### Performance Turbochargers





## About BorgWarner Turbo Systems

BorgWarner turbochargers provide customers worldwide with a comprehensive range of 3K and Schwitzer replacement turbochargers and spare parts.

For over 100 years, BorgWarner has demonstrated its commitment to advancing the automotive industry and motorsports through a continuous stream of technological advances. In particular, these advancements flourished in the late 1990s when BorgWarner embarked on a series of critical initiatives that immediately turned them into a pacesetter within the turbo technology industry.

In October of 1998, BorgWarner purchased 100% of the net assets of German turbocharger and turbo machinery manufacturer, AG Kühnle, Kopp & Kausch, renaming it 3K-Warner Turbosystems. In March of the following year, BorgWarner acquired Kuhlman Corporation as a means to gain access to Schwitzer, Inc., a leading manufacturer of turbochargers for commercial transportation and industrial equipment.

With the integration of 3K-Warner Turbosystems and Schwitzer, BorgWarner continues to set new technological standards in the field of engine boosting.

Fast forward to the new millennium where BorgWarner Turbo Systems has become a well positioned player in the engine boosting arena, with development centers, production sites and sales offices throughout the world.

In keeping with our maxim "Local Power—Global Strength" we use all of the resources and talents available within our worldwide organization to exceed the expectations of our customers. To ensure that our sites work efficiently around the world, we have standardized vital processes and best practice methods, without compromising location-specific flexibility and autonomy. Our goal is to continually offer you solutions that are perfectly tailored to meet the specific requirements of you and your market.



Louis Schwitzer Automotive Hall of Fame

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FORGED MILLED COMPRESSOR WHEEL WITH EXTENDED TIP TECHNOLOGY

## TECHNOLOGY



TWIN SCROLL TURBOCHARGER TECHNOLOGY



EFR TURBOCHARGER TECHNOLOGY



AIRWERKS TURBOCHARGER TECHNOLOGY

#### Innovation, speed, flexibility, quality and an acute customer focus are the benchmarks by which our customers measure us.

As a result, we not only are constantly developing new technologies internally, but are also seeking ways to continually improve the external relationships with our customers. We value the spirit of cooperation and strive to always enhance the processes regarding product development, manufacturing and quality assurance.

The speed in which we share product data with our customers is also becoming an increasingly important factor in setting up optimum processes. From the very start of development, we involve people from the design, production, purchasing and quality assurance areas.

# + innovation

By collaborating at the beginning of the process we are able to save both time and money, ensuring that the turbocharging systems we supply meet proven serial production quality, reliability and performance standards at the onset of production.

The latest generations of compressor and turbine stages assure optimum thermodynamic results. With the further development of materials and processing methods – such as forged milled compressor wheels – we not only optimize performance, but also enhance durability and reliability of our turbocharging systems.

Turbocharger assembly





Forged-milled compressor wheel production

## **TECHNOLOGY** + innovation



EFR durability test



Compressor wheel with extended tip technology

#### Extended Tip Technology

Select BorgWarner turbochargers employ BorgWarner "S" generation compressor wheels that incorporate extended tip technology. This compressor wheel design feature promotes greater airflow using a low inertia wheel that performs like a wheel of greater size and mass. Extended tip technology enables the user to have faster spool-up at lower engine speeds while providing the boost for the powerful top-end performance that most turbocharger enthusiasts have come to desire. Turbochargers have to meet different requirements with regard to map height, map width, efficiency characteristics, moment of inertia of the rotor and conditions of use. New compressor and turbine types are continually being developed for various engine applications with compressor

wheels having an increased influence on the engine's operational characteristics. These wheels are designed using computer programs that develop a three-dimensional calculation of the airflow and pressure.



#### The twin scroll turbocharger generates higher boost pressure at low revs

Twin scroll technology produces results similar to twin-turbo applications, but in a smaller package with lower weight and cost. In turbochargers of this type, the channels between the exhaust manifold and turbocharger of the first and fourth as well as the second and third cylinders are separated from each other. The exhaust gas streams are directed into so-called scrolls (spirals) and then reunited again directly at the turbine wheel. Separating the streams in this way offers improved performance. With this type of charging, spontaneous boost pressure can be built up 1000 RPMs earlier, which significantly improves response in the low rev band. The engineers at BorgWarner have also mastered the problem of high exhaust gas temperature in gasoline engine turbocharging despite the genuine challenge presented by such a compact turbine casing with two scrolls. One approach employed by the engineers here was to develop a new downsizing method of casting turbine housings to improve their temperature resistance and guarantee the quality needed. The benefits of the twin scroll turbocharging technology and other market-leading technologies by BorgWarner Turbo Systems offer passenger vehicles, dynamic performance, low fuel consumption and lower C02 emissions.



Turbo functional testing

## commitment to **PERFORMANCE**

#### **Mercedes Silver Arrow C11**

Mercedes Silver Arrow C11, World Sportscar Champion. 5.0 liter V8 twin 3K turbo engine



#### Audi 90 (quattro) GTO

Audi 90 (quattro) GTO was one of the most technologically advanced four-door race cars to ever hit the tracks. The 1988 Trans Am Manufacturer's champion was banned from the 1989 season due to its dominance. Boost was provided by a single BorgWarner K-series turbocharger.

St

AirWerks is an independent aftermarket program from BorgWarner Turbo Systems. This venture is focused on creating exceptionally high engine performance through forced induction technology. Why do the world's most prominent auto manufacturers select products from BorgWarner Turbo Systems? Simply put, we are the world leader in turbos for high speed, high temperature gasoline engines. The BorgWarner Turbo Systems performance line features an assortment of carefully chosen K and S series turbochargers and the EFR series to meet a wide array of high-performance engine requirements. These turbos will be steadily improved based on the latest findings in aerodynamic and materials technology.

#### Innovation, a fruit of competition

Racing has long been known as a fertile research and development arena and proving ground for new technology. BorgWarner takes full advantage of its rich racing heritage using some of the same materials and aerodynamic techniques that produced boost for winning cars, elevating and incorporating it into the hardware available through BorgWarner Turbo Systems. Partnerships fostered at the track can create alignment and uncommon results, in the marketplace.



### The Borg-Warner Trophy™

The Borg-Warner Trophy, is synonymous with high performance, speed and leading-edge automotive technology. In 1936, Eddie Rickenbacker,of the Indianapolis Speedway, unveiled the Borg-Warner Trophy and officially announced it as the prize for the champion of the Indy 500.

Commissioned by The BorgWarner Automotive Company in 1935, the trophy is made of sterling silver and stands over 5 feet tall, weighing nearly 155 pounds. The Trophy features a checkerboard pattern that bears the likeness of every winning driver since 1911 along with the date of their victory, and their average speed.

Today, the trophy is housed in the Hall of Fame Museum at the Indianapolis Motor Speedway. Each May, the Borg-Warner Trophy is featured at a number of Indianapolis 500 events. These include the drivers' meeting at the track and the 500 Festival Parade in downtown Indianapolis, both on the day before the race. Immediately after each race, the trophy is hoisted into Victory Circle along with the winning car and driver for photographs. A tradition dating back to 1936 when after winning his third race, Louis Meyer received the first trophy and promptly said, "winning the Borg-Warner Trophy is like winning an Olympic medal."

The Borg-Warner Trophy<sup>™</sup> is a registered trademark of BorgWarner Inc.

## a legacy of



BorgWarner, is proud of its long history of pushing the limits of technology.

From the first appearance of forced induction motor vehicles at the Indianapolis Motor Speedway in 1952 to the Mulsanne Straight of Le Mans and the winding roads of Nürburgring, BorgWarner turbochargers have made their mark.

Our decades of participation at the highest level in professional motorsports has provided tremendous experience and allowed us to further sharpen our precise engineering skills. And that legacy of excellence is embedded in every genuine BorgWarner turbocharger that we produce today.

Digipen

In 2012, the IZOD IndyCar Series (now known as the Verizon IndyCar Series) saw the return of the turbocharged engine with BorgWarner leading the way with its pace setting engine boosting technology.

Twin EFR-7163 turbochargers used to boost the Verizon IndyCar<sup>®</sup> series.





Mixed Flow Turbine Technology currently used on the EFR-7163 turbocharger.

2016 Indianapolis 500 winner, Alexander Rossi

DiaiPe



Team: Stuckey Racing
Driver: Phillip Palmer
Vehicle: Dodge 5.9
Racing Venue: NHRDA

Current Turbos of choice: Compound S400SX & S500SX



Team: Team Guss Racing				
Driver: Jeremy McElrath				
Vehicle: 1998 Ford Mustang				
Racing Venue: ORSCA & PTRA				

Current Turbo of choice: Twin S500SX







Team: Team VCMC

Driver: Richard Basford & Sead Causevic

Vehicle: VW Jetta GLI

Racing Venue: Knox Mountain Hill Climb, Pikes Peak Hill Climb

Current Turbo of choice: S200SX

Team: Jager Racing Driver: Mark Jager Vehicle: 2006 Subaru Sti Racing Venue:

Racing Venue: Global Time Attack, Redline Time Attack

Current Turbo of choice: EFR-9174





#### HIGH PERFORMANCE TURBOCHARGERS

#### Team: Aaron Parker Motorsports

Driver: Aaron Parker

Vehicle: 1993, Mazda Fd3s Rx7

Racing Venue: Formula Drift Pro-Am, Just Drift - Top Drift, Southwest Drift, Golden Gate Drift

Current Turbo of choice: EFR-9174



Team: Four Rings Performance Engineering

Driver: Jeff Gerner

Vehicle: 1992 Audi S4

Racing Venue: World Land Speed Racing, Bonneville

Current Turbo of choice: S400SX 82mm







Team: Mike Ryan Motorsports

Driver: Mike Ryan

Vehicle: Freightliner

Racing Venue: Pikes Peak International Hill Climb

Current Turbo of choice: S510SX

Driver: Eric Calabrese

Vehicle: Volkswagen Bug

Racing Venue: Pro Racing Association

Current Turbo of choice: Single S400SX



Vehicle: Mitsubishi EVO

Racing Venue: Standing mile/ Drag Racing/Dyno

Current Turbo of choice: Single S400SX







Driver: Michael Essa Vehicle: 2005 BMW M3 Racing Venue: Formula Drift

Current Turbo of choice: EFR-9174

"To be competitive in Formula Drift, you need mid-range power and throttle response to be instant, and still have tons of power in the top end. BorgWarner EFR turbos are the only units on the market capable of high power and fast response! There is no longer a need to sacrifice top end power by running a small turbo to increase response, the EFR design is truly the best of both worlds."

MICHAEL ESSA

Team: RealTime Acura TLX

Vehicle: Acura TLX

Racing Venue: Pirelli World Challenge, GT

Current Turbo of choice: Twin EFR-6258s

AIRWerks

#### Team: XDP

Vehicle: 1995 Dodge Ram Racing Venue: NHRDA

Current Turbos of choice: Compound S400SX & S500SX

nieselPerformanceConverters.com

MBRP.

#### Team: DeltaWing Racing Cars

Vehicle: DeltaWing<sup>®</sup> Coupe

Racing Venue: IMSA WeatherTech SportsCar Championship

Current Turbo of choice: EFR-6758



#### Team: DNA Racing

Driver: Alexa Taylor

Vehicle: 1968 Camaro

Racing Venue: Drag Week 1320

Current Turbo of choice: Twin S300SXs

#### Team: MotolQ

Driver: Chuck Johnson

Vehicle: Nissan S13 240SX

Racing Venue: World Land Speed Racing, Bonneville

Current Turbo of choice: EFR 8374





#### Team: MUGEN

**Drivers:** Hideki Muto Daisuke Nakajima

Vehicle: Mugen CR-Z GT300

Racing Venue: Japan Super GT Series

Current Turbo of choice: Twin EFR-6258s



### match-bot INSTRUCTIONAL

The team at BorgWarner has developed Match-Bot, an interactive turbo matching program that is internet based. The program begins by entering the engine input data. For each piece of input data, helpful pop-up's are provided. These useful tips guide the user through entering appropriate engine targets by means of giving optimal example ranges. Parameters such as BSFC, VE, and exhaust gas temperature are often difficult for the user to estimate, but helpful suggestions are offered each step of the way.

single or twin turbo configurations Enter Engine Information (Required) Turbo Carriguration ( Single Turbo - # ) MatchBot (122.04 CD) Diplacement (Liters) 2 Andrient Air Temp (deg F) 75 or sea level) 500 **Required Inputs** #1 #3 #4 #5 #2 #6 Engine Speed 3000 4000 5000 6000 7000 105 100 100 105 85 c Efficiency @ 17 17 15 17 I'm (Gauget) @ 5 10 15 90 -Intencoolar Effectiveness . 44 42 90 8.2 2.1 2.5 2.2 2.0 2.4 er Pressure Drop @ 0.08 0.1 0.12 0.13 0.18 0.2 Corrects turbo Air Filter Restriction @ 1.5 8.5 1.3 1.8 3 speed and capability ..... 70 24 26 ..... or Efficiency ® 64 for operating altitude n 72 56 1 70 1650 1450 . 100 ۰. . 2.18 1.36 1.41 1.81 1.98 1.18 30.66 9.18 ZZ.18 14.13 16.06 ai i BITCO BRON 0.43 0.45 0.48 0.5 0.52 0.55 A/T Ratto B 11.5 11.5 11.5 11.3 11.5 11.5

Solutions for

Each required input has suggested ranges that help users estimate values for categories such as Volumetric Efficiency and Brake Specific Fuel Consumption

#### CALCULATED OUTPUTS

		#1	#2	#3	#4	#5	#6	
Compressor Pressure Ratio	/	1.36	1.71	2.07	2.22	2.23	2.23	
Compressor Outlet Temp	deg F	149.05	200.46	240.46	252.92	263.94	282.25	
Intake Manifold Air Temp	deg F	75.74	81.27	83.25	89.23	93.89	95.72	
Intake Manifold Air Density	lb/in3	0.000057	0.000071	0.000085	0.000009	0.000089	0.000088	
Density Ratio (Intercooled)	١	1.34	1.67	2.01	2.12	2.1	2.09	
Actual Flow Rate (Not Corrected)	lb/min	5.89	12.29	20.69	27.32	34.13	39.69	
Actual Flow Rate (Not Corrected)	cfm	85.4	178.13	300.03	396.14	494.94	575.52	
Correct Air Flow Rate	lb/min	5.94	12.4	20.91	27.67	34.64	40.33	
Correct Air Flow Rate	kg/sec	0.045	0.094	0.158	0.209	0.262	0.305	
Correct Air Flow Rate	kg/hr	161	337	568	752	941	1096	
Correct Air Flow Rat	m3/sec	0.041	0.085	0.143	0.189	0.237	0.276	
1/BSAC	hp-min/lb	12	11.5	10.8	10.3	9.9	9.3	
Turbo Shaft Power	Hp	2.49	8.79	19.49	27.74	36.8	46.94	
Engine Power	Hp	71.5	142.4	224.9	285.1	342.5	376.5	
Torque	lb-ft	187.67	249.36	295.31	299.45	299.78	282.5	
Fuel Requirement	lb/hr	30.7	64.1	108	142.5	178.1	207.1	
	TUF	BIN	E M	A T C	ноц	JTPU	T S	
Exhaust Manifold Pressure	psi	3.2	6.6	10.9	14.4	17.7	21.4	
Engine Delta Pressure (dP)	psi	2	3	4	3	-1	-4	
Turbing Swallowing Decemptor	рш	0.0210	0.0012	0.0250	0.0267	0 0 0 0 0 0 0	0 0 0 0 7	ï

	poi	-	Ũ	•	Ũ		
Turbine Swallowing Parameter	PHI	0.0219	0.0213	0.0258	0.0267	0.0283	0.0287
Turbine Corrected Flow @ 59F	lb/min	9.2	15.2	18.4	19	20.2	20.5
Is the Wastegate Flow Choked	/	No	No	No	No	Yes	Yes
Wastegate Flow Area @ CF=0.8	in2	0.03	0.13	0.44	0.73	0.96	1.11
Port Diameter Requirement	mm	5	11	19	24	28	30

Text-Based Output is Provided as Well as Graphical Mapping





### An Equation for Engine





Team: Ryan Litteral Racing Driver: Ryan Litteral Vehicle: 1998 Nissan 240SX Racing Venue: Formula Drift

Current Turbo of choice: EFR-8374

Team: ADF Motorsport Vehicle: BMW 335i Racing Venue: Bridgestone Production Car Championship Current Turbo of choice: EFR-7670



### **Boosting Excellence**

So, you're probably wondering, "What does a new product line of high-performance turbochargers have to do with commercial applications?" The answer lies in the fact that commercial/industrial turbo products have extreme requirements for durability, reliability, and aerodynamic performance. Since modern passenger car applications use turbos smaller than 55mm in turbine wheel diameter, it's the aerodynamic development from the commercial side of the business (i.e. everything larger) that feeds into the performance enthusiast's desire for big power production. Boost pressures of 45-50 psi (3 bar+) are the norm, not the exception. Also required is resistance to abusive thrust loads, high vibrations, and robustness for a wide range of lubrication conditions. Additionally, our commercial product validation standards are among the highest in the engine boosting industry - all good things that also benefit the performance enthusiast or racer. Those are the commonalities, but there are also differences. Unlike commercial applications,

high performance users want lightweight, compact, versatile designs. They also deliver the turbocharger very high exhaust gas temperatures with high expectations for fast response. Cosmetic appearance is also valued as are integrated features that aid the installation process and remove the need for other turbo related accessories. Those performance and packaging requirements are quite common among the modern aftermarket passenger car turbo customer.

So, what happens when you combine all of those necessities and put them in front of passionate car people looking to advance the pace of aftermarket boosting solutions? You discover that something new is required to meet the demands of the next generation turbo consumer. There is a fierce desire to take engine boosting to the next level. It was this need for big power that led to EFR.



EFR 58mm and 80mm Gamma-Ti turbine wheels

#### EFR PRODUCT FEATURE SET



RROT	FOR GROU	PS		
■ co ■ tur	MPRESSOR	62K80) (58J88)	67 58 mm (67X80) (58J88)	71 63 mm (71x80) (63W90)
Fro	ame size 🕨	B1	B1	B1
		450hp	500hp	550hp
Super-Core, Aluminum		11587105002	11587105001	11637105000
Super-Core, Iron		179140	179375	
	<b>A-TYPE</b> B1 Frame Size 0.64 A/R, T25 Flange Single Scroll Wastegated	<b>179150</b> 11581009006	<b>179388</b> 11581009006	
	<b>F-TYPE</b> B1 Frame Size 0.85 A/R, T25 Flange Single Scroll Wastegated		<b>11589880034</b> 11581008000	<b>11639880005</b> 11631008000
	F(v)-TYPE B1 Frame Size 0.85 A/R, V-Band Inlet Single Scroll Wastegated		<b>11589880035</b> 11581008001	<b>11639880006</b> 11631008001
	<b>G-TYPE</b> B1 Frame Size 0.80 A/R, T4 Flange Twin Scroll Wastegated	11589880036 11581008002	<b>11589880037</b> 11581008002	<b>11639880002</b> 11631008002
	I-TYPE B1 Frame Size 0.85 A/R, V-Band Inlet Single Scroll Non-Wastegated		sold as turbine housing kit 11581008003	sold as turbine housing kit 11631008003

C

		70 64 mm mm	76 70	170 110	83 74 mm	10 0 0 0 0 0 0 0	<b>91 74</b>		<b>91</b> 80
		(70\$75) (64J88)	(76575) (70,188)		(83575) (74A87)		(91574) (74A87)		(91574) (80M92)
		B2	B2		<b>B2</b>		B2		<b>B2</b>
		550hp	650hp		750hp		1000hp		1000hp
Super-Core, Aluminun	n	12709097006	12769097001		12839097000		12919097000		12919097001
Super-Core, Iron		179354	179350		179257		12919097002		179356
	<b>B-TYPE</b> B2 Frame Size 0.83 A/R, T3 Flange Single Scroll Wastegated	<b>179355</b> 12641008006	<b>179351</b> 12701008014		<b>179258</b> 1 <i>27</i> 41008000				<b>179358</b> 12801008002
	<b>C-TYPE</b> B2 Frame Size 0.92 A/R,T4 Flange Twin Scroll Wastegated	<b>179389</b> 12641008007	<b>179390</b> 12701008016		<b>179357</b> 1 <i>27</i> 41008001				12809880000 12801019009
	<b>D-TYPE</b> B2 Frame Size 1.05 A/R, T4 Flange Twin Scroll Non-Wastegated	<b>179391</b> 12641019016	<b>179392</b> 12701019047		<b>179393</b> 12741019002	A RULE		ALC: NO	<b>179394</b> 12801019001
6	H-TYPE B2 Frame Size 1.45 A/R, T4 Flange Twin Scroll Non-Wastegated				sold as turbine housing kit 1 2741008003		9		sold as turbine housing kit 1 2801008006

KEY

#### EFR 6258-A

#### EFR 6258-G



#### FEATURES

- Gamma-Ti turbine wheel
- Integrated Compressor Recirculation Valve (CRV)
- Dual ceramic ball bearing assembly with metal cage
- Boost Control Solenoid Valve (BCSV)
- Forged Milled Compressor Wheel (FMW)
- Extended tip technology
- Compressor cover with speed sensor mounting provisions

Product	Complete	Bearing		ти		нои		
- (TYPE)	Turbo	Housing Material	Super-Core**	Assembly	A/R	Inlet	Scroll	Waste- gate
6258-A	179150	Iron	179140	11581009006	0.64	T25	Single	Yes
6258-G	11589880036	Aluminum*	11587105002	11581008000	0.85	T25	Single	Yes
6258	_	Aluminum*	11587105002	-	_	_	-	_
6258	_	Iron	179140	-	_	_	_	_
6258	_	_	-	11581008001	0.85	V-Band	Single	Yes
6258	_	_	_	11581008002	0.80	T4	Twin	Yes
6258	_	_	_	11581008003	0.85	V-Band	Single	No

Turbo Frame Size	B1
Comp. Wheel Inducer Dia. (mm)	49
Comp. Wheel Outer Dia. (mm)	62
Turbine Wheel Outer Dia. (mm)	58

\*Aluminum bearing housings require cooling

\*\*The following components are not included as part of the Super-Core: Turbine Housing, Clamp Plate Hardware, Wastegate, and Actuator



**OPTIONAL HARDWARE** 

See page 33 for: Speed Sensor, Turbine Gaskets & V-Bands, Oil Drain Gasket & Fitting, Actuators & Brackets



Compressor Cover	Compressor Cover	I- Type
SX-E Style	with 90° Outlet	Turbine Housing
11621013032	11621003002	11581008003

# EFR 6758-AEFR 6758-FEFR 6758-F(v)EFR 6758-G250 - 500 HP Turbo(Interse)<

#### FEATURES

- Gamma-Ti turbine wheel
- Integrated Compressor Recirculation Valve (CRV)
- Dual ceramic ball bearing assembly with metal cage
- Boost Control Solenoid Valve (BCSV)
- Forged Milled Compressor Wheel (FMW)
- Extended tip technology
- Compressor cover with speed sensor mounting provisions

Product - (TYPE)	Complete	Bearing		ти	RBINI	е но и	SING		Turbo Frame Size	B1
	Turbo Material	Housing Material	Super-Core**	Assembly	A/R	Inlet	Scroll	Waste- gate		ы
6758-A	179388	Iron	179375	11581009006	0.64	T25	Single	Yes	Comp. Wheel	54
6758-F	11589880034	Aluminum*	11587105001	11581008000	0.85	T25	Single	Yes	Inducer Dia. (mm)	
6758-F(v)	11589880035	Aluminum*	11587105001	11581008001	0.85	V-Band	Single	Yes	Comp Wheel	
6758-G	11589880037	Aluminum*	11587105001	11581008002	0.80	T4	Twin	Yes	Outer Dia. (mm)	67
6758-l	_	-	-	11581008003	0.85	V-Band	Single	No		
6758	_	Aluminum*	11587105001	-	_	-	_	_	Turbine Wheel	58
6758	_	Iron	179375	-	_	_	_	_	Outer Dia. (mm)	

\*Aluminum bearing housings require cooling

\*\*The following components are not included as part of the Super-Core: Turbine Housing, Clamp Plate Hardware, Wastegate, and Actuator

#### COMPRESSOR MAP

Comp. Wheel Inducer Dia. (mm) 54 Comp. Wheel Outer Dia. (mm) 67



Applicable to all 6758 Units

**OPTIONAL HARDWARE** 

See page 33 for: Speed Sensor, Turbine Gaskets & V-Bands, Oil Drain Gasket & Fitting, Actuators & Brackets



Compressor	Compressor Cover	I- Type
Cover SX-E Style	with 90° Outlet	Turbine Housing
11671013004	11671003001	

# EFR 7163-FEFR 7163-F(v)EFR 7163-G300 - 550 HP Turbo500 - 550 HP Turb

#### FEATURES

- Gamma-Ti mixed flow turbine wheel
- Integrated Compressor Recirculation Valve (CRV)
- Dual ceramic ball bearing assembly with metal cage
  Boost Control Solenoid Valve (BCSV)

• Forged Milled Compressor Wheel (FMW)

- Extended tip technology
- Compressor cover with speed sensor mounting provisions

Product	Complete	Bearing		тия	RBINE	Turbo Frame Size	B1			
- (TYPE)	Turbo	Housing Material	Super-Core**	er-Core** Assembly A/R Inlet Scroll		Waste- gate	Comp. Wheel			
7163-F	11639880005	Aluminum*	11637105000	11631008000	0.85	T25	Single	Yes	Inducer Dia. (mm)	57
7163-F(v)	11639880006	Aluminum*	11637105000	11631008001	0.85	V-Band	Single	Yes	Comp. Wheel	71
7163-G	11639880002	Aluminum*	11637105000	11631008002	0.80	T4	Twin	Yes	Outer Dia. (mm)	
7163-l	_	_	_	11631008003	0.85	V-Band	Single	No	Turbine Wheel	62
7163	_	Aluminum*	11637105000	_	_	_	_	_	Outer Dia. (mm)	63

\*Aluminum bearing housings require cooling

\*\*The following components are not included as part of the Super-Core: Turbine Housing, Clamp Plate Hardware, Wastegate, and Actuator

#### COMPRESSOR MAP Applicable to all 7163 Units Comp. Wheel Inducer Dia. (mm) 57 Comp. Wheel Outer Dia. (mm) 71 4.2 150 krpm 4.0 **SEFR** 3.8 0.70 3.6 0.68 3.4 0.72 3.2 0.66 7 0.64 132 krpm **Pressure Ratio** 3.0 11 0.74 0.62 2.8 0 64 ,0.60 2.6 2.4 111 krpm 0.62 0.58 2.2 0.60 2.0 0.58 1.8 84 krpm 1.6 1.4 ≣0.60 1.2 44 krpm 1.0 0 5 10 15 20 25 30 35 40 45 50 55 60 65 Compressor Flow (lb/min)

OPTIONAL HARDWARE

See page 33 for: Speed Sensor, Turbine Gaskets & V-Bands, Oil Drain Gasket & Fitting, Actuators & Brackets



Compressor Cover	Compressor Cover	I- Type
SX-E Style	with 90° Outlet	Turbine Housing
11711013004	11711003001	11631008003

# EFR 7064-BEFR 7064-CEFR 7064-D300 - 550 HP Turbo300 - 550 HP TurboImage: Comparison of the term of term

#### FEATURES

- Gamma-Ti turbine wheel
- Integrated Compressor Recirculation Valve (CRV)
- Dual ceramic ball bearing assembly with metal cage
- Boost Control Solenoid Valve (BCSV)
- Forged Milled Compressor Wheel (FMW)
- Extended tip technology
- Compressor cover with speed sensor mounting provisions

Product	Complete	Bearing		ти	RBINE	Turbo Frame Size	B2			
- (TYPE)	Turbo	Housing Material	Super-Core**	Super-Core** Assembly A/R Inlet S		Scroll	Waste- gate	Comp. Wheel		
7064-B	179355	Iron	179354	12641008006	0.83	Т3	Single	Yes	Inducer Dia. (mm)	52
7064-C	179389	Iron	179354	12641008007	0.92	T4	Twin	Yes	Comp. Wheel	70
7064-D	179391	Iron	179354	12641019016	1.05	T4	Twin	No	Outer Dia. (mm)	70
7064	-	Aluminum*	12709097006	-	_	_	-	_	Turbine Wheel	64
7064	_	Iron	179354	-	_	_	_	_	Outer Dia. (mm)	04

\*Aluminum bearing housings require cooling

\*\*The following components are not included as part of the Super-Core: Turbine Housing, Clamp Plate Hardware, Wastegate, and Actuator

#### COMPRESSOR MAP Applicable to all 7064 Units Comp. Wheel Inducer Dia. (mm) 52 Comp. Wheel Outer Dia. (mm) 70 5.0 4.8 153 krpm **SEFR** 4.6 0.64 4.4 - 0.68 4.2 0.66 0.70 4.0 0.64 3.8 0.72 134 krpm 0.62 3.6 **Pressure Ratio** 0.60 3.4 3.2 3.0 2.8 113 krpm 0.74 2.6 0.58 0.76 2.4 2.2 2.0 86 krpm 1.8 1.6 1.4 //0.62 0.58 1.2 46 krpn 1.0 0 5 10 15 20 25 30 35 40 45 50 55 60

Compressor Flow (lb/min)

#### OPTIONAL HARDWARE

See page 33 for: Speed Sensor, Turbine Gaskets & V-Bands, Oil Drain Gasket & Fitting, Actuators & Brackets



# EFR 7670-B EFR 7670-C EFR 7670-D 375 - 650 HP Turbo 375 - 650 HP Turbo Image: Comparison of the target of tar

#### FEATURES

- Gamma-Ti turbine wheel
- Integrated Compressor Recirculation Valve (CRV)
- Dual ceramic ball bearing assembly with metal cage
- Boost Control Solenoid Valve (BCSV)
- Forged Milled Compressor Wheel (FMW)
- Extended tip technology
- Compressor cover with speed sensor mounting provisions

Product	Complete	Bearing		TUI	RBINE	Turbo Frame Size	B2			
- (TYPE)	Turbo	Housing Material	Super-Core**	Assembly	A/R	Inlet	Scroll	Waste- gate	Comp. Wheel	
7670-B	179351	Iron	179350	12701008014	0.83	Т3	Single	Yes	Inducer Dia. (mm)	57
7670-C	179390	Iron	179350	12701008016	0.92	T4	Twin	Yes	Comp. Wheel	76
7670-D	179392	Iron	179350	12701019047	1.05	T4	Twin	No	Outer Dia. (mm)	
7670	_	Aluminum*	12769097001	-	_	_	-	-	Turbine Wheel	70
7670	_	Iron	179350	-	_	_	_	-	Outer Dia. (mm)	70

\*Aluminum bearing housings require cooling

\*\*The following components are not included as part of the Super-Core: Turbine Housing, Clamp Plate Hardware, Wastegate, and Actuator

#### COMPRESSOR MAP Applicable to all 7670 Units Comp. Wheel Inducer Dia. (mm) 57 Comp. Wheel Outer Dia. (mm) 76 5.0 4.8 140 krpm 9efr 4.6 0.66 \_ 0.68 4.4 4.2 0.70 0.64 4.0 0.66 0.72 $||| \lambda$ 3.8 123 krpm 3.6 0.62 **Pressure Ratio** 3.4 3.2 H 0.58 3.0 2.8 103 krpm 0.74 2.6 2.4 0.75 0.60 2.2 2.0 79 krpm 1.8 0.62 1.6 1.4 0.60 0.60 1.2 42 krpm 1.0 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 Compressor Flow (lb/min)

OPTIONAL HARDWARE

See page 33 for: Speed Sensor, Turbine Gaskets & V-Bands, Oil Drain Gasket & Fitting, Actuators & Brackets



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# EFR 8374-B EFR 8374-C EFR 8374-D 475 - 750 HP Turbo 475 - 750 HP Turbo 100 mm + 100

#### FEATURES

- Gamma-Ti turbine wheel
- Integrated Compressor Recirculation Valve (CRV)
- Dual ceramic ball bearing assembly with metal cage
- Boost Control Solenoid Valve (BCSV)
- Forged Milled Compressor Wheel (FMW)
- Extended tip technology
- Compressor cover with speed sensor mounting provisions

Product - (TYPE)	Complete Turbo	Bearing		ти			Turbo Frame Size	B2		
		Housing Material	Super-Core**	Assembly	A/R	Inlet	Scroll	Waste- gate		
8374-B	179258	Iron	179257	12741008000	0.83	Т3	Single	Yes	Comp. Wheel Inducer Dia. (mm)	62
8374-C	179357	Iron	179257	12741008001	0.92	T4	Twin	Yes		
8374-D	179393	Iron	179257	12741019002	1.05	T4	Twin	No	Comp. Wheel	83
8374-H	_	-	_	12741008003	1.45	T4	Twin	No	Outer Dia. (mm)	
8374	_	Aluminum*	12839097000	-	_	_	_	_	Turbine Wheel	74
8374	-	Iron	179257	-	_	_	_	_	Outer Dia. (mm)	74

\*Aluminum bearing housings require cooling

\*\*The following components are not included as part of the Super-Core: Turbine Housing, Clamp Plate Hardware, Wastegate, and Actuator



OPTIONAL HARDWARE

See page 33 for: Speed Sensor, Turbine Gaskets & V-Bands, Oil Drain Gasket & Fitting, Actuators & Brackets



#### EFR 9174 Aluminum Super-Core

EFR 9174 Iron Super-Core



#### FEATURES

- · Gamma-Ti turbine wheel
- Integrated Compressor Recirculation Valve (CRV)
- Dual ceramic ball bearing assembly with metal cage
- Boost Control Solenoid Valve (BCSV)
- Forged Milled Compressor Wheel (FMW)
- Extended tip technology
- · Compressor cover with speed sensor mounting provisions

B2

68

91

74

Product	Complete	Bearing		ти	RBINE		Turbo Frame Size		
- (TYPE)	Turbo	Housing Material	Super-Core**	Assembly	A/R	Inlet	Scroll	Waste- gate	Comp. Wheel
9174	_	Aluminum*	12919097000	-	_	-	-	_	Inducer Dia. (mm)
9174	_	Iron	12919097002	-	_	_	-	_	Comp. Wheel
9174	_	_	_	12741008000	0.83	Т3	Single	Yes	Outer Dia. (mm)
9174	_	_	_	12741008001	0.92	T4	Twin	Yes	Turbine Wheel
9174	_	_	_	12741019002	1.05	T4	Twin	No	
9174	—	-	-	12741008003	1.45	T4	Twin	No	

\*Aluminum bearing housings require cooling

COMPRESSOR MAP

\*\*The following components are not included as part of the Super-Core: Turbine Housing, Clamp Plate Hardware, Wastegate, and Actuator



#### **OPTIONAL HARDWARE**

See page 33 for: Speed Sensor, Turbine Gaskets & V-Bands, Oil Drain Gasket & Fitting, Actuators & Brackets



#### EFR 9180-B

#### EFR 9180-C

#### EFR 9180-D

#### 600 - 1000 HP Turbo



#### FEATURES

- Gamma-Ti turbine wheel
- Integrated Compressor Recirculation Valve (CRV)
- Dual ceramic ball bearing assembly with metal cage
- Boost Control Solenoid Valve (BCSV)
- Forged Milled Compressor Wheel (FMW)
- Extended tip technology
- Compressor cover with speed sensor mounting provisions

Product - (TYPE)	Complete	Bearing Housing Material	Super-Core**	тия	RBINE	нои	SING		Turbo Framo Sizo	B2
	Turbo			Assembly	A/R	Inlet	Scroll	Waste-		DZ
9180-B	179358	Iron	179356	12801008002	0.83	Т3	Single	Yes	Comp. Wheel	68
9180-C	12809880000	Iron	179356	12801019009	0.92	T4	Twin	Yes	inducer Dia. (mm)	
9180-D	179394	Iron	179356	12801019001	1.05	T4	Twin	No	Comp. Wheel	91
9180-H	_	-	_	12801008006	1.45	T4	Twin	No	Outer Dia. (mm)	0.
9180	_	Aluminum*	12919097001	-	_	_	_	_	Turbine Wheel	80
9180	_	Iron	179356	-	_	_	_	-	Outer Dia. (mm)	00

\*Aluminum bearing housings require cooling

\*\*The following components are not included as part of the Super-Core: Turbine Housing, Clamp Plate Hardware, Wastegate, and Actuator

Applicable to all 9174 and 9180 Units

#### COMPRESSOR MAP

Comp. Wheel Inducer Dia. (mm) 68



#### **OPTIONAL HARDWARE**

See page 33 for: Speed Sensor, Turbine Gaskets & V-Bands, Oil Drain Gasket & Fitting, Actuators & Brackets



### Turbo Frame Dimensions

For all 6258 / 6758 / 7163 EFR models.\*



A & F - TYPE





#### (V) & I - TYPE

Note: I-type is not wastegated





G - TYPE





#### Turbo Frame Dimensions

For all 7064 / 7670 / 8374 / 9174 and 9180 EFR models.\*



\*Speed sensor details, see page 55

B - TYPE





C - TYPE





D & H - TYPE





Compressor Inlet Ø
7064 / 7670 = 88.9mm (3.50)
8374 / 9174 / 9180 = 101.6mm (4.00)

Dimension 'X'	
7064 / 7670 D-Type = 142mm (	5.60)
8374 / 9180 D-Type = 148mm (	5.82)
8374 / 9180 H-Type = 140mm (	5.51)

\_

Dimension 'Y'
<b>D-Type =</b> 98.6mm (3.88)
H-Type = 106.4mm (4.19)

### Ancillary Parts

#### EFR WASTEGATE CANISTER SELECTION GUIDE

Core Assy.	A-TYPE 0.64a/r TH	G-TYPE 0.80a/r TH	B-TYPE 0.83a/r TH	F & F(v)- TYPE 0.85a/r TH	C-TYPE 0.92a/r TH
6258	179282, 179283, or 179284				
6258*	Optional Super Short Canister			00000000000000000000000000000000000000	
6758	58251107255,	58251107255, 179420, 179421, 58251107262, ar 0r 179422		Super Short Canister 58251107255	
6758*	58251107261			58251107262, or	
7163*				30231107201	
7064					
7670			179285, 179286,		179285, 179286,
8374			or 179287		or 179287
9180					

#### EFR WASTEGATE CANISTER BRACKET KIT SELECTION GUIDE

Core Assy.	A-TYPE 0.64a/r TH	G-TYPE 0.80a/r TH	B-TYPE 0.83a/r TH	F & F(v)- TYPE 0.85a/r TH	C-TYPE 0.92a/r TH	Each Wastegate Bracket Kit Includes:
6258	179427					(1) Stainless steel bracket
6258*				179427		(3) Bracket to bearing
6758	59007119007	179428		Super Short Capietor		(0) Consistents handlast
6758*				59007119007		lock nuts
7163*						(1) Actuator rod nut
7064						(outboard side)
7670			179428		179428	(1) Long 410mm wastegate signal hose
8374			170.400		170,400	(2) Hose clamps
9180			179429		179429	

#### EFR CANISTER PRELOAD GUIDE

		LOW E	BOOST	MEDIUN	I BOOST	нідн і	вооѕт	
ROD & SPRING FULL STROKE		179282, 17942 STANDARD	20, OR 179285 CANISTER	179283, 17942 STANDARD	21, OR 179286 CANISTER	179284, 1794: STANDARI	22, OR 179287 D CANISTER	
PRELOAD	CAPABILITY	59001 <sup>/</sup> SUPER SHOF	107255 RT CANISTER	59001 <sup>/</sup> SUPER SHOF	107262 RT CANISTER	59001107261 SUPER SHORT CANISTER		
(mm / nut turns)	inches (mm)	WG Crack-Open Full Stroke Pressure (psi) Pressure (psi)		WG Crack-Open Pressure (psi)	Full Stroke Pressure (psi)	WG Crack-Open Pressure (psi)	Full Stroke Pressure (psi)	
0	0.67" (17mm)	4.0 psi	13.7 psi	8.8 psi	20.6 psi	16.8 psi	32.3 psi	
1	0.63" (16mm)	4.9 psi	13.8 psi	9.6 psi	20.6 psi	17.3 psi	32.3 psi	
2	0.59" (15mm)	5.7 psi	14.0 psi	10.8 psi	20.6 psi	17.6 psi	32.3 psi	
3	0.55" (14mm)	6.1 psi	14.1 psi	11.2 psi	20.6 psi	17.8 psi	32.3 psi	
4	0.51" (13mm)	6.8 psi	14.3 psi	11.9 psi	20.6 psi	17.9 psi	32.3 psi	
5	0.47" (12mm)	7.3 psi	14.4 psi	12.3 psi	20.6 psi	18.1 psi	32.3 psi	
6	0.43" (11mm)	8.0 psi	14.4 psi	13.2 psi	20.6 psi	18.6 psi	32.3 psi	
7	0.39" (10mm)	8.5 psi	14.6 psi	14.0 psi	20.6 psi	19.0 psi	32.3 psi	
8	0.35" (9mm)	9.1 psi	14.6 psi	14.5 psi	20.6 psi	19.3 psi	32.3 psi	
9	0.31" (8mm)	9.6 psi	14.7 psi	14.8 psi	20.6 psi	19.4 psi	32.3 psi	
10	0.28" (7mm)	9.9 psi	14.7 psi	15.9 psi	20.6 psi	19.6 psi	32.3 psi	
		Use with up to 13 p	si applied pressure	Use with up to 19 p	osi applied pressure	Use with up to 31 psi applied pressure		

Note 1: Avoid too little preload. The diaphragm can rub (and wear) against the top of the can. We recommend 3mm of preload as a starting point.

Note 2: Avoid too much preload. Too much preload can cause premature diaphragm wear, but can be used functionally to limit travel and avoid boost droop at high RPM.

Note 3: When using solenoid valve boost control, the signal pressure that the WG canister sees can be bled off. Select a canister that will allow nearly full stroke.

Note 4: The "use with up to" pressures avoid long-term wear. By bottoming out the stroke, the diaphragm can be distressed over the course of time.

Note 5: EFR turbo assemblies come standard with the "Medium Boost" WG canisters. "Low" or "High" as well as Super Short boost actuator canisters can be purchased from an EFR dealer.

### Ancillary Parts





## The passion of power



#### When DSport magazine started building

a Honda engine for the 72MM class limit turbo, they reached for the S400SX3 from BorgWarner's AirWerks division. This turbo is capable of supporting over 1000 horsepower, offers super-quick response and the durability associated with the BorgWarner name.

In 2002, the aftermarket group of BorgWarner Turbo Systems started a program named AirWerks. This independent aftermarket program was created to assist the needs of BorgWarner distributors who currently sell into the market of competitive motorsports or are assisting those customers who are looking for a little more performance to a factory turbocharged car or to retrofit a naturally aspirated engine.





#### TURBO FRAME DIMENSIONS



Twin hydrodynamic journal bearings

- Integrated wastegate assembly
- Adjustable compressor and turbine housing orientation

Turbo Part #	Comp. Wheel O.D. (in)	Comp Wheel O.D. (mm)	Comp Wheel Inducer Dia. (in)	Comp Wheel Inducer Dia. (mm)	Turbine Wheel O.D. (in)	Turbine Wheel O.D. (mm)	Turbine Wheel Exducer (in)	Turbine Wheel Exducer (mm)	Turbine Housing A/R	Cartridge Assembly	Service Kit
313295	1.90	48.31	1.35	34.21	1.85	46.99	1.58	40.00	0.35	N/A	318374
313296	2.08	52.91	1.55	39.32	2.08	52.92	1.80	45.73	0.46	315358	318374
313683	2.08	52.91	1.55	39.32	2.08	52.92	1.80	45.73	0.61	N/A	318374
313297	2.28	57.96	1.70	43.28	2.08	52.92	1.80	45.73	0.61	313737	318374
313798	2.28	57.96	1.70	43.28	2.08	52.92	1.80	45.73	0.61	313737	318374

#### COMPRESSOR MAP

AP Applicable to part number 313296

Comp. Wheel Inducer Dia. (mm) 39.32 Comp. Wheel Outer Dia. (mm) 52.91





#### S200SX

# 220 - 580 HP Turbo

#### TURBO FRAME DIMENSIONS





#### FEATURES

- Twin hydrodynamic journal bearings
- Extended tip technology compressor wheel
- Twin scroll turbine housing
- Adjustable compressor and turbine housing orientation

Turbo Part #	Comp. Wheel O.D. (in)	Comp Wheel O.D. (mm)	Comp Wheel Inducer Dia. (in)	Comp Wheel Inducer Dia. (mm)	Turbine Wheel O.D. (in)	Turbine Wheel O.D. (mm)	Turbine Wheel Exducer (in)	Turbine Wheel Exducer Dia (mm)	Turbine Housing A/R	Turbine Inlet	Cartridge Assembly	Service Kit
177258	2.74	69.57	1.81	45.90	2.74	69.56	2.42	61.43	0.83	VTF	176639	318383
177267	2.74	69.57	1.95	49.56	2.74	69.56	2.42	61.43	1.09	VTF	176642	318383
177257	2.74	69.57	2.00	50.72	2.74	69.56	2.42	61.43	0.83	VTF	176638	318383
177268	3.00	76.20	2.20	55.80	2.74	69.56	2.42	61.43	1.22	VTF	176637	318383
178034*	3.00	76.20	2.20	55.80	2.74	69.56	2.42	61.43	1.22	VTF	N/A	318383
178042*	3.00	76.20	2.20	55.80	2.74	69.56	2.42	61.43	1.27	VTF	N/A	318383

\* Compressor inlet diameter 4.00"

#### **COMPRESSOR MAP** Applicable to part number 177268

Comp. Wheel Inducer Dia. (mm) 55.80 Comp. Wheel Outer Dia. (mm) 76.20



#### TURBINE HOUSING

Part #	A/R	Inlet Con	figuration	Notes
177191	0.83			
177193	1.00			
177196	1.09	Volute.	14 Bolt Pattern	70mm
177192	1.15	Twin Flow	T3 Volute	Wheel
177194	1.22		opening	
178331	1.27			

#### **S200SX-E**

## 300 - 650 HP Super-Core BorgWanier

#### B<sup>org</sup>Warner 50 8mm [2.00] -M8X1.25 0 1/4-18 50 8mm NPSF [2.00] ¢ 19 05mm [.75] 16mm [.63] OIL OUTLET

SUPER-CORE FRAME DIMENSIONS

#### ATU R E S E. E

Comp Wheel nducer

Dia (in)

2.05

2.25

- · Integrated speed sensor port
- · Forged milled compressor wheel

Comp.

Whee O.D.

2.74

3.00

Super-Core Part #

12709095019

12769095003

- · Pre-machined boost port
- · Optimized compressor stage aerodynamics

Not included with turbo assemblies: Speed sensor, Turbine outlet V-Band, Drain port fitting

Comp.

Whee O.D.

(mm)

69.60

76.20





Turbine

Wheel Exduce

(in)

2.42

2.42

Turbine

Wheel Exduce

61.43

61.43

Servio Kit

318383

318383



#### **TURBINE HOUSING**

Part #	A/R	Inlet Co	Notes	
177191	0.83			
177193	1.00		T4 Bolt	
177196	1.09	Volute,	Pattern	70mm
177192	1.15	Flow	T3 Volute	Wheel
177194	1.22		Opening	
178331	1.27			

All turbine housing mounting hardware, clamp plates and cap screws are included with Super-Core.

Comp Wheel Inducer

(mm)

52.17

57.15

Turbine

Wheel O.D.

(in)

2.74

2.74

Turbine

Whee O.D.

(mm

69.56

69.56

#### COMPRESSOR MAPS

**S200SX-E** 300 - 550 HP Super-Core Part #: 12709095019

Comp. Wheel Inducer Dia. (mm) 52.17 Comp. Wheel Outer Dia. (mm) 69.60



Compressor Flow (lb/min)

**S2005X-E** 300 - 650 HP Super-Core Part #: 12769095003 Comp. Wheel Inducer Dia. (mm) 57.15

Comp. Wheel Outer Dia. (mm) 76.20



Compressor Flow (lb/min)

#### 38

#### S300SX3

#### TURBO FRAME DIMENSIONS





#### FEATURES

- Twin hydrodynamic journal bearings
- Extended tip technology compressor wheel
- Twin scroll turbine housing options available
- Adjustable compressor and turbine housing orientation
- Compressor cover recirculation grooves

Turbo Part #	Comp. Wheel O.D. (in)	Comp Wheel O.D. (mm)	Comp Wheel Inducer Dia.	Comp Wheel Inducer Dia. (mm)	Turbine Wheel O.D. (in)	Turbine Wheel O.D. (mm)	Turbine Wheel Exducer (in)	Turbine Wheel Exducer (mm)	Turbine Housing A/R	Cartridge Assembly	Service Kit (Standard)	Service Kit (360° thrust bearing)
177281	3.60	91.44	2.60	66.11	3.14	79.76	2.89	73.37	0.88	176634	318393	13007110005
177275	3.60	91.44	2.60	66.11	3.14	79.76	2.89	73.37	0.91	176646	318393	13007110005
177272	3.29	83.47	2.36	60.03	3.00	76.20	2.66	67.56	0.91	176635	318393	13007110005

#### COMPRESSOR MAP

Applicable to part number 177281 & 177275

Comp. Wheel Inducer Dia. (mm) 66.11 Comp. Wheel Outer Dia. (mm) 91.44



Compressor Flow (lb/min)

#### TURBINE HOUSING

Part #	A/R	Inlet Configurat	ion	Notes
177211	0.88	Volute, Open Flow		80mm
177208	0.91	Volute, Twin Flow		Turbine
179905	1.00	Volute, Twin Flow	T4	Wheel
177210	0.88	Volute, Open Flow	Inlet	76mm
177207	0.91	Volute, Twin Flow		Turbine
177209	1.00	Volute, Twin Flow		Wheel

#### S300SX3

#### TURBO FRAME DIMENSIONS







#### FEATURES

- Twin hydrodynamic journal bearings
- Extended tip technology compressor wheel
- Twin scroll turbine housing options available
- Adjustable compressor and turbine housing orientation
- Compressor cover recirculation grooves

Turbo Part #	Comp. Wheel O.D. (in)	Comp Wheel O.D. (mm)	Comp Wheel Inducer Dia. (in)	Comp Wheel Inducer Dia. (mm)	Turbine Wheel O.D. (in)	Turbine Wheel O.D. (mm)	Turbine Wheel Exducer (in)	Turbine Wheel Exducer (mm)	Turbine Housing A/R	Cartridge Assembly	Service Kit (Standard)	Service Kit (360° thrust bearing)
177280	3.29	83.47	2.36	60.03	3.00	76.20	2.66	67.56	0.88	171901	318393	13007110005
177283	3.44	87.37	2.48	62.99	3.00	76.20	2.66	67.56	0.88	176648	318393	13007110005
177284	3.60	91.44	2.60	66.11	3.14	79.76	2.89	73.37	0.91	176650	318393	13007110005

#### COMPRESSOR MAP

Applicable to part number 177283

Comp. Wheel Inducer Dia. (mm) 62.99 Comp. Wheel Outer Dia. (mm) 87.37



Compressor Flow (lb/min)

#### TURBINE HOUSING

Part #	A/R	Inlet Configurat	Notes	
177211	0.88	Volute, Open Flow		80mm
177208	0.91	Volute, Twin Flow		Turbine
179905	1.00	Volute, Twin Flow	T4	Wheel
177210	0.88	Volute, Open Flow	Inlet	76mm
177207	0.91	Volute, Twin Flow		Turbine
177209	1.00	Volute, Twin Flow		Wheel

#### S300GX

#### Cummins 5.9 Upgrade



#### FEATURES

The BorgWarner S300GX replacement turbo is more than a great match for your Cummins 5.9 engine. The S300G is aerodynamically designed to provide boost that can propel your Cummins 5.9 engine to 400 wheel horsepower. A rugged thrust bearing system helps insure the durability of your S300G, even under these extreme load conditions.

To realize the full horsepower potential of your S300G, we highly recommend the use of the following upgrade components:

- 4" Exhaust System
- High Flow Air Filter
- Performance Chip
   High Flow Fuel Injectors

Ram Air Intake Tube
 Boost Control Fitting

Turbo Part #	Comp. Wheel O.D. (in)	Comp. Wheel O.D. (mm)	Comp Wheel Inducer Dia. (in)	Comp Wheel Inducer Dia. (mm)	Turbine Wheel O.D. (in)	Turbine Wheel Exducer (in)	Turbine Wheel Exducer (mm)	Turbine A/R
174430	3.29	83.47	2.25	57.10	2.92	2.54	64.50	.80

#### COMPRESSOR MAP

#### Applicable to part number 174430



Compressor Flow (lb/min)

#### TURBO FRAME DIMENSIONS





#### DODGE 5.9 ENGINE PERFORMANCE TURBO UPGRADE CHART

Model Year	Transmission Type	Stock Horsepower	BWTS Turbo Part #	Turbo Mfr. Model #
	Auto	160		
1994	Manual	175	174430	S300G
	One Ton Truck	240		
1005	Auto	160	174430	\$300G
1995	Manual	175	174450	
	Auto	180		
1996	Manual	215	174430	S300G
	Calif. Emission	180		
	Auto	180		
1997	Manual	215	174430	S300G
	Calif. Emission	180		
	12 Valve Auto	180		
1998	12 Valve Manual	215	174430	S300G
	12 Calif. Emission	180		
1998.5	12 V Auto & Manual	215	174430	S300G
1000	Auto	215	174430	\$300G
1333	Manual	230	174450	00000
2000	Auto	215	174430	\$300G
2000	Manual	230	174450	33000
2001	Auto	235	174420	S300C
2001	Manual	245	174450	33000
2002	Auto	235	174430	\$300G
2002	Manual	245	17-4450	33000

#### **S300SX-E**

#### SUPER-CORE FRAME DIMENSIONS





#### FEATURES

- 360 degree thrust bearing
- Integrated speed sensor port
- Forged milled compressor wheel
- Flexible compressor cover outlet options
- Pre-machined boost port
- Optimized compressor stage aerodynamics

speed sensor details

Not included with turbo assemblies: Speed sensor, Turbine outlet V-Band, Drain port fitting

Super-Core Part #	Comp. Wheel O.D. (in)	Comp. Wheel O.D. (mm)	Comp Wheel Inducer Dia. (in)	Comp Wheel Inducer Dia. (mm)	Turbine Wheel O.D. (in)	Turbine Wheel O.D. (mm)	Turbine Wheel Exducer (in)	Turbine Wheel Exducer (mm)	Service Kit (360° thrust bearing)
13009097056	3.29	83.47	2.42	61.44	3.00	76.20	2.66	67.56	13007110005
13009097053	3.29	83.47	2.42	61.44	3.14	79.76	2.89	73.37	13007110005
13009097006	3.44	87.37	2.48	62.99	3.00	76.20	2.66	67.56	13007110005
13009097047	3.44	87.37	2.48	62.99	3.14	79.76	2.89	73.37	13007110005
13009097008	3.44	87.37	2.54	64.47	3.00	76.20	2.66	67.56	13007110005
13009097055	3.44	87.37	2.54	64.47	3.14	79.76	2.89	73.37	13007110005
13009097049	3.60	91.44	2.60	66.11	3.14	79.76	2.89	73.37	13007110005
13009097051	3.60	91.44	2.72	69.00	3.14	79.76	2.89	73.37	13007110005

All turbine housing mounting hardware, clamp plates and cap screws included with Super-Core.

#### **TURBINE HOUSING**

Part #	A/R	Inlet Configurat	Notes			
177211	0.88	Volute, Open Flow		80mm		
177208	0.91	Volute, Twin Flow		Turbine		
179905	1.00	Volute, Twin Flow	T4 Inlet	vvneel		
177210	0.88	Volute, Open Flow		76mm		
177207	0.91	Volute, Twin Flow	-	Turbine		
177209	1.00	Volute, Twin Flow	-	vvheel		



#### **S300SX-E** 400 - 775 HP Part #: 13009097053, 13009097056

Comp. Wheel Inducer Dia. (mm) 61.44 Comp. Wheel Outer Dia. (mm) 83.47



#### **S300SX-E** 500 - 875 HP Part #: 13009097049 Comp. Wheel Inducer Dia. (mm) 66.11 Comp. Wheel Outer Dia. (mm) 91.44 5.0 uredC = 560 m/s 0.66 <u>AlR</u>Werk 4.6 0.68 52 .66 4.2 N 0.64 0.72 0.62 3.8 0.7 0.6 0 58 3.4 0.76 3.0 2.6 370 2.2 0.62 0 310 1.8 0.58 0.56 1.4 230 1.0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 0 90 Compressor Flow (lb/min)

**S3005X-E** 450 - 785 HP Part #: 13009097006, 13009097047



**S3005X-E** 500 - 1000 HP Part #: 13009097051

Comp. Wheel Inducer Dia. (mm) 69.00 Comp. Wheel Outer Dia. (mm) 91.44

Pressure Ratio



**S3005X-E** 450 - 825 HP Part #: 13009097008, 13009097055





# S400SX 400 - 1300 HP Turbo

#### FEATURES

- Twin hydrodynamic journal bearings
- Extended Tip Technology Compressor Wheel
- Twin Scroll Turbine Housing
- Adjustable compressor and turbine housing orientation
- Standard turbine inlet and outlet connections
- Compressor cover recirculation grooves

#### Compressor Wh Extended Technol

#### TURBO FRAME DIMENSIONS



Turbo Part #	Comp. Wheel O.D. (in)	Comp Wheel O.D. (mm)	Comp Wheel Inducer Dia. (in)	Comp Wheel Inducer Dia. (mm)	Turbine Wheel O.D. (in)	Turbine Wheel O.D. (mm)	Turbine Wheel Exducer (in)	Turbine Wheel Exducer (mm)	Turbine A/R	Super-Core	Cartridge Assembly	Service Kit (Stan- dard)	Service Kit (360° thrust bearing)	
178855	3.60	91.44	2.66	67.66	3.29	83.47	2.92	74.29	1.10	179352	178856	318396	14007110000	
14879880082	3.78	96.00	2.83	72.00					1.10	14009097006	14009097007	318396	14007110000	
179174	3.94	100.17	2.94	74.56						1.10	14009097001	14009097001	318396	14007110000
179176	4.13	104.84	2.99	76.00	3.44	87.37	3.22	81.74	1.10	178781	178782	318396	14007110000	
179180	4.32	109.73	3.16	80.30	_				1.25	179179	179181	318396	14007110000	
179182	4.32	109.73	3.24	82.20	1				1.25	179184	179183	318396	14007110000	

#### TURBINE HOUSING

Part #	A/R	Inlet Con	figuration	Notes		
177102	0.90					
177103	1.00	Volute,	T4 Inlat	83mm		
177104	1.10	Twin Flow	14 miet	Wheel		
177105	1.25					
178787	0.90					
178788	1.00	Volute,	T4 Inlot	87mm		
178789	1.10	Twin Flow	14 met	Wheel		
178790	1.25					



Compressor Flow (lb/min)

45

#### **S400SX-E**

# 500 - 1200 HP Turbo

ATUR

E S

Twin hydrodynamic journal bearings

F E

- Extended Tip Technology Compressor Wheel
- Twin Scroll Turbine Housing
- Adjustable compressor and turbine housing orientation
- Standard turbine inlet and outlet connections
- Compressor cover recirculation grooves

#### SUPER-CORE FRAME DIMENSIONS



Super-Core	Comp. Wheel O.D. (in)	Comp Wheel O.D. (mm)	Comp Wheel Inducer Dia. (in)	Comp Wheel Inducer Dia. (mm)	Turbine Wheel O.D. (in)	Turbine Wheel O.D. (mm)	Turbine Wheel Exducer (in)	Turbine Wheel Exducer (mm)	Service Kit (360° thrust bearing)
14009097006	3.78	96.00	2.83	72.00	3.44	87.37	3.22	81.74	14007110000
14009097014	3.94	100.00	2.99	76.00	3.44	87.37	3.22	81.74	14007110000

**TURBINE HOUSING** 

Part #	A/R	Inlet Con	Notes	
178787	0.90			
178788	1.00	Volute,	T4	87mm Turbino
178789	1.10	Flow	Inter	Wheel
178790	1.25			

#### COMPRESSOR MAPS

**S400SX-E** 500 - 1100 HP Part #'s: 14009097006

Comp. Wheel Inducer Dia. (mm) 72.00 Comp. Wheel Outer Dia. (mm) 96.00



Compressor Flow (lb/min)

 S400SX-E
 550 - 1200 HP
 Part #s: 14009097013 & 14009097014

 Comp. Wheel Inducer Dia. (mm) 76.00
 14009097014

 Comp. Wheel Outer Dia. (mm) 100.00
 14009097014



#### **S400SX-E**

#### SUPER-CORE FRAME DIMENSIONS





#### FEATURES

- Twin hydrodynamic journal bearings
- Extended Tip Technology Compressor Wheel
- Twin Scroll Turbine Housing
- · Adjustable compressor and turbine housing orientation
- Standard turbine inlet and outlet connections
- Compressor cover recirculation grooves



Super-Core	Comp. Wheel O.D. (in) Comp Wheel O.D. (mm)		Comp Wheel Inducer Dia. (in)	Comp Wheel Inducer Dia. (mm)	Turbine Wheel O.D. (in)	Turbine Wheel O.D. (mm)	Turbine Wheel Exducer (in)	Turbine Wheel Exducer (mm)	Service Kit (360° thrust bearing)
*14009097013	3.94	100.00	2.99	76.00	3.77	95.70	3.47	88.05	14007110003
14009097010	4.33	110.00	3.16	80.30	3.77	95.70	3.47	88.05	14007110003
14009097008	4.33	110.00	3.46	87.93	3.77	95.70	3.47	88.05	14007110003

\*See page 46 for compressor map

TURBINE HOUSING

Part # Inlet Configuration 14961019007 1.15 96mm Τ6 Volute, 171698 1.32 Twin Turbine Inlet 14961016101 1.45 Flow Wheel 14961016100 1.58

#### COMPRESSOR MAPS

**S4005X-E** 650 - 1350 HP Part #: 14009097010 Comp. Wheel Inducer Dia. (mm) 80.30

Comp. Wheel Outer Dia. (mm) 110.00



**S4005X-E** 750 - 1575 HP Part #: 14009097008 Comp. Wheel Inducer Dia. (mm) 87.93

Comp. Wheel Outer Dia. (mm) 110.00





# <section-header>

#### FEATURES

- Twin hydrodynamic journal bearings
- Extended tip technology compressor wheel
- Twin scroll turbine housing
- Adjustable compressor and turbine housing orientation
- Standard turbine inlet and outlet allows for drop-in to existing turbocharged applications
- Compressor cover recirculation grooves

#### Compressor Wheel Extended Tip Technology





Turbo Part #	Comp. Wheel O.D. (in)	Comp Wheel O.D. (mm)	Comp Wheel Inducer Dia. (in)	Comp Wheel Inducer Dia. (mm)	Turbine Wheel O.D. (in)	Turbine Wheel O.D. (mm)	Turbine Wheel Exducer (in)	Turbine Wheel Exducer (mm)	Turbine Housing A/R	Cartridge Assembly	Service Kit (Standard)	Service Kit (360° thrust bearing)
177248	3.94	100.17	2.80	71.08	3.29	83.47	2.92	74.29	1.10	177249	318396	14007110000
177101	3.94	100.17	2.94	74.56	3.29	83.47	2.92	74.29	1.10	176807	318396	14007110000

#### COMPRESSOR MAP

#### Applicable to part number 177101

Comp. Wheel Inducer Dia. (mm) 74.56 Comp. Wheel Outer Dia. (mm) 100.17



Compressor Flow (lb/min)

#### TURBINE HOUSING

Part #	A/R	Inlet Configur	Notes	
177102	0.90			
177103	1.00	Voluto Twip Flow	T4 Inlat	83mm
177104	1.10	volute, Twin Flow	14 met	Wheel
177105	1.25			

#### \$4005X4



#### FEATURES

- Twin hydrodynamic journal bearings
- Extended tip technology compressor wheel
- Twin scroll turbine housing
- Adjustable compressor and turbine housing orientation
- Compressor cover recirculation grooves

#### TURBO FRAME DIMENSIONS



Turbo Part #	Comp. Wheel O.D. (in)	Comp Wheel O.D. (mm)	Comp Wheel Inducer Dia. (in)	Comp Wheel Inducer Dia. (mm)	Turbine Wheel O.D. (in)	Turbine Wheel O.D. (mm)	Turbine Wheel Exducer (in)	Turbine Wheel Exducer (mm)	Turbine Housing A/R	Cartridge Assembly	Service Kit (Standard)	Service Kit (360° thrust bearing)
171701	3.94	100.17	2.80	71.08	3.77	95.70	3.47	88.05	1.32	171699	176391	14007110003
171702	3.94	100.17	2.94	74.56	3.77	95.70	3.47	88.05	1.32	171703	176391	14007110003
176806	3.94	100.17	2.94	74.56	3.29	83.47	3.29	74.29	1.10	176807	318396	14007110000

#### COMPRESSOR MAP

Applicable to part numbers 171702 and 176806

Comp. Wheel Inducer Dia. (mm) 74.56 Comp. Wheel Outer Dia. (mm) 100.17



Compressor Flow (lb/min)

#### **TURBINE HOUSING FOR 176806 ONLY**

Part #	A/R	Inlet Config	Notes	
176809	0.90			
176810	1.00	Volute,	T6 Inlat	83mm Turbino
176811	1.10	Twin Flow	ro met	Wheel
176812	1.25			

#### TURBINE HOUSING FOR 171701 AND 171702

Part #	A/R	Inlet Config	Notes	
14961019007	1.15			
171698	1.32	Volute,	TC Inlat	96mm
14961016101	1.45	Twin Flow	To met	Wheel
14961016100	1.58			

# S400SX4 750 - 1250 HP Turbo

#### TURBO FRAME DIMENSIONS



#### 3/4 Marmon Clamp 5.51 5.51 6.39 5.01

#### FEATURES

- Twin hydrodynamic journal bearings
- Extended tip technology compressor wheel
- Twin scroll turbine housing
- Adjustable compressor and turbine housing orientation
- Compressor cover recirculation grooves

Turbo Part #	Comp. Wheel O.D. (in)	Comp Wheel O.D. (mm)	Comp Wheel Inducer Dia. (in)	Comp Wheel Inducer Dia. (mm)	Turbine Wheel O.D. (in)	Turbine Wheel O.D. (mm)	Turbine Wheel Exducer (in)	Turbine Wheel Exducer (mm)	Turbine Housing A/R	Cartridge Assembly	Service Kit (Standard)	Service Kit (360° thrust bearing)
177287	4.32	109.73	3.16	80.30	3.77	95.70	3.47	88.05	1.32	176654	176391	14007110003

#### COMPRESSOR MAP



#### TURBINE HOUSING

Part #	A/R	Inlet Config	Notes	
14961019007	1.15			
171698	1.32	Volute,	T6 Inlot	96mm
14961016101	1.45	Twin Flow	To inier	Wheel
14961016100	1.58			

#### S400SX Super-Core

### 400 - 1300 HP Turbo



#### FEATURES

#### 83MM (O.D.) TURBINE WHEEL

Component	Part Number
Turbo	178855
Super-Core	179352

#### •FORGED MILLED WHEEL® TECHNOLOGY

#### TURBO FRAME DIMENSIONS







RICKY EVERLY, SFWD | S4005X3

#### 87MM (O.D.) TURBINE WHEEL

Component	Part Number	Part Number	Part Number	Part Number	Part Number
Turbo	14879880082	179174	179176	179180	179182
Super-Core	14009097006	179175	178781	179179	179184

#### TURBINE HOUSING OPTIONS

Part #	A/R	Inlet Confi	iguration	Outlet Configuration	Turbine Wheel	
177102	0.90					
177103	1.00	Volute,	T4 Inlat	Half Marmon	83mm	
177104	1.10	Twin Flow	14 IIIet		Wheel	
177105	1.25					
178787	0.90					
178788	1.00	Volute,	T4 Inlat	Half Marmon	87mm Turbine Wheel	
178789	1.10	Twin Flow	14 11161			
178790	1.25					
176809	0.90					
176810	1.00	Volute,	T6 Inlot		83mm	
176811	1.10	Twin Flow	10 met		Wheel	
176812	1.25					
14961019007	1.15					
171698	1.32	Volute,	T6 Inlot	Eull Mormon	96mm	
14961016101	1.45	Twin Flow	romet		Wheel	
14961016100	1.58				WIECI	

#### S500SX

#### S500SX

#### 900 - 1475 HP Turbo



#### FEATURES

- Twin hydrodynamic journal bearings
- Extended Tip Technology Compressor Wheel
- Available in twin scroll and open flow turbine volute options
- Adjustable compressor and turbine housing orientation
- Compressor cover recirculation grooves

- Optimized compressor inlet geometry
- Dual machined compressor cover discharge connection (v-band or hose bead)
- Premachined speed sensor mounting boss



\* Super-Core options found on page 53

#### COMPRESSOR MAPS

**\$500\$X** 900 - 1475 HP Turbo Part #: 179188

Comp. Wheel Inducer Dia. (mm) 88.19 Comp. Wheel Outer Dia. (mm) 120.20



Compressor Flow (lb/min)

**\$500\$** 900 - 1575 HP Turbo Part #: 179191 Comp. Wheel Inducer Dia. (mm) 90.67 Comp. Wheel Outer Dia. (mm) 120.20



#### S500SX

#### TURBO FRAME DIMENSIONS





#### TURBINE HOUSING

Part #	A/R	Turbine Inlet Centerline (A)	Other Notes
179159	0.85	3.62"	Volute, Open Flow
179160	1.00	3.62"	Volute, Open Flow
179161	1.15	4.25"	Volute, Open Flow
178498	1.30	3.62"	Volute, Open Flow; .50" Longer Turbine Discharge
179162	1.45	4.25"	Volute, Open Flow
179478	1.15	3.62"	Volute, Twin Flow (Divided)
179192	1.45	3.62"	Volute, Twin Flow (Divided)
179193	1.60	3.62"	Volute, Twin Flow (Divided)

#### **S500SX Super-Core**







#### 110MM (O.D.) TURBINE WHEEL

Component	Part #	Part #
Turbo	179188	179191
Super-Core	179186	179190

#### S500SX-E

# 900 - 1875 HP Turbo

- FEATURES
- Twin hydrodynamic journal bearings
- Extended Tip Technology Compressor Wheel
- Twin Scroll Turbine Housing
- Adjustable compressor and turbine housing orientation
- Standard turbine inlet and outlet connections
- Compressor cover recirculation grooves

#### TURBO FRAME DIMENSIONS



Super- Core	Comp. Wheel O.D. (in)	Comp Wheel O.D. (mm)	Comp Wheel Inducer Dia. (in)	Comp Wheel Inducer Dia. (mm)	Turbine Wheel O.D. (in)	Turbine Wheel O.D. (mm)	Turbine Wheel Exducer	Turbine Wheel Exducer (mm)	Service Kit (360° thrust bearing)
15009097001	4.72	120.00	3.46	87.93	4.32	109.73	3.90	99.08	173611
15009097002	4.72	120.00	3.69	93.80	4.32	109.73	3.90	99.08	173611

TURBINE HOUSING	Part #	A/R	Inlet Configuration		Turbine Inlet to Centerline*	Notes
	179159	0.85	Volute, Open Flow		3.62"	
*See page 53	179160	1.00	Volute, Open Flow		3.62"	
	179161	1.15	Volute, Open Flow		4.25"	
	178498	1.30	Volute, Open Flow (50" longer discharge)	те	3.62"	110 Turbino
	179162	1.45	Volute, Twin Flow	10	4.25"	Wheel
	179478	1.15	Volute, Twin Flow		3.62"	111001
	179192	1.45	Volute, Twin Flow		3.62"	
	179193	1.60	Volute, Twin Flow		3.62"	

#### COMPRESSOR MAPS

**S500SX-E** 900 - 1575 HP Part #: 15009097001



#### Compressor Flow (lb/min)

#### **S5005X-E** 900 - 1875 HP Part #: 15009097002



### INSTRUCTIONS

Select BorgWarner turbochargers offer convenient pre-machined options to help users get the most out of their turbocharger in terms of customization and installation needs. These additional features require the user to perform some basic drilling, cutting and de-burring. Please seek help if you are uncomfortable with these operations.

#### Speed Sensor & Boost Port

- 1. Carefully remove the compressor cover from turbo.
- 2. Place cover on a table, with some kind of backing so that it is secure while being drilled.
- Using a hand drill with a ¼" drill bit, drill through bottom of speed senor or boost port hole while being careful
  not to damage the pre-machined speed sensor O-ring sealing surface or the boost port threads.
- 4. De-burr the inside edge of the hole in the compressor cover.
- SPEED SENSOR: Lubricate O-ring and install speed sensor while checking for a good fit. Ensure that the sensor tip is nearly flush with the edge of the hole (within .5mm/.020") and install speed sensor bolt.
   BOOST PORT: Install 1/8 - 27 NPT boost fitting with thread sealant or Teflon tape and ensure the joint is leak free.
- 6. Carefully re-install compressor cover on turbo and verify that the compressor wheel spins freely.





PREMACHINED SPEED SENSOR



PREMACHINED BOOST PORT

#### Optional v-band or hose bead

- 1. Carefully remove the compressor cover from turbo.
- 2. Secure compressor cover and remove connection feature with a straight, clean cut. Reference the drawings below. Be sure to remove all sharp edges when complete.
- 3. Carefully re-install the compressor cover on turbo and verify that the compressor wheel spins freely.





### BorgWarner Turbos for Upgraded Passenger Car Engines

ОЕМ	Vehicle	Build Date	Engine	Stock Turbo(s)	Original Rating	Stock Turbo Limit
Audi	various vehicles with longitudinal engine	up to 1999	1.8T 20V	K03-005, K03-013	150 hp	195 hp
Audi	various vehicles with transverse engine	up to 2000	1.8T 20V	K03-011, K03-026, K03-035, K03-044, K03-045	150-180 hp	200 hp
Audi	various vehicles with longitudinal engine	from 2000	1.8T 20V	K03-025, K03-029	150-180 hp	200 hp
Audi	various vehicles with transverse engine	from 2004	2.0 TFSI	K03-086, K03-105 (integrated manifold)	185-200 hp	245 hp
Audi	A4	from 2007	1.8 TFSI	K03-119, K03-141 (integrated manifold)	120-160 hp	220 hp
Audi	various		1.8T 20V	various K03, K04	150-225 hp	-
Audi	various		1.8T 20V	various K03, K04	150-225 hp	-
Audi	S4, A6, allroad		2.7T 30V biturbo	K03-016 + K03-017	230-265 hp	315 hp
Ford	Focus ST/XR5, Kuga, Mondeo, S-Max	from 2003	HUBA, HUWA, HYDA, B5254	K04-033, K04-130 (integrated manifold)	200-230 hp	305 hp
Mini	Cooper S	from 2006	EP6 DTS/ CDTS	K03-118, K03-181 (twin-scroll turb/hsg)	163-184 hp	220 hp
Mini	Cooper S	from 2009	EP6 DTS/ CDTS	K03-163 (twin-scroll turb/hsg)	163-200 hp	220 hp
Opel	Astra, Zafira	from 2000	Z20LET	K04-024	190-200 hp	240 hp
Opel	Astra, Zafira	from 2005	Z20LER, Z20LEL	K04-048	170-200 hp	240 hp
Peugeot, Citroen	207, 208, DS3	from 2006	EP6 DT/ CDT	K03-104, K03-120, K03-121 (twin-scroll turb/hsg)	140-156 hp	180 hp
Peugeot, Citroen	308, RCZ, DS4	from 2009	EP6 DTS/ CDTS	K03-163 (twin-scroll turb/hsg)	163-200 hp	220 hp
Peugeot, Citroen	207, 208, DS3	from 2009	EP6 DT/ CDT	K03-179, K03-217, K03-243 (twin-scroll turb/hsg)	140-156 hp	180 hp
Porsche	911 turbo (model 993)	1994 to '97	3.6 biturbo	K16-6735 + K16-6736	408 hp	500 hp
Porsche	911 turbo (model 996)	2000 to '05	3.6 biturbo	K16-6726 + K16-6727	420 hp	500 hp
Porsche	911 turbo (model 997)	from 2005	3.6 biturbo	K04-0060 + K04-0061 (VTG)	480 hp	575 hp
Seat	Alhambra	up to 2000	1.8T 20V	K03-022	150 hp	195 hp
Seat	Alhambra	from 2000	1.8T 20V	K03-049	150 hp	200 hp
Seat/Skoda	various		1.8T 20V	various K03, K04	150-225 hp	-
Seat/Skoda	various		1.8T 20V	various K03, K04	150-225 hp	-
vw	various vehicles with longitudinal engine	up to 1999	1.8T 20V	K03-005, K03-013	150 hp	195 hp
VW	Sharan	up to 2000	1.8T 20V	K03-022	150 hp	195 hp
VW	Sharan	from 2000	1.8T 20V	K03-049	150 hp	200 hp
vw	various vehicles with transverse engine	up to 2000	1.8T 20V	K03-011, K03-026, K03-035, K03-044, K03-045	150-180 hp	200 hp
vw	various vehicles with transverse engine	up to 2000	1.8T 20V	K03-011, K03-026, K03-035, K03-044, K03-045	150-180 hp	200 hp
vw	various vehicles with longitudinal engine	from 2000	1.8T 20V	K03-025, K03-029	150-180 hp	200 hp
VW	various		1.8T 20V	various K03, K04	150-225 hp	-
VW	various		1.8T 20V	various K03, K04	150-225 hp	-
vw	various vehicles with transverse engine	from 2004	2.0 TFSI	K03-086, K03-105 (integrated manifold)	185-200 hp	245 hp
Volvo	C30, S40, V50, XC60, C70	from 2003	T3 / T6 / T7 / T8	K04-033, K04-130 (integrated manifold)	200-230 hp	305 hp

Upgrade Turbo	Plug & Play	Upgrade Turbo Limit	Max. T3 continuously	Max. T3 temporarily
5304 988 7500	yes	225 hp	930°C	950°C
5304 988 7501	yes	230 hp	930°C	950°C
5304 988 7500	yes	225 hp	930°C	950°C
5304 988 0064	yes**	305 hp	1025°C	1050°C
5303 988 0106	yes	245 hp	930°C	950°C
5316 988 6717	NO	250 hp	950°C	980°C
5324 988 7200	NO***	340 hp	950°C	980°C
5304 988 0025 + 5304 988 0026	yes	475 hp	930°C	950°C
5316 998 0010	yes*****	375 hp	950°C	980°C
5303 988 0146	yes****	245 hp	950°C	980°C
5303 988 0298	yes	245 hp	950°C	980°C
5304 998 0049	yes****	290 hp	930°C	950°C
5304 998 0049	yes	290 hp	930°C	950°C
5303 988 0117	yes	220 hp	950°C	980°C
5303 988 0298	yes	245 hp	950°C	980°C
5303 988 0426	yes	220 hp	950°C	980°C
5324 988 7003 + 5324 988 7004	yes	555 hp	950°C	980°C
5324 988 7005 + 5324 988 7006	yes	555 hp	950°C	980°C
5304 988 0080 + 5304 988 0081	yes	610 hp	950°C	980°C
5304 988 7500	NO*	225 hp	930°C	950°C
5304 988 7500	NO*	225 hp	930°C	950°C
5316 988 6717	NO	250 hp	950°C	980°C
5324 988 7200	NO***	340 hp	950°C	980°C
5304 988 7500	yes	225 hp	930°C	950°C
5304 988 7500	NO*	225 hp	930°C	950°C
5304 988 7500	NO*	225 hp	930°C	950°C
5304 988 7501	yes	230 hp	930°C	950°C
5304 988 7501	yes	230 hp	930°C	950°C
5304 988 7500	yes	225 hp	930°C	950°C
5316 988 6717	NO	250 hp	950°C	980°C
5324 988 7200	NO***	340 hp	950°C	980°C
5304 988 0064	yes**	305 hp	1025°C	1050°C
5316 998 0010	yes*****	375 hp	950°C	980°C

- \*Compressor housing orientation different.
- \*\*Original turbo has electronic pop-off valve integrated into comp/hsg, upgrade turbo has not.

External pop-off valve has to be fitted. Moreover, K04-064 has a larger compressor housing discharge.

- \*\*\* Upgrade turbo without wastegate, external wastegate required.
- \*\*\*\* Turbine housing outlet gasket with BMW OE part no. 7 589 503 required.
- \*\*\*\*\* Piece of coolant pipe already fitted, may require adaptation of coolant piping.
- \*\*\*\*\*\* Slightly different position and size of compressor discharge.

# BV50 Porsche 997 Upgrade

#### FEATURES

BorgWarner was the fi rst manufacturer in the world to offer VTG <u>turbochargers for gasoline engines</u> in mass production. BV turbos employ materials and designs that are optimally tuned to the high thermal loads in gasoline engines. BorgWarner has developed a robust VTG mechanism that works reliably even in the toughest of conditions and also employ a CFD-Optimized vane design that provides excellent effi ciency.

#### TURBO FRAME DIMENSIONS



Manufacturer	Vehicle	Reference No.	Year	НР	Liters	Service Turbo No.	Model Spec	Remarks
Porsche	911 Turbo (997)	997.123.014.72	2005	480	3.6	5304 988 0060	BV50-2277	Stock Turbo (Right Side)
Porsche	911 Turbo (997)	997.123.013.72	2005	480	3.6	5304 988 0061	BV50-2277	Stock Turbo (Left Side)
Porsche	911 GT2 (997)	997.123.078.71	2007	530	3.6	5304 988 0080	BV50-2280	Upgrade Turbo (Right Side)
Porsche	911 GT2 (997)	997.123.014.70	2007	530	3.6	5304 988 0081	BV50-2280	Upgrade Turbo (Left Side)

#### **TURBO COMPARISON**





**PORSCHE 911 GT2 (997)** 



#### TURBO FRAME DIMENSIONS



#### FEATURES

- High temperature alloy turbine housing
- Extended tip compressor wheel
- Twin scroll turbine housing
- Water cooled bearing housing

Turbo Part #	Comp. Wheel O.D. (mm)	Comp Wheel Inducer Dia. (in)	Comp Wheel Inducer Dia. (mm)	Turbine Wheel O.D. (in)	Turbine Wheel O.D. (mm)	Turbine Wheel Exducer (in)	Turbine Wheel Exducer (mm)	Turbo Area	Cartridge Assembly	Service Kit
5303 988 0146	51.00	1.61	41	1.77	45	1.58	40.3	4 cm <sup>2</sup>	_	-
							Upgrado Tu	rbo		

Manufacturer	Year	Engine	Stock Turbo	Stock Turbo	Upgrade HP	Upgrade Turbo Part #	Model Spec	Remarks
Mini	From 2006	EP6 DTS	5303 988 0163	215	255	5303 988 0146	K03-2080	Twin Scroll Turbine Housing



MINI COOPER

# <section-header>

#### FEATURES

- High temperature alloy turbine housing
- Extended tip compressor wheel
- Water cooled bearing housing

#### TURBO FRAME DIMENSIONS



The 1.8 TFSI also uses a compact integrated turbocharger module. Since the manifold and turbine housing are combined to form a single component made of a highly heat-resistance material, this system not only saves space, it also offers thermodynamic advantages.

Manufacturer	Vehicle	Year	Engine	Stock Turbo	Stock Turbo HP Limit	Upgrade HP	Upgrade Turbo Part #	Model Spec	Remarks
Audi	A4	From 2007	1.8 TFSI	5303 988 0141	215	255	5303 988 0106	K03-2080D	Integrated Manifold
Audi	A4	From 2007	1.8 TFSI	5303 988 0119	160	255	5303 988 0106	K03-2080D	Integrated Manifold



"The 1.8 TFSI also uses a compact integrated turbocharger module. Since the manifold and turbine housing are combined to form a single component made of a highly heat-resistance material, this system not only saves space, it also offers thermodynamic advantages."

AUDI A4 UPGRADE | K03-2080

# <section-header>

#### FEATURES

How about a BorgWarner AirWerks K04 series performance upgrade turbo, developed specifically for Audi and VW 1.8 liter engines? This upgrade option can enhance engine performance as much as 15%. Ultimate output may vary depending on prior engine condition, fuel settings and other supporting performance components. Only qualified companies and tuner shops should attempt to make performance modifications to the engine and the vehicle.

#### TURBO FRAME DIMENSIONS



Turbo Part #	Comp. Wheel O.D. (in)	Comp. Wheel O.D. (mm)	Comp Wheel Inducer Dia. (in)	Comp Wheel Inducer Dia. (mm)	Turbine Wheel O.D. (in)	Turbine Wheel O.D. (mm)	Turbine Wheel Exducer (in)	Turbine Wheel Exducer (mm)	Turbine Area	Cartridge Assembly	Service Kit
5304 988 7500	1.97	50.04	1.48	37.60	1.81	46	1.65	42	4 cm <sup>2</sup>	5304 710 0503	5303 711 0000

#### COMPRESSOR MAP



VEHICLE APPLICATION DATA

Application Model	Model Year	Engine Spec	Rated HP
Audi A4 A6 / 1.8T	95-99	1.8 liter 5-Valve, Inline	220
Passat	96-99	1.8 liter 5-Valve, Inline	220

#### K04-2075



#### FEATURES

How about a BorgWarner AirWerks K04 series performance upgrade turbo, developed specifically for Audi and VW 1.8 liter engines? This upgrade option can enhance engine performance as much as 15%. Ultimate output may vary depending on prior engine condition, fuel settings and other supporting performance components. Only qualified companies and tuner shops should attempt to make performance modifications to the engine and the vehicle.

#### TURBO FRAME DIMENSIONS



Turbo Part #	Comp. Wheel O.D. (in)	Comp. Wheel O.D. (mm)	Comp Wheel Inducer Dia. (in)	Comp Wheel Inducer Dia. (mm)	Turbine Wheel O.D. (in)	Turbine Wheel O.D. (mm)	Turbine Wheel Exducer (in)	Turbine Wheel Exducer (mm)	Turbine Area	Cartridge Assembly	Service Kit
5304 988 7501	1.97	50.04	1.48	37.60	1.81	46	1.65	42	5 cm <sup>2</sup>	N/A	5303 711 0000

#### COMPRESSOR MAP



#### VEHICLE APPLICATION DATA

Application Model	Model Year	Engine Spec	Rated HP
Audi A3 1.8T, VW Beetle	96-01	1.8 Liter 5-Valve, Transverse	220
Golf	1996	1.8 Liter 5-Valve, Transverse	220

#### K04-2283



#### FEATURES

- High-temperature alloy turbine housing
- Extended tip compressor wheel
- Water cooled bearing housing

\*Upgrade turbo does not come with a compressor recirculation valve or the mounting detail for one. An external valve will have to be used.

#### TURBO FRAME DIMENSIONS



The electrical recirculation valve, which is also integrated into the compressor casing, guarantees fast response times when closing the throttle valve. The use of a "latest generation" turbine wheel helps increase the efficiency of the turbocharger significantly, while optimized thermodynamics have led to further improvements in fuel consumption and transient behavior, i.e. the acceleration of the engine at full throttle. **Original turbo has electronic pop-off valve integrated into comp/hsg, upgrade turbo has not. External pop-off valve has to be fitted.** Moreover, K04-064 has a larger compressor housing discharge.

Manufacturer	Vehicle	Year	Engine	Stock Turbo	Stock Turbo HP Limit	Upgrade HP	Upgrade Turbo Part #	Model Spec	Remarks
Audi	A3	From 2004	2.0 TFSI	5303 988 0105	255	325	5304 988 0064*	K04-2283D	Integrated Manifold
Audi	A3	From 2003	2.0 TFSI	5303 988 0086	255	325	5304 988 0064*	K04-2283D	Integrated Manifold



AUDI A3

#### K16-2480



- FEATURES
- High-temperature alloy turbine wheel
- Extended tip compressor wheel
- Water cooled bearing housing

#### TURBO FRAME DIMENSIONS



Volvo's requirement for the developers at BorgWarner was to replace the bi-turbo boosting of the previous engine with a new unit with single-turbo boosting. The new 6-cylinder engine also had to possess at least the same transient response as its predecessor, and of course fuel consumption and emissions needed to be brought up to date. With the K16 used in the Volvo 6-cylinder engine, BorgWarner unveils the first in a wide range of turbos for gasoline engines displacing from 1.6 to 3.0 liters or between 150 and 285 bhp.

Manufacturer	Vehicle	Year	Engine	Stock Turbo	Stock Turbo HP Limit	Upgrade HP	Upgrade Turbo Part #	Model Spec	Remarks
Volvo	S40/V50/ XC60/C70	From 2003	2.5L RNC-RS	5304 988 0033	300	370	5316 998 0010	K16-2480D	Integrated Manifold
Ford	Focus	From 2005	2.5L RNC-RS	5304 988 0033	300	370	5316 998 0010	K16-2480D	Integrated Manifold



#### Warranty Statement

#### LIMITED WARRANTY:

BorgWarner Turbo Systems, Inc. ("BWTS") warrants that its goods or merchandise will be free from defects in material and workmanship for its intended use and service. This warranty shall extend for a period of twelve (12) months from the date of purchase by end user. BWTS will repair or provide a replacement product, at BWTS's sole option, for any defective part. Replaced parts will be warranted in time only through the remaining period of this warranty. BWTS shall not be obligated to repair or replace any defective part unless it receives notice, in writing, within 14 days of discovery of a defect. Any action for breach of warranty, contract or otherwise, shall be barred unless BWTS is provided with notice as provided herein. Specifically excluded from this warranty are design defects or damage caused by improper installation, misuse, neglect,

improper maintenance, handling or operation of the product or unauthorized repair or alterations or externally induced physical damage.

Further, this warranty shall not apply if any person attempts to repair or replace the defective part without BWTS written authorization. Any auxiliary equipment sold hereunder and not manufactured by BWTS carries only such warranty as given by the manufacturer thereof and which is hereby assigned without recourse to BWTS. No warranty is made for any other claims or special, indirect or consequential damages (including but not limited to component removal or installation, equipment down time, prospective profits or other economic losses) because of any defect deemed warrantable by BWTS.

This is BWTS's sole warranty and is in lieu of all other warranties, express or implied, including, without limitation, implied warranty of merchantability, or fitness for a particular purpose.

No representative or distributor of BWTS has the authority to change or alter this warranty. This warranty may only be modified by an agreement signed by an authorized officer of BWTS.

Any claim made under this limited warranty must be presented to BWTS, with valid proof of date of purchase by end-user. All merchandise or goods shipped to BWTS, for warranty consideration, must be shipped prepaid - freight. Collect shipments will be refused.

No warranty on competition applications or applications not approved in writing by BorgWarner Turbo Systems.



#### BORGWARNER TURBOCHARGERS



#### WHERE OUTRACING THE COMPETITION BEGINS WITH OUTTHINKING THEM!

