

## PDI SURFOMETER KEY FEATURES

All 400 series models utilize the same basic hardware, with model differences determined by the software installed, style of tracer and optional plotter. Starting with a basic Ra (Roughness Average) system, the units may be upgraded for future needs by simply adding parameter modules. Simplicity is also inherent in the operation of the instrument, with prompts to guide the operator as the system gathers data, calculates the results and automatically displays the selected parameter, cutoff and system settings. The vacuum fluorescent display is bright and has a wide viewing angle, making it easy to read from any position.



## Series 400 Models

Skid-Referenced Models	Parameters Available	Skidless Models
Model 410 Single Parameter Unit	Ra (Roughness Average)	Model 420 Single Parameter Unit
Model 430 Multiple Parameter Unit	Ra plus Rq, Rt(1-5), Rmax, Rp, Rpm, R3z, Pc, Rz(DIN), Rz(ISO), Rv	Model 440 Multiple Parameter Unit
Model 460 Advanced Parameter Unit	All the above plus tp, Htp, Hsc, Sm, Rsk, Rku	Model 470 Advanced Parameter Unit
Model 460K Rk Parameter Unit	All the above plus Rk, Rpk, Rvk, Mr1, Mr2 Rpk*, Rvk*, Vo, λa, λq, Δa, Δq	Model 470K Rk Parameter Unit

## Product Components

### The Series 400 Amplifier

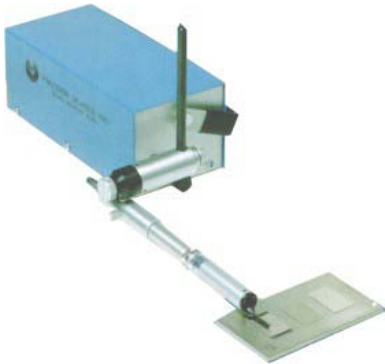
The Series 400 Amplifier is a sophisticated yet easy to use instrument with a modular surface texture program.

All models feature a vacuum fluorescent display and sealed membrane keypad. An RS-232 communication port is standard (RS-485 optional), along with a remote start switch port and lockout key switch. Battery power is included on all models with the graphic plotter, and is optional on all other models.

Operation is at once simple, sophisticated and secure. The instrument is configured by an easy-to-use set-up menu. The user selects the proper settings for the cutoff, stroke length, standard 2RC and Gaussian filters (Rk filter optional), parameter functions, serial port and plotter operation. Set the exact stroke length required or use the standard 5-cutoffs. After setting, the programming can be secured by a turn of the lockout key, which prevents inadvertent changes. Once configured, the system operates by pressing the Start Button or through use of an optional remote start switch.



## Piloters / Motor Drives



### The Skid-Reference Piloter

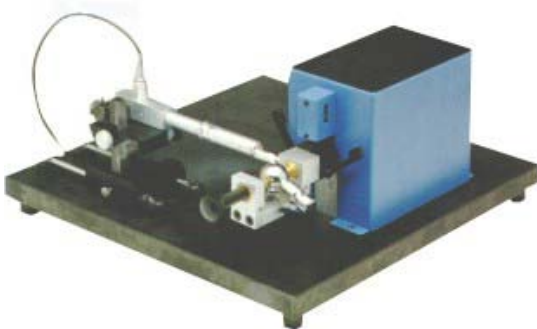
Skid-referenced systems are designed to measure normal I.D., O.D., and flat surfaces. The skid-referenced motor drive (piloter) contains a motor which moves the linkarm with the tracer across the surface to be sampled. The tracers have skidpads which establish a reference line. The transducer translates the vertical motion of the diamond tip stylus in relation to the reference line. The piloter traverses at a speed of 0.1 in/sec (2.54 mm/sec) for the travel length specified and can be set to acquire data in either direction. Our patented Lite-Touch Linkarm protects the tracer and surface from inadvertent damage and comes standard with each system, unless otherwise specified.

### The Skidless Piloter

The skidless motor drive has an internal reference in the drive unit. Skidless instruments of the 400 Series are designed to evaluate small, difficult-to-reach areas that are not accessible by skid-type tracers. The motor drive is mounted on a granite base to minimize vibration and to provide a level, stable surface for locating the workpiece. For more precise measurement setup, the stroke length can be set to the proper distance for the surface being measured. This is ideally suited for short stroke requirements such as grooves. This drive may also be programmed to acquire data in either direction.



### The Rotary Piloter



The rotary piloter is designed to measure inside and outside diameters of parts such as balls, ball studs, and extruded tubing. The part is rotated across a stationary tracer, through an arc perpendicular to the lay. The drive, with proper tooling, will trace parts with a range from 6.35 mm to 63.5 mm (0.250 in to 2.500 in) inner or outer diameter. The amplifier will automatically adjust the speed of the rotary piloter, based upon the diameter of the measurement area, to attain a constant speed of 0.1 in/sec 2.54 mm/sec). The piloter is able to take readings in clockwise or counterclockwise directions. It is easy to use, and can be changed from one part to another in seconds. The part can be mounted with exchangeable clamping devices.

## Optional Thermal Graphic Plotter

An internal graphic plotter can be added to any of the 400 series amplifiers. The plotter is totally configurable to produce output that is appropriate to the user's needs. Plotter operation can be disabled, enabled or set for automatic plot. The user may print any combination of setup information, parameter values, roughness profile and Bearing Area Curve (BAC). The roughness profile printout has selectable horizontal and vertical magnification.

## Accessories

### Skid-Referenced Tracers

**PDK** The versatile PDK tracer, with the single SMT skidmount, can measure a 1/8 in. I.D. and O.D. to flat surfaces. The PDK has a series of standard, interchangeable double skidmounts available for most surface texture requirements.

**PDM** Rugged and durable, the PDM style tracer provides accurate reading throughout the surface texture measurement range. From super-fine to high micro finished, the PDM tracer offers the reliability for critical surface evaluation. Standard skidmounts permit measurements on outside diameters as small as 1/8 in to inside diameters from 1 13/16 in to flat surfaces.

### Skidless Tracers

**PDG** The PDG tracer does not use skids, but has various standard stylus assemblies that mount onto the tracer beam.

Other standard tracers and accessories are available based upon specific applications. If a standard product does not meet your exact need, Precision Devices, Inc. will design and build a tracer or stylus assembly that will satisfy your requirements.

### Standard Skidmounts

#### *For PDK Tracers*

SMT	3.2 mm (1/8 in) I.D. and O.D. to flat
SML	12.7 mm (1/2 in) I.D. to flat
SMM	9.5 mm (3/8 in) O.D. to flat
SMV	12.7 mm (1/2 in) I.D. to flat for 2.54 mm (0.100 in) cutoff
SMW	9.5 mm (1/2 in) O.D. to flat for 2.54 mm (0.100 in) cutoff
SMQ Adapter	Required for SML, SMM, SMV, and SMW skidmounts
SML-1	12.7 mm (1/2 in) I.D. to flat*
SMM-1	9.5 mm (3/8 in) O.D. to flat*
SMV-1	12.7 mm (1/2 in) I.D. to flat for 2.54 mm (0.100 in) cutoff*
SMW-1	9.5 mm (3/8 in) O.D. to flat for 2.54 mm (0.100 in) cutoff*
	*No adapter

#### *For PDM Tracers*

SMA	19 mm (3/4 in) O.D. and 46 mm (1 13/16 in) I.D. to flat
SMB	9.5 mm (3/8 in) O.D. to flat
SMD	3.2 mm (1/8 in) to 12.7 mm (1/2 in) O.D. only
SME	19 mm (3/4 in) O.D. to flat, for sideways tracing
SMA-1	19 mm (3/4 in) O.D. and 46 mm (1 13/16 in) I.D. to flat for 2.54 mm (0.100 in) cutoff and 7.62 mm (0.300 in) cutoffs
SMB-1	9.5 mm (3/8 in) O.D. to flat for 2.54 mm (0.100 in) cutoff

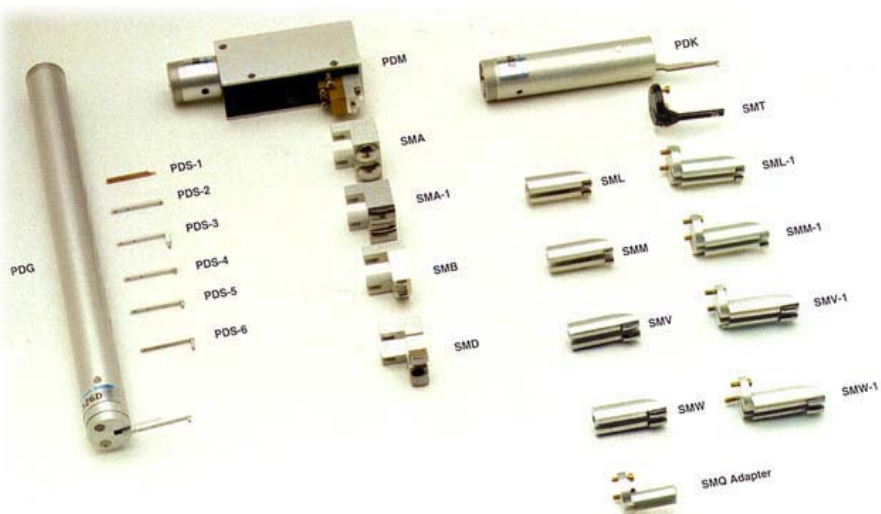
## Stylus Assemblies

### For PDG Tracers

PDS-1	Diamond depth 0.05 mm (0.002 in)
PDS-2	Diamond depth 0.5 mm (0.020 in)
PDS-3	Diamond depth 6.5 mm (0.260 in)
PDS-4	Diamond depth 1.2 mm (0.050 in)
PDS-5	Diamond depth 2.2 mm (0.090 in)
PDS-6	Diamond depth 4.5 mm (0.177 in)

## Linkarms, Extensions

Standard and special linkarms and linkarm extensions are also available. Contact your Precision Devices representative for additional information.



## **PDI SURFOMETER SPECIFICATIONS**

### **Specifications**

<b>Amplifier</b>	
Filters	Standard: 2RC and Digital Gaussian; Optional: DIN 4776 (Rk)
Cutoff Values	0.08 mm (0.003 in) 0.25 mm (0.010 in) 0.8mm (0.030 in) 2.5 mm (0.100 in)
Pc Threshold Values	Adjustable from 0 $\mu$ m to 12.7 $\mu$ m (0 $\mu$ in to 500 $\mu$ in)
Wavelength Sensitivity	Cutoff to 2.5 $\mu$ m (100 $\mu$ in)
Dynamic Range	150 $\mu$ m (6000 $\mu$ in) total peak-to-valley max
Display	Digital 2 x 20 character vacuum fluorescent
Keypad	Sealed membrane
Serial Port	Standard: RS-232 Interface; Optional: RS-485 SPC data collection or serial printer modes user selectable Serial Command Protocol for remote computer control, monitoring and data transfer available
Lockout Key Switch	Standard: locks amplifier settings so they cannot be changed
Remote Start Switch Connector	Standard: allows for optional external START switch
Power Supply	Input: 120 $\pm$ 5% V AC, 60 hz Output: 12 V DC, 1.2 A Other options available
Temperature Range	Operation: 10° to 32° Celsius (50° to 90° Fahrenheit) Storage: -1° to 43° Celsius (30° to 110° Fahrenheit)
Relative Humidity	10% to 90% non-condensing
Physical Dimensions	220 mm L x 234 mm W x 111 mm H (8 5/8 in L x 9 3/16 in W x 4 3/8 in H (without handle)
Weight	2.16 kg (4 lb 12 oz) 3.52 kg (7 lb 12 oz) with battery 3.86 kg (8 lb 8 oz) with battery and graphic plotter
<b>Optional Battery</b>	
Battery Type	Sealed gel cell
Battery Life	Over 8 hours of continuous use (including plotting) between overnight charges
<b>Optional Graphic Plotter</b>	
Grid Size	6 mm x 6 mm (0.24 in x 0.24 in)
Writing Method	Direct Thermal
Resolution	32 dots/mm Y-axis, 8 dots/mm X-axis (800 dots/in Y-axis, 200 dots/in X-axis)
Chart Speed	25 mm/sec (1 in/sec)

Print Width	48 mm (1.89 in)
Paper	5.1 cm x 30.5 m (2 in x 100 ft) roll, thermal graphic
<b>Piloters</b>	
<b>Linear</b>	
Stroke Length	Adjustable from 1.27 mm to 30.48 mm (0.05 in to 1.20 in). For evaluation length of five cutoffs, the drive will traverse an additional two cutoffs for all cutoff values
Piloter Speed	2.54 mm/sec (0.1 in/sec)
Set Start Point	Sets the exact START point of the piloter to a selected position
Physical Dimensions	Skid-referenced: 203.2 mm L x 82.5 mm W x 95.3 mm H (8 in L x 3 1/4 in W x 3 3/4 in H) Skidless 235 mm L x 146 mm W x 121 mm H (9 1/4 in L x 5 3/4 in W x 4 3/4 in H)
Weight	Skid-referenced: 2.1 kg (4 lb 10 oz) Skidless: 4.5 kg (10 lb) without Granite Base; 84 kg (185 lb) with Granite Base
<b>Rotary</b>	
Diameter Range	Standard: 6.35 mm to 63.5 mm (0.250 in to 2.500 in)
Piloter Speed	Automatically set by entering Part Diameter into Amplifier
Set Start Point	Sets the exact START point of the piloter to a selected position
Dimensions and Weight	Based upon part configuration
<b>Tracer</b>	
Detection Method	Moving Coil
Stylus Material	Diamond
Stylus Tip Radius	Standard: 10 $\mu$ m (0.0004 in) Optional: 5 $\mu$ m (0.0002 in) and 2.5 $\mu$ m (0.0001 in)
Stylus Force	0.016 N (1.6 gf) or less
<b>Precision Reference Standard</b>	
3-Patch Master	Consists of Calibration, Linearity and Diamond Stylus Condition Patches traceable to N.I.S.T. Available in two grades: Reference Grade and Shop Grade.

# RFM

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