



Fig. 2

min ◀ Drehknopfstellung ▶ max

- · - · - · P_M, P_W Motorleistung und Leistung an der Abtriebswelle
 - - - - - n_M Motordrehzahl
 - - - - - n_W Drehzahl Abtriebswelle
 - - - - - M_W Moment Abtriebswelle
 - - - - - M_M Moment Motor

min ◀ Rotary knob position ▶ max

- · - · - · P_M, P_W Motor power and power at off-drive shaft
 - - - - - n_M Motor speed
 - - - - - n_W Speed of off-drive shaft
 - - - - - M_W Moment of off-drive shaft
 - - - - - M_M Moment of motor

min ◀ Position du bouton rotatif ▶ max

- · - · - · P_M, P_W Puissance du moteur et puissance à l'arbre de sortie
 - - - - - n_M Vitesse de rotation du moteur
 - - - - - n_W Vitesse de rotation de l'arbre de sortie
 - - - - - M_W Moment de l'arbre de sortie
 - - - - - M_M Moment du moteur

Fig. 1

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Safety instructions

Never operate the equipment with the stirrer tools rotating freely. Ensure that parts of the body, hair or items of clothing cannot be trapped by the rotating parts. Pay attention when setting the speed to any imbalance of the stirrer tools and possible spraying of the medium to be stirred. Use a stirrer shaft protection device! The equipment is not suitable for manual operation. Please follow the relevant safety instructions and guidelines, and occupational health and safety regulations for use in the laboratory.

Avoid knocks and impacts on the lower end of the shaft and the chuck gear teeth. Even minor, invisible damage can lead to imbalance and uneven shaft action. Careful handling guarantees safe working and the long life of the equipment.

Imbalance of the output shaft, the chuck and in particular the stirring tools can lead to uncontrolled resonant vibrational behaviour of the equipment and the whole assembly. Glass apparatus and stirrer containers can be damaged or shattered by this. It can cause injury to the operator, as can the rotating stirring tool. If vibration of the equipment is noticed, the speed must be reduced immediately in all cases until no more vibration occurs. In this case exchange the stirring tool for one without imbalance or remedy the cause of the imbalance.

Operating with a freely rotating shaft end is dangerous. Therefore for safety reasons the stirrer tool is permitted to project over the upper edge of the housing only when the machine is not running.

The unit must be switched off before changing to another gear speed, otherwise the toothed gears in the reduction stage will be damaged.

The machine may only be opened by trained specialists - even during repairs. The machine is to be unplugged from the mains before opening. Live parts inside the machine may still be live for some time after unplugging from the mains.

The high torque developed by the RW 28 basic requires particular care in the choice of stand, cross sleeve and anti-rotation element for the stirring bowl.

NOTE! Covering or parts that are capable of being removed from the unit without accessory equipment have to be reattached to the unit for safe operation in order to prevent, for example, the ingress of fluids, foreign matter, etc.

The agitated vessels used for stirring have to be secured.





Additional hazards to the user may occur if inflammable materials are used during the stirring operation or, if glass equipment is used, the energy transmitted from the stirring device results in glass breakage.

Make certain that the unit is set at the lowest speed before commissioning; otherwise, the unit will begin running at the speed last set.

The unit will automatically begin operation again after a mechanical or current supply failure.

Correct use

The RW28 basic stirrer are suitable for stirring and mixing liquids with low or high viscosity. They are designed for use in the laboratory. For proper use the units have to be fastened to a stand by means of a cross sleeve after assembly of the extension arm (cf. spare parts diagram, p. 77).

Unpacking

Please unpack the machine carefully and inspect for damage. It is important that any transit damage should be noted at the time of unpacking. In certain circumstances it may be necessary to investigate immediately (post, rail or freight forwarder). The guarantee covers: One RW28 basic stirring machine in accordance with the type ordered, a chuck key and operating instructions.

Useful facts

In buying this machine you have chosen a high quality product. Ease of use is guaranteed with its handy shape and simple operation. The housing offers protection against ingress of liquids. The materials used and their precise identification make recycling possible and simple, and enables re-use of the parts. The speed can be infinitely adjusted between 60 and 1400 rpm 50 Hz; 72 and 1680 rpm 60Hz. The machine can be operated continuously and warms up during operation. The generously proportioned cooling surfaces enable distribution and transference of heat to be as even as possible. The two metre long mains lead makes it possible to work on stands - even with high glass apparatus under vapour extraction hoods - without extension leads. The precision stirrer shaft is designed as a hollow shaft to allow the stirrer shanks to be inserted.

Drive

The method of operation of the motor is characteristic of the operating behavior of the RW 28 basic units. The motor can be infinitely adjusted via a friction wheel drive unit but is operated in one position only. The power output, rotational speed and torque of the motor are regarded as constant and are optimized for this operating position. After the friction wheel drive the motor power output is transmitted to the off-drive shaft of the stirrer via either the first or second stage of the subsequent manually adjustable toothed gear train.

Neglecting all losses, the power at the off-drive shaft during power transmission (conversion) is always as great as the power output of the motor. The gear train merely provides rpm and torque conversion, which can be described in purely theoretical terms by the characteristic curve plotted in Fig. 1.

Friction wheel wear is kept low by a helical clutch matched to the gear train. The down-pressure required at the friction wheel is ad-

justed by the helical clutch according to the moment acting on the stirrer shaft. A low torque results in a low down-pressure; a high torque results in a high down-pressure.

Gear Speed Change

(Fig 2)

After the catch knob on the left side of unit is pulled, the gears are taken out of mesh by turning in a direction counterclockwise to the bearing bushing on the black knurled surface above the chuck. The centre axis of the stirring apparatus is thus shifted in a radial direction. The bearing bushing is then axially positioned up or down in accordance with the range which is to be set. The gears are put back into mesh by turning the bearing bushing back (clockwise) and the centre axis of the agitator is swivelled into the original position until the catch knob catches.

Should it be necessary to change the gear speed in the course of setting up an experiment or process with glass apparatus, then attention must be paid to the movement of the stirrer attachment by the eccentric bearing bush and to the movement in the axial direction. If this is unacceptable, the stirrer attachment must be loosened in the chuck.

Motor Circuit Breaker

The ball race capacitor motor (degree of protection IP 42 only together with the factory-provided switch box) is maintenance free. In its winding it carries a special overheating circuit breaker (self-locking temperature limiter) which shuts down the motor permanently if the permissible motor temperature is exceeded. This special type of circuit breaker is used when the automatic reactivation of the protected unit after overheating is undesirable or impermissible. The principle of the temperature limiter is that of a

switch that heats up and isolates the motor from the power supply when the maximum permissible temperature is reached.

When the self-locking temperature sensor is tripped, the yellow glow lamp on the front plate of the unit lights up to indicate the motor overload and the stoppage of the motor. In this case the unit can only be switched back on after it has been switched off for approx. 4-5 minutes by pressing the rocker switch on the front plate or by disconnecting the mains plug.

After this short cooling period, the contacts in the current circuit are closed again and the unit is operational once more.

Speed Display

The speed on the RW 28 basic agitator is adjusted by means of the rotary button.

The speed that is set can be read on the label (Fig. 2) attached to the side of the unit using the marking on the motor support. (The values are only valid for low agitator shaft lows.)

Commissioning

For correct use, the stirrer machine must be fixed with a cross sleeve (eg R261 or R270) to a stable stand (eg R2722 or R2723). The stirrer container should always be fixed with a tensioner (eg RH2) for safety reasons.

A minimum distance of 40 mm must be provided for between the agitator housing elements and the stand leg in order to prevent the motor from bumping against the stand at the lowest speed setting.

Switching on the machine

Check whether the voltage given on the type plate corresponds to the available mains voltage. The socket used must be earthed (fitted with earth contact). If these conditions have been met, the machine is ready to operate when the mains plug is plugged in. If these conditions are not met, safe operation is not guaranteed and the machine could be damaged.

During commissioning of the machine the output shaft starts to run at the last speed set. Therefore check the setting of the control knob. Also ensure that the speed set is suitable for the test texture selected. If in doubt, set the speed knob to the lowest speed (left-hand position). In case of doubt use the rotary button to set the lowest speed (front motor slide stop) and set the drive at the lowest speed.

The unit starts to operate when the rocker switch is pressed.

If the unit has not been used for some time, a knocking noise will be heard when switching on, which is due to the preload on the friction lining of the friction wheel drive. This has no detrimental effect on the function of the unit, and the knocking noise will disappear after a short running-in period.

Output shaft

The chuck and off-drive shaft allow stirrer attachments with shank diameters of up to 10mm to be clamped and inserted. The opening at the top of the housing allows stirrer attachments to be pushed up above the top edge of the housing, e.g. in order to change the stirring bowl with the unit switched off.

Maintenance and cleaning

The stirrer is maintenance-free. It is subject only to the natural wear and tear of components and their statistical failure rate.

When ordering spare parts, please give the manufacturing number shown on the type plate, the machine type and the name of the spare part.

Please send in equipment for repair only after it has been cleaned and is free from any materials which may constitute a health hazard. Use only cleansing agents which have been approved by IKA to clean IKA devices. To remove use:

Dyes	isopropyl alcohol
Construction materials	water containing tenside / isopropyl alcohol
Cosmetics	water containing tenside / isopropyl alcohol
Foodstuffs	water containing tenside
Fuels	water containing tenside

For materials which are not listed, please request information from IKA. Wear the proper protective gloves during cleaning of the devices. Electrical devices may not be placed in the cleansing agent for the purpose of cleaning.

When cleaning the unit, take particular care not to bring substances containing oil or grease into contact with the running surfaces of the cone pulley and the friction wheel. This would substantially reduce the frictional coefficient resulting from the pairing of the friction wheel and cone pulley materials, and would impair power transmission in the unit.

Make certain that the hexagon head nut (part no. 11 of spare parts diagram) is sufficiently tightened in order to prevent the shifting of the motor plate and thus the speed as well.

Technical data

Speed range (50Hz stage I)	min⁻¹ 60 - 400
(50Hz stage II)	min⁻¹ 240 - 1400
(60Hz stage I)	min⁻¹ 72 - 480
(60Hz stage II)	min⁻¹ 288 - 1680
Max. torque stirrer shaft measured at 100min ⁻¹ in stage I	Ncm 900
Permitted on-time:	% 100
Speed adjustment:	mechanical rotary button on the side speed label
Speed display:	on the side speed label
Design voltage:	VAC 230 ±10% or VAC 115 ±10%
Design frequency:	Hz 50/60
Input power (motor):	W 220 <i>EURO</i> 60Hz W 200 <i>USA</i>
Output power (motor):	W 90 <i>EURO</i> 60Hz W 94 <i>USA</i>
Maximum output at stirrer shaft measured at 400min ⁻¹ in stage I, 230V 50Hz:	W 90
Overall efficiency (measured at 400min ⁻¹ in stage I, 230V 50Hz:	0,5
Protection type to DIN 40 050:	IP 42
Excess voltage category:	II
Protection class:	I (protective earth)
Contamination level:	2
Protection at overloaded:	Temperature sensor in motor winding
Fuse (on mains plate):	
220-240VAC, 50/60Hz	A T4AL (ident.no. 28 205 00)
100-120VAC, 50/60Hz	A T6,3AL (ident.no. 14 080 00)
Ambient temperature:	°C +5 to +40
Ambient humidity: (rel.)	% 80
Operating position:	on stand, clamping chuck pointing down

Drive: Rib cooled capacitor motor with friction wheel drive and subsequent 2-stage toothed gear train.

Maximum stirring quantity - water:	ltr 80
for high-viscosity (HV):	mPas 10000 - 50000
Clamping chuck - clamping range:	mm 1 -10
Hollow shaft internal diameter:	mm 10,5
Extension arm:	mm 16x145long
Housing:	Al, thermoplastic
Dimension without extension arm: (WxDxH)	mm 123 x 252 x 364
Weight with extension arm and clamping chuck:	kg 7,4

Accessories

R 2722	H-Plate stand	R 260	Cross sleeve
R 2723	Telescopic stand	R 261	Cross sleeve
RH 2	Tensioner	R 270	Cross sleeve
R 182	Bowl clamp	R 271	Cross sleeve

Guarantee

You have purchased an original IKA laboratory machine which meets the highest engineering and quality standards. In accordance with IKA guarantee conditions, the guarantee period is 12 months. For claims under the guarantee please contact your local dealer. You may also send the machine direct to our works, enclosing the delivery invoice and giving reasons for the claim. You will be liable for freight costs.

Permitted IKA stirrer tools

Max. Speed 1/min

R 1313	Turbine stirrer	800
R 1376	Surface stirrer	800
R 1343	Propeller stirrer 4fl	1 000
R 1345	Propeller stirrer 4fl	800
R 1385	Propeller stirrer 3fl	800
R 1388	Propeller stirrer 3fl	400
R 1300	Dissolver stirrer	2 000
R 1301	Dissolver stirrer	800
R 1302	Dissolver stirrer	1 000
R 1336	Kneading stirrer	1 000
R 1331	Anchor stirrer	1 000
R 1333	Anchor stirrer	800
R 1393	Worm stirrer	1 000

Associated standards and regulations

Associated EU guidelines

EMC guidelines: 89/336/EC

Low Voltage Guideline: 73/023/EWG

Machine guidelines: 89/392/EC

Construction in accordance with the following safety standards:

EN 61 010-1

EN 60 204-1

EN 292-1, -2

EN 414

UL 3101-1

CAN/CSA C22,2 (1010-1)

Construction in accordance with the following EMVstandards:

EN 55 011

EN 55 014-1

EN 50 081

EN 50 082-1

EN 60 555-2, -3