



Hamworthy Combustion Engineering's ELECTROtec Rotary Cup burner is a product designed to incorporate state of the art combustion technology – offering significant performance enhancements over any other non-volumetric oil metering burner.

The ELECTROtec offers an integral volumetric electronic liquid fuel management system* and electronic air/fuel ratio control - ensuring optimum combustion efficiency for the most demanding operational requirement while minimising energy use and maintenance costs.

With increasing demands on liquid and gaseous fuel reserves and the need for more of the lighter fractions to be refined from the crude supplies, changes have occurred in the characteristics of the cheaper grades of residual oil traditionally used as boiler fuel.

Increases in pour point temperature, viscosity, S.G. and levels of long chain molecules known as asphaltenes all tend to have a degrading effect on combustion performance.

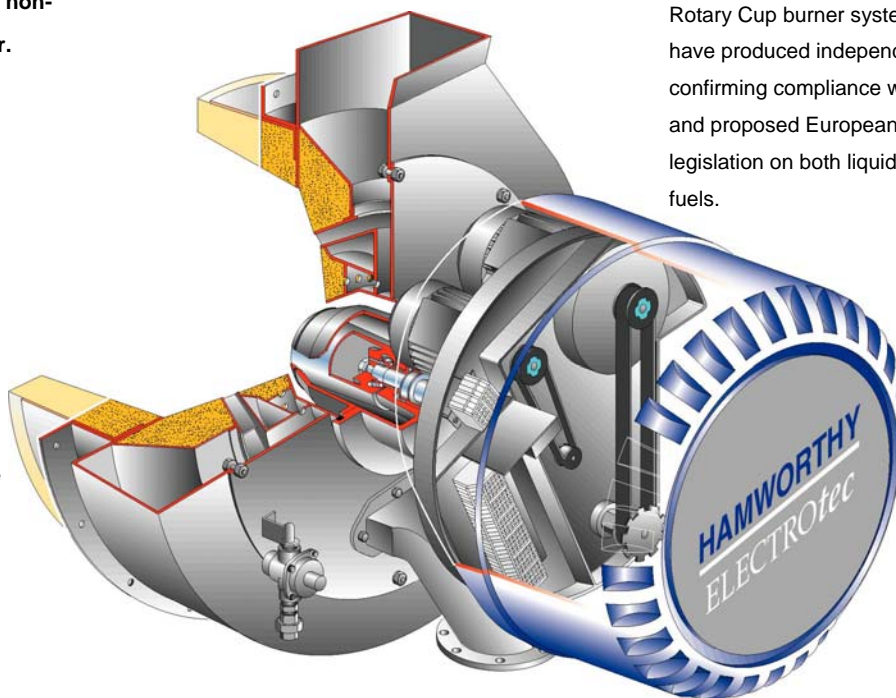
Previously, the generation of high flame temperatures assisted in the combustion of these heavy residual fuel oils.

Today however with the emphasis on reducing NOx as well as particulates, high flame temperatures only exacerbate the NOx problem, along with high furnace heat release rates and fuel nitrogen content.

The ability to reduce all types of pollutant emissions is, therefore, dependant not only on burner design, but on the ability to match the combustion equipment to the plant.

With some of the largest test facilities in the world, Hamworthy is at the forefront of industrial, process and utility burner development and the ELECTROtec has been designed to meet the world demand for 'low pollution' combustion equipment.

Site testing of 'low NOx' Hamworthy Rotary Cup burner systems in Europe have produced independent results confirming compliance with the current and proposed European emission legislation on both liquid and gaseous fuels.



Complete Combustion Flexibility

Capable of burning virtually all liquid fuels, including marine sludge and chemical wastes, the Hamworthy range of Rotary Cup burners are currently operating on shell and water tube industrial boilers and marine auxiliary boilers worldwide - as well as on various process and drier applications.

In order to achieve the large degree of flexibility associated with this burner, the ELECTROtec has been designed to offer a number of variables. By incorporating separate drives for the rotary cup and primary fan, atomisation can be optimised for any fuel.

- Oil and gas burners can easily be converted to dual fuel
- Suitable for firing in both horizontal and vertical downshot positions
- The gas version is also capable of firing vertically upwards
- Same burner machine, for either oil or dual fuel with the same application principle for gas only version

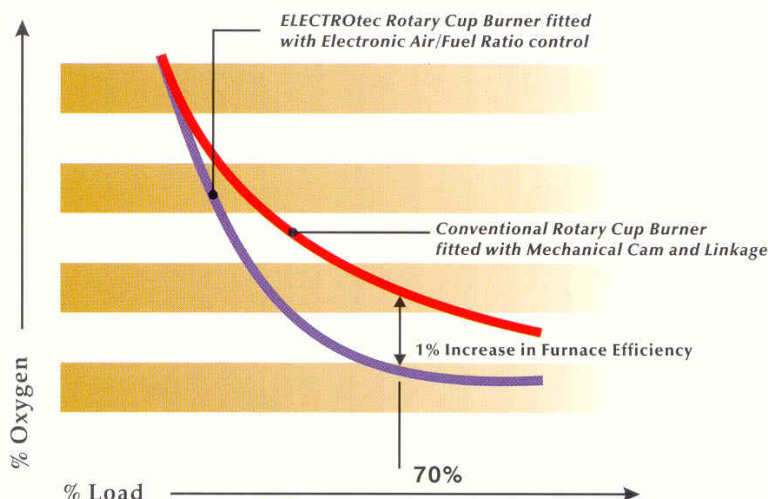


Relationship between O₂ (excess air) and boiler load using a Rotary Cup Burner fitted with a Conventional Mechanical Cam and Linkage versus the ELECTROtec Rotary Cup Burner

Electronic Air/Fuel ratio control provides greater combustion performance, eliminates hysteresis and is less susceptible to mechanical wear or negligence than burners fitted with mechanical cam and linkage. Even in well maintained plant, direct losses caused by these factors can result in combustion inefficiencies of up to 1%, which will relate to additional fuel costs.

For example, fuel costs for a 10 t/hr boiler running for 24 hours per day, on a 70% load for 300 days per year, burning heavy fuel oil would be approximately £274,579*. A 1% saving on this cost would be £2,746 a year and over 15 years of operation this would equate to a total saving of £41,190.

*Based on spot price of 8 pence per litre %



Cost Effective Reliable Combustion Performance

Reliable Performance

- 1.9-29 MW boiler input
- Overall combustion performance enhanced through the ELECTROlink electronic modulation system fitted as standard
- Consistent and reliable operation through a volumetric electronic liquid fuel management system
- Capable of burning heavy fuel oils at much lower temperatures and pressures than equivalent pressure atomised burners
- Low noise levels
- Variable speed compound fan available to reduce power absorption at lower boiler loadings (optional)
- Constant velocity design windbox for improved air distribution and performance over entire turn-down range
- Capable of operating on oil ring main pressures from 0.2 to 7 barg
- Ability to burn wide range of fuels

- No re-calibration of burner required when switching between liquid fuels
- Excellent turn-down ratios for gas and as oil firing
- Local oil meter (optional)
- Low NO_x recirculated flue gas version available
- Mechanical cam and linkage version is available
- Based on proven Hamworthy Rotary Cup combustion technology

Safety

- Automatic double shut-off valves employed for all fuel supplies including ignitor
- Designed to comply with all relevant standards e.g. BS.EN., DIN, Marine Classification Societies etc.

Quality

- ISO 9001:2000

Certification

- Russian Certification (Gosgortekhnadzor)
- Polish Certification UDT

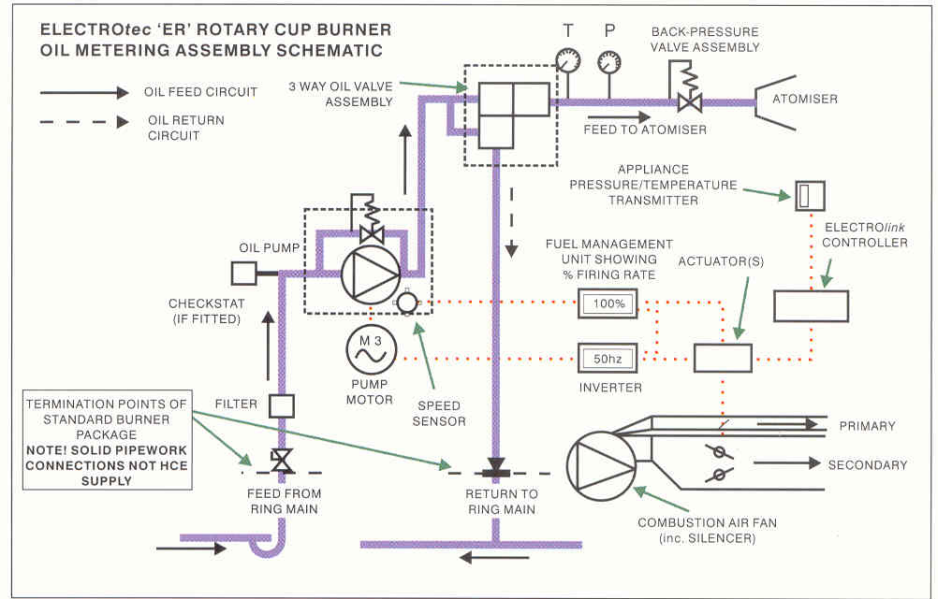
This table is based upon: Fuel Oil Gross C.V. of 42566 kJ/kg (18300 Btu/lb, 1067 kcal/kg) and S.G. at atomising temperature of 0.93. Natural Gas Gross C.V. of 38.563 MJ/m³ (1035 Btu/ft³). Gas volume @ 15°C and 1013 mbar.

Standard Burner Capacity Chart

BURNER MODEL	MAX. FUEL REQUIREMENTS					THERMAL OUTPUT	BOILER OUTPUT @ 83% GROSS EFFICIENCY				
	FUEL OIL			GAS			STEAM F & AT 100° C		HOT WATER		
	Litres per hr.	Imp. Gal. per hr.	kg. per hr.	m. ³ per hr.	ft. ³ per hr.		kg. per hr.	lb. per hr.	Gcal/hr Net	Btu/hr. Millions	
ER5/1.9	170	37.5	159	179.0	6322	1.87	2476	5458	1.335	5.297	1.552
ER7/2.5	227	50.0	211	238.7	8429	2.49	3301	7277	1.780	7.063	2.070
ER8/3.1	284	62.5	264	298.4	10537	3.11	4126	9096	2.225	8.829	2.587
ER10/3.7	341	75.0	317	358.0	12644	3.74	4951	10915	2.670	10.594	3.105
ER11/4.1	375	82.5	349	393.8	13908	4.11	5446	12007	3.415	11.654	3.415
ER12/4.5	414	91	385	434.4	15341	4.53	6007	13244	3.240	12.854	3.767
ER15/5.4	496	109	461	520.3	18376	5.43	7196	15863	3.880	15.397	4.512
ER17/6.3	577	127	537	606.3	21411	6.33	8384	18483	4.521	17.940	5.258
ER20/7.2	659	145	613	692.2	24445	7.23	9572	21103	5.162	20.482	6.003
ER22/8.1	741	163	689	778.1	27480	8.13	10760	23722	5.803	23.025	6.748
ER25/9.0	827	182	769	868.8	30683	9.07	12015	26488	6.479	25.709	7.535
ER30/10.9	996	219	926	1045.5	36921	10.92	14457	31872	7.796	30.935	9.066
ER35/12.7	1155	254	1074	1212.6	42821	12.66	16768	36966	9.042	35.879	10.515
ER40/14.5	1318	290	1226	1384.4	48890	14.46	19144	42206	10.324	40.965	12.006
ER45/16.4	1491	328	1387	1565.8	55296	16.36	21653	47736	11.677	46.333	13.579
ER50/18.2	1659	365	1543	1742.5	61534	18.20	24095	53121	12.994	51.559	15.110
ER60/21.8	1991	438	1848	2090	83797	21.83	28886	63683	15.576	61.81	18.114
ER70/25.5	2323	511	2156	2438	86096	25.46	33701	74296	18.171	72.11	21.134
ER80/29.1	2650	583	2459	2786	98396	29.10	38515	84910	20.767	82.413	24.153
						#	#	#	\$	#	#

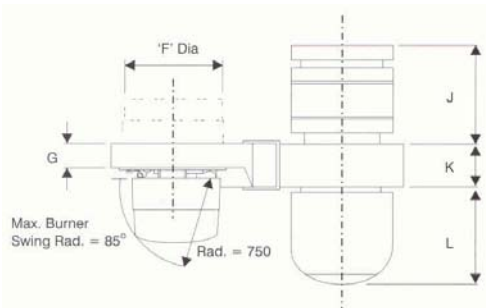
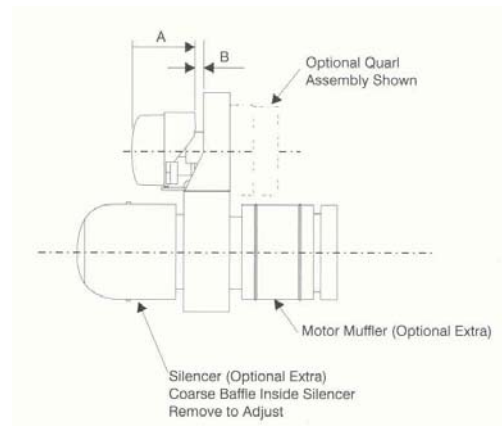
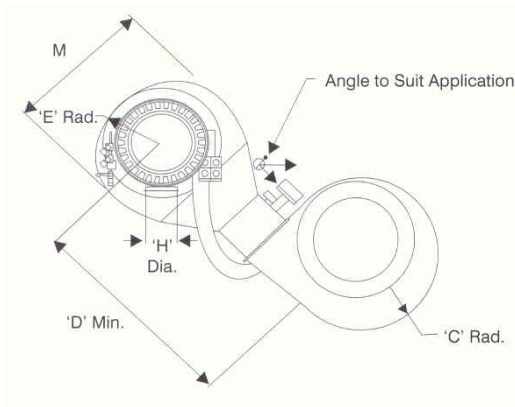
= BASED ON GROSS CV OF FUEL, \$ = BASED ON NET CV OF FUEL

Oil Metering Assembly



Gas Train System

ELECTROtec Burner Typical Arrangement



BURNER SIZE	A	B	C rad	D	E rad	F dia	G	H dia	J	K	L	M
ER 5-11	355	70	412	1302	408	635	181	200	795	480	800	810
ER 12-20	355	70	478	1436	478	730	198	220	810	481	800	945
ER 22-30	355	70	563	1645	565	857	221	220	930	555	1080	1125
ER 35-50	355	70	563	1830	580	972	288	220	945	675	1080	1290

All dimensions shown in mm

Hamworthy Combustion Engineering reserve the right to make changes and improvements which may necessitate alteration to the specification without prior notice.

All technical information for indication purposes only.

FEATURES

Combustion Air System

The asymmetric windbox design ensures excellent air distribution throughout the burner operating range. Combustion air is supplied from a compound fan assembly and is controlled by an integral twin bladed damper.

Ignition

Two types of ignitor are available, utilising either diesel or gas (Natural or L.P.G.). The units are mounted on the burner doorplate and incorporate an integral ignition flame monitor

Flame Detection Equipment

The ELECTROtec burner is equipped with both ignition and main flame proving systems as standard.

Fuel Gas Regulation Supply

A gas valve train is supplied to suit whichever gas is specified, e.g. Natural, LPG, Landfill etc. and is designed to meet all relevant statutory requirements.

Burner Controls

Automatic sequencing, supervisory and modulating controls are normally housed in a suitable steel cabinet and incorporate all necessary safety circuits. Relay logic and P.L.C. based management controls with electrical, electronic or pneumatic modulation are available with all necessary safety circuits included as standard.



ADDITIONAL EQUIPMENT

Alphalink

Advanced Electronic Air/Fuel-ratio control system, including:

- Alphatrim capability
- Inputs, displays and associated alarm/commissioning displays for:
 - Oxygen – Flue temperature – Efficiency
 - Carbon Monoxide
 - Boiler shell temperature
- Communications function
- Second Set-point capability

Sequence 2000

Automatic and efficient control of boilers to match boiler outputs according to overall steam demand.

Diagnostics System

Designed to indicate the cause of a plant shutdown, or failure to operate.

Systems Manager

Fully integrated control and data acquisition system for boiler house and associated equipment.

Water Injection System

Designed to reduce particulate emissions when firing heavy fuel oil.

Worldwide Network



- Offices in fifteen countries over five continents
- Fully qualified representation in over eighty countries worldwide
- Commissioning
- Site supervision

Global Support

Hamworthy Combustion Engineering is dedicated to providing comprehensive customer care through:

- Product familiarisation at our extensive training centre in Poole or on site
- Global after-sales support through our worldwide network of service engineers
- Continual product development and enhancement through our Advanced Research & Technology Centre - one of the largest of its kind in the world

Service & Spares

- International network of specialised engineering teams dedicated to providing boiler house and associated equipment manufacturers with the highest levels of professional maintenance
- These teams are made up of highly trained and technically qualified engineers situated around the world
- New and retrofit plant installation capability
- Levels of contractual involvement can be arranged to suit wide range of requirements, from annual inspections to quarterly or monthly visits
- Breakdown and emergency response times typically within twenty four hours



Training

Hamworthy Combustion Engineering offer an all encompassing training service.

Training Courses

Pressure Jet, Rotary and Register Burners fitted to:

- Water Tube Boilers
- Fire Tube Boilers
- Ovens
- Incinerator



