BIOLOGICAL MICROSCOPES

1962

Section A

Our catalogue is, for ease of reference, issued in sections, covering the following categories :

Section	Colour	Title
A	Maroon	Biological Microscopes
B	Dark Blue	Metallurgical Microscopes and Accessories
D	Light Green	Measuring Microscopes and Accessories
E	Orange	Microscope Accessories and Illuminants
F	Dark Green	Photomicrographic and Projection Apparatus
G	Light Blue	Magnifiers and Microbiological Accessories
H	Lilac	Optomax Research Microscope
J	Purple	Stereoscopic Microscopes
K	Maroon	Diamax Laboratory Microscope
M	Red	Grinding and Polishing Machine
S	Brown	Spectroscopes
T	Grey	Optical Units and Benches

In addition, the following catalogues describe specialised items of our manufacturing programme :

Multimax Stereoscopic Microscope
Lomag Surgical Stereoscope
Reflecting Objectives
Vertiphase Unit for Metallurgical Microscopes
Dobson Ozone Spectrophotometer

We shall be pleased to furnish copies of any of the above publications on request.

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Section A

BIOLOGICAL MICROSCOPES

Model No. 47 London Microscope

The No. 47 London microscope is a general purpose biological instrument suitable for all applications requiring the specimen to be illuminated by transmitted light. The basic microscope consists of the base, limb, focusing adjustments and the bodytube, and the following pages describe different models incorporating a comprehensive choice of substages and stages (Section E of the catalogue gives full details of the stages). An instrument can, therefore, be selected to have the necessary features for a wide range of possible applications. Typical outfits of accessory equipment are tabulated on page A—6 and these will facilitate the selection of a complete outfit capable of meeting current requirements. Further equipment to satisfy specific applications can be selected by reference to the appropriate sections of this catalogue which are devoted to detailed descriptions of all the accessories available.

Careful consideration of the requirements likely to arise has resulted in an instrument, which, with the appropriate set of equipment, satisfies the immediate needs and which can later be elaborated as conditions dictate, from the simplest student requirement to a true research instrument, with no duplication or waste and without returning the instrument for adaptation.

Specification

The model No. 47 instrument stands on a tripod base having a spread of 8 in. × 5¾ in. to which the limb is attached by means of a pivot, so that the microscope tube can be inclined to any position between vertical and horizontal. The weight distribution is arranged so that in all positions the instrument remains completely stable. The limb is shaped to form a convenient handle, so that the microscope can be carried without stress on the moving parts.

The focusing adjustments both actuate the microscope tube and are controlled by milled heads on either side of the limb. The coarse adjustment rack and pinion gives 100 mm. (4 in.) of travel and the associated slide is of the unique Beck cylindrical design, which has considerably better "wear" characteristics than the more conventional dovetail slide. The fine adjustment incorporates a double speeded control, another feature found only in Beck instruments. The left-hand milled head gives twice the sensitivity of the right and is engraved so that each division represents a nominal displacement of .005 mm.

The fittings for the attachment of objectives, condensers, eyepieces and over-eyepiece apparatus are all manufactured to closely controlled sizes, conforming to the appropriate R.M.S. specifications.

The instruments are finished in durable mid-grey eggshell enamel, coupled with chromium plating, the complete instrument having a modern and pleasing appearance.

Each microscope is supplied in a polished wooden cabinet with lock and key, which is equipped with the necessary racks and fittings for the reception of the accessories. Special cases suitable for use in tropical conditions are available.

Model No. 47A Microscope



The model 47A is the simplest version of the series consisting, in addition to the features already described, of a plain stage, 4⅜ in. square, with stage clips, a fixed body tube 160 mm. long and a simple tubular substage for the reception of condensers. When equipped with accessory sets S1 or S2 it is eminently suitable for advanced level science studies in schools or for such routine investigations where ease of manipulation is of greater importance than versatility and sensitivity of control. The stage of the microscope is drilled ready for the reception of the No. 3305 detachable mechanical stage.

Model No. 47B Microscope



The model 47B conforms in all respects to the requirements of all the medical schools, veterinary and biological courses at universities, and similar curricula. It has a fixed body tube 160 mm. long, a plain stage fitted with stage clips and drilled for the reception of the No. 3305 detachable mechanical stage and a focusing substage fitting actuated by a sensitive helical thread enabling the condenser in use to be accurately focused. Accessory set S2 conforms to the requirements of courses up to 2nd M.B. level and set S3 includes the immersion objective necessary for subsequent clinical studies.

No. 47A Stand only, with tubular substage and iris diaphragm, in case ... ...

No. 47B Stand only, with spiral focusing and swing-out substage, in case ... ...

No. 1348 Extending drawtube, in place of fixed bodytube ... extra

For details of the optical equipment sets and extra items recommended for use with these instruments, please refer to pages A—6 and A—7.

Model No. 47C Microscope



The model 47C has a bodytube fitted with an adjustable drawtube enabling the tubelength of the microscope to be adjusted from 140 mm. to 200 mm. extension. It has a plain object stage, 4⅜ in. square, fitted with stage clips and drilled for the reception of the No. 3305 detachable mechanical stage (illus.). The substage can be focused by means of an accurate rack and pinion slide and various items of substage apparatus can be interchanged by a quick-release system which also provides centring adjustments. This model should be selected where the use of achromatic, dark ground or phase contrast condensers is contemplated.

Model No. 47L Microscope



The model 47L has the rack and pinion focusing and centring substage and adjustable drawtube similar to the 47C. In addition, it is fitted with an integral mechanical stage. Lateral and vertical movements of 75 mm. and 25 mm. respectively are provided and can be measured by means of scales and verniers to an accuracy of .1 mm. The slide holders are adjustable to accommodate slide lengths between 40 mm. and 105 mm. These holders may be removed to leave the top plate of the stage clear for the reception of large objects. This instrument will be found most useful in laboratories where routine or research problems demand a really versatile instrument with a full range of easily manipulated controls.

No. 47C Stand only, with plain stage, rack and pinion focusing and centring substage, in case ... ...

No. 47L Stand only, with built-in mechanical stage ; rack and pinion focusing and centring substage, in case ...

For details of the optical equipment sets and extra items recommended for use with these instruments, please refer to pages A—6 and A—7.

Model No. 47P Microscope



The model 47P has an extending drawtube covering the range from 140 mm. to 200 mm. The substage bracket is of the focusing and centring type and the instrument is similar to the model 47L in all respects except the stage. For pathological work involving the examination of Petri dishes and other large objects, the need arises for a stage in which the whole top plate carrying the specimen is moved mechanically and this is a particular feature of the model 47P. The range of movement is 30 mm. × 30 mm. and stage clips are provided. Scales and verniers reading to .1 mm. are available as extras as is the Topley stage unit which can replace the stage clips and provides positive location for standard slides.

Model No. 47J Microscope



The model 47J incorporates the features of the No. 47P but the stage traverse movements, while still operating on a top plate, are actuated by two standard engineering micrometer thimbles reading to .01 mm. over a range of 25 mm. in each direction. The instrument, therefore, becomes a measuring microscope capable of evaluating specimens up to 25 mm. in length. By incorporating the accurately calibrated fine focusing adjustment described on page A—6, three dimensional co-ordinates of points in a thick object can therefore be established. The Topley stage unit is available as an extra to facilitate the positive location of standard microscope slides.

No. 47P Stand only, with built-in mechanical stage ; rack and pinion focusing and centring substage, in case ...

No. 47J Stand only, with micrometric stage ; rack and pinion focusing and centring substage, in case ... ...

No. 3750 Topley stage unit ... ...

No. 3752 Verniers to No. 47P stage ... ...

For details of the optical equipment sets and extra items recommended for use with these instruments, please refer to pages A—6 and A—7.

Model No. 47H Microscope



The model 47H has as its distinguishing feature a circular, revolving, stage graduated on its circumference to read to 5 min. of arc by means of a degree scale and vernier. The axis of rotation of the stage can be centred by means of two milled heads so that it can be brought exactly coincident with the optical axis of the microscope tube. The optical sets S7 and S12, which include centring objective changers are particularly recommended for this instrument so that absolute parcentricity can be achieved for the whole equipment. The instrument also includes a graduated, extending, drawtube and a rack and pinion focusing and centring substage.

Model No. 47K Microscope



The model 47K has a circular, revolving stage like the model 47H, but this, in turn, carries a mechanical stage which accepts standard microscope slides. The range of movement is 75 mm. × 25 mm. and scales and verniers reading to .1 mm. are fitted. Optical sets S7 and S12 must be selected for use with this instrument to obviate the possibility of interference between the mechanical stage and objectives on the revolving nosepiece. The rotation is provided with a clamp and with a degree scale and vernier reading to 5 min. The instrument includes a graduated, extending, drawtube and a rack and pinion focusing and centring substage.

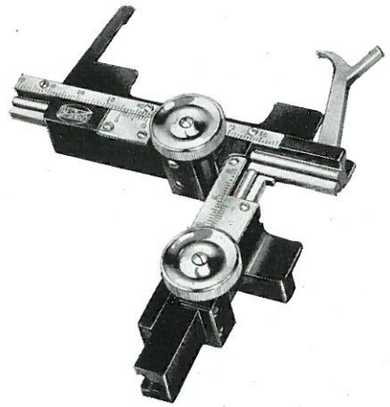
No. 47H Stand only, with revolving, centring stage with graduations and vernier ; rack and pinion focusing and centring substage ; in case ... ...

No. 47K Stand only, with revolving, centring and mechanical stage, with graduations and vernier ; rack and pinion focusing and centring substage ; in case ... ...

For details of the optical equipment sets and extra items recommended for use with these instruments, please refer to pages A—6 and A—7.

Models No. 47 and No. 48 Microscopes

Detachable mechanical stage



The No. 3305 stage unit is designed specifically for ready attachment to the plain stage of the Model No. 47A, No. 47B, No. 47C or No. 48C microscopes. It accepts the standard size of microscope slide and has a horizontal travel of 75 mm. and vertical travel of 25 mm., thus enabling the entire area of a slide to be scanned. Both movements are fitted with scales and verniers reading to .1 mm. and are actuated by rack and pinion movements having a very fine pitch to give the necessary delicacy and smoothness of touch for accurate traverse of the slide.

No. 3305 Detachable mechanical stage to fit plain stage of No. 47 microscope ... ...

Inclined monocular tube

Any of the microscopes utilising the No. 47 monocular tube can be supplied alternatively with an inclined tube of fixed extension. There are many applications, such as the examination of wet preparations, when it is desirable that the microscope stage should be horizontal. In these circumstances, selection of the inclined bodytube will permit a far more comfortable viewing position for the operator.

When ordering, the letter " I " should be added to the model number, e.g., No. 47CI.

No. 1349 Inclined monocular body ... ... extra

Depth measuring fine adjustment

For the accurate measurement of depth, a special fine adjustment milled head can be incorporated into any microscope utilising the No. 47 body. This is carefully calibrated and compensated so that a linear movement is imparted to the microscope tube, the displacement being measured by a scale calibrated to read to .002 mm. or .0001 in. over a range of 2.5 mm.

No. 1355 Depth measuring fine adjustment (metric) ... ... extra
No. 1356 Depth measuring fine adjustment (inches) ... ... extra

N.B.—The inclined monocular tube and the depth measuring fine adjustment cannot be supplied separately for adding to existing equipment since they constitute an integral part of the instrument.

No. 3796 Soft plastic dustcover ... ...
No. 3818 Special case for tropical climates for No. 47 series extra

Section A

BIOLOGICAL MICROSCOPES

Models No. 47 and No. 48 London Microscopes

Sets of Equipment

The sets of equipment scheduled below represent typical outfits suitable for undertaking a large number of routine and research investigations. Other sets of equipment to suit particular requirements can be selected by reference to sections E and F of the catalogue where, in addition to full details of the complete range of objectives, eyepieces, substage apparatus and nosepieces, descriptions will be found covering further accessories for integral illumination, photomicrography and specialised techniques.

Selection of a set of equipment to meet the immediate requirement should in no way inhibit the later addition of further accessories.

Sets for use with model No. 47 microscopes are prefixed by the letter " S " while equivalent sets for the model No. 48 are prefixed by the letter " B " and include paired eyepieces for use in the binocular unit, but are otherwise identical.

Set		Objectives		Eyepieces	Condensers	Nosepiece	Remarks
		Dry	Imm.				
No. 47	No. 48	Achromatic		Huygenian			
S1		×10/.17 ×45/.65		×6		Double	School science
S2		×10/.17 ×45/.65		×6 ×10	Abbe	Triple	Medical and biology studies
S3	B3	×10/.17 ×45/.65	×90/1.0	×6 ×10	Abbe	Triple	Medical studies, clinical work
S4	B4	×10/.25 ×45/.65	×100/1.30	×6 ×10	Abbe	Triple	General purpose set for routine laboratory work
S5	B5	×3.5/.07 ×10/.25 ×45/.65	×100/1.30	×6 ×10	Abbe Dark ground	Quadruple	Routine pathological laboratory set
S6	B6	×10/.25 ×45/.65	×100/1.30	×6 ×10 ×15	Achromatic dry and immersion	Triple	Research set for instruments type L, P or J
S7	B7	×10/.25 ×45/.65	×100/1.30	×6 ×10	Achromatic dry	Centring changers	Recommended for instruments type H or K
		Apochromatic		Compensating			
S11	B11	×10/.35 ×20/.65 ×40/.95	×90/1.30	×6 ×11 ×17	Achromatic dry and immersion	Quadruple	Research set for instruments type L.P. or J
S12	B12	×10/.35 ×20/.65 ×40/.95	×90/1.30	×6 ×11 ×17	Achromatic dry and immersion	Centring changers	Research set for instruments type H or K

Model No. 48 London Microscope

The general specification of this instrument is similar to that given on page A—1 in respect of the model No. 47, except that the microscope tube has special features. The principle of the No. 48 microscope allows for the attachment of alternative eyepiece units. This is achieved by means of a special breach fitting in the microscope tube, the individual components of which are the subject of very careful gauging during manufacture to ensure the ready interchangeability of the alternatives, whether supplied with the instrument or added subsequently.

Three units are made giving either alone, or in combination, the four possibilities of a straight monocular ; inclined monocular ; straight binocular or inclined binocular microscope.

The monocular tube fitted directly to the main body junction gives an instrument identical in specification with the No. 47 series. It is equipped with a double extension drawtube to provide a tube-length adjustment from 140 mm. to 180 mm. The eyepiece fitting will accept standard eyepieces and over-eyepiece equipment for photomicrography, etc.



No. 48LI Microscope outfit

The binocular body, which can also be fitted to the main body junction, has a prism system which enables the interocular separation of the eyepieces to be adjusted over a range from 55 mm. to 70 mm. The adjustment is made by means of a calibrated milled head, so that any operator, once having established his individual setting, can immediately adjust the body for use. The left-hand eyepiece tube is fitted with an independent focusing adjustment to allow for compensation of any refractive differences between the eyes of the operator.

The inclining unit is attached direct to the body junction and has on its upper inclined face a second identical junction for the reception of either the monocular or binocular units. The optics in the inclining unit consist of a special prism and lens system which maintains the exact magnification of the microscope system, whether the unit is fitted or omitted. This feature makes the microscope particularly suitable for a procedure in which the inclined binocular is used for visual observation of the image and interchanged with the straight monocular for photomicrographic recording or microprojection.

To ascertain the particular features of the different instruments scheduled opposite, reference should be made to the comparable series of identification letters used to specify the various models of the No. 47 microscope described on pages A—3 to A—5.

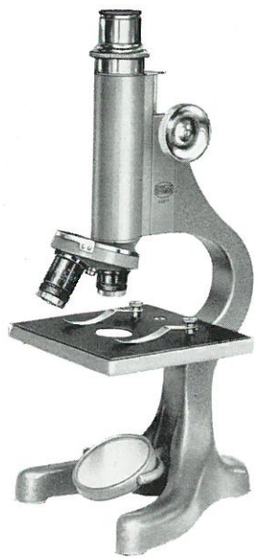
Model No. 48 London Microscope (continued)

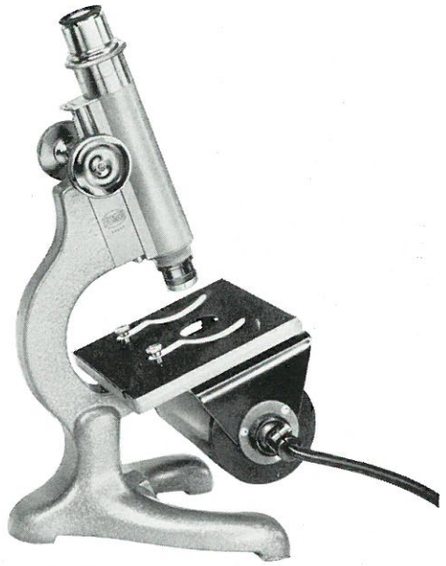
Some typical sets of optics for use on the No. 48 series of microscopes are tabulated on page A—6. These recommended outfits represent a very small selection from the total range available and for special applications reference should be made to section E of the microscope catalogue for details of the complete ranges of achromatic, apochromatic and aplanar objectives, along with the special eyepieces most appropriate to each range. Section E of the catalogue also gives details of special eyepieces, over-eyepiece equipment, substage condensers, phase contrast and polarised light attachments. The various microscope illuminants, including the very convenient No. 2093 integral substage illuminator, are also listed in section E, while section F is devoted to the photomicrographic accessories applicable to this microscope.

No. 48C	Binocular microscope with plain stage, rack and pinion focusing and centring substage and binocular unit—stand only in case ... ...
No. 48L	Binocular microscope with integral mechanical stage, rack and pinion focusing and centring substage and binocular unit—stand only in case ... ...
No. 48P	Binocular microscope with integral mechanical stage, rack and pinion focusing and centring substage and binocular unit—stand only in case ... ...
No. 48J	Binocular microscope with integral micrometric stage, rack and pinion focusing and centring substage and binocular unit—stand only in case ... ...
No. 48H	Binocular microscope with revolving centring stage, rack and pinion focusing and centring substage and binocular unit—stand only in case ... ...
No. 48K	Binocular microscope with revolving, centring, mechanical stage, rack and pinion focusing and centring substage and binocular unit—stand only in case ... ...
No. 48CI	As No. 48C, but with inclining unit added ... ...
No. 48LI	As No. 48L, but with inclining unit added (see illustration opposite) ... ...
No. 48PI	As No. 48P, but with inclining unit added ... ...
No. 48JI	As No. 48J, but with inclining unit added ... ...
No. 48HI	As No. 48H, but with inclining unit added ... ...
No. 48KI	As No. 48K, but with inclining unit added ... ...
No. 1344	Monocular body for any of the above instruments, interchangeable with binocular unit ... ...
No. 1345	Inclining unit, if supplied separately ... ...
No. 1346	Binocular unit, if supplied separately ... ...

To any of the above microscopes must be added a set of equipment as listed on page A—6 or selected for special applications from section E.

Models No. 10 and No. 15 London Microscopes





The No. 10 and No. 15 microscopes are full sized instruments, utilising the same optics as are fitted to our more complex and advanced stands. However, for many uses, the adjustments and magnifying powers offered here are sufficient for relatively restricted requirements and they are robust enough to withstand constant use.

Both instruments accept the same range of optical equipment and accessories, the model No. 10 having a vertical tube, while the model No. 15 is permanently inclined to provide a more comfortable viewing position for an operator in those circumstances where a tilted stage is acceptable. Focusing is controlled by an extremely fine, accurately cut rack and pinion, which enables objectives up to a power of ×45 to be focused easily.

The body has an extending drawtube for tubelength adjustment, and objective, eyepiece and over-eyepiece fittings of standard R.M.S. size, for the reception of optical equipment and accessories.

The stage is 4½ in. × 4⅜ in. and equipped with stage clips for holding the specimens. It is also drilled and tapped on the underside to accept the tubular substage fitting or the integral lighting unit, either of which can be supplied with the initial order or added at a later date. The mirror unit, consisting of reversible plane and concave mirrors, is mounted in gimbals to provide full tilting adjustment.

The No. 2983 integral lighting unit operates directly from the A.C. mains supply and, although attached to the microscope, is fully earthed to conform with the necessary safety regulations. The lamphouse is adequately ventilated to minimise excessive heating of the specimen and is supplied with a removable blue filter to convert the lighting to daylight colouring.

The optical equipment fitted can be varied from the recommended outfits to suit individual requirements and complete specifications of the alternative objectives and eyepieces will be found in section E of the microscope catalogue. It should be borne in mind, however, that in view of the restricted sensitivity of the focusing controls, no objective higher in power than ×45 can be fitted to these microscopes.

Section A

BIOLOGICAL MICROSCOPES

Models No. 10 and 15 London Microscopes (continued)

No. 10 London Microscope, with vertical bodytube, stand only
No. 15 London Microscope, with permanent inclination, stand only ... ...

Outfit A:— 2 Huygenian eyepieces ×6 and ×10,
Achromatic objective ×10/.17 N.A. .....

Outfit C:— 2 Huygenian eyepieces ×6 and ×10,
2 Achromatic objectives ×10/.17 N.A. and ×45/.65 N.A.
Double nosepiece ... ...

Outfit D:— 2 Huygenian eyepieces ×6 and ×10,
2 Achromatic objectives ×10/.17 N.A. and ×45/.65 N.A.,
Double nosepiece,
Cylindrical substage and Abbe condenser with iris diaphragm ... ...

Outfit E:— 2 Huygenian eyepieces ×6 and ×10,
Achromatic objective ×10/.17 N.A.,
Cylindrical substage with iris diaphragm .....

Outfit AL:— 2 Huygenian eyepieces ×6 and ×10,
Achromatic objective ×10/.17 N.A.,
Integral lighting unit ... ...

Outfit CL:— 2 Huygenian eyepieces ×6 and ×10,
2 Achromatic objectives ×10/.17 N.A. and ×45/.65 N.A.,
Double nosepiece,
Integral lighting unit ... ...

In ordering, it is sufficient to add the identification letter(s) of the selected outfit to the model number of the instrument required, e.g., No. 10AL identifies the No. 10 instrument complete with the outfit specified under the code AL.

Accessories for No. 10 and No. 15 microscopes

No. 2983 Lighting unit for attachment to existing instruments ...
No. 2984 Spare lamp for No. 2983, 230 v. 25 watt ... ... each
No. 3815 Case for model Nos. 10 or 15, with outfits A, C, D or E ...
No. 3815A Case for model Nos. 10 or 15, with outfits AL or CL ...
No. 3110 Cylindrical substage ... ...
No. 3308 Iris diaphragm to fit No. 3310 ... ...
No. 3286 Abbe condenser and iris diaphragm to fit No. 3310 ...

Optomax Research Microscope

This instrument is the subject of a separate publication, which describes the microscope and its many accessories in greater detail. Copies will gladly be supplied on request.



The Optomax microscope is a very versatile equipment capable of being fitted with a wide range of alternative accessories. The base and limb of the microscope are combined in an extremely robust and rigid casting which carries the integral illuminating system, the stage and substage assemblies, the objective nosepiece fitting and the junction for the reception of the alternative viewing bodies.

The coarse motion focusing control is actuated by a rack and pinion coupled to the stage assembly, while the fine motion control operates a ball-bearing slide carrying only the objective nosepiece. The reduction in the weight supported by the fine motion mechanism achieved by this design results in an extremely sensitive control which is responsive to the most critical requirements.

The integral lighting system satisfies the Kohler conditions and by use of the appropriate substage condenser, optimum illumination can be arranged for the complete range of microscope objectives. The 6 v. 15 watt lamp employed as the source is sufficiently brilliant for all methods of illumination and observation.

In the above illustration the Optomax is shown with the Tetravar intermediate body in use for photomicrography. This combination provides facilities for the photo-electric assessment of correct exposure times, combined with continuous binocular observation of the specimen.

Accessories are available for the examination of transparent specimens by normal, darkfield, phase contrast and polarised light techniques, using either monocular or binocular observing tubes. A rotating stage version of the Optomax is available and further accessories ensure that the instrument is capable of satisfying all the requirements of research laboratories.

Section A

BIOLOGICAL MICROSCOPES

BUSINESS TERMS

1. All prices are strictly nett for cash.
2. Payment should be made by cash with order where no account has been opened in our ledgers. Where it is desired that a ledger account be opened, London reference should accompany order to prevent delay.
3. All goods and experimental models made to order must be paid for half in advance and half on delivery. We take no responsibility for the performance of experimental models.
4. Prices are subject to alteration on account of fluctuation in cost of labour and materials.
5. A charge is made for packing cases, which, when returned empty, carriage paid and in good condition, will be credited at invoiced price.
6. Delivery is free in the London district. Elsewhere in the United Kingdom, goods are sent carriage paid and the cost of carriage charged on the invoice, except in cases where delivery is included in the contract price.
7. We do not hold ourselves in any way responsible for damage to goods in transit, although every care is expended in the packing. Our risk terminates on the goods leaving our warehouse. We can insure goods at customer's expense if instructed to do so.
8. We cannot consider complaints as to the execution of any order unless lodged within seven days of the receipt of the goods.
9. Code. In cabling or telegraphing orders it is only necessary to quote catalogue number.

As constant improvements are incorporated in our instruments the illustrations and descriptions in this catalogue may not be up to date in every detail.

Regular servicing maintains the efficiency and prolongs the life of an instrument.
We shall be pleased to furnish details of our servicing facilities.

This catalogue cancels previous lists

Pubn. No. C.254

F. & F. Ltd.