

# ELECTRICAL & ELECTRONICS

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# Cable Heaters/Coil Heaters Cast in Brass

## Description

### Normal Cable Heaters

Cable heaters deliver a reliable heat source of high temperatures in applications where standard sources are impractical due to size or shape restrictions. These heaters are also known as high performance tubular heaters or coil heaters.

The basic construction of these heaters consists of compacted MgO, high temperature resistance and stainless steel tube. These heaters can be constructed with or without built in thermocouples. They are available in standard cross-sections of round, square and flat. Different types of terminations exist namely Tangential, Radial and Axial. It is available in Silicon coated fibreglass sleeve, wire braid hose and Stainless steel flexible conduit.

### Coil Heaters casted in Brass

Coil heaters are an advance concept of thermal engineering which has a construction similar to high watt density cartridge heaters. These heaters are also known as high performance tubular heaters or cable heaters. The basic construction of these heaters consists of compacted MgO, high temperature resistance wire and stainless steel tube. These are Coil Heaters cast in Brass having an outer casing of stainless steel tube. These heaters can be constructed with or without built in thermocouples.

They are available with an added feature of built in thermocouple. These heaters have very specific applications and therefore are made as per customer's requirement. The inner diameters of these heaters are ground finished and can be provided with a tolerance of 0.02mm.

## Advantages

### Normal Cable Heaters

A wide range of coil heaters with built-in thermocouples are stocked in straight length. As these heaters are in straight length and annealed condition, they can be coiled as per the requested dimensions at a nominal cost and dispatched within 48 hours.

### Coil Heaters casted in Brass

These heaters have a robust cast body can withstand pressure during leakages and avoids de-coiling and are highly non-corrosive. They provide for maximum heat transfer due to more contact area. They have an even temperature profile and are precision fit on hot runner nozzles. They have higher watt density, SS casing acts as a heat insulator.

## Applications

### Normal Cable Heaters

Cable Heaters are installed where space available for heating is limited and are widely used on hot runner nozzles, and manifolds, die cast nozzles, packaging machines etc.

### Coil Heaters casted in Brass

They are usually installed where space available for heating is limited and are widely used on hot runner nozzles, pressure die cast nozzles, tube extrusions, packaging machines etc

## Target Countries

USA, Canada, Europe, Australia, Hong Kong, Taiwan, Iran, Saudi Arabia, African Continent, Sri Lanka, Bangladesh

## Collaboration Options

Marketing Agreement

## Organisation

Pratik Heat Products Pvt. Ltd.

## Specifications of Normal Cable Heaters

Sheath Material	SS304 and SS316L
Insulation Material	High purity MgO
Heating Element	NiCr 80:20
Thermocouple	"J" Type (Fe K) "K" Type (Cr Al)
Connection Wires	Stranded Nickel wires with PTFE coating
Voltage Range	24 to 250 Volts
Power Rating	Depending on application
Power Tolerance	± 10%
H.V. Testing	800 V (Bent Heater)
Insulation Resistance	> 5 M
Current Leakage	< 0.5 mA
Sheath Temperature	750 C max
Adapter Temperature	150 C max
Length Tolerance	Heated length ± 2%
Unheated Length	5-10mm on bottom end; 50 mm on adapter end

## Specifications of Coil Heaters Casted in Brass

Outer Sheath Material	SS304
Coil Heater Sheath Material	SS304
Insulation Material	High purity MgO
Heating Element	NiCr 80:20
Thermocouple	"J" Type (FeK) "K" Type (CrAl)
Connection wires	PTFE coated Nickel Wires
H.V. testing	800 V between Sheath & resistance wires 500V between T/C & resistance wires
Insulation Resistance	> 0.5 M
Current Leakage	< 0.5 mA
Max. Operating Temp	450°C
Adapter Temp	100°C max

(contd...)

## High Watt Density Cartridge Heaters

### Description

These are round tubular heaters with electrical terminations on one side.

Heating conductor grade NiCr is wound over the supporting core which is centrally located in SS304. The inner space is filled with High purity MgO. The assembled unit is then highly compressed, converting the core, powder and conductor into homogenous mass. The bottom end of the heater is welded to disc washer to prevent contamination.

### Advantages

PHP's High Watt Density Cartridge Heaters are designed and manufactured out of experience of many years, thus the performance and life expectancy supercedes other cartridge heaters.

### Applications

These heaters find application in hot runner and pressure die cast nozzles, tube extrusion, injection moulding, packaging machinery, hot plates and other industrial applications

### Target countries

USA, Canada, Europe, Australia, Hong Kong, Taiwan, Iran, Saudi Arabia, African Continent, Sri Lanka, Bangladesh

### Collaboration Options

Marketing Agreement

### Organisation

Pratik Heat Products Pvt. Ltd.

### Specifications

Outer Sheath Material	Stainless steel 304, welded end disc washer of the same material. Max. Operating temp 750C
Heating Conductor	NiCr 80:20
Power	+/- 10%
Voltage	12 to 440 Volts
Leakage Current	< 5mA
High Voltage	800V
Surface Loading	upto 50 watts/cm <sup>2</sup>
Lead Orientation	a) Crimped on leads: 30mm long annealed pure nickel rods crimped with wires b) Swaged in Leads: Flexible Fibre Glass or PFTE leads emerging from within the heater

## Digital Image Processing Based Pilling Tester

### Description

An image processing based pilling system has been developed to determine various pilling parameters. This system processes and analyses the image of pilled fabric as per standards like ASTM, BIS, JIS etc.

The procedure for determining pilling parameters is sequential in nature. The image of the sample fabric is grabbed using a camera and frozen into a RGB image containing all data including the colour information. The RGB is further converted to gray image by removing colour information. Fast Fourier transformation further converts gray image to frequency spectrum from which corresponding power spectrum is generated for showing contribution in the form of peaks of each frequency to the frequency spectrum function.

The peaks are identified and filtered by replacing them with zeros if found to be greater than specified threshold frequency. Replacing the peaks by zeros removes all image information which belong to weave pattern and design formed due to colour warp and weft. The image of the filtered peak is then reconstructed using Inverse Fourier transformation. The image is converted to binary format for further processing using threshold technique. Using binary image various pilling parameters such as number of pills, total and mean area of pills and pills per unit area are determined.

### Advantages

This technology can be used for all types of fabric and weave pattern. It eliminates subjective assessments. The technology is accurate, user friendly and adopts universal standard testing procedures.

### Applications

The technology finds application in fabric manufacturing and testing agencies.

### Target Countries

The countries with large textile industries would find this technology useful. Countries of special focus are China and South East Asian countries.

The technology has been patented under the Indian patent application no. 65/DEL/2003 dated 24.1.2003 entitled "Objective Measurement of Pilling using Image Processing".

### Collaboration Options

Technology Transfer and Consultancy Service

### Organisation

Indian Institute of Technology, Delhi

### Specifications

Schematic technique for determination of pilling parameter

- Image acquisition
- Fast Fourier transformation
- Power spectrum
- Identification of peaks
- Filtering of peaks
- Reconstruction of image using fast Fourier transformation
- Converting to binary format using threshold technique
- Pilling parameter determination

# Micro-Electro-Mechanical System (MEMS) (Recessed Microstructure Device and Its Fabrication)

## Description

The basic building block of sensors and actuators are microstructures such as cantilever beams, diaphragms, bridges, suspended membranes etc. and fabricated using "bulk or surface micro machining" technology. These microstructures being delicate require careful packaging and handling to avoid possible damage. In order to overcome this problem a new technique to form MEMS microstructure several micros below the surface of the silicon wafers has been developed. This technique is termed as "recessed microstructure".

MEMS device is formed in the cavity of the substrate through a series of machining steps. The semiconductor substrate generally comprises of microcrystalline silicon with a surface oxide layer which may be doped or undoped depending on the MEMS and electronic circuitry to be formed. One or more cavities are formed after subjecting the substrate to lithography and etching.

The substrate is then subjected to re-oxidation followed by further lithography and oxide etching to form the first functional level of MEMS. This is subjected to P4 diffusion and subsequently formed by depositing a first layer of a micro-machinable material which is also conductive. This layer is micro-machined to form one or more functional elements of MEMS. These elements are then joined to form functional components like sensors or actuators.

## Advantages

The newly developed process enables easy packaging and handling MEMS. A number of difficulties faced during conventional process like selective etching of sacrificial layer without reacting with other material, increased use of material for sacrificial layer, additional etching step required to remove sacrificial layer and increased duration of machine are eliminated.

## Applications

It finds application in electronic control circuit used for various applications in Aeronautical, Chemical, Food Processing, Metallurgical industries, Automobile, Space, Railway and Defence etc. It is also used in micro-sensor application Radio Frequency (RF) switches.

## Target countries

All countries with semi-conductor fabrication industry can benefit from this technology.

The technology is patented under Application no. 39/DEL/2003 dated 13.1.2003 with title "Recessed Microstructure Device and Method of Fabrication Thereof".

## Collaboration Options

Technology Transfer and Consultancy Service

## Organisation

Indian Institute of Technology, Delhi

# Vibration Measurement/Monitoring Using Digital Speckle Pattern Interferometry

## Description

The Digital Speckle Pattern Interferometric System (DSPI) is a digital equivalent of wet processing for developing, fixing and displaying a hologram at a video rate. It gives a live TV display of static and dynamic deformations of the object with the same sensitivity as that of conventional holography.

The DSPI is digital equivalent of conventional Holographic Interferometric (HI) system where object and reference beams interfere at almost zero degree. One of the beams illuminates the diffused reflecting surface of the object. The other beam is spatially filtered and collimated before interference takes place close to zero degree at the CCD faceplate. The object wave is combined with reference wave to form a speckle interferogram that is converted to video signal by photoelectric action of video camera.

The Video analog output from the camera is fed to the PC based image processing system. Initially one speckle interferogram is grabbed and stored as a reference speckle interferogram. Successive time average speckle interferogram are subtracted from reference interferogram continuously and displayed on a computer screen at the frame rate 30 images per seconds. Computer program for interferogram acquisition, processing, and displaying the results have been developed. The system has also been optimised to get high contrast fringes.

## Advantages

The system monitors vibration and its mode shapes almost in real time even if the intensity of light falling is too poor/high or it fluctuates. Measurement of large deformation which is not possible by other commercially available system has been achieved. The time interval between display and recording the fringes can be adjusted as per requirement in specific application. Fringes with relatively high signal-to-noise (SNR) and improved contrast are obtained in specific application and if the object is in continuous motion measurement of vibration with zero error is possible.

## Applications

The system has wide range of applications in engineering industries including power generation, automobile and aerospace industry as well as R&D laboratories for real time monitoring of vibration and large deformation.

## Target Countries

All countries with semi-conductor fabrication industry can benefit from this technology.

The technology has been patented under Indian Patent Application no. 925/DEL/2002 dated 12/9/2002.

## Collaboration Options

Technology Transfer and Consultancy Service

## Organisation

Indian Institute of Technology, Delhi

## Specifications

**Approx. Cost of the Device:** Rs. 4 to 5 Lakhs (US \$10000 - \$12000), costs are indicative as of 2003

**Equipment and Facility Required:** Basic fabrication and assembly facilities are required with an investment less than Rs. 50,000

### Major Components Required:

- Lasers
- Optical Components
- CCD Camera
- Personal Computer
- Image Grabbing and Processing Unit
- Existing Programming Language

# Fiber Array Block for Integrated Optics Circuit

## Description

Optical Integrated Circuits (OIC) have wide application due to their compact size, higher reliability and durability. The formation of connection between the wave guide ports on OIC and optical fiber require considerable precision since the cross-sectional dimensions of the wave guide and the fiber-core are only a few microns. This high precision connection is done through a Fiber Array Block (FAB). Due to the disadvantages of conventional FAB, a new FAB has been developed.

The new FAB has been fabricated on glass substrates, as per a separate method of manufacture. The grooved member and the bottom support member are fixed of the lower plate with an adhesive layer. The ribbon fiber exposed from the jacket with exposed optical fibers is placed on bottom support member and grooved member so that the optical fiber sits precisely in groove and partly exposed. The plane member and the side support members are then placed on grooved member sandwiching the optical fiber and the bottom support member respectively with the help of adhesive layer. The gap in between each part of the middle layer is filled with adhesive and finally the upper plate is fixed on the middle layer.

## Advantages

The new FAB is superior to the conventional FAB. It provides better alignment of optical axes of optical fiber and optical element. It is a simple and easy construction of FAB for OIC application. The performance of FAB is superior. Fibers are not subjected to undue mechanical stresses and each of the optical fiber can be handled individually.

## Application

The new FAB finds application in manufacture of optical devices such as switches, splitters, wave guides, wave division, multiplexes etc.

## Target Countries

All countries

The technology has been patented under Indian Patent Application no. 339/DEL/96 dated 28/9/1998.

## Collaboration Options

Technology Transfer and Consultancy Service

## Organisation

Indian Institute of Technology, Delhi

# High Performance Heaters for Machine Nozzle

## Description

It is a superior heater for heating machine nozzles as compared to conventional Mica Band Nozzle Heaters. Compared to conventional method of heating machine nozzles with Mica Band Heaters, PHP offers a High Performance Heater with several advantages. The product has evolved out of experience and regular heater failure complains of plastic processor around the globe.

It has an extremely robust design and can perform efficiently even where polymer spillage is as regular feature. They can be manufactured with built-in thermocouple, thus can be controlled very accurately while processing sensitive materials e.g. Nylon 66 with 40% glass filled.

A coil heater is mounted onto a Brass Collet which is machined to high accuracy for better heat transfer and covered with a stainless steel clamping band. Upon tightening of band, brass collet firms its grip over the nozzle, resulting in a very even fit for efficient performance.

## Advantages

These heaters offer efficient heat transfer due to Brass Collet. There is negligible effect of material spillage. The operating temperature (400°C max) is higher compared to conventional Mica Band Heaters (250°C max). There is accurate temperature control and quick ramp up of temperature is possible due to higher watt density.

## Applications

These heaters are used in plastic injection moulding machines.

## Target countries

USA, Canada, Europe, Australia, Hong Kong, Taiwan, Iran, Saudi Arabia, African Continent, Sri Lanka, Bangladesh

## Collaboration Options

Marketing Agreement

## Organisation

Pratik Heat Products Pvt. Ltd.

## Specifications

Following are the standard sizes available. All the heaters are fitted with 39.37" long wire and J type built-in thermocouple

Size	Watts	Voltage
1" x 1"	250	240
1" x 1.5"	250	240
1" x 2"	330	240
1" x 3"	400	240
1.5" x 1"	250	240
1.5" x 1.5"	330	240
1.5" x 2"	400	240
1.5" x 3"	550	240
1" x 1"	250	120
1.5" x 1.5"	330	120

# Bulk Power Metering

## Description

Apex is the most advanced metering equipment introduced by Secure Meters for bulk power metering. An evolution of the world renowned CALMU ( CALMU is a Microprocessor technology for accurately measuring electrical parameters) technology, it has reached unsurpassed levels of metering accuracy and yet offers a powerful, flexible metering platform with better price & performance than the traditional bulk powering metering equipment.

## Advantages

The advantages of the technology are as follows:

- Dynamic error compensation, a technique of improving the overall accuracy of the metering installation by compensating CT/VT errors, using error curves of the measurement transformers. By doing so an overall measurement accuracy of .3% can be achieved
- Multiple levels of back up through a dedicated integral power supply. In the unlikely event of 110 or 230 volt supply failure, Apex defaults to the station auxiliary DC supply
- It is the most compact metering system of its type in the world; Apex incorporates up to four completely independent metering modules (including current and potential transducers) in a standard 19" rack. Each withdrawal metering module is individually certified and is self shorting-allowing easy maintenance and removing the need for isolation at the panel desk
- Capable of signaling any operational changes using alarm outputs - for example watchdog (self-diagnostic error), auxiliary power failure, VT phase imbalance and supply voltage failure. The alarm outputs are available as a build option instead of conventional energy pulse outputs. It records such events in its memory with date and time stamping for amicable and just settlements
- Each metering module can collect and store as a minimum, 40 days of 30 minute data for four quadrants using the apex load survey capability. Other demand integration periods can be selected via software. Even in case of total power failure data is stored in non-volatile memory for over 10 years
- Each metering module carries its own independent communication port so that meter data, alarm transfer ,time setting and password programming can be carried out prior to installation and at any time during service ,without affecting other meeting modules in the same sub-rack
- Each sub-rack carries its own programmable 80 character alphanumeric LCD indicating panel. Owing to the larger display format each of the measure and is associated with descriptive legend to provide unambiguous readout

## Application

Apex is available for 3 wire or 4 wire installations. It offers 1A or 5A solutions which can be combined into a single 3U metering suitable for installation in a 19" standard sub rack.

## Target Countries

Developing Countries

## Collaboration Options

Marketing Agreement and Technology Transfer

## Organisation

Secure Meters Ltd.

## Specifications

<b>Electrical</b>	Measuring elements 110V, 3 phase, 3 wire (2 elements) 63.5,3 phase, 4 wire (3 element)
<b>Auxillary Supplies</b>	110V/230 AC and/or 24V, 30V, 48V, 110V, 220V DC Other back up configuration available on request Build options with no auxiliary supply also available on request
<b>Current</b>	Nominal (In)      5Amp or 1Amp Maximum            120% In Starting (Typical) 0.1% In
<b>Metrological</b>	Each metering card supports full four quadrant measurement to IEC 687 class 0.2s and 0.5s and far exceeds limits as specified in IEC 1268 (reactive)
<b>Mechanical</b>	Standard 19" 3 U rack Dimension W .482 mm, H .133 mm and .250 mm approx Enclosure material Anodised Aluminium IP Rating IP 51
<b>Frequency</b>	50 Hz ±5%
<b>Display</b>	80 characters, alpha numeric, LCD with backlight
<b>Apex Enclosure</b>	Available with 1,2, 3 or 4 metering cards or modem cards
<b>Pulse Outputs</b>	Each metering card supports upto 4 pulse outputs Type                    Volt free contact Voltage rating        240V AC Current rating        100mA Life (typical)        10 operations Pulse Width           Software controlled, 80ms typical
<b>Alarm Monitoring</b>	The pulse outputs can be configured to provide alarm monitoring outputs e.g watchdog (self diagnostic error), auxiliary supply failure, VT phase imbalance (configurable 5%) Each metering card can have LED to signal an alarm condition on the front
<b>Metrological Indicator</b>	LED per metering card. Software configurable for active (import/export) and reactive (import/export) energy measurement
<b>Communications</b>	Local each metering module supports an optical communication port. Remote via telephone line connected modem (modem card)

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## Pro DVD ± R/RW

### Description

With the need for storing more data onto a single disc, Moser Baer has launched Pro DVDs. The Pro range of DVD±R/RWs each holds up to 4.7 gigabytes of data in total security.

These DVDs can be written at speeds up to 4x for DVD-Recordable and 2.4x for DVD-Rewritable. Moser Baer Pro DVD±R/RWs are available in

- Single Normal Jewel Case
- 5 Pack Normal Jewel Case Boxes

### Advantages

Moser Baer's in-line manufacturing equipment guarantees that the DVD is equipped with the best possible physical/mechanical disc characteristics and superior high-speed performance.

A recordable DVD holds up to 4.7 gigabytes of data, which is approximately 7 times the amount an ordinary CD can hold.

The DVDs are protected by a trademarked technology called "Protection Plus" of Moser Baer. The DVD has six layers namely:

- Disc substrate
- Recording layer (patented dye technology)
- Reflective layer
- Protective layer
- Advanced protection layer
- Metallic printing surface

### Application

With the help of a DVD burner one can make back-up copies of favourite movies or you could also back-up the entire hard disk on these DVDs. It can store data, audio and video files.

### Target countries

All countries

### Collaboration Options

Marketing Agreement

### Organisation

Moser Baer

### Specifications

	DVD-R	DVD+R	DVD+RW
Capacity	4.1 GB	4.7 GB	4.7 GB
Speed	1x-4x	1x-4x	4x
Disc Diameter	.....120mm±0.3 mm.....		
Thickness	.....1.20+0.03/-0.06mm.....		
Central Hole Dia	.....15.05mm±0.05mm.....		
Disc Material	.....Polycarbonate.....		
Recording Layer	.....AZO Technology.....	Phase Change Alloy	
Reflector Layer	.....Silver Alloy.....		
Bonding Layer	.....UV Bonding Resin.....		

## Professional Electret PA Gooseneck Microphones

### Description

Ahuja has introduced two new professional high quality gooseneck microphones for wide PA applications. Unique features of the instrument are:

- Electret condenser type
- Wide frequency response
- Unidirectional CARDIOID pick-up pattern
- High front-to-back rejection for more gain before feedback
- Foam windshield supplied
- Built-in XLR socket

### Advantages

Ahuja has customised its products for various customer requirements. For e.g. in conferences, one of the important features is "unobtrusive" ringing. Model GM-601L has a ring LED indication, and therefore satisfies this customer requirement.

The sleek and slender design makes the microphones unobtrusive; while GM-611 has a longer reach.

### Application

The microphone finds application in lectures & podiums, conferences etc.

### Target countries

All countries

### Collaboration Options

Marketing Agreement

### Organisation

Ahuja Radios

### Specifications

Models	GM-601L	GM-611
Frequency Response	50Hz-16KHz	50Hz-16KHz
Impedance	1K Ω	1K Ω
Sensitivity	4mV/Pa/1KHz	4mV/Pa/1KHz
Power Source	3V-9V DC	1.5V-9V DC
Length	445mm (17")	590mm (23")

# Super Heat Recovery Water Heaters

## Description

Super Heat Recovery Water Heaters (SHRWH) are used to generate cold and hot utilities simultaneously. In this system super heat is recovered from refrigeration, air conditioning systems to generate hot water.

The key features of this patented process are:

- Novel Modular Design: Vented tube-tube design, starting with increments of 10TR, no upper limit for chiller capacity
- Safe Integration into the system: Vented design ensures no mixing of refrigerant and water, SHRWH can be isolated while chiller is online
- Simple to retrofit: Only the pipe/tube between compressor and condenser is tapped into install the SHRWH
- High Heat Transfer Coefficients: Wide choice of MOC, optimised based on the application. SS 316L, SS 316, SS 304L, Mild Steel, Carbon Steel and Copper
- Easy to Maintain: Can be cleaned in place using chemical de-scaling fluids while keeping the chiller/refrigeration system online

## Advantages

SHRWH offers several benefits. These are:

- Heats tap water to 60°C: 500 to 870 liters/hr water heated from a 60 TR R22 based reciprocating chillers
- Heats tap water to 75°C: 720 to 1700 l/hr water heated from a 135 TR Ammonia (R717) refrigeration system used in typical dairy applications
- Instant supply of hot water: Start hot water recovery within 5 minutes
- Energy Savings: 100% of fuel used for water heating is saved and 5-15% of electrical power is saved due to improved cooling COP of the chiller/refrigeration system
- Increased Cooling capacity: 5-20% increase in cooling/refrigeration capacity
- Attractive Payback: Typically 3 to 12 months

## Application

The technology finds application in:

**Residential Buildings and Complexes:** Simultaneous space cooling, water heating for pre-heating, dish washing etc

**Commercial: Hotels, Restaurants, Hospitals etc:** Space Cooling, water heating/pre heating and simultaneous production of cold and hot streams, sea water desalination or water purification, liquid desiccant regeneration

**Industrial: Dairy, Pharmaceutical, Textile, Chemical Process etc:**

- Water heating/preheating, air conditioning and simultaneous generation of cold and hot water stream, condenser to re-boiler heat pumping
- Cogeneration of air conditioning and hot water for process heating, boiler feed water heating or pre-heating
- Cogeneration of air conditioning and hot water for heating/pre-heating dryer air, sea water desalination or water purification, liquid desiccant regeneration.

## Target countries

All countries

SHRWH is a patented technology of IIT, Bombay. License has been granted to Aqua Engineering, Mumbai for retrofit market.

## Collaboration Options

Technology Transfer and Consultancy Service

## Organisation

Indian Institute of Technology, Bombay

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