



## PAR-100 Pendulum Regulator and Controller

### Turret clock conversion to automatic timekeeping

UK patent pending

Issue date 08 August 2016

- The perfect timekeeping solution for traditional weight driven turret clocks.
- Accurate quartz controlled timekeeping.
- Integrates with Smith of Derby AW10 autowinding.
- Nil effect on the historical integrity of your clock.
- Automatic power failure backup and time correction.
- Excellent build quality giving many years of service.
- UK manufactured.

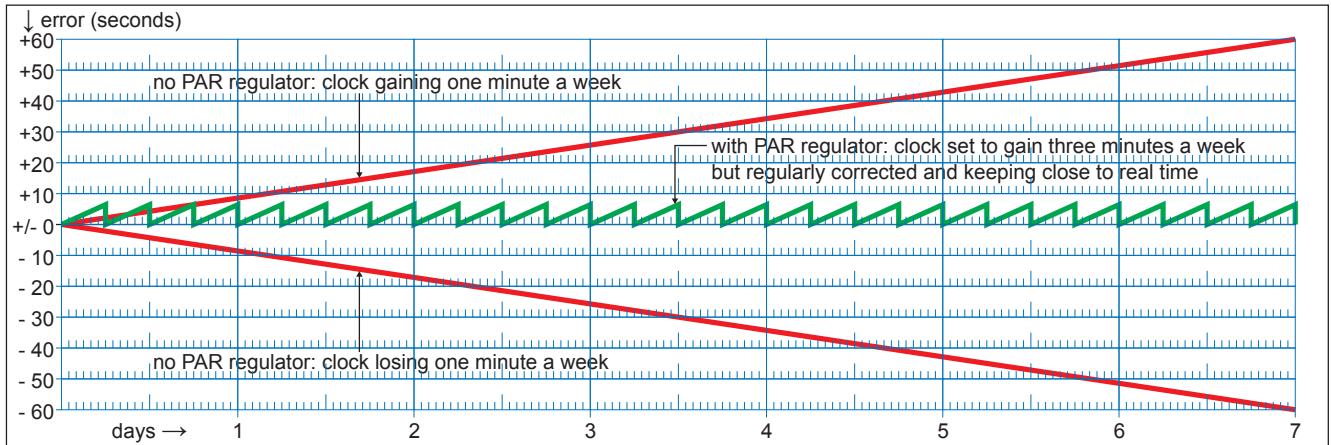


The Smith of Derby PAR-100 Pendulum Regulator System provides automated time adjustment for weight driven tower and church clocks. Alongside the AW10 Autowinding system which takes care of the regular need to wind the clock, the PAR-100 will eliminate the need for regular manual adjustment.

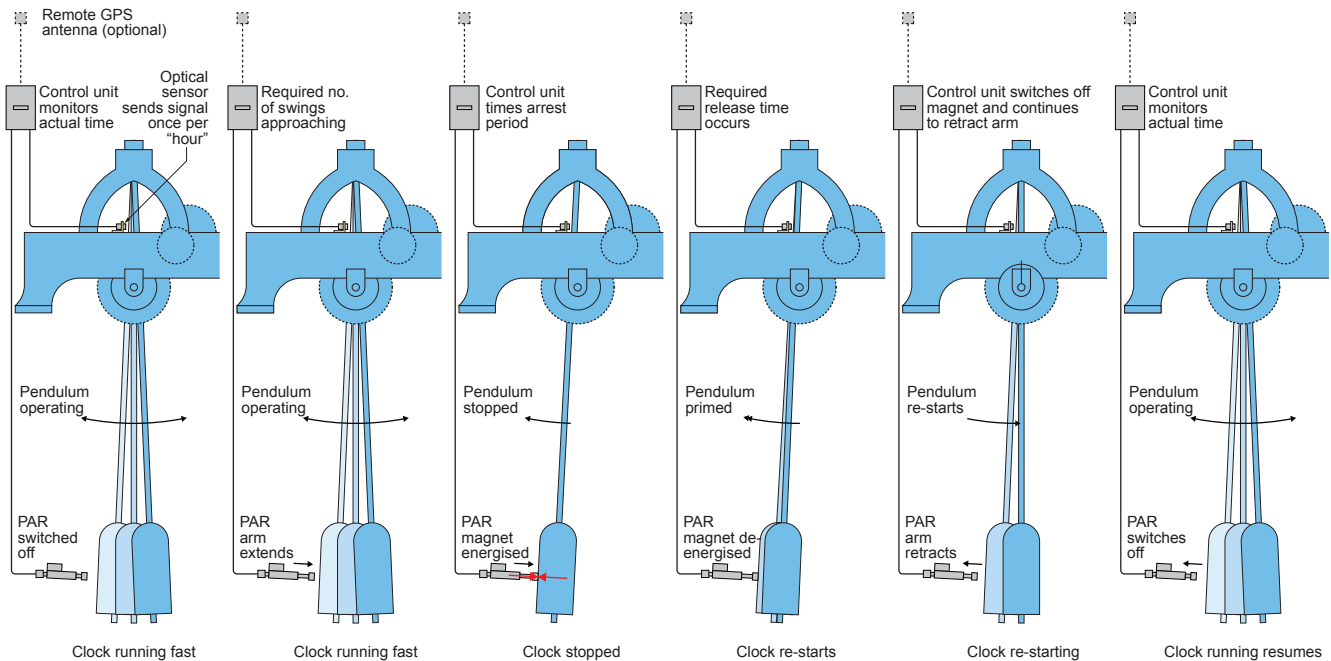
All clocks will vary somewhat in timekeeping accuracy, due to temperature and climate variations. If left unchecked, timekeeping error will accumulate over weeks and months.

## How The System Works

With a PAR-100 system installed, our engineers will calculate the amount by which your clock will always gain time. This enables the PAR-100 to pause the clock momentarily at regular intervals, in order for “real time” to catch up with clock time. There will not be any noticeable difference to the displayed time on an hour-by-hour basis, as the gain is small and the pause times usually only a few seconds.



The graph shows how small but frequent corrections will, long-term, keep your clock very close to real time. If not corrected, a timekeeping error of plus or minus one minute a week will accumulate week-on-week. But that same margin of error, if corrected every hour, will not be noticeable.



The position of pendulum "bob" (the large weight at the bottom of the rod) is raised slightly to make the clock run fast. The PAR system "counts" pendulum swings, whilst a sensor fitted to one of the one-revolution-per-hour shafts on the clock informs the system of the exact moment of passing the hour. The control unit calculates any gain in time and if necessary activates the pause mechanism.

To pause the clock, an electromagnet is extended towards the swinging pendulum, and is energised so as to hold it. When it is time to restart the clock, the magnetic arm draws the pendulum a short distance back, then de-energises so as to release it – a procedure known as "priming". These actions replicate exactly the manual process of stopping and re-starting the clock.

If timekeeping has become very inaccurate for any reason, the PAR-100 will not pause the clock for more than three minutes, but will continue to pause and correct on subsequent hours. The exception is twice a year at pre-programmed summer/winter changeover times, see below.

## Summer/Winter Time Change

The PAR-100 automatically takes care of clock altering for summer/winter time changes. The dates and times are pre-programmed into the control unit, and your clock will pause for eleven hours (effectively forward by one hour) in the spring and one hour (back) in the autumn. If your clock has night silencing, the spring time change can be programmed for 23 hours to maintain chiming continuity.

## Quartz Time Control (Standard)

Timekeeping is governed by an on-board clock, accurate to within  $\pm 2$  seconds/year at a temperature range of between -40 and +85 Celsius (military specification), in the PAR-C-100 control unit.

## GPS Time Control (Optional)

A GPS receiver may be installed which sends a time signal to the on-board quartz clock and adjust the time if necessary. Timekeeping is governed by a GPS time signal clock, accurate to the UTC (atomic clock controlled) time signal.

## Installation

The system must be installed by qualified personnel only in order that guarantees are not invalidated. It is for internal use only and should be installed where it will not be subject to great temperature variations, or dampness, such as outside walls, window openings, or direct sunlight.

## Site Requirements

Before installation of the PAR system a preliminary site inspection by our engineer is highly recommended. This will ensure that information such as access, space for installation, power supply and any special requirements can be verified.

## Integration with Automatic Winding

The PAR-100 will improve the timekeeping of any tower or church clock, whether autowinding is fitted or not. If the clock is equipped with the Smith of Derby AW10 system, then the PAR-100 can run off the same power supply unit, which is configured to run both systems together.

## Heritage

All our work on heritage clocks is fully conservation compliant, and does not involve any drilling of any part, nor the attachment of equipment that could not be subsequently removed. Your clock could, if you wish, be returned to its exact un-regulated (and un-auto-wound) condition.

## Maintenance

PAR series regulators must be serviced every 12 months by a qualified clock engineer. Please ask about our annual maintenance contract.

## Guarantee

12 months' warranty against failure through faulty workmanship or materials. Please see our full terms and conditions, available on our website or on request.

# Elements of the PAR-100 System



PAR-100 Magnet Unit



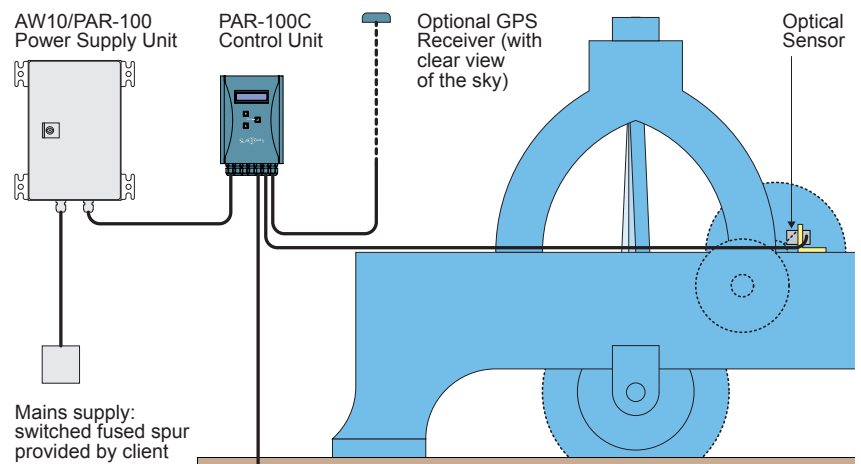
Pendulum Catcher Plate



Optical Sensor



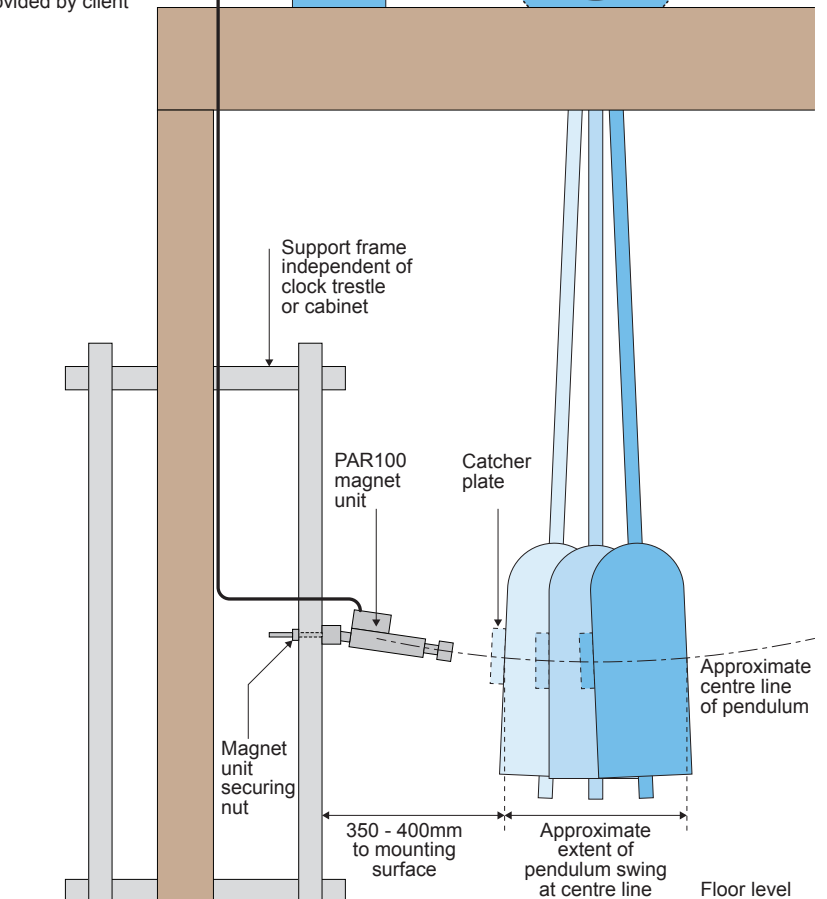
PAR-100C Control Unit



AW10/PAR100 Power Supply Unit

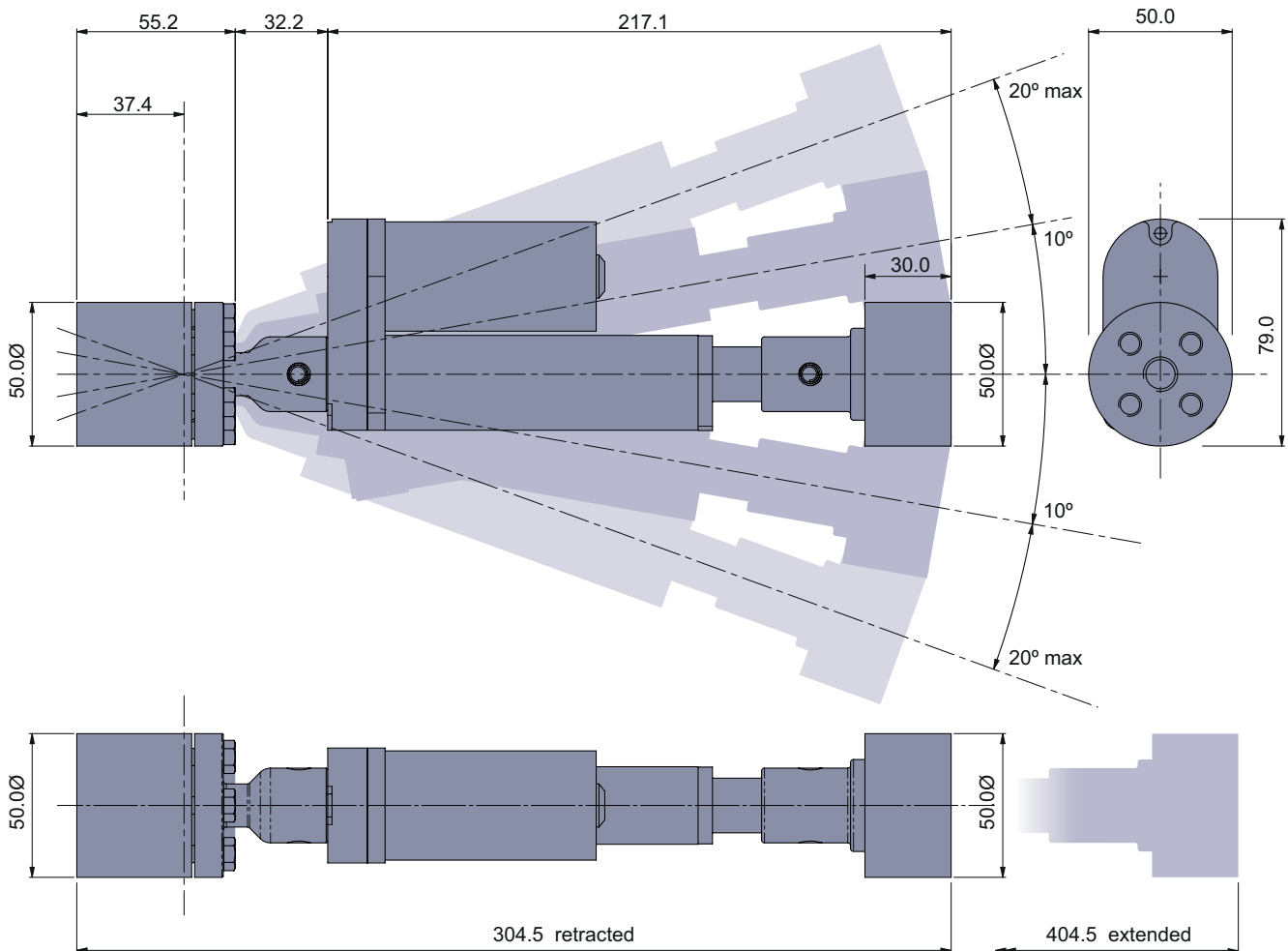


Optional GPS Receiver

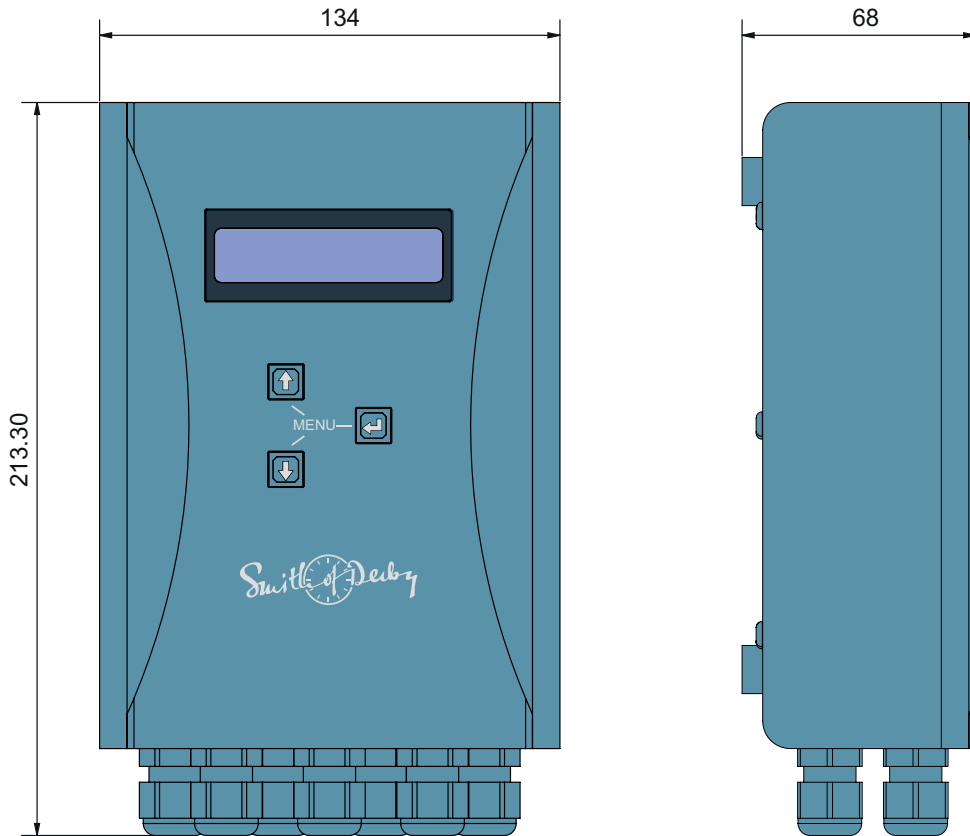


## Data and Dimensions

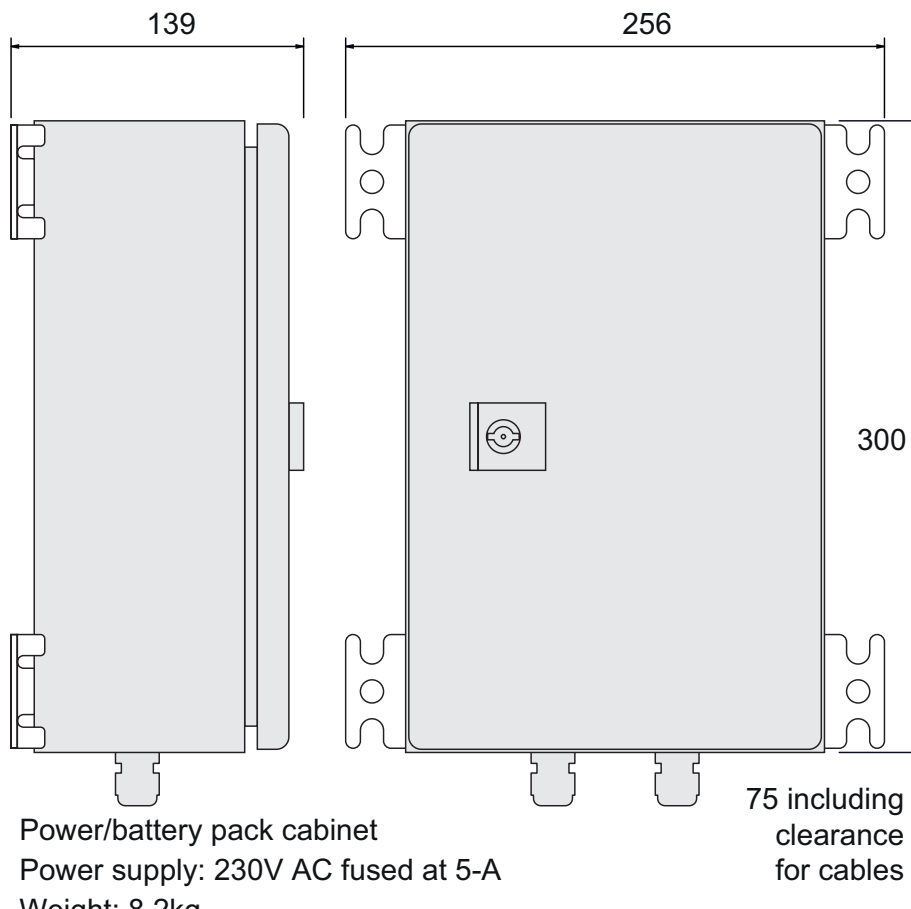
			PAR-100 Magnet Unit	PAR-100C Control Unit	AW10/PAR-100 Power Supply Unit
Timekeeping accuracy:	Quartz				
	GPS				
Weight (nominal)		600 g	3.1 kg	10 kg	
Power requirements	200-240V 50Hz AC, 100-120V 50/60Hz AC to special order				
Fuse rating		5A	5A	5A	
Power consumption		5w	5w	5w	
Operating temperature range	-15 to +35 degrees Celsius				
Materials					



PAR-100 Pendulum Arrester Release overall dimensions



PAR-100-C Pendulum Arrester Release Control overall dimensions



Power/battery pack cabinet  
 Power supply: 230V AC fused at 5-A  
 Weight: 8.2kg

AW10/PAR-100 Power Supply Unit (PSU) overall dimensions

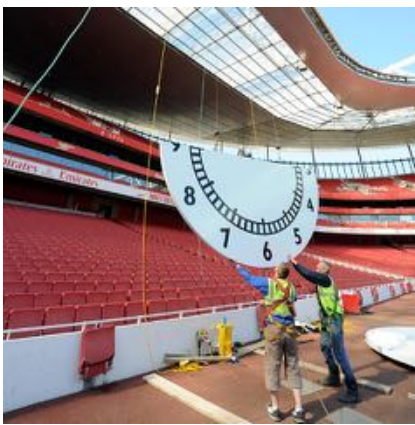


## Further Information

Please contact us or visit our website for information about related products:

- Custom and creative clock design
- Clock dials, cases and enclosures
- Pillar clocks
- Projecting (bracket mounted) clocks
- Clock turrets, finials and windvanes
- Bell Sound System
- Dial restoration

## What Makes Us Tick



As the UK's leading clock repairers, restorers and conservation specialist we are proud to have been serving the horological community for over 150 years.

During this time our passion has been creating and caring for the world's greatest public clocks; from small parish church clocks to some of the most celebrated cathedral, commercial and private clocks.

Annually our team of Service Engineers carefully maintain 4,500 wonderful clocks in the UK and around the world, whilst our production team create and install some of the world's latest innovations in time telling. We understand a clock represents the heartbeat of your community and we take the preservation of its longevity very seriously to enable future generations to enjoy.

Customer care and conservation of your timepiece heritage is at the heart of everything we do.

## The Importance of a Name

We are proud of our own heritage, and Smith of Derby incorporates some important names from the history of tower clockmaking:

John Smith & Sons, Derby (1856); William Potts & Sons, Leeds, (1833); J B Joyce & Co, Whitchurch, Shropshire, (1690); G&F Cope & Co, Nottingham, (1845) and James Ritchie & Son, Edinburgh, (1809). We also in partnership with other makers of fine clocks and clock control systems, and we service, maintain and conserve clocks by all of the many turret clockmakers from times past.

All designs, descriptions, diagrams and illustrations copyright © Smith of Derby Ltd.

We reserve the right to amend the design, price and availability of our products without prior notice.

**SMITH OF DERBY LTD** 112 Alfreton Road, Derby DE21 4AU United Kingdom  
t: +44 (0)1332 345569 | e: enquiries@smithofderby.com | w: www.smithofderby.com

PAR 100 Data 08 2016