideal flat flame pattern for furnace performance and improves radiant heat transfer in high temperature applications for glass furnaces while significantly reducing NO_x emissions.

- Industry lowest NO_x levels
- Improve radiant heat transfer
- Adjustable staged oxygen design to optimize heat transfer, flame volume and emissions
- Fuel oil capability ranges from light to heavy fuel oils
- Dual fuel capable - Quickly convert between gas and oil service by changing the fuel nozzle only
- Capacities up to 24 MBtu/hr (7 MW)
- Fuel savings up to 25% - 40% depending on application compared to an air-fuel burner.

	PrimeFire 300	PrimeFire 400	OXY-THERM FHR
Key Differentiators	<ul style="list-style-type: none"> • Flame Shape is Adjustable With High Luminosity • Improved Heat Transfer • Reduced Melting Cost 	<ul style="list-style-type: none"> • Patented Gas Cracking Technology Produces Maximum Luminosity & High Efficiency • Low Peak Flame Temperatures • A Significant Reduction in NO_x 	<ul style="list-style-type: none"> • No_x with adjustable oxygen Staging • Quickly Convert From Gas to Oil • Improved Radiant Heat Transfer
When To Use	<ul style="list-style-type: none"> • Flat Flame • Non-Staged 	<ul style="list-style-type: none"> • Flat Flame • Non-Staged (With Gas Cracking Technology) 	<ul style="list-style-type: none"> • Staged oxygen burner with adjustable oxygen staging • Increased heat transfer • Adjustable capacity with simple nozzle change • Flat flame • Lowest available nox emissions • Adjustable capacity with simple nozzle change

Flat Flame Burner Comparison Chart

Maxon OXY-THERM® LE

OXY-THERM® LE Natural Gas Burners provide the lowest NO_x levels of any industrial oxygen/fuel burner, regardless of oxygen purity. NO_x levels are up to 70% lower than conventional oxy-gas burners and up to 50% lower than conventional oxy-oil burners. OXY-THERM® LE Industrial Burners have substantially improved product quality for the glass industry, while reducing fuel usage and emissions produced per ton of product.

- Extremely low NO_x levels with patented oxygen staging design.
- Burns any gaseous fuel, including fuels that may be unstable using air for combustion.
- Fuel oil capability ranges from light to heavy fuel oils.
- Patented design eliminates flame lofting providing cooler furnace crowns.
- Quickly convert between gas and oil service by changing the burner nozzle.
- Nozzles can be removed during furnace operation, eliminating costly downtime



Maxon OXY-THERM® FHR

Eclipse PrimeFire 100

The PrimeFire 100 has become an industry standard for glass furnace applications. It provides greater flexibility, extended fuel firing capability, increased melter efficiency, improved refractory life, and reduced melting cost. The Primefire 100 oxygen-fuel burner produces a conventional flame shape and has multiple-fuel capabilities, from natural gas to light/heavy oils. The adjustable control on the burner allows variation in flame coverage to suit melter size and temperature profile.

- High Flame Luminosity
- Lower Flame Temperature
- Adjustable Flame Shape
- Lower Emissions (NO_x and Particulates)
- Uniform Heat Distribution
- Lower Precombustor (Burner Block) Operating Temperatures
- Lower Burner Nozzle Operating Temperatures
- Extended Turn-Down Ratio



Eclipse PrimeFire 100

Maxon OXY-THERM® 300

OXY-THERM® 300 Series Natural Gas Burners offer capacities up to 300,000 Btu/hr (88 kW) with choice of two block shapes for the glass industry, while also providing clean combustion with low NO_x levels.

- Burns any gaseous fuels
- Clean combustion with low NO_x levels.
- Easy installation and maintenance
- Nozzles can be removed during furnace operation.
- Improve heat transfer with increased flame temperature and luminosity.
- Substantially reduce the size of exhaust gas handling equipment.
- Oxygen-fuel firing can reduce flue gas volume and exhaust gas treatment requirements by 75% or more.
- Dramatically increase efficiency by producing higher flame temperatures from burning fuels with oxygen.
- Simple, robust design and high operational turndown provides application flexibility.



Maxon OXY-THERM® 300

	PrimeFire 100	OXY-THERM LE	OXY-THERM 300
Key Differentiators	<ul style="list-style-type: none"> • Highly luminescent flame • Very little Maintenance Required 	<ul style="list-style-type: none"> • No_x with oxygen Staging, Quickly convert from gs to oil • Multiple sizes for application flexibility. 	<ul style="list-style-type: none"> • Small size makes it versatile for multi-burner applications
When To Use	<ul style="list-style-type: none"> • Flat Glass Applications or Boosting applications that require uniform heat distribution • A highly Luminescent Flame and little maintenance is desired 	<ul style="list-style-type: none"> • Gas/oil requirements with quick conversions necessary • Low No_x requirements 	<ul style="list-style-type: none"> • OXY GAS BURNER and small capacity with multiple burners needed
Applications	<ul style="list-style-type: none"> • Glass Melting Furnaces, ladle heater 	<ul style="list-style-type: none"> • Glass Furnaces • Glass Melting Furnaces 	<ul style="list-style-type: none"> • Low capacity specialty burner • Unit melters • Lab furnaces • High temperature focused flame applications

Conical Flame Burner Comparison Chart

Fuel Delivery Components

Honeywell Thermal Solutions offers fuel delivery solutions for commercial and industrial applications, with a full valve portfolio that includes mechanical valves, safety shut-off valves and control valves, plus intelligent valves that deliver a distinctive competitive advantage. With a proven history of safety and performance, our comprehensive range of products and piping systems meet most global and regional requirements.

Maxon 8000 series Shut Off Valve

Series 8000 Pneumatic Safety Shut-off Valve combines an integral air solenoid, quick exhaust and position switches that protects components; simplifying piping and minimizing space requirements.

This valve features a maintenance-free gas and fluid seal that eliminates packing adjustments around the stem, reduces maintenance, and minimizes drag on opening and closing. Designed for performance, reliability and durability, Maxon gas valves are the only fuel shutoff valves with metal-to-metal seats that wear in, not out. Plus, powerful closing springs provide assurance of safe fuel shut-off for your glass processing systems.

- Compact design with integral solenoid, quick exhaust and position switches that protect components, simplify piping and minimize space requirements
- Large top mounted 360-degree open-shut visual position indicator, configurable in red/green or yellow/black color schemes
- Factory Mutual, CSA, CE, IECEx, INMETRO and KTL (KC mark) approved safety shut-off and vent valves
- Cast iron, carbon steel, low temperature carbon steel and stainless steel body assemblies with internal trim options to handle general purpose or corrosive gases; oxygen compatibility, NACE compliance, and fire safe conformance to API 6FA
- Hazardous Location approved: Intrinsically Safe and Non-Incendive constructions available
- Full assessment to IEC 61508 as SIL 3 capable



Maxon 8000 series Shut Off Valve

Maxon SMARTLINK® DS Actuators

Recognized globally for precision and accuracy, the SmartLink DS is a certified safety controller used to control the flow of air, gas, and fluids with precision accuracy to 1/10 of a degree to deliver highly precise positioning. It requires low maintenance for continuous duty and high temperature operations. The compact and robust design allows the SMARTLINK® DS to mount in any orientation while the repeatable specific flow control optimizes fuel efficiency, enables accurate temperature control and lowers burner emissions. The SMARTLINK®'s direct coupled, factory calibrated valve and actuator assembly includes a weatherproof housing with integrated position feedback and heavy duty gearheads for reliable long life operation.

- Each SMARTLINK® Valve is adjustable to 0.1 degree accuracy.
- Precise, durable and repeatable flow control optimizes fuel efficiency, enables accurate temperature control and lowers burner emissions.
- Factory Mutual (FM) approved as non-incendive for Hazardous Locations Class 1, Division 2 and ATEX and IEC Ex approval
- UL and CE approved electronics and software for air-fuel ratio control
- Standby, purge, ignition and light off positions can be defined independent of valve profiles.
- Maintenance-free operation: no lubrication required. No valve packing to adjust.
- Stores a 22-point user-customized profile for each valve.
- Synchronous control of up to four valves with conventional 4-20mA signal from the user's process controller.



Maxon SMARTLINK® DS Actuators

SmartLine Multivariable Transmitter

Honeywell's SmartLine Multivariable Transmitters (SMV800) extend its proven smart technology to the simultaneous measurement of three separate process variables per standard industry methods for air, gases, steam and liquids. They also offer the ability to calculate compensated mass or volume flow rate as a fourth process variable. In addition, meter body-only components are also available to support third party and OEM metering solutions.

The SMV 800 combines sensor technologies for differential pressure, static pressure and temperature with the latest microprocessor technology to provide highly accurate compensated flow measurement. When paired with the other SmartLine unique features the SMV 800 delivers the highest levels of safety, reliability and efficiency available.

- Accuracy up to 0.0400% for Differential pressure
- Accuracy up to 0.0375% for Static pressure
- Accuracy up to 0.1 Deg C for Temperature
- Rangeability up to 400:1
- Mass Flow Reference Accuracy: up to 0.6%
- Automatic static pressure & temperature compensation
- Compensated flow response time of up to 2x per second

Gas Trains

From upstream, downstream, and everything in between; we provide a variety of options for efficient gas management; including Maxon safety shut off valves, gas pressure regulators and other components connected to the fuel train. Each standard or custom-built system is designed for optimal thermal process control. This approach allows customers to focus on their core competency while saving valuable in-house resources. Honeywell offers an extremely wide variety of other quality gas components and solutions that include:

- Oxygen-Enriched Air Staging
- SmartLink MRV
- Hercules
- SMARTLINK meters
- Modutrol actuators and a full line of Kromschroder products

Oxygen-Enriched Air staging (OEAS)

Cutting edge technology that provides a highly economical way to dramatically decrease NO_x production in air-fired regenerative glass furnaces:

- NO_x reduction levels of 30%-70%.
- Installations can be done without making significant changes to the operation
- This NO_x control technology is available for end-fired and cross-fired regenerative glass furnaces
- Easily installed on new furnaces or retrofits

Elster Gas Lab

The Honeywell Elster® GasLab Q2 Gas Quality Analyzer determines the calorific value, Wobbe index and other parameters in natural gas. The applications of the device range from fiscal energy metering to measurement, control and regulation. The main features and benefits of the Elster GasLab Q2 include:

- Determination of main gas parameters: calorific value/Wobbe index/density/CO₂ concentration/methane number and more
- Easy to operate via touch panel or web browser
- User-friendly with fast, continuous and accurate gas quality measurements
- Low capital investment and minimal ownership costs
- Cleaner burner regulation
- Optimized emission of processes
- Better end-product quality control



SmartLine Multivariable Transmitter



Gas Trains



Oxygen-Enriched Air staging (OEAS)



GasLab Q2 Gas Quality Analyzer

Connected Solutions

Honeywell Thermal Solutions' has developed innovative connected solutions to address the increasing "digital intelligence" need to manage and operate all assets from a single site or across an enterprise. Connected Solutions presents the glass industry with an advanced option to keep a pulse on fuel-firing equipment and site management processes, addressing critical operating demands organization-wide and decreasing downtime.

- Thermal IQ for Remote Process and Equipment Monitoring - Thermal IQ is a cyber-secure offering designed to connect glass processing equipment to the Honeywell cloud, making critical thermal process data available anytime, so users can optimize operations, predict plant failures and eliminate unplanned downtime.
- SV2 Series- Redefines the entire valve category with embedded intelligence that helps you develop differentiated solutions. Modular components reduce assembly, install and commissioning time. The intuitive user interface speeds troubleshooting and service.
- SLATE Integrated Burner Control - The SLATE solution combines configurable safety with programmable logic – all in one platform, connectable to the cloud.
- 7800 Series - The 7800 SERIES is a microprocessor-based integrated burner control platform for single burner applications. This platform includes a family of relay modules that provide burner sequencing for many types of glass firing operations.

Eclipse Heat-Up Burner

The Eclipse Heat-Up Burner is a portable combustion system designed for the controlled heat-up and dry-out of refractory in a variety of furnaces, including glass furnaces. It is typically used to raise the furnace temperature from a cold start up to main burner light-off. The system is also used for slag burn-out and cleaning in furnace regenerator checkers.

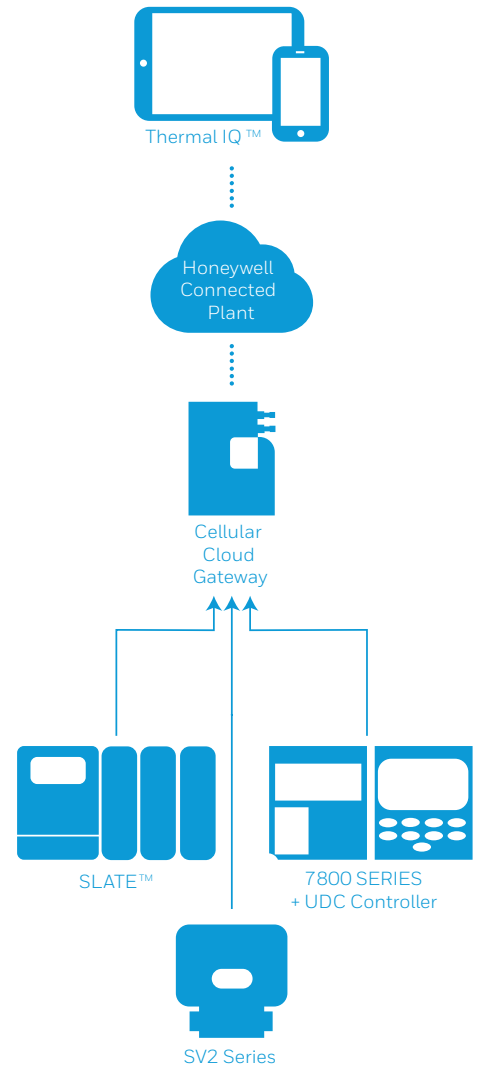
- The main gas and air cart include the combustion air blower and gas and air safety systems.
- The Eclipse ThermJet direct-fired burner is supplied with an extended combustor cone.
- All safety interlock and controls required for monitoring and starting the burner system are included.
- All safety systems meet NFPA 86 requirements.

Tin Bath Supplemental Heating

The low NOx Eclipse SER V5 burner delivers the best fuel efficiency of any burner in the glass industry. The SER V5 is especially beneficial in Float Glass applications; keeping the tin bath up to temperature, which is critical for producing high quality, uniform flat glass.

Traditionally, tin baths have supplemental heating electrodes, and if those fail, replacing them means shutdown of an entire production line; leading to lost production product, time, and money. Honeywell has helped customers address this concern by providing their SER Single Ended Radiant tube burners in a custom designed edge heating system, which can be installed while the furnace is running and prevent lost production.

Honeywell Thermal Solutions solved the countless issues surrounding maintaining the float edge temperatures in tin bath applications by utilizing the SER V5 Burner. Designed and built with a custom gas fired edge heating system, using five 6" SER AutoRecupe indirect fired self-recuperative burners with ceramic inner and metallic outer tubes.



Eclipse Heat-Up Burner

It also provides enough heat for the float to stay in solution during a recent power outage. When the plant back-up power cannot energize all of the electrical heating elements, the "Float Fire" Burner system is able to operate on auxiliary power and retain heat in the furnace.



Tin Bath Supplemental Heating

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For more information

The Honeywell Thermal Solutions family of products includes Honeywell Combustion Controls, Honeywell Combustion Safety, Honeywell Combustion Service, Eclipse, Exothermics, Hauck, Kromschroder and Maxon.

To learn more about our products, visit ThermalSolutions.Honeywell.com or contact your Honeywell Sales Engineer.

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BR-19-05-ENG | 07/19
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