MSI AUTOMATION, INC. Thermal Medicine

Magnetic Hyperthermia Unit for Nano Particle Heating

3.0 -10.0 KW INDUCTION SYSTEM

NANO PARTICLE HEATING: THIS SYSTEM IS BUILT FOR THE LABORATORY, ANIMAL AND CLINICAL STUDIES AND TUMOR ABLATION TREATMENT.

System Features:

A. **MAGNETIC POWER INTENSITY:** 10- 30 kAMP/METER*
B. **HANDHELD HEATING DEVICE** IS LIGHT WEIGHT & MOBILE
C. **COLOR TOUCH SCREEN** OPERATOR CONTROLS.
D. **TEMPERATURE CONTROLLER** IS BUILT-IN
E. **REMOTE PC CONTROL** via ETHERNET & RS 232/485
F. **POWER AND FREQUENCY** PLASMA DIAPLAY.
G. **SOLID STATE ELECTRONICS**
H. **FIBER OPTIC LOGIC.**
I. **COIL SIZES:** BUILT TO CUSTOMER SPEC'S.
J. **OPERATING FREQUENCY**: **150 KHZ - 2.0 MHZ**

***Power Intensity is directly related to frequency, coil amperage, coil diameter and coil geometry. Obviously, the smaller the heating coil, the higher will be the field intensity, all other parameters remaining the same.**

Detailed Description:

POWER SUPPLY:
THE MAGNETIC HYPERTHERMIA SYSTEM UTILIZES THE LATEST **IN SOLID STATE ELECTRONICS**, FIBER OPTIC CONTROLS AND POWER TRANSISTOR TECHNOLOGY. THESE FEATURES ARE A GOOD EXAMPLE OF THE CONTINUING EVOLUTION OF MODERN DAY ELECTRONICS. THEIR RESULTING IMPACT HAS REDUCED THE SIZE, COMPLEXITY AND COST OF ALL INDUCTION HEATING SYSTEMS.

THOUGH SMALL IN DIMENSIONS, THE MAGNETIC HYPERTHERMIA SYSTEM IS BUILT RUGGED WITH **INDUSTRIAL-RATED COMPONENTS**. FRONT PANEL 3-PHASE DISCONNECT SWITCH, 3 PHASE CIRCUIT BREAKER AND POWER CONTACTOR ARE ALL STANDARD. THE INTERNALS ARE DUAL FAN AND WATER COOLED.

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EXTERNAL HEAT STATION:
THE EXTERNAL **HEAT STATION** IS AVAILABLE IN SEVERAL DESIGN VERSIONS AND CAN BE POSITIONED NEXT TO THE POWER SUPPLY ON A WORK BENCH OR UP TO 30 FEET AWAY IN A WORK CELL OR REMOTE LABORATORY. THE HEATING COIL IS NORMALLY ATTACHED TO THE HEAT STATION EITHER BY PREMIUM BRASS COMPRESSION FITTINGS OR A BOLT-ON FLANGE. ALL PRIMARY ELECTRICAL SURFACES ARE SILVER PLATED FOR CORROSION RESISTANCE AND HIGH ELECTRICAL CONDUCTIVITY. WATER COOLING OF THE HEATING COIL IS PASSED THRU O-RING SEALS BETWEEN THE MATING (FLANGED) SURFACES.

COMMAND AND CONTROL:
UNIQUE TO MSI AUTOMATION'S MAGNETIC HYPERTHERMIA SYSTEM IS A SOPHISTICATED ON-BOARD COMPUTER AND **COLOR TOUCH SCREEN DISPLAY**. VITAL FUNCTIONS OF THE UNIT ARE DISPLAYED IN REAL TIME. IN ADDITION, EVENTS SUCH AS TIME, PART TEMPERATURE AND STEPPED POWER SETTINGS CAN BE PROGRAMMED. THE UNIT CAN BE LINKED TO A REMOTE PLC FOR PRODUCTION LINE OPERATION. IT CAN ALSO BE CONTROLLED AND MONITORED EXTERNALLY FROM THER USER'S PC VIA AN **ETHERNET** or **RS232/485 SERIAL INTERFACE**. USE OF FIBER OPTIC TEMPERATURE SENSORS IS POSSIBLE TO CONTROL THE TEMPERATURE CONTROLLER WITHIN SPECIFIED LIMITS.

HEATING COILS: HEATING COILS ARE FABRICATED FROM HIGH PURITY COPPER TUBING AND COATED FOR ELECTRICAL ISOLATION. COIL SIZES AND SHAPES VARY DEPENDING UPON THE USER'S REQUIREMENTS.

COOLING SYSTEM:
RELIABLE OPERATION OF ANY INDUCTION SYSTEM REQUIRES BOTH FORCED AIR AND WATER COOLING. THOUGH THE NEW SOLID STATE ELECTRONICS NORMALLY OPERATE ABOVE 90% EFFICIENCY, THE HEATING COIL, OUTPUT TRANSFORMER AND RELATED HIGH CURRENT CONDUCTING COMPONENTS DO NOT. IN TRUTH, OVERALL EFFICIENCY OF ANY SYSTEM WILL RANGE BETWEEN 60-80% DEPENDING UPON SEVERAL FACTORS: NOTABLY HEATING COIL DESIGN AND THE TYPE AND GEOMETRY OF THE METAL PARTICLES OR CONDUCTIVE MATERIAL BEING HEATED. AS A RESULT, IT IS RECOMMENDED THAT THE WATER CHILLER BE CALCULATED FOR THE CORRECT BTU CAPACITY.

DESCRIPTION	1.0 / 3.0 KW	3.0/7.5 KW	NOTES
HEATING POWER	1.0 or 3.0 KW*	5.0 or 7.0 KW	*SWITCH SELECTABLE
FREQUENCY RANGE	150-450 KHZ	450 KHZ-2.0 MHZ	NANO PARTICLE HEATING
INPUT VOLTAGE	110- 480 VAC	220-560 VAC	50-60 HZ
PHASE	1 OR 3 PHASE	3 PHASE	50-60 HZ
WATER COOLING	0.5 GPM	1.5 GPM	20-30 PSI @ 60-85 degrees F
CONTROL METHOD	N/O CONTACT 5 ma (5-24VDC)	N/O CONTACT 5 ma (5-24VDC)	FOOT SWITCH, PUSH BUTTON OPERATOR STATION OR PC
CLOSED LOOP CONTROL	4 -20 ma 0-10 VDC	4-20 ma 0-10 VDC	ANALOG INTERFACE FROM TEMP. CONTROLLER OR PLC
PC INTERFACE	RS-232/485	RS-232/485	*OPTIONAL*
PID CONTROL	32 us/loop	32 us/loop	*OPTIONAL*

SHOWN: MEASURING FLUID TEMPERATURE WITH A FIBER OPTIC SENSING ELEMENT

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