



P.LEMMENS

A Swegon Group company

TAC forward- blade fan (Impulse)

Technical documentation

Table of contents

I.	Our TAC forward-blade range	2
1.	Description	2
2.	TAC technology	2
•	The ECM motor	2
3.	Types of fans	3
4.	Fan naming principle	4
5.	Regulation	4
•	TAC 3	4
•	TAC 5	5
6.	Selection program	5
7.	Economical = Ecological	5
8.	Applications	6
II.	List of TAC forward-blade fans:	7
III.	OPTIONS	8
1.	No flange	8
IV.	Technical specifications of TAC forward-blade fans:	8

TAC fans

A complete range of high-efficiency forward-blade fans for airflows of 100 to 5700 m³/h

The company P. Lemmens was established for the purpose of manufacturing fans. In 1981 (i.e. two years after the company was created), P. Lemmens actually started to produce its own fans, which used alternating current (AC) motors. The company P. Lemmens has come a long way since then, most notably in 1995 with the introduction of fans fitted with direct-current electronically commutated motors. This innovation, which was unprecedented in the European continent, soon became a market standard in energy savings and is now included in all our fan units.

I. Our TAC forward-blade range

1. Description

TAC fans (with forward blades) are centrifugal fans provided with impulse turbines with a large number of narrow, direct-drive blades in which the motor is placed in the air stream. The blades are set forwards, tilted in the direction of rotation. All the fans of the range, volutes and turbines, are made of galvanised steel (DIN 17162). Each fan is statically and dynamically balanced to provide silent, vibration-free operation.

2. TAC technology

TAC, which stands for Total Airflow Control, is based on the construction of aeraulic models and on the latest developments in the field of motors, such as the electronically commutated motor (ECM). This technology is applied to airflow control and has made it possible to create a new range of standard fans fitted with these motors: the TAC series.

This technology has allowed us to produce extremely efficient fans, regardless of the speed of rotation.

In addition, TAC fans have the following advantages:

- ECM motor = at least 50% energy savings (compared with the standard AC motor).
- Constant airflow regardless of the pressure drop, constant pressure, link with 0/10 V signal, etc.
- Easy installation: the requested airflow is the same as the obtained airflow, with no complicated, tedious adjustments.
- Lower noise levels than conventional airflow control technologies.
- Compliant with European energy requirements (ErP 2013/2015)

• The ECM motor



The ECM motor used is a direct-current, permanent-magnet motor, but it is supplied with alternating current. An added electronic module is secured to the motor, which provides the commutation of the rotor and controls the operation thereof. This ECM motor is capable of accurately communicating the instantaneous value of its working point. On the basis of this information, we have developed instantaneous calculation models of the working point of the fan. The permanent availability of this information opens the door to many smart uses. TAC technology uses this information to control the fan according to the needs of the application.

3. Types of fans

Forward-blade TAC fans are classified according to whether they have a single or double inlet and one or more turbines. The standard five classes of fans are as follows:

- DD: double inlet, one turbine, one motor
- DS: double inlet, one turbine, one motor
- DP: double inlet, two turbines, one motor
- DF: single inlet, one turbine, one bypass motor, with suspension, housing and casing
- KDF: this is the "built-in" version of the DF



DD fan



DS fan



DP fan



DF fan



KDF fan

The single-inlet fan (DS) is very compact and inexpensive.

The double-inlet fan (DD), in turn, requires a larger installation space because the intake is on either side of the wheel. It has the advantage of allowing a greater airflow and a higher air pressure.

The double-inlet fan (DP) has the advantage of allowing a very large airflow considering how compact it is, a noticeably attenuated noise level due to its four air inlets, and an attractive price, since the two turbines share a single motor.

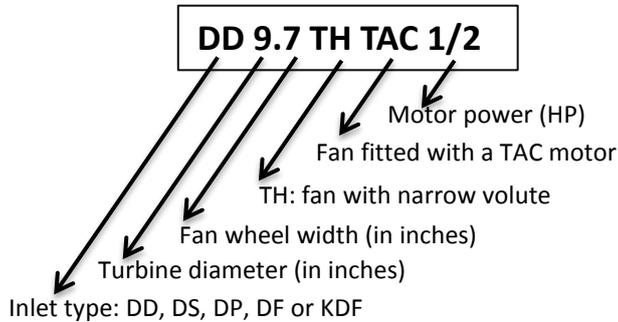
The DF fan is characterised by its low height, the fact that the pulse units of the fan are in two opposing directions, and by its low noise level. It is designed in particular for FFU applications (laminar ventilation ceilings), where it allows an even distribution of the air over the filter, despite the space being very reduced. PLC has developed a housing shape which optimises the efficiency of the assembly.

The KDF fan must be built into the application of the integrator manufacturer. It only includes the Suspension/Programmed motor/Turbine assembly. The housing in this case is provided by the integrator, but must comply with our specifications in order to be able to perform TAC3 control.

4. Fan naming principle

All Lemmens fans follow the same naming principle which allows them to be easily identified.

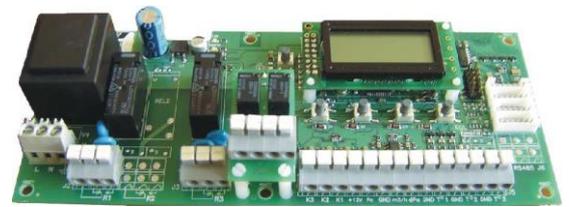
To help understand this, we have taken the example of a DD 9-7 TH TAC 1/2 fan



Some fans do, however, have a name for the diameter of the turbine and the width of the wheel in mm.

5. Regulation

TAC technology is constantly improving and allows complete control of the operation of the fan. According to the needs of the customer, various types of regulation for fans only are optionally available:



- **TAC 3**

TAC3 regulation allows a large number of control possibilities and flexibility which are integrated into the control box.

Three operating modes are available:

- Constant airflow (CA) mode: Three airflow settings can be selected via digital inputs. The airflow settings are kept constant without requiring an external probe, regardless of the pressure drop.
- Link with signal (LS) mode: The airflow setting is slaved to a 0-10 V signal (temperature sensor, moisture sensor, air quality sensor (CO₂), PLC, etc.), via a linear link. This airflow setting is kept constant, regardless of the pressure drop. A multiplier can be activated via a digital input.
- Constant pressure (CPf without probe, CPs with probe) mode: The pressure setting (calculated on the fan or measured by an external pressure probe) is kept constant. A multiplier can be activated via a digital input.



Its control interface (LCD screen and push buttons) is very intuitive and its configuration is quick and easy (less than 1 minute).



• **TAC 5**

TAC 5 regulation also offers, in addition to the TAC3 operating modes, the following advantages:

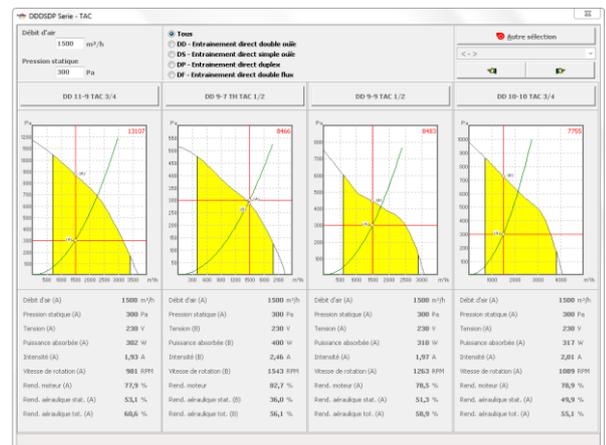
- Remote configuration via RC
- Compatibility with various communication and networking modes (Modbus, Wi-Fi, Ethernet and KNX)
- The option of defining ranges of operating times.

Comment: Control by simplified 0-10V signal is only possible with the DD 146-210 and DD 140-59 fans. The torque and thus also the speed of one or more TAC fans can be controlled via a single 0-10V signal. This simple functionality only affects the torque of the fan. Consequently, operation with constant airflow or pressure is impossible.

6. Selection program

The fan selection software, which is straightforward and intuitive to use, makes it possible to select the fan which you require. By indicating the necessary airflow and pressure, the software will select the fan that best meets your needs. This software will also allow you to print detailed technical specifications of the fan at the selected working point.

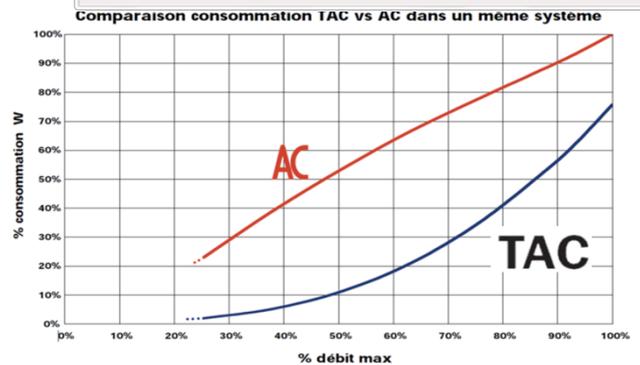
You can download it from our website www.lemmens.com.



7. Economical = Ecological

The product focuses specifically on saving electricity consumption. Thus, consumption can be considerably lower than that of a standard centrifugal fan according to the point of application and the type of regulation under consideration (see graphic). In addition to the direct savings, the indirect savings should also be taken into account: less electricity consumption generates less heat waste, and thus in certain cases, less production of cooling energy. This also makes it possible to reduce the investment in the air-conditioning system.

In this regard, the technology is a concrete result of the industry, faced with the worldwide environmental concerns of global warming.



8. Applications

The features of the fan make it very interesting in all fields in which forced ventilation is necessary, and in which an airflow control system must be applied. In addition, the energy savings alone are enough to justify the application economically, the other features being merely additional benefits.

Our customers apply the technology in such diverse devices as hot-air generators (gas or fuel-oil), air-treatment units, heat pumps, laminar flows, controlled mechanical ventilation, heat recovery, etc.

II. List of TAC forward-blade fans:

Below is the list of Lemmens standard-production TAC fans:

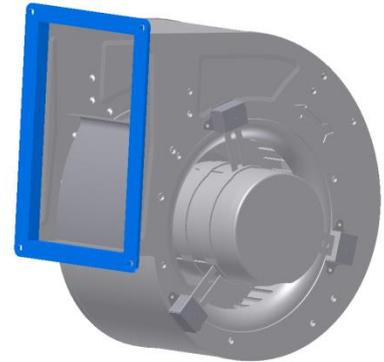
CID	Name	Airflow range [m ³ /h]	Pressure range [Pa]
<u>DD: fans with double inlet, one turbine, one motor</u>			
720130	DD 9-5 TAC 1/3	100-1500	670-250
720054	DD 9-7 TH TAC 1/2	100-2000	460-120
720055	DD 9-9 TAC 1/2	100-2900	620-160
720056	DD 10-10 TAC 3/4	100-3800	840-220
720110	DD 11-9 TAC 3/4	100-3400	1000-170
720057	DD 11-11 TAC 1/1	100-4400	860-160
<u>DP: fans with double inlet, two turbines, one dual-axis motor</u>			
720058	DP 6-6 TAC 1/2	100-2200	380-130
720059	DP 9-7 TH TAC 1/1	100-3600	460-210
720011	DP 9-7 TH TAC 1/2	100-3000	450-160
720060	DP 9-9 TAC 1/1	100-5700	700-140
<u>DS: fans with single inlet, one turbine, one motor</u>			
720061	DS 10-4 TAC 1/2	100-1500	620-100
720071	DS 10-4 TH TAC 1/3	100-1000	450-150
720062	DS 11-4 TAC 1/2	100-1900	730-180
720123	DS 11-4 TAC 3/4	400-1800	740-210
720063	DS 12-5 TAC 3/4	200-2600	1000-210
720102	DS 12-5 TH TAC 3/4	200-2400	1000-250
<u>DF: fan with single inlet, one turbine, one bypass motor</u>			
720036	DF 280-114 EH TAC 1/3	100-1300	400-200
720077	DF 280-114 TAC 1/3	100-1300	400-200
720037	DF 280-114 EH TAC 1/2	100-1700	540-140
720078	DF 280-114 TAC 1/2	100-1700	540-140
<u>KDF: the "built-in" version of the DF</u>			
720038	KDF 280-114 TAC 1/3	Depends on the type of installation	
720039	KDF 280-114 TAC 1/2	Depends on the type of installation	
<u>Other DD and DS fans</u>			
720114	DD 146-210 TAC 180W pl.	200-1000	430-110
720124	DS 140-59 TAC 230W	100-600	740-120

III. OPTIONS

1. No flange

All Lemmens DP, DS and DD fans are delivered as standard with their flanges attached by clinching to the pulse units of the fan, allowing the securing of the fan.

On request, all our fans can be ordered without a flange.



Example of a flange (in blue) on a DD 9-5 TAC 1/3 fan

IV. Technical specifications of TAC forward-blade fans:

The technical specifications of our fans contain the pressure curve. Their dimensions and all the other aeraulic and electrical information is available and can be downloaded from the Lemmens website: <http://www.lemmens.com/>



P.LEMMENS

A **Swegon Group** company

P. LEMMENS COMPANY

Address

Parc Industriel de Sauvenière
102, chaussée de Tirlemont
B 5030 Gembloux
Belgium

Phone

+32 (0)81 62 52 52

Web

www.lemmens.com

We are constantly striving to improve our products. As a result, we reserve the right to modify them with no prior notice. Special care was taken when producing this brochure; however, we disclaim all responsibility for any possible errors and/or omissions it might contain.