

***Service  
& Support***

# Service & Support Contents

<b>Description</b>	<b>Page</b>
<b>Metrology &amp; Calibration Laboratory</b>	
Calibration Price List.....	1894 - 1895
Torque Wrench Calibration & Repair.....	1896
<b>Power Tool Repair</b>	
Electric & Air Tool Service & Technical Support.....	1897
<b>Technical Tooling Division</b>	
Technical Sales Support & CAD Facility.....	1893
Tool Reclamation Service.....	1892

## TOOLING RECLAMATION SERVICE

Your local distributor offer a Tooling Reclamation Service on all makes of standard indexable insert production, cutting tools and qualified/special tools.

The unique machining methods are fully compatible with original tool manufacturing and guarantee the same pocket precision and repeatability.

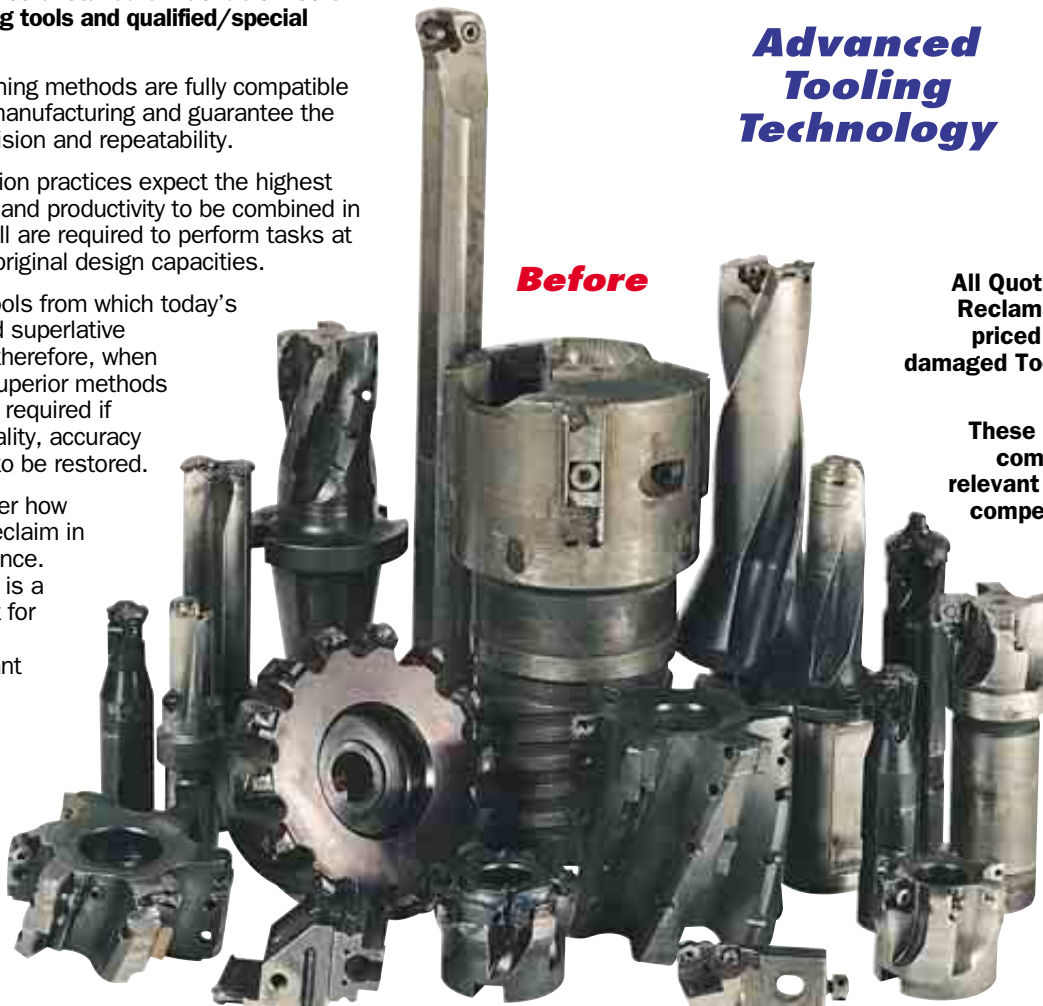
The latest production practices expect the highest levels of accuracy and productivity to be combined in specific tooling. All are required to perform tasks at the limits of their original design capacities.

They are cutting tools from which today's Engineers demand superlative performance and therefore, when damage occurs, superior methods of reclamation are required if the benefits of quality, accuracy and reliability are to be restored.

**Specials:** No matter how complex we can reclaim in almost every instance. All that is required is a drawing and insert for each pocket type, including all relevant spares.

## Advanced Tooling Technology

**Before**



All Quotations on Tooling Reclamation can only be priced on receipt of the damaged Toolholders/Milling body.

These must be supplied complete with all the relevant spares to ensure competitive pricing and prompt repair.

We will make as new, supplying the spares, screws, shims etc., wherever required at an additional cost.

### Standard Toolholders

Range: Up to 63mm Shank  
- 38mm Insert

### Cartridge Units

"S", "P" & "U" Type

### Boring Bars

Range: Up to 50mm Shank  
- 22mm Insert

### Boring Heads

Range:  
Up to 80mm Dia (Fixed)  
- 140mm Dia (Adj.)

### Parting, Threading & Grooving

Range: 40mm Shank

### End Mills Bodies

Range: 50mm Dia - 2, 3 and 4 Pocket

### Milling Cutters

Range: Up to 315mm Dia

### Drilling

Range: Any Style,  
Any Diameter

**After**



**Product Support Division - Advice & Support**

Utilising technical tooling engineers and machines to test both new and existing tooling to ensure product quality. Comprehensive testing and product evaluation facilities available.

**Product testing capabilities:**

Drills - taps - shank cutters - reamers - bore cutters - carbide inserts - collets - toolholders - back end tooling - thread mills - solid carbide tooling - milling chucks - part off grooving tools - counter boring tools.



**CAD - Computer Aided Design Facilities Available**



Experienced Design Engineers combine CAD capability with knowledge from engineering industry.

Tooling and design facility dedicated to individual and specific tooling design packages.

Dedicated and experienced design engineers who are independent technical solution providers.



**Technical Engineering Products - Application Support Team**

**PRODUCT SUPPORT**

All products sold by our company can be fully supported both via telephone and on the machines by our fully experienced team of technical engineers.

**“We Sell & Support”**

Product application advice.

Tooling packages quotations.



**Production Engineering - Analysis & Improvement**



Staffed by skilled and experienced engineers.

Advice given on improved manufacturing processes.

Current and prototype tool testing handled.

CNC machine capabilities.

Component processing and Tool layouts.

Production Engineering advice available.

Product features and benefits are analysed.

**Service & Support**

**CONTRACT PRICES AVAILABLE FOR VOLUME PURCHASES**

All Prices Exclude V.A.T. © 2009

## CALIBRATION PRICE LIST



**UKAS**  
Calibration  
Service  
Available

Our purpose-built **Metrology Laboratory and Repair Workshop** provides a repair and calibration service for a wide and growing range of precision measuring and torque equipment.

The calibration Laboratory which occupies an area of 106 square metres is environmentally controlled to  $20^{\circ}\text{C} \pm 0.5^{\circ}\text{C}$  and is built on an isolated vibration free floor to provide the necessary conditions for accurate calibration of most types of dimensional measuring equipment.

The Laboratory is **UKAS** accredited and conforms to the requirements of **International Standard BS EN ISO/IEC 17025** (General requirements for the competence of testing and calibration laboratories).

We can offer fast turnaround on calibration together with the back up of a repair workshop, with extensive stocks of spare parts and replacement equipment.

### PROCEDURES

Calibration procedures used are documented and **UKAS** approved.

All equipment submitted for calibration is cleaned, inspected and prepared prior to calibration. Minor burrs, which may be detrimental to calibration, are removed. If an item is found unsuitable for calibration at this stage, a quotation for repair/service or replacement may be issued. Otherwise the item will be returned as received uncalibrated.

Generally, unless otherwise requested, measured results will be reported on the certificate together with any respective tolerances from the current issue of the relevant British or International Standard, or manufacturer's specification. Where no specification is available, the measured results only will be reported.

The calibration of surface tables and large electronic digital height gauges, can on request be carried out 'on site' at the customer's premises. A quotation for this work can be obtained via your local branch.

### CERTIFICATION

**UKAS** accredited certificates will be issued for items submitted for calibration which are included in the scope of our UKAS accreditation schedule.

The current issue of our **UKAS** scope may be viewed by visiting the web site; [www.ukas.org](http://www.ukas.org) (Laboratory no. 0244) or by contacting the Laboratory direct.

'In House' certificates can be issued on certain specific items which do not fall within our UKAS scope. The calibration work is carried out to the stringent requirements of our quality system and certificates are traceable to national standards via traceable equipment certification. Where relevant, the client will be informed of this option before any work is carried out. **Note:** This work is not accredited or assessed by any outside organisation (e.g. UKAS).

All calibration prices are inclusive of certificates.

**For items not listed, special requirements or technical enquiries the metrology division may be contacted direct**

**Tel. 0116 257 2338**

**Fax: 0116 288 8843**

**or contact your local branch**



# CALIBRATION PRICE LIST

ID	Description: Type & Range	Price
<b>Angle Plates</b>		
1	Right	<b>£38.00</b>
2	Box	<b>£42.50</b>
<b>Bore Gauges (Dial)</b>		
3	One Stem	<b>£26.00</b>
4	Additional Stems	<b>£10.50</b>
<b>Calibration Tester</b>		
5	Mitutoyo	<b>£33.00</b>
<b>Calipers - Vernier - Dial - Digital</b>		
6	up to 8"/200mm	<b>£19.50</b>
7	up to 12"/300mm	<b>£24.50</b>
8	up to 24"/600mm	<b>£32.00</b>
9	up to 40"/1000mm	<b>£44.00</b>
10	up to 60"/1500mm	<b>£64.50</b>
11	up to 80"/2000mm	<b>£77.50</b>
<b>Combination Sets</b>		
12	Per Set	<b>£33.00</b>
13	Per Individual Item	<b>£13.00</b>
<b>Comparators</b>		
14	Mechanical	<b>£52.50</b>
15	Electronic (2 Scales)	<b>£64.50</b>
16	Additional Scales (Per 2)	<b>£12.50</b>
17	Platen Only	<b>£19.50</b>
<b>Cylindrical Setting Standards</b>		
18	Each	<b>£10.50</b>
<b>Depth Gauges - Vernier - Dial - Digital</b>		
19	Up to 300mm	<b>£19.00</b>
20	Above 300mm	<b>£32.00</b>
21	Protractor/Rule Type	<b>£21.50</b>
<b>Dial Gauges - Plunger Type</b>		
22	0.001"/0.0005"/0.01mm - Up to 25mm Travel	<b>£19.00</b>
23	0.001"/0.0005"/0.01mm - Over 25mm Travel	<b>£24.50</b>
24	0.0001"/0.002mm	<b>£24.50</b>
<b>Dial Gauges - Lever Type</b>		
25	All	<b>£19.00</b>
<b>Dial Thickness Gauges/Calipers</b>		
26	Internal/External	<b>£26.00</b>
<b>Digital Indicators</b>		
27	Each	<b>£32.00</b>
<b>Digital Scale Units</b>		
28	up to 12"/300mm	<b>£26.00</b>
<b>Feeler Gauges</b>		
29	Sets - Per Blade	<b>£1.70</b>
30	Individual Blades	<b>£6.00</b>
<b>Gap/Snap Gauges - Plain</b>		
31	Per Gauge	<b>£15.00</b>
<b>Height Gauges - Vernier - Dial - Digital</b>		
32	up to & inc. 18"/450mm	<b>£33.00</b>
33	up to & inc. 24"/600mm	<b>£38.50</b>
34	up to & inc. 48"/1200mm	<b>£57.00</b>
<b>Height Gauges — Electronic*</b>		
35	High Resolution Digital	<b>£85.00</b>
36	Calibration Block	<b>£16.00</b>
<b>*On Site Calibration Available POA</b>		
<b>Height Micrometer</b>		
37	All Sizes	<b>£51.50</b>
<b>Riser Block for Above</b>		
38	All sizes	<b>£18.00</b>
<b>Hole Gauges</b>		
39	E.G Kwik Check Type	<b>£24.50</b>
<b>Micrometers - External Fixed Anvil</b>		
40	up to 4"/100mm Max Range	<b>£13.00</b>
41	up to 12"/300mm	<b>£16.00</b>
42	up to 24"/600mm	<b>£22.50</b>
43	up to 40"/1000mm	<b>£32.50</b>
<b>Micrometer Setting Standards</b>		
44	up to 12"/300mm	<b>£6.00</b>
45	up to 24"/600mm	<b>£8.00</b>
46	up to 40"/1000mm	<b>£13.00</b>
47	Over 40"/1000mm	<b>£19.00</b>

ID	Description: Type & Range	Price
<b>Micrometer Heads</b>		
48	1"/25mm Travel	<b>£26.00</b>
49	2"/50mm Travel	<b>£36.50</b>
<b>Micrometers - Depth</b>		
50	0 - 1"/25mm	<b>£16.50</b>
51	0 - 3"/75mm	<b>£19.00</b>
52	0 - 6"/150mm	<b>£26.00</b>
53	0 - 9"/225mm	<b>£35.50</b>
54	0 - 12"/300mm	<b>£41.50</b>
<b>Micrometers - External Adjustable</b>		
Excluding Setting Rods (see items 44-47)		
55	2 Ext. Rods 0-2"/50mm	<b>£19.00</b>
56	4 Ext. Rods up to 24"/600mm	<b>£30.00</b>
57	6 Ext. Rods up to 24"/600mm Above 24"/600mm	<b>£42.00</b> <b>POA</b>
<b>Micrometers - Indicating</b>		
58	With Dial indicator	<b>£18.00</b>
<b>Micrometers - Internal/Stick</b>		
59	Head Including 1 Extension Rod	<b>£18.00</b>
60	Each Additional Rod/Spacer	<b>£3.00</b>
<b>Micrometers - Internal</b>		
61	Fixed Head	<b>£18.00</b>
<b>Micrometers - 3 Point Bore</b>		
Excluding Setting Ring		
62	up to 4"/100mm (price per head)	<b>£19.00</b>
63	Above 4"/100mm	<b>£33.00</b>
64	Setting Ring	<b>£12.50</b>
<b>Micrometers - Internal</b>		
65	Caliper Type	<b>£16.50</b>
<b>Micrometer Screw Thread Type</b>		
66	Metric/Unified/Whit	<b>£18.50</b>
67	V Anvil-3 or 5 Flute	<b>£18.50</b>
<b>Parallels - Engineers</b>		
68	per pair	<b>£26.00</b>
<b>Pin Gauges/Drill Blanks</b>		
(One Mean Diameter Reported)		
69	Qty Up to 50 (price per pin)	<b>£1.20</b>
70	Qty Above 50 (price per pin)	<b>£0.95</b>
<b>Plug Gauges - Plain</b>		
71	Parallel - Single Ended	<b>£5.50</b>
72	Parallel - Double Ended	<b>£10.00</b>
73	Taper	<b>£19.00</b>
<b>Plug Gauges — Screw *</b>		
74	Parallel - Single Ended	<b>£8.00</b>
75	Parallel - Double Ended	<b>£13.00</b>
76	Screw Taper	<b>£22.50</b>
* Effective Diameter only - Other parameters ACME & Specials		
		<b>POA</b> <b>POA</b>
<b>Protractors</b>		
77	Bevel Vernier	<b>£33.00</b>
<b>Radius Gauges</b>		
78	Per Blade ( 2 Rads)	<b>£3.00</b>
<b>Ring Gauges - Plain</b>		
79	Parallel	<b>£12.50</b>
80	Taper	<b>£22.50</b>
<b>Ring Gauges - Screw*</b>		
81	Parallel	<b>£13.00</b>
82	Taper	<b>£24.50</b>
* Effective Diameter only - Other parameters Acme & Specials		
		<b>POA</b> <b>POA</b>
<b>Rules — Engineers (1 Side Only)</b>		
83	Up to 12"/300mm	<b>£19.00</b>
84	Up to 40"/1000mm	<b>£32.00</b>
85	Up to 80"/2000mm	<b>£50.00</b>
<b>Rules — Engineers (Both Sides)</b>		
86	Up to 12"/300mm	<b>£32.00</b>
87	Up to 40"/1000mm	<b>£50.00</b>
88	Up to 80"/2000mm	<b>£92.50</b>
<b>Screw Thread Caliper Gauges</b>		
89	Reset where necessary & calibration	<b>£19.00</b>
90	Regrind above	<b>Add £19.00</b>

ID	Description: Type & Range	Price
<b>Screw Thread Parallels</b>		
91	Per pair	<b>£14.00</b>
<b>Screw Thread Wires</b>		
92	Per pair	<b>£11.00</b>
93	Per set of 3	<b>£15.00</b>
<b>Sine Bars &amp; Plates</b>		
94	Each	<b>£33.00</b>
<b>Sine Tables - Simple Angle</b>		
95	Up to 500mm Length	<b>£38.50</b>
<b>Slip Gauges Steel/Tungsten Carbide</b>		
Imperial Set Sizes		
96	E81	<b>£144.00</b>
97	E68	<b>£119.00</b>
98	E49	<b>£81.00</b>
99	E41/E35/36	<b>£71.50</b>
100	E28	<b>£48.00</b>
101	E8/E9/E11	<b>£26.00</b>
Metric Set Sizes		
102	M112	<b>£174.00</b>
103	M103	<b>£162.00</b>
104	M88/M83/M76	<b>£151.00</b>
105	M47	<b>£81.00</b>
106	M41	<b>£68.50</b>
107	M32	<b>£58.50</b>
108	M8/M9/M11	<b>£26.00</b>
<b>Slip Gauges - Individual</b>		
109	up to 4"/100mm	<b>£6.00</b>
<b>Spirit Levels</b>		
110	Construction Type	<b>£24.50</b>
111	Precision or Block Type	<b>£38.50</b>
112	Engineer's Type	<b>£33.00</b>
<b>Squares</b>		
113	Engineer's up to 12"/300mm	<b>£26.00</b>
114	Engineer's up to 36"/900mm	<b>£38.50</b>
115	Cylindrical & Block	<b>£38.50</b>
<b>Straight Edges</b>		
<b>(IN HOUSE ONLY NOT UKAS)</b>		
116	up to 96"/2400mm	<b>£33.00</b>
<b>Surface Plates/Tables *</b>		
117	Up to 450mm (18") Longest Side	<b>£42.50</b>
118	Up to 750mm (30") Longest Side	<b>£58.00</b>
Larger than above <b>POA</b>		
<b>* On site calibration service available for large plates/tables. Please contact your local branch or the Laboratory direct for more details/quotation.</b>		
<b>Tapes - (Pocket Retractable Only)</b>		
<b>(IN HOUSE ONLY NOT UKAS)</b>		
119	up to 5 Metres	<b>£25.00</b>
120	up to 10 Metres	<b>£33.00</b>
<b>Telescopic &amp; Small Hole Gauges</b>		
<b>(IN HOUSE ONLY NOT UKAS)</b>		
121	Per Gauge	<b>£5.00</b>
<b>Torque Wrenches/Screwdrivers</b>		
122	up to 350 N.m/250 Lbf.Ft	<b>£33.00</b>
123	up to 1000 N.m/750 Lbf.Ft	<b>£38.50</b>
124	Setting Only (No Certificate)	<b>£7.50</b>
<b>Vee Blocks</b>		
125	Single Vee (per pair)	<b>£33.00</b>
126	Double Vee (per pair)	<b>£38.50</b>
127	4 Vees (per pair)	<b>£51.50</b>
<b>Vee Groove Cylindrical Setting Stds</b>		
128	Per Standard	<b>£101.00</b>

**CONTRACT PRICES AVAILABLE FOR VOLUME PURCHASES**

All Prices Exclude V.A.T. © 2009

Service & Support

# TORQUE WRENCH CALIBRATION & REPAIR



**Up to  
1000N.m/750Lbf.ft**

As well as a wide range of dimensional measuring equipment and gauging the Metrology division is able to service/repair and calibrate torque wrenches and torque screwdrivers.

We can calibrate and issue **UKAS** certificates for wrenches up to and including **1000 Newton-metres (750 foot pounds)**.

Calibration is carried out to **BSEN 26789: 1994** specification and measurements are fully traceable to national standards.

Most brands of torque tools can be serviced/repared where necessary and calibrated if required.



**Prices Available  
on Request**

**NORBAR**

**BRITool**

**KENNEDY**  
QUALITY INDUSTRIAL TOOLING

**PROTO**

**TRI TORQ**

**Q-TORQ**

**MHH**

**... & MANY MORE QUALITY BRANDS**



High quality repairs on most brands.  
Spares stocked for most models.  
Warranty claims handled.  
Experienced & fully trained staff.  
Tool collection service.

**BRANDS HANDLED ...**



**... & MANY MORE QUALITY BRANDS**



**Service & Support**

**CONTRACT PRICES AVAILABLE FOR VOLUME PURCHASES**

All Prices Exclude V.A.T. © 2009



## INGRESS PROTECTION (IP) RATINGS

# Ingress Protection (IP) Ratings

Ingress Protection (IP) ratings are developed by the **European Committee for Electro Technical Standardization (CENELEC)** (described IEC/EN 60529), specify the environmental protection an enclosure provides. In order to comply with stringent requirements for **CE Marking**, machine makers today are fitting their machines with parts that are certified according to **EU (European Union)** and international standards.

The IP rating normally has two (or three) numbers:

**IP First Number** - Protection from solid objects or materials

**IP Second Number** - Protection from liquids

**IP Third Number** - Protection against mechanical impacts  
(commonly omitted)

Example - IP Rating

1    2    3  
IP 5 4

**5** describes the level of protection from solid objects and **4** describes the level of protection from liquids.



**1**

### Protection against solid objects

- 0** No protection.
- 1** Protected against solid objects up to 50mm, e.g. accidental touch by hands.
- 2** Protected against solid objects up to 12mm, e.g. fingers.
- 3** Protected against solid objects over 2.5mm (tools and wires).
- 4** Protected against solid objects over 1mm (tools, wire, and small wires).
- 5** Protected against dust limited ingress (no harmful deposit).
- 6** Totally protected against dust.

**2**

### Protection against liquids

- 0** No protection.
- 1** Protection against vertically falling drops of water e.g. condensation.
- 2** Protection against direct sprays of water up to 15° from the vertical.
- 3** Protected against direct sprays of water up to 60° from the vertical.
- 4** Protection against water sprayed from all directions or limited ingress permitted.
- 5** Protected against low pressure jets of water from all directions or limited ingress.
- 6** Protected against low pressure jets of water, e.g. for use on ship decks - limited ingress permitted.
- 7** Protected against the effect of immersion between 15cm and 1m.
- 8** Protects against long periods of immersion under pressure.

**3**

### Protection against mechanical impacts (commonly omitted)

- 0** No protection.
- 1** Protects against impact of 0.225 joule (e.g. 150g weight falling from 15cm height).
- 2** Protected against impact of 0.375 joule (e.g. 250g weight falling from 15cm height).
- 3** Protected against impact of 0.5 joule (e.g. 250g weight falling from 20cm height).
- 4** Protected against impact of 2.0 joule (e.g. 500g weight falling from 40cm height).
- 5** Protected against impact of 6.0 joule (e.g. 1.5kg weight falling from 40cm height).
- 6** Protected against impact of 20.0 joule (e.g. 5kg weight falling from 40cm height).



Page 20

**STANDARDS FOR ENGINEERING DRAWINGS**

Symbol For	ANSI/ASME	ISO
All round profile		NONE
Angularity		NONE
As length		NONE
All maximum material condition		NONE
All least material condition		NONE
Basic dimensions		
Circular runout		
Circularity		
Conical taper		
Circularity		
Cylindrical		
Depth/Deep		NONE
Datum feature		
Datum target		
Diameter		
Diameter not to scale		
Dimension origin		NONE
Feature control frame		
Flatness		
Number of times/Plates		
Parallelism		
Perpendicularity		
Position		
Profile of a line		
Profile of a surface		
Projected tolerance zone		
Radius		
Reference dimensions		
Regardless of feature size		NONE
Slope		
Spherical diameter		NONE
Spherical radius		NONE
Square (SPAC)		
Straightness		
Symmetry		NONE
Target point		
Total runout		

COMMON ABBREVIATIONS USED IN ENGINEERING DRAWINGS

General Terms	Abbreviation	General Terms	Abbreviation
Across flats	A/F	Minimum	MIN
Assembly	ASSY	Minute of angle	MIN
Birmingham gauge	BG	Not to scale	N/T/S
British Standard	BS	Number	NO.
Centimetres	CM	Outside diameter	O/D
Denotes	CRS	Pinless number	PIN NO.
Centre line on a skew	CL or L	Pitch circle diameter	PCD
Centre of gravity	G	Pneumatic	PNEU
Chamfered	CHAM	Pound	LB
Cheese head	CH HD	Radius	RAD or R
Countersink	CSK	Required	REQD
Countersink head	CSK HD	Revolutions per minute	RPM
Countersore	C SORE	Right hand	RH
Cylinder or cylindrical	CYL	Round head	RD HD
Datum system	DATUM	Screw	SCR
Degree (of angle)	°	Second (of angle)	''
Diameter	dia or φ	Sheet, when preceding a material	SH
Dimension	DM	Swiss	SR
Drawing	DRG	Specification	SPEC
Equally spaced	EQU SP	Spherical	SPH
External	EXT	Spotface	SPFACE
Figure	FIG	Square	SQ
Foot	FT or'	Standard	STD
Gallon	GAL	Standard imperial wire gauge	SWG
Galvanneal	GALV	Thread	THD
Hardness	HS	Thread per inch	TPI
Brinell	HB	Undercut	UCUT
Rockwell	HRC	Volume	VOL
A scale	HRA	Weight	WT
B scale	HRE		
C scale	HRC		
D scale	HRE		
E scale	HRE		
Vickers	HV		
Hexagon	HEX		
Hexagon head	HEX HD		
Hydraulic	HYD		
Inch	IN or"		
Insulated or insulation	INSUL		
Internal	INT		
Internal diameter	I/D		
Kilogram	KG		
Left hand	LH		
Long	LG		
Machine	M/C		
Machined	M/CD		
Material	MATL		
Maximum	MAX		
Metric	M		
Millimetre	MM		

Conversions Supplied By  
**The Pocket REF**



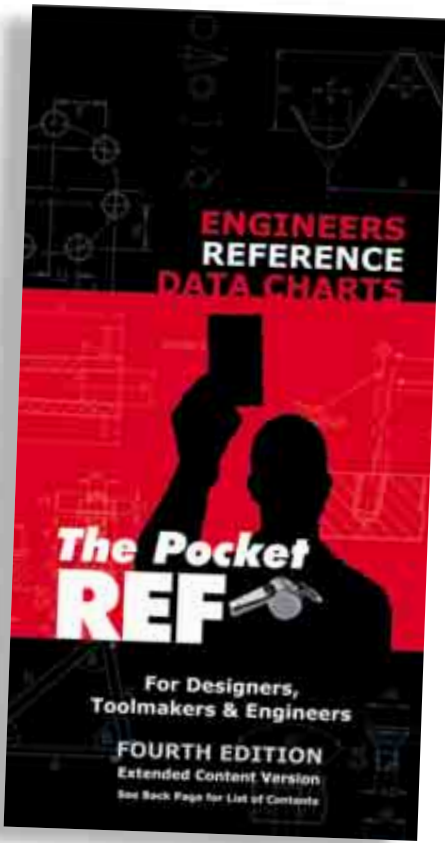
**FOURTH EDITION**  
Extended Content Version

**FLIP-UP ANTI-GLARE MATT LAMINATED EDITION**

**40 Pages**  
**Pocket Size**  
**164 x 84mm**

- Basic forms of heat treatment
- Material groups
- Tensile strength and hardness
- Lubricant selection
- Hole and shaft tolerances
- Metric screw and hole sizes
- Thread Notation
- Standard thread forms;
- Dimensions of common shank types
- Standards for engineering drawings
- Abbreviations used in engineering drawings
- Common CNC codes
- Axis Nomenclature for Machine Tools
- Trigonometry formulae
- Sines and cosines
- Tangents and cotangents
- Co-ordinates for equally pitched holes
- Bending allowances for malleable materials
- Cutting Speed Calculator
- Standard drill size conversions;
- Abbreviations and formulae
- Weight and measure systems, useful conversions and constants

**CAT-849-0356C**  
See page 233 for further information.



**Service & Support**

# CONVERSIONS Fraction, Millimetre, Gauge, inch

CONVERSIONS				Fraction • Millimetre • Gauge • Inch			
Fraction	Millimetre	Gauge	Inch	Fraction	Millimetre	Gauge	Inch
30	0.118			1.067	58	0.420	
32	0.126			1.092	57	0.430	
34 1/2	0.135	80		1.10		0.433	
35	0.138			1.15		0.453	
36 1/2	0.145	79		1.181	56	0.465	
38	0.150			1.191		0.469	
39 1/2	0.156			1.20		0.472	
40	0.157			1.25		0.492	
40 1/2	0.160	78		1.30		0.512	
42	0.165			1.321	55	0.520	
45	0.177			1.35		0.531	
45 1/2	0.180	77		1.397	54	0.550	
48	0.189			1.40		0.551	
50	0.197			1.45		0.571	
50 1/2	0.200	76		1.50		0.591	
52	0.205			1.511	53	0.595	
53 1/2	0.210	75		1.55		0.610	
55	0.217			1.588		0.625	
57 1/2	0.225	74		1.60		0.630	
58	0.228			1.613	52	0.635	
60	0.238			1.65		0.650	
61 1/2	0.240	73		1.70		0.669	
62	0.244			1.702	51	0.670	
63 1/2	0.250	72		1.75		0.689	
65	0.256			1.778	50	0.700	
66 1/2	0.260	71		1.80		0.709	
68	0.269			1.85		0.728	
70	0.276			1.854	49	0.730	
71 1/2	0.280	70		1.90		0.748	
72	0.283			1.930	48	0.760	
74 1/2	0.292			1.95		0.766	
75	0.295			1.984		0.781	
78	0.307			1.994	47	0.785	
78 1/2	0.310	68		2.00		0.787	
79 1/2	0.312			2.05		0.807	
80	0.315			2.057	46	0.810	
81 1/2	0.320			2.083	45	0.820	
82	0.323	67		2.10		0.827	
83 1/2	0.330			2.15		0.846	
85	0.335			2.184	44	0.860	
88	0.346			2.20		0.866	
88 1/2	0.350	65		2.25		0.886	
90	0.354			2.261	43	0.890	
91 1/2	0.360	64		2.30		0.906	
92	0.362			2.35		0.925	
94 1/2	0.370			2.375	42	0.935	
95	0.374	63		2.381		0.938	
96 1/2	0.380			2.40		0.945	
98	0.386	62		2.438	41	0.960	
99 1/2	0.390			2.45		0.965	
1.00	0.394	61		2.489	40	0.980	
1.016	0.400			2.50		0.984	
1.041	0.410	60		2.527	39	0.995	
1.05	0.413	59		2.55		1.004	

CONVERSIONS				Fraction • Millimetre • Gauge • Inch			
Fraction	Millimetre	Gauge	Inch	Fraction	Millimetre	Gauge	Inch
2.578	38	1015		4.50		1772	
2.60		1074		4.572	15	1800	
2.642	37	1040		4.60		1811	
2.65		1043		4.623	14	1820	
2.70		1063		4.70	13	1850	
2.705	36	1065		4.75		1870	
2.75		1083		4.765		1875	
2.778		1094		4.80	12	1890	
2.794	35	1100		4.851	11	1910	
2.80		1102		4.90		1929	
2.819	34	1110		4.915	10	1935	
2.85		1122		4.978	9	1960	
2.870	33	1130		5.00		1969	
2.90		1142		5.055	8	1990	
2.946	32	1160		5.10		2008	
2.95		1161		5.105	7	2010	
3.00		1181		5.159		2031	
3.048	31	1200		5.182	6	2040	
3.10		1220		5.20		2047	
3.175		1250		5.220	5	2055	
3.20		1260		5.25		2067	
3.25		1280		5.30		2087	
3.264	30	1285		5.309	4	2090	
3.30		1299		5.40		2126	
3.40		1339		5.410	3	2130	
3.454	29	1360		5.50		2160	
3.50		1378		5.556		2188	
3.569	28	1405		5.60		2205	
3.572		1406		5.613	2	2210	
3.60		1417		5.70		2244	
3.658	27	1440		5.75		2264	
3.70		1457		5.791	1	2280	
3.734	26	1470		5.80		2283	
3.75		1476		5.90		2323	
3.797	25	1495		5.944	A	2340	
3.80		1496		5.953		2344	
3.881	24	1520		6.00	B	2362	
3.90		1535		6.045		2380	
3.912	23	1540		6.10		2402	
3.969		1562		6.147	C	2420	
3.988	22	1570		6.20		2441	
4.00		1575		6.248	D	2460	
4.039	21	1590		6.25		2461	
4.089	20	1610		6.30	E	2480	
4.10		1614		6.350	F	2500	
4.20		1654		6.40		2520	
4.216	19	1660		6.50		2559	
4.25		1673		6.528	F	2570	
4.30		1693		6.60		2598	
4.305	18	1695		6.629	G	2610	
4.366		1719		6.70		2638	
4.394	17	1730		6.747		2656	
4.40		1732		6.75		2657	
4.496	16	1770		6.796	H	2680	

CONVERSIONS				Fraction • Millimetre • Gauge • Inch			
Fraction	Millimetre	Gauge	Inch	Fraction	Millimetre	Gauge	Inch
6.80			2677	9.6			3780
6.90			2717	9.7			3819
6.909	I		2720	9.75			3839
7.00			2756	9.8			3854
7.036	J		2770	9.804	W		3860
7.10			2795	9.9			3898
7.137			2810	9.922			3906
7.144	K		2812	10.00			3937
7.20			2835	10.084	X		3970
7.25			2854	10.1			3978
7.30			2874	10.2			4016
7.366	L		2900	10.25			4035
7.40			2913	10.262	Y		4040
7.493	M		2950	10.3			4055
7.50			2953	10.319			4062
7.541			2969	10.4			4094
7.60			2992	10.490	Z		4130
7.671	N		3020	10.5			4134
7.70			3031	10.6			4173
7.75			3051	10.7			4213
7.80			3071	10.716			4219
7.90			3110	10.75			4235
7.938			3125	10.8			4252
8.00			3150	10.9			4291
8.026	O		3160	11.00			4331
8.10			3189	11.1			4370
8.20			3228	11.112			4375
8.204			3230	11.2			4409
8.25			3248	11.25			4429
8.30			3268	11.3			4449
8.334			3281	11.4			4488
8.40			3307	11.5			4528
8.433	Q		3320	11.500			4531
8.50			3346	11.6			4567
8.60			3384	11.7			4608
8.611			3390	11.75			4626
8.70			3425	11.8			4646
8.731			3438	11.9			4685
8.75			3445	11.900			4688
8.80			3485	12.00			4724
8.839			3490	12.1			4764
8.90			3504	12.2			4803
9.00			3543	12.25			4823
9.093			3580	12.3			4843
9.10			3583	12.303			4844
9.128			3594	12.4			4882
9.20			3622	12.5			4921
9.25			3642	12.6			4991
9.30			3661	12.7			5000
9.347	U		3680	12.75			5020
9.40			3701	12.8			5039
9.50			3740	12.9			5079
9.525			3750	13.00			5118
9.576	V		3770	13.097			5156

CONVERSIONS				Fraction • Millimetre • Gauge • Inch			
Fraction	Millimetre	Inch	Fraction	Millimetre	Inch		
13.10		5157	20.25		7972		
13.20		5197	20.472		8040		
13.25		5217	20.50		8071		
13.30		5236	20.538		8125		
13.40		5276	20.75		8169		
13.484		5312	21.00		8268		
13.50		5315	21.034		8281		
13.60		5354	21.25		8366		
13.70		5394	21.431		8438		
13.75		5413	21.50		8465		
13.80		5433	21.75		8563		
13.891		5469	21.828		8594		
13.90		5472	22.00		8661		
14.00		5512	22.225		8750		
14.25		5610	22.25		8790		
14.268		5625	22.50		8858		
14.50		5709	22.622		8906		
14.684		5781	22.75		8957		
14.75		5807	23.00		9055		
15.00		5906	23.019		9062		
15.081		5938	23.25		9154		
15.25		6004	23.416		9219		
15.478		6094	23.50		9252		
15.50		6102	23.75		9350		
15.75		6201	23.812		9375		
15.870		6250	24.00		9449		
16.00		6299	24.209		9531		
16.25		6398	24.25		9547		
16.272		6406	24.50		9646		
16.50		6496	24.606		9688		
16.669		6502	24.75		9744		
16.75		6594	25.00		9843		
17.00		6693	25.003		9844		
17.068		6719	25.25		9941		
17.25		6791	25.400		1.0000		
17.462		6875	25.50		1.0039		
17.50		6890	25.75		1.0138		
17.75		6988	25.797		1.0156		
17.859		7031	26.00				

# Fraction, Millimetre, Gauge, Inch CONVERSIONS

CONVERSIONS			Fraction • Millimetre • Gauge • Inch		
Fraction	Millimetre	Inch	Fraction	Millimetre	Inch
1/16	28.50	1.1220	1 1/16	38.894	1.5312
	28.575	1.1250		39.00	1.5354
	28.75	1.1319	1 3/16	39.221	1.5469
				39.50	1.5551
1/8	28.972	1.1406	1 1/8	39.688	1.5625
	29.00	1.1417		40.00	1.5748
	29.25	1.1518	1 1/4	40.084	1.5781
1/4	29.369	1.1562	1 1/4	40.481	1.5938
	29.50	1.1614		40.50	1.5945
	29.75	1.1713	1 1/2	40.878	1.6094
1 1/8	29.766	1.1719	1 1/2	41.00	1.6142
	30.00	1.1811		41.275	1.6250
1 1/4	30.162	1.1875	1 3/4	41.50	1.6339
	30.25	1.1909		41.672	1.6406
	30.50	1.2008	1 7/8	42.069	1.6562
1 3/8	30.559	1.2031	1 7/8	42.466	1.6719
	30.75	1.2106		42.50	1.6732
1 1/2	30.856	1.2188	1 7/8	42.862	1.6875
	31.00	1.2205		43.00	1.6929
1 5/8	31.25	1.2303	1 7/8	43.259	1.7031
	31.353	1.2344		43.50	1.7126
1 3/4	31.50	1.2402	1 7/8	43.656	1.7188
	31.75	1.2500		44.00	1.7323
1 7/8	32.00	1.2598	1 7/8	44.053	1.7344
	32.147	1.2656		44.50	1.7520
2	32.50	1.2795	1 7/8	44.847	1.7656
	32.644	1.2812		45.00	1.7717
	32.766	1.2900	1 7/8	45.244	1.7812
2 1/8	32.941	1.2969		45.50	1.7913
	33.00	1.2992		45.641	1.7969
2 1/4	33.338	1.3125	1 7/8	46.00	1.8110
	33.50	1.3189		46.038	1.8125
2 1/2	33.734	1.3261	1 7/8	46.434	1.8261
	34.00	1.3368		46.50	1.8307
2 3/4	34.131	1.3438	1 7/8	46.831	1.8438
	34.50	1.3583		47.00	1.8504
3	34.528	1.3594	1 7/8	47.228	1.8594
	34.925	1.3750		47.50	1.8701
3 1/8	35.00	1.3780	1 7/8	47.625	1.8750
	35.322	1.3906		48.00	1.8898
3 1/4	35.50	1.3976	1 7/8	48.022	1.8906
	35.719	1.4062		48.419	1.9062
3 1/2	36.00	1.4173	1 7/8	48.50	1.9094
	36.116	1.4219		48.816	1.9219
3 3/4	36.50	1.4370	1 7/8	49.00	1.9291
	36.512	1.4375		49.212	1.9375
4	36.909	1.4531	1 7/8	49.50	1.9488
	37.00	1.4567		49.609	1.9531
4 1/8	37.306	1.4688	1 7/8	50.00	1.9685
	37.50	1.4764		50.006	1.9688
4 1/4	37.703	1.4844	1 7/8	50.403	1.9844
	38.00	1.4961		50.50	1.9882
4 1/2	38.100	1.5000			
4 3/4	38.497	1.5156			
	38.50	1.5167			

CONVERSIONS			Fraction • Millimetre • Gauge • Inch		
Fraction	Millimetre	Inch	Fraction	Millimetre	Inch
2 1/8	50.800	2.0000	3 1/8	74.612	2.9375
	51.00	2.0079		75.00	2.9528
2 1/4	51.594	2.0312	3 1/4	75.406	2.9688
	52.00	2.0472		76.00	2.9921
2 3/8	52.388	2.0625	3 3/8	76.200	3.0000
	53.00	2.0866		76.994	3.0312
2 1/2	53.181	2.0938	3 1/2	77.00	3.0315
	53.975	2.1250		77.788	3.0625
2 5/8	54.00	2.1260	3 1/2	78.00	3.0709
	54.769	2.1562	3 3/4	78.581	3.0938
2 3/4	55.00	2.1654		79.00	3.1102
	55.562	2.1875	3 3/4	79.375	3.1250
2 7/8	56.00	2.2047		80.00	3.1496
	56.356	2.2188	3 3/4	80.169	3.1562
3	57.00	2.2441		80.962	3.1875
	57.150	2.2500	3 3/4	81.00	3.1890
3 1/8	57.944	2.2612		81.756	3.2188
	58.00	2.2835	3 3/4	82.00	3.2283
3 1/4	58.738	2.3125	3 3/4	82.550	3.2500
	59.00	2.3228		83.00	3.2677
3 1/2	59.531	2.3438	3 3/4	83.314	3.2812
	60.00	2.3622		84.00	3.3071
3 3/8	60.325	2.3750	3 3/4	84.138	3.3125
	61.00	2.4016		84.931	3.3438
3 1/2	61.119	2.4062	3 3/4	85.00	3.3465
	61.912	2.4375		85.725	3.3750
3 3/4	62.00	2.4409	3 3/4	86.00	3.3858
	62.706	2.4688	3 3/4	86.519	3.4062
3 7/8	63.00	2.4803		87.00	3.4252
4	63.500	2.5000	3 3/4	87.312	3.4375
	64.00	2.5197		88.00	3.4646
4 1/8	64.294	2.5312	3 3/4	88.106	3.4688
	65.00	2.5591		88.900	3.5000
4 1/4	65.088	2.5625	3 3/4	89.00	3.5039
	65.881	2.5938		90.00	3.5433
4 1/2	66.00	2.5984	3 3/4	90.488	3.5625
	66.675	2.6250		91.00	3.5827
4 3/4	67.00	2.6378	3 3/4	92.00	3.6220
	67.469	2.6562		92.075	3.6250
5	68.00	2.6772	3 3/4	93.00	3.6614
	68.262	2.6875		93.662	3.6875
5 1/8	69.056	2.7188	3 3/4	94.00	3.7008
	69.850	2.7500		95.00	3.7402
5 1/4	70.00	2.7559	3 3/4	95.250	3.7500
	70.644	2.7812		96.00	3.7795
5 1/2	71.00	2.7953	3 3/4	96.838	3.8125
	71.438	2.8125		97.00	3.8189
5 3/4	72.00	2.8346	3 3/4	98.00	3.8583
	72.231	2.8438		98.425	3.8750
6	73.00	2.8740		99.00	3.8976
	73.025	2.8750		100.00	3.9370
6 1/8	73.819	2.9062	3 3/4	100.012	3.9375
	74.00	2.9134	4	101.600	4.0000

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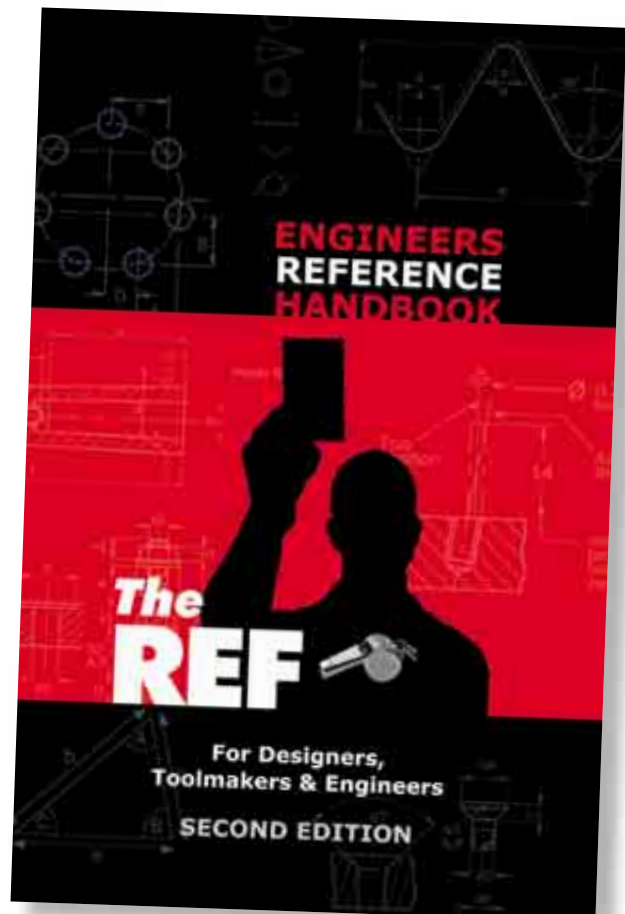
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# CONVERSIONS Spanner & Socket Sizes

mm	Thread Size			
	German (BRD) metric according to DIN and ISO	France N F E 27-311 (69) 27-411 (69)	Sweden S M S 2164-1967 2175-1971	Metric for DIN 6914 - 6915
4	2		2 & 2.2	
4.5	2.3			
5	2.5		2.5	
5.5	3	3	3 & 3.5	
6	3.5	3.5		
7	4	4	4 & 4.5	
8	5	5	5	
9	5 Alt			
10	6	6	6	
11	7	7	7	
12				
13	8	8	8	
14	8 Alt			
15	10 KFZ			
16				
17	10	10	10	
18				
19	12	12	12	
20				
21				
22	14	14	14	12
23				
24	16	16	16	
25				
26				
27	18	18	18	16
28				18
30	20	20	20	
32	22	22	22	20
36	24	24	24	22
38				
41	27	27	27	24
46	30	30	30	27
50	33	33	33	
55	36	36	36	
60	39	39	39	
65	42	42	42	
70	45	45	45	
75	48	48	48	
80	52	52	52	
85	56	56	56	
90	60	60	60	
95	64	64	64	
100	68	68	68	
105	72	72	72	
110	76	76	76	
115	80	80	80	
120	85	85	85	
125				
130	90	90	90	
135	95	95	95	
140				
145	100	100	100	
150	105	105	105	
155	110	110	110	
160				
165	115	115	115	
170	120	120	120	

AF	Inch Decimal	mm Equivalent	Unified Standard		ANSI B 18.2.1 - 1972				
			Nominal Series	Heavy Series	Nuts			Bolts & Screws	
					Square Bolt Hex Bolt Hex Cap Screw (Finished Hex Bolt) Lag Screw	Heavy Hex Bolt Heavy Hex Screw Heavy Structural Bolt	Hex Flat Hex Flat Jam Hex Jam Hex Slotted Hex Thick Slotted Hex Castle	Heavy Square Heavy Hex Flat Heavy Hex Flat Jam Heavy Hex Jam Heavy Hex Slotted	Square Nut
5/32	0.1562	3.97							
3/16	0.1875	4.76							
7/32	0.2187	5.56							
1/4	0.2500	6.35							
9/32	0.2812	7.14			No. 10				
5/16	0.3125	7.94							
11/32	0.3438	8.73							
3/8	0.3750	9.52							
13/32	0.4062	10.32							
7/16	0.4375	11.11	1/4		1/4		1/4		1/4
1/2	0.5000	12.70	5/16	1/4	5/16		5/16	1/4	
9/16	0.5625	14.29	3/8	5/16	3/8		3/8	5/16	5/16
19/32	0.5938	15.08							
5/8	0.6250	15.88	7/16		7/16				3/8
11/16	0.6875	17.46		3/8		7/16	3/8		
3/4	0.7500	19.05	1/2	7/16	1/2		1/2	7/16	7/16
25/32	0.7812	19.84							
13/16	0.8125	20.64	9/16		9/16				1/2
7/8	0.8750	22.22		1/2		1/2	9/16	1/2	
15/16	0.9375	23.81	5/8		5/8		5/8	9/16	
1	1.0000	25.40							5/8
1 1/16	1.0625	26.99		5/8				5/8	
1 1/8	1.1250	28.58	3/4		3/4		3/4		3/4
1 3/16	1.1875	30.16							
1 1/4	1.2500	31.75		3/4		3/4		3/4	
1 5/16	1.3125	33.34	7/8		7/8		7/8		
1 3/8	1.3750	34.92							
1 7/16	1.4375	36.51		7/8		7/8		7/8	
1 1/2	1.5000	38.10	1		1		1		1
1 5/8	1.6250	41.28		1		1		1	
1 11/16	1.6875	42.86	1 1/8		1 1/8		1 1/8		1 1/8
1 3/4	1.7500	44.45							
1 13/16	1.8125	46.04		1 1/8		1 1/8		1 1/8	
1 7/8	1.8750	47.62	1 1/4		1 1/4		1 1/4		1 1/4
2	2.0000	50.80		1 1/4		1 1/4		1 1/4	
2 1/16	2.0625	52.39	1 3/8		1 3/8		1 3/8		1 3/8
2 3/16	2.1875	55.56		1 3/8		1 3/8		1 3/8	
2 1/4	2.2500	57.15	1 1/2		1 1/2		1 1/2		1 1/2
2 3/8	2.3750	60.32		1 1/2		1 1/2		1 1/2	
2 7/16	2.4375	61.91			1 5/8				
2 9/16	2.5625	65.09				1 5/8		1 5/8	
2 5/8	2.6250	66.68	1 3/4		1 3/4				
2 3/4	2.7500	69.85		1 3/4		1 3/4		1 3/4	
2 13/16	2.8125	71.44			1 7/8				
2 15/16	2.9375	74.61				1 7/8		1 7/8	
3	3.0000	76.20	2		2				
3 1/8	3.1250	79.38		2		2		2	
3 3/8	3.3750	85.72	2 1/4		2 1/4				
3 1/2	3.5000	88.90		2 1/4		2 1/4		2 1/4	
3 3/4	3.7500	95.25	2 1/2		2 1/2			2 1/2	
3 7/8	3.8750	98.42				2 1/2		2 1/2	
4 1/8	4.1250	104.78	2 3/4		2 3/4				
4 1/4	4.2500	107.95		2 3/4		2 3/4		2 3/4	
4 1/2	4.5000	114.30	3		3				
4 5/8	4.6250	117.48		3		3		3	
4 7/8	4.8750	123.82			3 1/4				
5	5.0000	127.00					3 1/4		
5 1/4	5.2500	133.35			3 1/2		3 1/2		
5 3/8	5.3750	136.52					3 1/2		
5 5/8	5.6250	142.88			3 3/4		3 3/4		
5 3/4	5.7500	146.05					3 3/4		
6	6.0000	152.40			4		4		
6 1/8	6.1250	155.58					4		

Inch Decimal	mm Equivalent	Thread Size (Spanner Size)	
		BA & BSW	BSF
0.152	3.86	8BA	
0.172	4.37	7BA	
0.193	4.90	6BA	
0.220	5.59	5BA	
0.248	6.30	4BA	
0.256	6.50	1/16W	
0.282	7.16	3BA	
0.297	7.54	3/32W	
0.324	8.23	2BA	
0.340	8.64	1/8W	(3/16)
0.365	9.27	1BA	
0.413	10.49	0BA	(7/32)
0.445	11.30	3/16W	1/4
0.525	13.34	1/4W	5/16
0.600	15.24	5/16W	3/8
0.710	18.03	3/8W	7/16
0.820	20.83	7/16W	1/2
0.920	23.37	1/2W	9/16
1.010	25.65	9/16W	5/8
1.100	27.94	5/8W	(1 1/16)
1.200	30.48	1 1/16W	3/4
1.300	33.02	3/4W	7/8
1.390	35.31	13/16W	(15/16)
1.480	37.59	7/8W	1
1.670	42.42	1W	1 1/8
1.860	47.24	1 1/8W	1 1/4
2.050	52.07	1 1/4W	1 3/8
2.220	56.39	1 3/8W	1 1/2
2.410	61.21	1 1/2W	1 5/8
2.580	65.53	1 5/8W	1 3/4
2.760	70.10	1 3/4W	2
3.150	80.01	1 7/8W	
3.550	90.17	2W	2 1/4
3.890	98.81		2 3/4
4.180	106.17		3
4.530	115.06		3 1/4
4.850	123.19		3 1/2
5.180	131.57		3 3/4
5.550	140.97		4
6.380	162.05		4 1/2

Service & Support

# Weights & Measures CONVERSIONS

**C** = Centigrade  
**F** = Fahrenheit  
**ft** = Feet  
**g** = Gram  
**gal** = UK Gallon  
**hp** = Horse Power

**in** = Inch  
**K** = Kelvin  
**mtr** = Kilogram  
**km** = Kilometre  
**Kw** = Kilowatt  
**l** = Litre

**lb** = Pound  
**mm** = Millimetre  
**mtr** = Metre  
**oz** = Ounce  
**pt** = UK Pint  
**yd** = Yard

To Convert From Imperial	To Metric	Multiply By
°F	°C	°C=(°F -32) x 5/9
°F	°K	°K=°C + 271.3
ft	mtr	0.3048
ft <sup>2</sup>	mtr <sup>2</sup>	0.092903
ft <sup>3</sup>	mtr <sup>3</sup>	0.028317
ft-lbs	kg-m	0.13826
ft-tons	tonne-mtr	0.3097
gal	ltr	4.54609
gal/ft <sup>2</sup>	ltr/m <sup>2</sup>	48.905
grains/gal	gm/ltr	0.01425
hp	kw	0.7457
in	mm	25.40
in <sup>2</sup>	cm <sup>2</sup>	6.4516
in <sup>2</sup>	mm <sup>2</sup>	645.16
in <sup>3</sup>	cm <sup>3</sup> (cc)	16.3871
in-tons	kg-m	25.8
lb	kg	0.45360
lb/ft	kg/m	1.488
lb/ft <sup>2</sup>	kg/m <sup>2</sup>	4.883
lb/ft <sup>3</sup>	kg/m <sup>3</sup>	15.020
lb/gall	kg/ltr	0.09983
lb/in <sup>2</sup> (PSI)	kg/cm <sup>2</sup>	0.07037
lb/in <sup>2</sup> (PSI)	kg/mm <sup>2</sup>	0.0007037
lb/in <sup>2</sup> (PSI)	kg/mtr <sup>2</sup>	703.7
lb/mile	kg/km	0.2818
lb/yd	kg/m	0.496
lb/yd <sup>3</sup>	kg/m <sup>3</sup>	0.5933
nautical mile	km	1.8532
miles	km	1.60934
miles <sup>2</sup>	km <sup>2</sup>	2.58999
oz	g	28.3495
pt	ltr	0.568261
tons	tonnes (1000kg)	1.01605
tons/ft	kg/m	3333.33
tons/ft <sup>2</sup>	tonnes/m <sup>2</sup>	10.936
tons/in <sup>2</sup>	kg/mm <sup>2</sup>	1.575
tons/in <sup>2</sup>	n/mm <sup>2</sup>	15.444
tons/yd	kg/m	1111.11
tons/yd <sup>2</sup>	tonnes/m <sup>2</sup>	1.215
tons/yd <sup>3</sup>	tonnes/m <sup>3</sup>	1.329
yd	mtr	0.9144
yd <sup>2</sup>	mtr <sup>2</sup>	0.836127
yd <sup>3</sup>	mtr <sup>3</sup>	0.764555

To Convert From Metric	To Imperial	Multiply By
°C	°F	°F=(°Cx9/5)+32
°K	°F	°F=(°K-271.3)x1.8+32
cm <sup>2</sup>	in <sup>2</sup>	0.155
cm <sup>3</sup> (cc)	in <sup>3</sup>	0.06102
g	oz	0.035274
gm/ltr	grains/gal	70.156
kg	lb	2.2046
kg/cm <sup>2</sup>	lb/in <sup>2</sup> (PSI)	14.223
kg/km	lb/mile	3.548
kg/ltr	lb/gal	10.022
kg/m	lb/ft	0.672
kg/m	lb/yd	2.016
kg/m	tons/ft	0.0003
kg/m	tons/yd	0.0009
kg/m <sup>2</sup>	lb/ft <sup>2</sup>	0.2048
kg/m <sup>3</sup>	lb/ft <sup>3</sup>	0.0624
kg/m <sup>3</sup>	lb/yd <sup>3</sup>	1.686
kg/mm <sup>2</sup>	lb/in <sup>2</sup> (PSI)	1421.06
kg/mm <sup>2</sup>	tons/in <sup>2</sup>	0.635
kg/mtr <sup>2</sup>	lb/in <sup>2</sup> (PSI)	0.00142
kg-m	in-tons	0.03875
kg-m	ft-lbs	7.233
km	nautical miles	0.5396
km	miles	0.62137
km <sup>2</sup>	miles <sup>2</sup>	0.38610
kw	hp	1.341
ltr	gal	0.21997
ltr	pt	1.75975
ltr/m <sup>2</sup>	gall/ft <sup>2</sup>	0.0204
mm	in	0.03937
mm <sup>2</sup>	in <sup>2</sup>	0.00155
mtr	yd	1.09361
mtr	ft	3.28084
mtr <sup>2</sup>	yd <sup>2</sup>	1.19599
mtr <sup>2</sup>	ft <sup>2</sup>	10.76391
mtr <sup>3</sup>	yd <sup>3</sup>	1.30795
mtr <sup>3</sup>	ft <sup>3</sup>	35.31467
N/mm <sup>2</sup>	tons/in <sup>2</sup>	0.06475
tonne-m	ft-tons	3.229
tonnes (1000kg)	tons	0.9842
tonnes/m <sup>2</sup>	tons/ft <sup>2</sup>	0.0914
tonnes/m <sup>2</sup>	tons/yd <sup>2</sup>	0.823
tonnes/m <sup>3</sup>	tons/yd <sup>3</sup>	0.752

Metric Weight	Metric Surface Area
10 Milligrams	1 Centigram
10 Centigrams	1 Decigram
10 Decigrams	1 Gram
10 Grams	1 Decagram
10 Decagram	1 Hectogram
10 Hectograms	1 Kilogram
10 Kilograms	1 Myriagram
10 Millilitres	1 Centilitre
10 Centimetres	1 Decimetre
10 Decimetres	1 Metre
10 Meters	1 Decametre
10 Decametres	1 Hectometre
10 Hectometres	1 Kilometre
10 Kilometres	1 Myriametre
1 Metre	1.094 Yards, 39.371in
1 sqmtr	1 Centiares
10 Centiares	1 Deciare
10 Deciares	1 Are, (100 sq metres)
10 Ares	1 Dekare
10 Dekares	1 Hectare (10,000 sqmtr)
100 Hectares	1 Sq km
10 Millilitres	1 Centilitre
10 Centilitres	1 Decilitre
10 Decilitres	1 Litre
10 Litres	1 Decalitre
10 Decalitres	1 Hectolitre
10 Hectolitres	1 Kilolitre

Apothecaries' Weight	Apothecaries' Fluid Measure
<i>Used for Dispensing Drugs, etc.</i>	
20 Grains	1 Scruple
3 Scruples	1 Dram
8 Drams	1 Ounce
12 Ounces	1 Pound
60 Minims	1 Dram
8 Drams	1 Ounce
20 Ounces	1 Pint
8 Pints	1 Gallon
24 Grains	1 Pennyweight
20 Pennyweight	1 Ounce (480 Grains)
12 Ounces	1 Pound (5760 Grains)
<i>Diamonds and Pearls are weighed by Carats, of 4 grains each (equal to 3.2 Troy grains). The Troy ounce is equal to 150 Diamond Carats. Gold, when pure, is 24 Carats fine; if it contains one part alloy it is said to be 23 Carats, and so on.</i>	

Imperial Weight (Avoirdupois)	Imperial Surface Area
<i>Used for General Merchandise</i>	
16 Drams	1 Ounce
	(437½ Grains Troy)
16 Ounces	1 Pound
	(7000 Grains Troy)
14 Pounds	1 Stone
28 Pounds	1 Quarter
100 Pounds	1 Cental
4 Quarters	1 Hundredweight
	(112 Pounds)
2000 Pounds	1 Short Ton
20 Hundredweight	1 Ton (2240 Pounds)
<i>Avoirdupois pounds are greater than Troy in the proportion of 17 to 14 approx; Troy ounces are greater than Avoirdupois in the proportion of 79 to 72 approx.</i>	
144 Square inches	1 Square foot
9 Square feet	1 Square yard
30¼ Square yards	1 Square pole
40 Square poles	1 Rood
4 Roods	1 Acre
640 Acres	1 Square mile
<i>7.92 inches is equal to one hundredth of a "Gunter's Chain" (22 yards) which is (was) commonly used by surveyors. An "Engineer's link" is equal to 12 inches and a chain is therefore 33½ yards (100 feet)</i>	
1728 Cubic Inches	1 Cubic Foot
27 Cubic Feet	1 Cubic Yard
5 Cubic Feet	1 Barrel Bulk
40 Cubic Feet	1 Ton Shipping
40 Cubic Feet	1 Load Hard Timber
50 Cubic Feet	1 Load Foreign Fir

Imperial Length	Imperial Capacity		
<i>Used for Liquids and Dry Goods</i>			
3 Barleycorns	1 Inch		
3 Inches	1 Palm		
4 Inches	1 Hand		
7.92 Inches	1 Link		
9 Inches	1 Span		
12 Inches	1 Foot		
18 Inches	1 Cubit		
30 Inches	1 Pace		
3 Feet	1 Yard		
37.2 Inches	1 Scottish Ell		
45 Inches	1 English Ell		
5 Feet	1 Geometrical Pace		
6 Feet	1 Fathom		
5½ Yards	1 Pole		
4 Poles	1 Chain		
100 Links	1 Chain		
10 Chains	1 Furlong		
220 Yards	1 Furlong		
608 Feet	1 Cable		
8 Furlongs	1 Mile (land)		
10 Cables	1 Nautical Mile		
1 Nautical Mile	1.1515 land Miles		
1 Knot	1 Nautical Mile		
3 Miles (land)	1 League		
4 Gills	1 Pint		
2 Pints	1 Quart		
4 Quarts	1 Gallon		
2 Gallons	1 Peck		
4 Pecks	1 Bushel		
8 Bushels	1 Quarter		
5 Quarters	1 Load		
36 Bushels	1 Chaldron		
<i>A bushel of wheat on an average weighs 60 pounds; of barley, 47 pounds; of oats, 40 pounds. The gallon contains 10 pounds avoirdupois of distilled water.</i>			
<b>Decimal Capacity</b>			
Pints	Gallon	Cub.Ft.	Litres
1	0.125	0.0200	0.568
8	1.000	0.1604	4.544
16	2.000	0.3208	9.082

**CONTRACT PRICES AVAILABLE FOR VOLUME PURCHASES**

All Prices Exclude V.A.T. © 2009

**Service & Support**

## MERCHANDISING DISPLAY STANDS



### Merchandising Display Stands

Universal stands suitable for displaying a wide range of products at shows or trade counters. Manufactured from durable mild steel with a choice of 3 different painted finishes.

Colour	Order Code
Grey/Red	<b>CAT-849</b>
Yellow/Black	<b>-1900A</b>
Light Blue/Dark Blue	<b>-1901A</b>
	<b>-1902A</b>

## Create Eye Catching Product Displays!



**NB. This product display is shown for example of product layout only. Not actual stands. Product not included with stands.**

Display stands supplied with 320mm deep shelf and 40 hooks in 3 lengths to display a wide variety of products.

- 2 piece leg design and individual backpanel slats for convenient storage and transport size.
- Side and front kick panels. • 240V illuminated header box with replaceable fascia panel.
- Hand adjustable rear tension wire and cross bar stabilizers for rigid construction.
- Units can be linked together to span any distance.
- Height adjustable feet to level stands on uneven surfaces. • Dimensions (HxWxD): 1130/2260mm x 1000mm x 450mm.

### Contents:

2 x 2 piece legs, 2 x leg connectors, 2 x cross bar stabilizers, 6 x individual backpanel slats, 1 x shelf (not shown), 1 x 390mm deep base shelf, 1 x front kickplate, 40 x hooks (15 x 75mm, 20 x 150mm, 5 x 200mm), 2 x tension wires & adjusters, 1 x Header lightbox with plain white panel. **Branded fascia panels available separately (see opposite page).**

## MERCHANDISING DISPLAY STANDS

### Display Stand Accessories

#### Branded Fascia Panels for Light Box

Brand	Order Code
<b>KENNEDY</b>	<b>-1960A</b>
<b>OXFORD</b>	<b>-1961A</b>
<b>SOLENT</b>	<b>-1962A</b>
<b>CTL</b>	<b>-1963A</b>
<b>RUTLAND</b>	<b>-1964A</b>
<b>YAMOTO</b>	<b>-1965A</b>
<b>SENATOR</b>	<b>-1966A</b>
<b>SWISS+TECH</b>	<b>-1967A</b>
<b>KOBE</b>	<b>-1968A</b>
<b>SHERWOOD</b>	<b>-1969A</b>
<b>YORK</b>	<b>-1970A</b>

### Shelf

Colour	Order Code
Red	<b>-1920A</b>
Yellow	<b>-1921A</b>
Light Blue	<b>-1922A</b>

### Hooks

To fit perforated display stand backpanels. Available in 3 lengths.



Length	Order Code
75mm	<b>-1940A</b>
150mm	<b>-1941A</b>
200mm	<b>-1942A</b>

### Display Packaging

#### Heavy Duty Display Cards

Manufactured from tough Polypropylene. Available in two sizes with pre-punched holes which will accept cable ties featured on the right. Suitable for screwdrivers, pliers, spanners, hammers etc.



Heavy Duty Display Cards



Display Wallets

#### Display Wallets

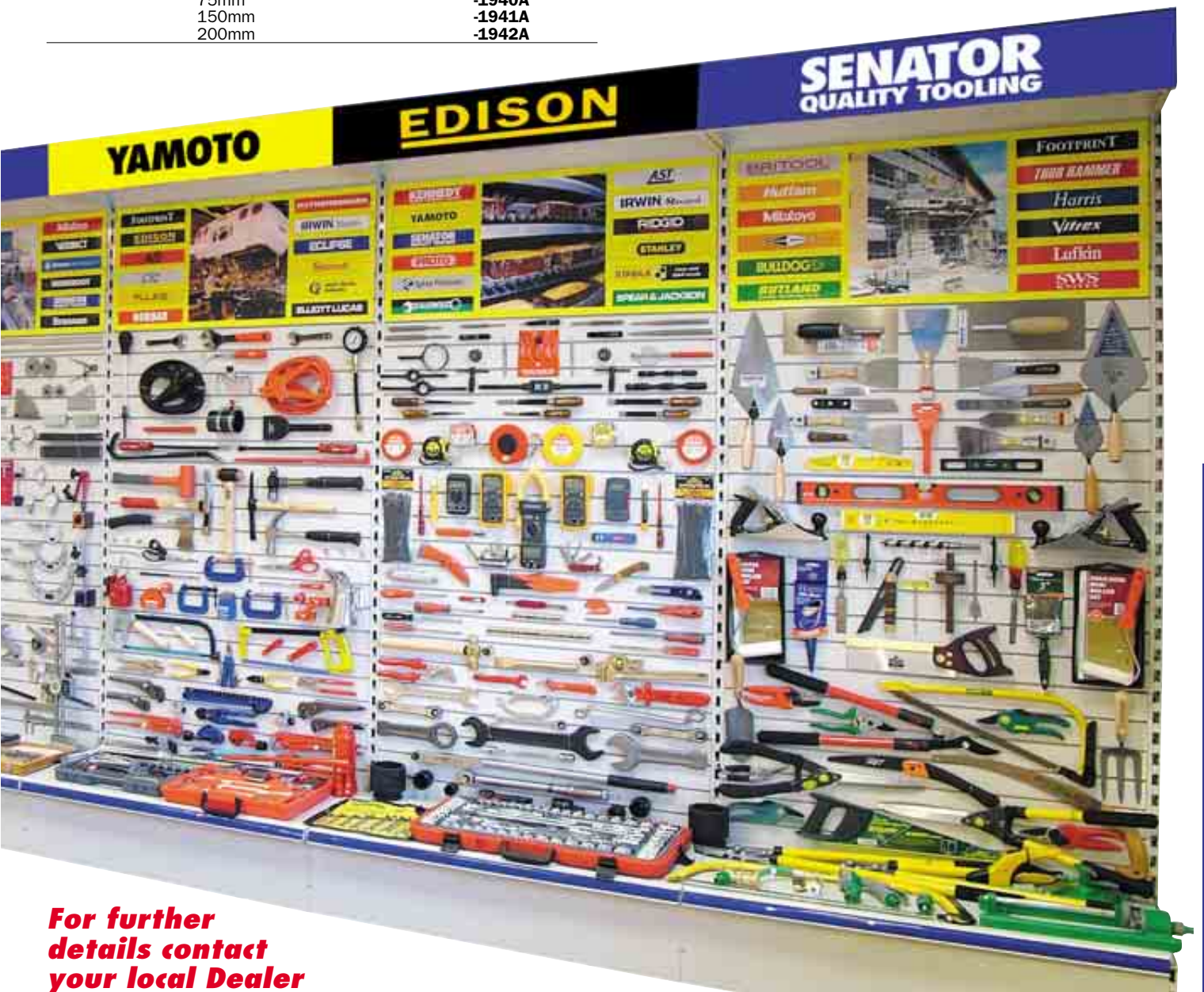
Manufactured from PVC. Suitable for chisels, auger bits, scissors, rules, punches etc.

#### Display Wallets

Overall Size (Length x Width)	Pocket Size (Length x Width)	Order Code
360 x 108mm	305 x 105mm	<b>-2900K</b>
300 x 95mm	250 x 95mm	<b>-2920K</b>
240 x 75mm	190 x 75mm	<b>-2940K</b>
265 x 40mm	210 x 40mm	<b>-6160K</b>
330 x 55mm	270 x 55mm	<b>-6180K</b>

#### Heavy Duty Display Cards

Overall Size (Length x Width)	Order Code
360 x 108mm	<b>-2900K</b>
300 x 95mm	<b>-2920K</b>



**For further details contact your local Dealer**

**CONTRACT PRICES AVAILABLE FOR VOLUME PURCHASES**

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# Product Vending & Inventory Control

## [ the concept ]

**VENDA 365** is a total inventory and cost control system, which allows a wide variety of users to dispense and track products, tools, components, etc across the organisation with complete accuracy and total confidence. This technically unique and highly versatile system is being continuously developed and adapted for manufacturing industries and other specific applications. It is acknowledged as one of the most important cost saving developments in supply chain management to be offered to industry.

Its flexibility is one of its key features. It utilises Windows based software and it has hardware that can be configured to meet the exact needs of the user. **VENDA 365** can be used to control a wide range of products, such as tooling, gauges, machine spares, PPE items, valuable components and documents, basically any item that is required instantly from a secure location. It is modular and therefore available with any drawer configuration, in single frame units or in multiples of up to 10 frames. Over 2600 systems are now successfully operational in the United States, Europe, South Africa, China, Japan, Australia and the Middle East.

The patented features coupled with the well proven integrated ATMS management software make the vending system unique in its class. The robust design, system reliability, paperless reordering facilities, management reports and product usage monitoring features are some of the reasons why 84% of customers added extra vending capacity within 12 months of operating an initial unit.

The vending machine consists of a storage unit, drawers, cupboards and lockers, a PC (*Windows*) that allows storage locations to open electronically.

Product movements are continuously recorded by the in-built PC.

The operator is able to use an optional swipe-card facility to gain access to the system's control mechanism, and can use a light pen to select the required product and open the specific storage location.



## [ the control ]

- c** complete user accountability
- o** orders for stock replenishment generated automatically
- n** no squirrelling & hoarding nor walk & wait time
- t** total control over consumables
- r** retain control with minimum utilisation of management time
- o** on-hand management information
- l** line side replenishment



**VENDA 365**  
SUPPLY SYSTEMS

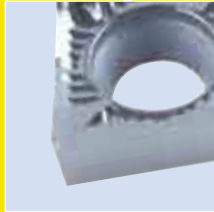


**PPE-365**  
SUPPLY SYSTEMS

For further details please contact your local distributor.

monitoring

[ the products ]



securing

[ the valuables ]



working in

[ industry ]

[ food processing ]



[ aerospace ]



[ automotive ]



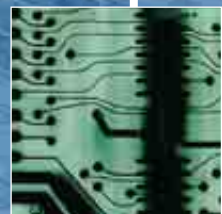
[ manufacturing ]



[ pharmaceutical ]



[ electronics ]



**VENDA 365**  
SUPPLY SYSTEMS

**PPE-365**  
SUPPLY SYSTEMS