

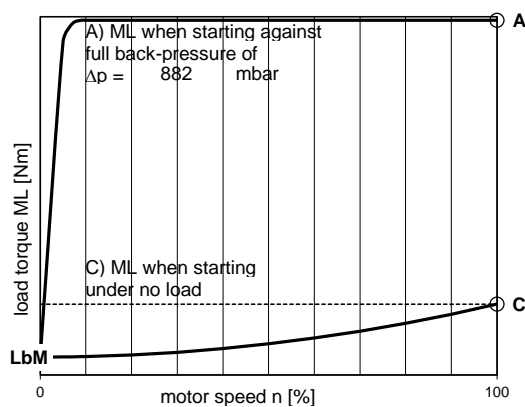
# Starting Diagram for Rotary Piston Blowers

Type and size: GQa 22.23  
Design Configuration 6 or GA  
Order data: Ghadir PG 1. Stage  
Quotation number:  
Job number:

Blower operating data	Case	A	C
Blower speed	$n_{\text{Gebi}}$ (1/min)	403	403
Motor speed	$n_{\text{Motor}}$ (1/min)	1495	1495
Power required at blower drive shaft	P (kW)	1877	505
Torque based on motor speed, where: $M_L = 9,55 \cdot P \cdot 1000 / (n_{\text{Motor}} \cdot \eta)$ $\eta=0,98$	$M_L$ (Nm)	12234,9	3291,8
Moment of inertia of the blower	J (kgm <sup>2</sup> )	910	910
Moment of inertia of the blower and accessories based on motor speed (without motor)	$J_{\text{red}}$ (kgm <sup>2</sup> )	66,13	66,13
Total moment of inertia based on motor speed	$J_{\text{red,ges}}$ (kgm <sup>2</sup> )	without motor	without motor

(See also text and reverse side of this document)

## Starting diagram of the blower:



LbM = breakaway torque: **500 Nm**

The power reserve consideration for the motor rating selection varies with the power at the blower shaft:

up to 1 kW	100 - 50 %
1 - 2 kW	30 - 20 %
2 - 75 kW	20 - 10 %
above 75 kW	10 %

Electric motors feature a tolerance of +20% on locked rotor torque and locked rotor current, while the breakdown torque is given with a  $\pm 10\%$  in accordance with VDE 0530. In consideration of these tolerances, the locked-rotor torque of the drive must sufficiently exceed the breakaway torque of the driven machine. Also, the driving torque must, at any time during acceleration, be higher than the load torque. The acceleration torque is the difference between the load torque and the driving torque.

$$M_{Bm} = M_{am} - M_L \quad (\text{Nm})$$

The acceleration time can be estimated by using the average acceleration torque as follows:

$$t_a = \frac{n_{\text{Motor}} \cdot J_{\text{red,ges}}}{9,55 \cdot M_{Bm}} \quad (\text{Sek.})$$

The total moment of inertia is the sum of the moments of inertia of the motor, blower and coupling, i.e. belt drive or gear. With star-delta starting, the locked-rotor torque is reduced to approximately 30 % of the locked-rotor torque under direct on line start. To enable the star-delta start to achieve its intended purpose, it is necessary for the motor to accelerate almost to its rated speed while

in the star-connection. Should this not be the case the motor will tend to stall and the result will be a current peak when switching into delta-connection. If the current peak is not significantly lower than the locked-rotor current, it eliminates any advantage of a low voltage start.

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Date: 25. 07. 2018



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