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INDUSTRIAL PROCESS AND
COMMERCIAL VENTILATION SYSTEMS

Elektror
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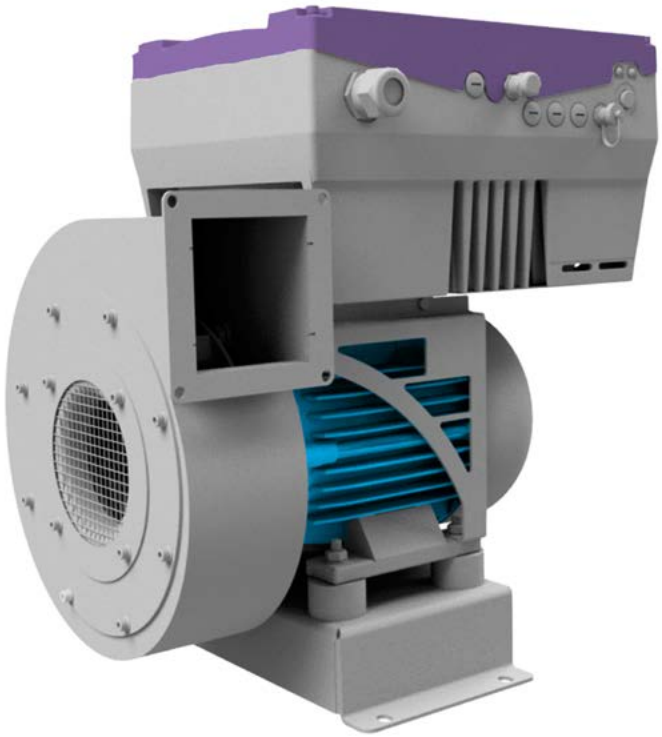
EXTREME PRESSURE BLOWERS

Model TXS



Model TXS

Overview

TXS

Twin City Fan is proud to announce the new Extreme Pressure Blower Model TXS, engineered and produced by our German partner Elektror Airsystems GmbH. Model TXS, part of the new TX series of blowers, are designed and built to deliver superior performance with a special impeller and steel housing, driven by special motors capable of operating between 11,000 to 15,000 RPM. Compared to the conventional belt driven blowers, these compact size direct drive blowers achieve the same high pressure and efficiency with about 1/2 - 1/3 of the size. The direct drive also eliminates belt and pulley maintenance, giving our customer years of reliable operation. Combined with the variable frequency drives, the TX series demonstrates the versatile performance and is suitable for many applications.

The substantially higher pressure and airflow rating of TCF's Model TXS Extreme Pressure Blower come from the extremely high rotation speeds, in combination with specially designed electric motors driven by a frequency converter. The motors are manufactured to meet the needs of the high pressure blower and ensure optimum performance. The aesthetically designed steel housings are not only appealing to the environment, but are also aero-dynamically optimized to deliver the airflow required. The well-balanced impeller is made from steel sheet metal. Together, they ensure vibration-free operation at low noise levels.

All motors are UL certified with a rating of IP 54 or better and comply with IEC 60034-1. Motors are designed for frequency converter operations with enhanced winding insulation and a PTC thermistor. The maximum operating frequency is between 200 Hz and 250 Hz. Please note the information on the nameplate of the blower.

Energy Regulations

Twin City Fan & Blower supports energy efficiency regulations enacted by the U.S. Department of Energy (DOE) and specific states. The selection and application of fan products is a significant part of these regulations. Engineers and specifiers must understand how to apply TCF products to their specific applications to meet applicable DOE and state regulatory requirements. Twin City Fan & Blower has made significant investments in product testing and development to provide efficient products. Developments in Twin City Fan & Blower's Fan Selector software are in place to aid your decision in product selection to assist with meeting the efficiency requirements as stipulated in the applicable regulations.

Extreme Pressure Blowers Offer:

- Extreme compact size
- Superior performance
- High efficiency
- Built-in high efficiency motor
- Variable speed control
- Industrial strength construction
- Low maintenance

Overview

TXS

Speed Control Blowers

This type of device is used wherever different volume flows or pressures are required for process air or process engineering reasons, or where these parameters have to be kept constant.

Advantages

- Energy and cost savings through the combination of high efficiency blower, specially designed motor and use of a frequency converter
- Soft blower start, resulting in longer service life
- Lower noise level and heat generation
- Low maintenance with the elimination of the belts and couplings

Twin City Fan offers two types of construction. The IK Series features the frequency inverter directly mounted on the motors, eliminating the needs for additional or special cabling and installation. The IV Series features the motors with terminal boxes, allowing the necessary frequency converter to be mounted at a limited distance, which depends on the motor and frequency converter type. If the frequency converter is supplied by Twin City Fan, it is available for EMC limit value class A as standard.

Typical Applications Include

- Delivering medium air flow against high system resistance (static pressure)
- Gas and vapor extractions
- Machine components cooling
- Ventilation
- Vacuum generation
- Air supply for combustion systems
- Drying applications
- Air supply for air cushion tables

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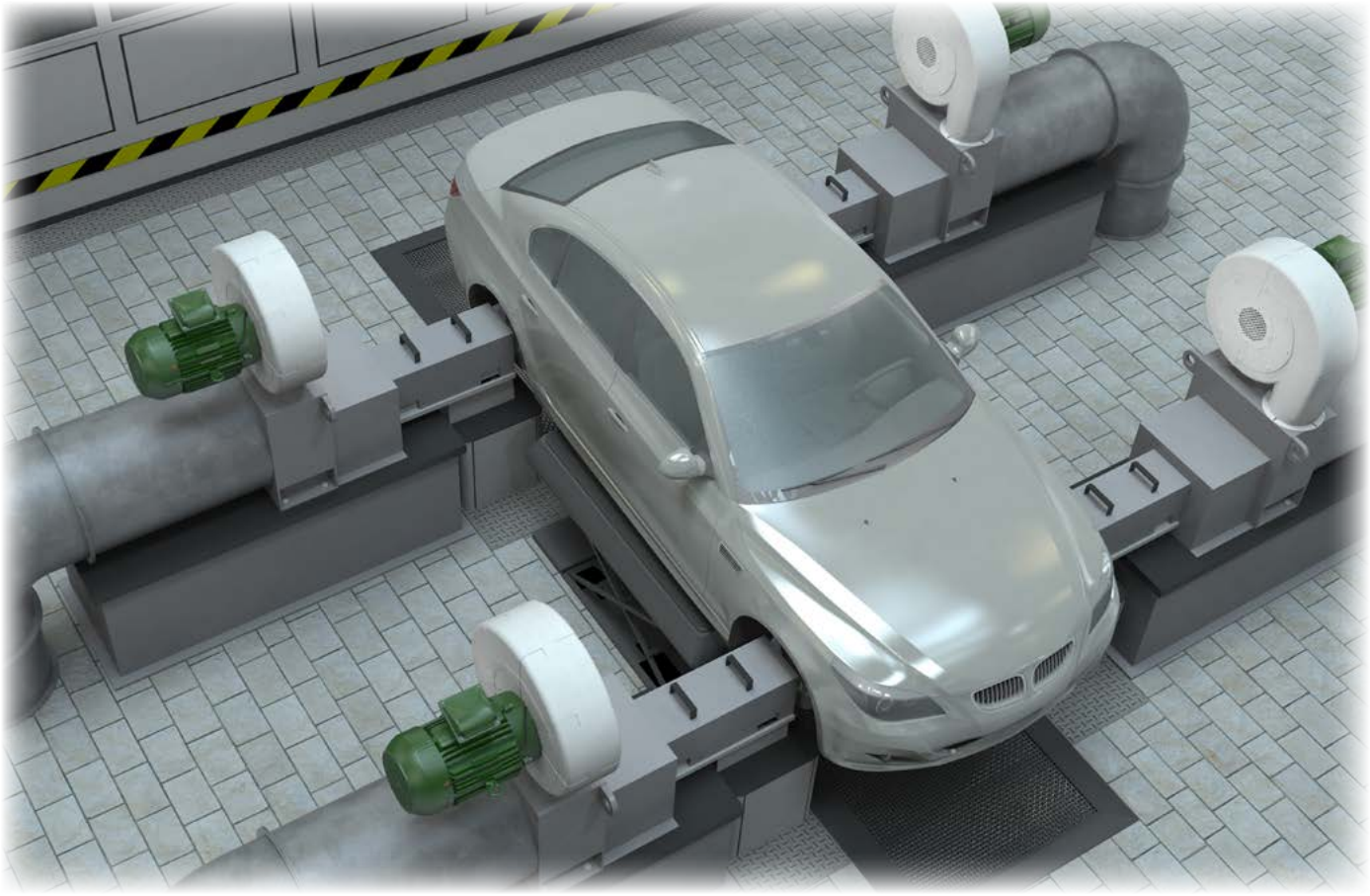
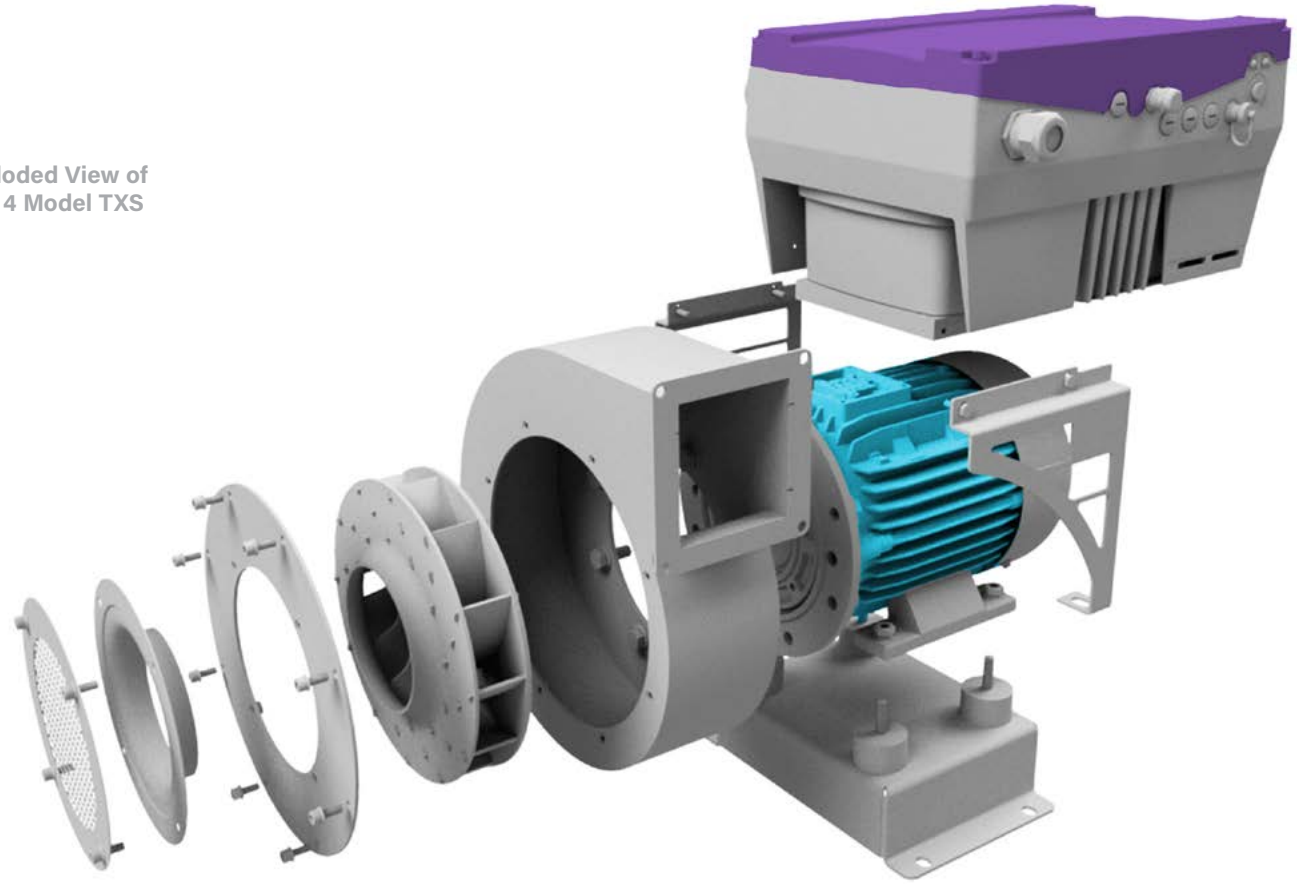


Automotive Test Bench Application

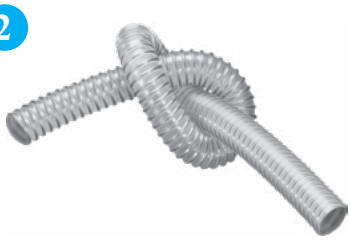
ACCESSORIES

Exploded View of
Arr. 4 Model TXS



1 Air Knife

- Ideally suitable as a blower connection accessory for drying, cooling, cleaning, blowing out and de-dusting
- Provides a consistent air flow or air curtain and directs it precisely at the desired spot
- Slot width adjustable between 0.04 in. and 0.39 in.
- Material: stainless steel



2 Spiral Hose

- Highly abrasion-proof, smooth interior, optimized flow properties, flexible, high tensile strength and tear resistant
- High resistance to oils, fuels, diluted alkaline solutions and acids, UV radiation and atmospheric agents
- Also suitable for abrasive solids like dusts, powder, fibers, shavings and granules

3 Spiral Hose Clamps

- For attachment of exterior corrugated spiral hoses
- Stainless steel band and housing

Performance

Blowers are flow-generating devices for the movement of air and other gases. In centrifugal blowers the conveyed medium is drawn axially, accelerated radially through the rotation of the impeller and expelled tangentially. The resistance to the discharged air (by ducts, pipes, filters, parts of the installed system) must be overcome by the pressure generated by the blower. However, with increasing flow volume, the ability of the blower to generate more pressure is decreased. The performance behavior depends on the blower design and size. This is presented as characteristic curves of differential pressure and airflow (blower curve).

The required static pressure increases as the airflow increases:

- If the volumetric flow rate shall be doubled, four times the installation resistance must be overcome. The resultant characteristics is called system curve.
- The operating point of the blower is determined by the intersection point of the system curve and the static pressure curve.
- The system pressure calculation requires skill and sometimes experimentation. Prior experience will also help. An increase in system pressure reduces the flow and power consumption (per the blower performance curves).

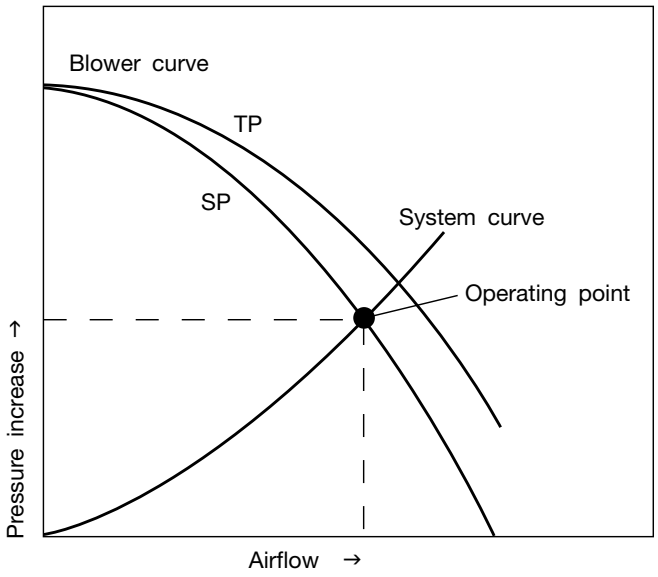
All Model TXS blowers have overloading power curves, which means the power consumption continues to rise as the airflow increases. The maximum airflow of a blower occurs at zero static pressure and consumes the maximum power.

Noise Generation

The noise generated by a blower ensues from flow processes and vortices inside the impeller and the housing and is determined by:

a) the blower design (axial blower, radial blower, construction principle of the impeller),
b) the blower size in relation to the specified pressure differences and volumetric flow rates,
c) the operating point of the blower on the performance curve,
d) discharge velocity,
e) the rotational speed that can be reduced by the variable speed control for the Twin City Fan Extreme Pressure Blowers.

Figure 1. Operating Point of the Blower



The noise levels are not constant over the entire performance range. Blower housings and impellers are designed in accordance with flow requirements. Therefore, the noise generation depends mainly on the requirements for flow volume and pressure difference, as well as on the correct selection of the blower. The noise levels are usually specified in units of dB(A), which is the overall noise level of the blower. Please refer to Twin City Fan's Fan Engineering Letters FE-200 and FE-300 for more detailed information on applications and calculations of noise level.

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Performance Curves

Fan performance curves provided for the Model TXS blowers show the flow and pressure. The blowers are tested in our test lab per AMCA 210, AMCA 300, ISO 5801 and ISO 3746:2010, with free inlet, ducted outlet. Noise levels are indicated at 3.28 feet / 1 meter from the inlet of the blower. All performance values are based on density of 0.075 lb/ft³.

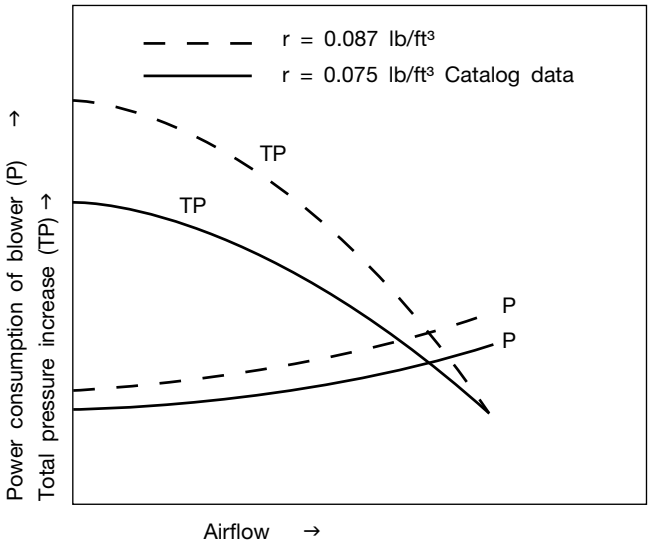
Influence of Air Density

The total pressure increase and the power consumption of the blower change proportionally to the density of the conveyed medium and must be taken into consideration on selecting the blower. See Figure 2. Blower performance must be corrected for any density values other than 0.075 lb/ft³. Twin City Fan's Fan Selector software will give values corrected for density. Density changes through temperature influences may also be calculated as follows:

$$\rho_2 = \rho_1 \frac{273 + \vartheta_1}{273 + \vartheta_2}$$

ϑ = temperature of conveyed medium [°F]
ρ = air density [lb/ft³]

Figure 2. Influence of conveyed medium density



Features

Speed Controlled Blowers

They are to be used wherever a change of airflow is needed.

Model Range IV and IK

All Model TXS blowers require frequency converter operations. The motors are equipped with PTC thermistor sensors for thermal protection with enhanced winding insulation. Speed ranges are 50-120 Hz and 50-140 Hz. The speed range is clearly marked on the nameplate and is the maximum operating speed of the blower.

Temperature of conveyed media and environment
Blowers are designed for an ambient temperature range of -4°F to +104°F. All motors comply with thermal class F in accordance with EN 60034-1 (VDE 0530 Part 1). The media temperature that is handled by the standard blower ranges from -4°F to +104°F.

Insulation

Upon special requests, motors can be supplied for the more stringent protection category IP 55 as well as with tropical and moisture protection insulation. If the blower needs to be further insulated, a PTFE radial shaft seal can be fitted on the shaft. Further insulation possibilities are available upon request.

Protection Against Corrosion

By using steel housings and impellers as manufacturing material, the Model TXS blowers are substantially resistant to corrosion. Painting on the housing further improves the corrosion resistance. Special coatings are available for special applications. In addition, impellers made from stainless steel material can be supplied. Please consult with Twin City Fan for special requests.

Blower Speeds

The standard blowers are equipped with 2-pole motors, which must be driven by the frequency converter. When the blower speed changes, the total pressure, volumetric airflow and power consumption change as follows:

$$\dot{V}_2 = \dot{V}_1 \frac{n_2}{n_1}$$

$$\Delta TP_2 = \Delta TP_1 \left(\frac{n_2}{n_1}\right)^2$$

$$n_2 = n_1 \frac{\dot{V}_2}{\dot{V}_1}$$

$$P_2 = P_1 \left(\frac{n_2}{n_1}\right)^3$$

$\dot{V}$ - Volumetric airflow
ΔTP - Total pressure increase
n - RPM
P - Power consumption

Voltages and Frequencies

Blowers are provided with specially designed 2-pole motors suitable for variable frequency speed controllers. The motors are rated for 400 Volts. It is mandatory to operate the motor at the rated voltage with the variable frequency controllers, which can be connected to the standard power

supply. Special voltages are available on request. Variable frequency speed controller changes the fan speed to suit the required performance as follows:

$$n_2 = n_1 \frac{f_2}{f_1}$$

$$\Delta TP_2 = \Delta TP_1 \left(\frac{f_2}{f_1}\right)^2$$

$$\dot{V}_2 = \dot{V}_1 \frac{f_2}{f_1}$$

$$P_2 = P_1 \left(\frac{f_2}{f_1}\right)^3$$

$\dot{V}$ - Volumetric airflow
ΔTP - Total pressure increase
n - RPM
P - Power consumption
f - Frequency

Energy Efficiency

Twin City Fan's Model TXS Extreme Pressure Blowers come installed with high efficiency motors as standard.

Model TXS Extreme Pressure Blower Motors

- high efficiency
- reduce operating costs
- longer service life
- generate less waste heat
- protect the environment

Besides the energy efficient motors used, other factors may further reduce energy and costs. Potential savings may be found, for example, by:

- evaluating the conditions of the application or installation
- the correct selection of the blower
- choosing the appropriate accessories
- optimized control/regulation of Extreme Pressure Blowers with a frequency converter

Instructions for Operation and Maintenance

Up to an operating frequency of 105 Hz, the direct drive Model TXS Extreme Pressure Blowers motors are equipped with sealed (permanently lubricated) ball bearings that do not have to be lubricated. The motor bearings have a minimum service life of 10,000 hours for Model TXS 0916 and 7,000 hours for Model TXS 1008 with a horizontal shaft position.

The service life of the ball bearings depends on the operating hours and other factors, such as temperature, humidity, etc. Check the condition of the blower periodically to ensure its optimal performance. Replace the bearings or the motor when the bearing service life runs out.

The Extreme Pressure Blower is intended for clean air. Conveying solid matters is not permitted and the blower's curved impellers are not suitable for transporting material. If the media to be conveyed includes solid matters or other contaminants, an inlet filter must be installed on the blower inlet. Light dust might be permissible to a certain extent. Please consult with Twin City Fan for such applications.

Upon special request, a drain plug can be provided at the lowest point of the blower housing for condensation drainage.

Conveying potentially explosive gas is strictly prohibited. For blowers that have a free inlet or free outlet arrangement, proper protections need to be installed to avoid personal injury. Special screens or guards are available as accessories from the manufacturer.

When installed outdoors, the blower must be installed with weather protection.

Ordering Data

- Blower type
- Volumetric airflow
- Required total or static pressure difference
- Voltage, frequency, three-phase AC for the motor
- Ambient and conveyed medium temperature
- Conveyed medium density
- Type of conveyed medium
- Housing position
- Accessories / special requirements

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Conversion Tables

Units of Measurement

	BY UNITS OF MEASUREMENT	WITH CONVERSION FACTOR	IN UNITS OF MEASUREMENT	BY UNITS OF MEASUREMENT	WITH CONVERSION FACTOR	IN UNITS OF MEASUREMENT
PRESSURE	bar	1000	mbar	mbar	0.001	bar
PRESSURE	mbar	100	Pa	Pa	0.01	mbar
PRESSURE	mmWS	0.098	mbar	mbar	10.2	mmWS
PRESSURE	mWS	98.07	mbar	mbar	0.0102	mWS

European Units of Measurement in the USA

	BY UNITS OF MEASUREMENT	WITH CONVERSION FACTOR	IN UNITS OF MEASUREMENT	BY UNITS OF MEASUREMENT	WITH CONVERSION FACTOR	IN UNITS OF MEASUREMENT
PRESSURE	bar	14.5	psi = lb/in²	psi = lb/in²	0.068	mbar
PRESSURE	mbar	0.0145	psi = lb/in²	psi = lb/in²	68.95	bar
PRESSURE	mbar	0.402	inches water	inches water	2.49	mbar
VOLUMETRIC AIRFLOW	m³/min	264.2	gal/min	gal/min	0.003	m³/min
VOLUMETRIC AIRFLOW	m³/min	35.31	cfm	cfm	0.028	m³/min
ELECTRIC POWER	kW	1.36	hp	hp	0.735	kW
LENGTH	mm	0.039	inch	inch	25.4	mm
LENGTH	m	39.37	inch	inch	0.025	m
LENGTH	mm	0.003	ft	ft	305	mm
LENGTH	m	3.28	ft	ft	0.305	m
WEIGHT	kg	2.05	lb	lb	0.454	kg

Example for Conversion

	BY UNITS OF MEASUREMENT	WITH CONVERSION FACTOR	IN UNITS OF MEASUREMENT	BY UNITS OF MEASUREMENT	WITH CONVERSION FACTOR	IN UNITS OF MEASUREMENT
PRESSURE	180 mbar	0.014	2.61 PSI	2.61 PSI	68.95	180 mbar
VOLUMETRIC AIRFLOW	6 m³/min	35.31	211.8 cfm	211.8 cfm	0.028	6 m³/min

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Housing Configurations

CLOCKWISE (CW) - ROTATION & DISCHARGE (ROTATION VIEW FROM DRIVE SIDE)

UBD
Upblast
CW 360

THD
Top Horizontal
CW 90

TAD*
Top Angular Down
CW 135

DBD
Downblast
CW 180

BAD*
Bottom Angular Down
CW 225

BHD
Bottom Horizontal
CW 270

BAU*
Bottom Angular Up
CW 315

COUNTER CLOCKWISE (CCW) - ROTATION & DISCHARGE (ROTATION VIEW FROM DRIVE SIDE)

UBD
Upblast
CCW 360

THD
Top Horizontal
CCW 90
(standard)

TAD*
Top Angular Down
CCW 135

DBD
Downblast
CCW 180

BAD*
Bottom Angular Down
CCW 225

BHD
Bottom Horizontal
CCW 270

BAU*
Bottom Angular Up
CCW 315

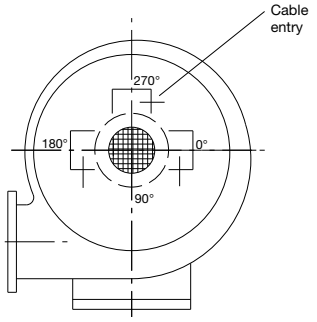
∗ Discharge not standard. Consult Sales.

Terminal Box Positions

Definition of the terminal box position
(seen from suction side)

270° = terminal box at top (standard version)
180° = terminal box left (only on request)
0° = terminal box right (only on request)
90° = terminal box at bottom (only on request)

Figure 4. Terminal Box Positions

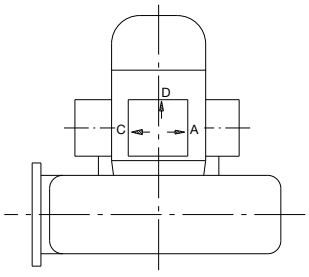


Cable Entry

Definition of cable inlet

A = right (standard version)
C = left
D = rear

Figure 5. Cable Entry



Nomenclature

Model

TXS 09 16 IV/IK

- IV/IK — Frequency Converter
- 16 — Width of Impeller (0.1 in.)
- 09 — Diameter of Impeller (in.)
- TXS — Twin City Fan Extreme Pressure Blower

Serial Number

16 06 A 1234567

- 1234567 — Serial Number, 7-digit
- A — Place of Manufacture
- 06 — Month of Manufacture, 2-digit
- 16 — Year of Manufacture, 2-digit

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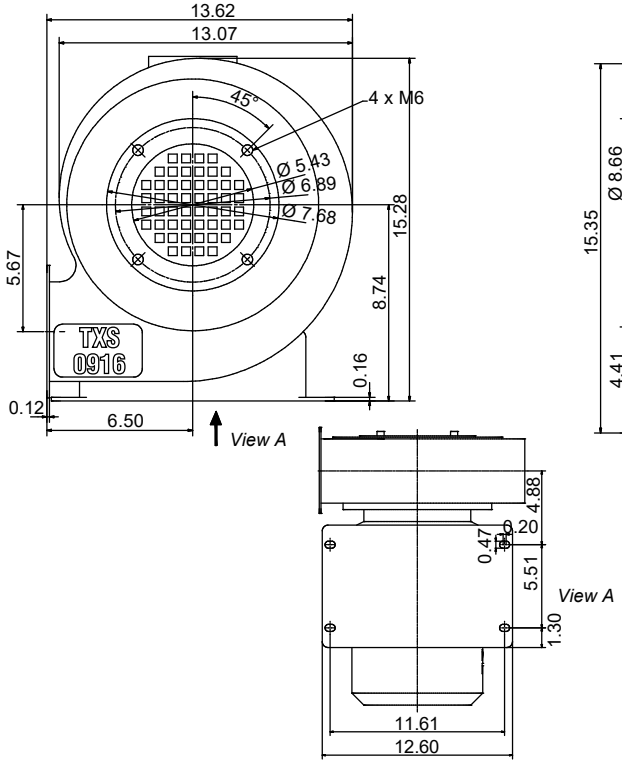
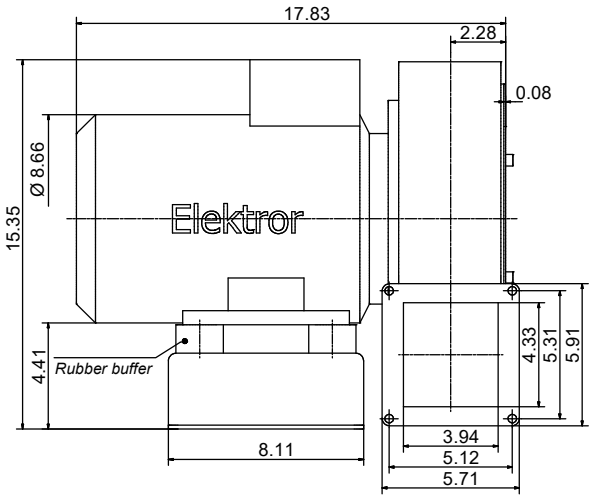
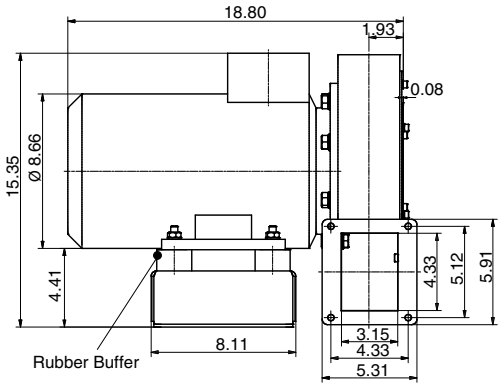
TXS 0916

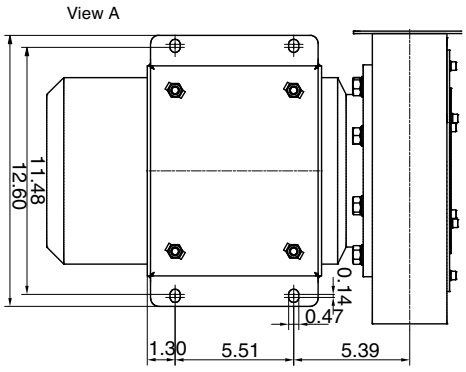


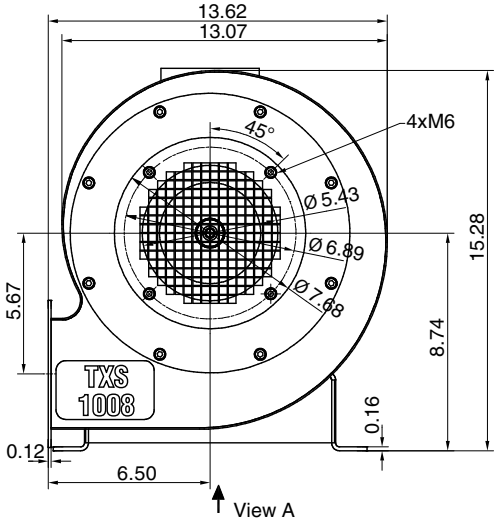


Attention:
Do not strain the rubber buffers to shear.
Operate only with horizontal motor shaft.

TXS 1008







Attention:
Do not strain the ruber buffers to shear.
Operate only with horizontal motor shaft.

Model

TXS

Furnish and install Model TXS Extreme Pressure Blowers, as supplied by Twin City Fan & Blower, Minneapolis, Minnesota. Fans shall be of the size and arrangement as indicated in the fan schedule.

PERFORMANCE — Fans shall be tested in accordance with ISO 5801:2017 (air performance) and ISO 3746:2010 (sound performance) or ANSI/AMCA Standard 210 (air performance) and ANSI/AMCA Standard 300 (sound performance).

HOUSINGS — Model TXS Extreme Pressure Blower housings are to be constructed with continuously-welded heavy-gauge steel for pulsation-free operation and to maintain shape at operating pressures. The blower features a solidly-welded steel motor pedestal with heavy plate and angle bracing for positive and smooth operation. Model TXS blowers are available in direct drive Arrangement 4 only and are available in both clockwise (CW) and counterclockwise (CCW) rotation and in Top Horizontal (THD), Bottom Horizontal (BHD), Upblast (UBD) and Downblast (DBD) discharge positions.

IMPELLERS — Impellers shall be designed for high efficiency air handling at relatively low volume and high pressures. Impellers shall be constructed from high strength aluminum. Heavy-gauge blades shall be fixed to both the front and back plates. Impellers shall be statically and dynamically balanced.

MOTOR AND DRIVE — Motors shall be provided by Twin City Fan & Blower and directly mounted on the blower. A Variable Frequency Drive (VFD) is required to operate the motor and fan. All motors shall be UL recognized.

FINISH AND COATING — The entire fan assembly, excluding the impeller and shaft, shall be properly washed and pretreated before application of a rust-preventative primer, if called out on the order. After the fan is completely assembled, a finish coat of paint shall be applied to the entire assembly, if called out on the order. The fan shaft shall be coated with a petroleum-based rust protectant.

ACCESSORIES — When specified, accessories such as inlet filters, inlet and outlet silencers, flexible connectors, inlet and outlet flanged connectors, air knives, built-in dampers, vibration sensors, hoses and clamps, shall be provided by Twin City Fan & Blower to maintain one source responsibility.

FACTORY RUN TEST — Prior to shipment, all fans shall be completely assembled and test run as a unit. Each impeller shall be statically and dynamically balanced in accordance with ISO 21940-11 “Mechanical Vibration – Rotor Balancing,” Balance Quality Grade G6.3 or ANSI/AMCA 204 “Balance Quality and Vibration Levels for Fans” to Fan Application Category BV-3, Balance Quality Grade G6.3.

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