Wilo – Stratos GIGA

Stratos GIGA Presentation – March, 2012

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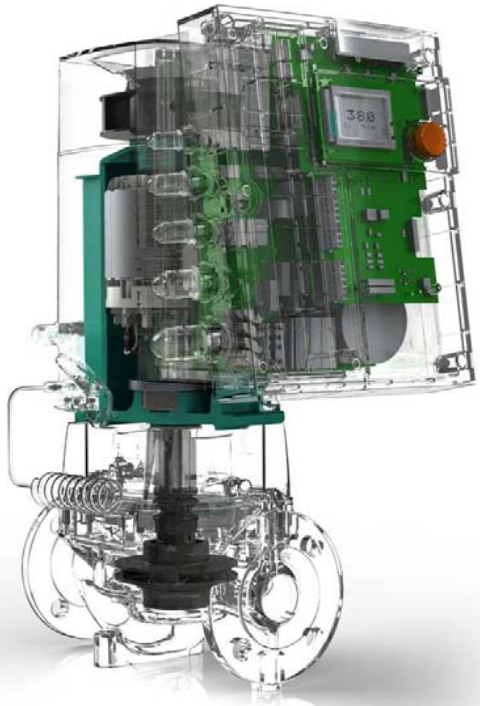
Introduction – Wilo Stratos GIGA / High Efficiency Drive (HED)

Wilo
Controls

Wilo
EC-Motor



Wilo
Hydraulics

=

wilo®

High Efficency
Pump System

2013 AHR Expo®
INNOVATION AWARDS
Value
Impact
Application
HONORABLE MENTION

product
design
award
2011

Introduction – Wilo Stratos GIGA / High Efficiency Drive (HED)

- **Stratos GIGA – The Highest Level of Efficiency**
  - New worldwide regulations are requiring efficiency standards like CAFE standards for automobiles.

- **Stratos GIGA is prepared for the future:**
  - All motors fullfill the highest efficiency level IE4
  - This exceeds all NEMA Premium Efficiency (IE3)

- **Over 70 % savings compared to Uncontrolled Inline Pumps!**

- **Over 33 % savings compared to Controlled Inline Pumps!**

Technology – Motor & Drive

- New hydraulics optimally adapted to the EC motor technology
- Huge power supply adaption range: 3~380-480V, ±10% 60Hz
- Connectable to the most common Building Management Systems via optional IF-Modules
- Simple operation based on Stratos "Red-Button-Technology"

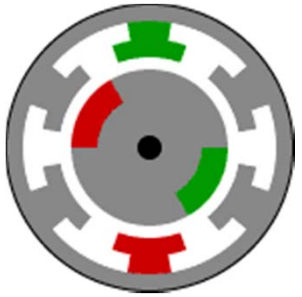
*acc. to IEC TS 60034-31 Ed.1

Technology – Motor & Drive

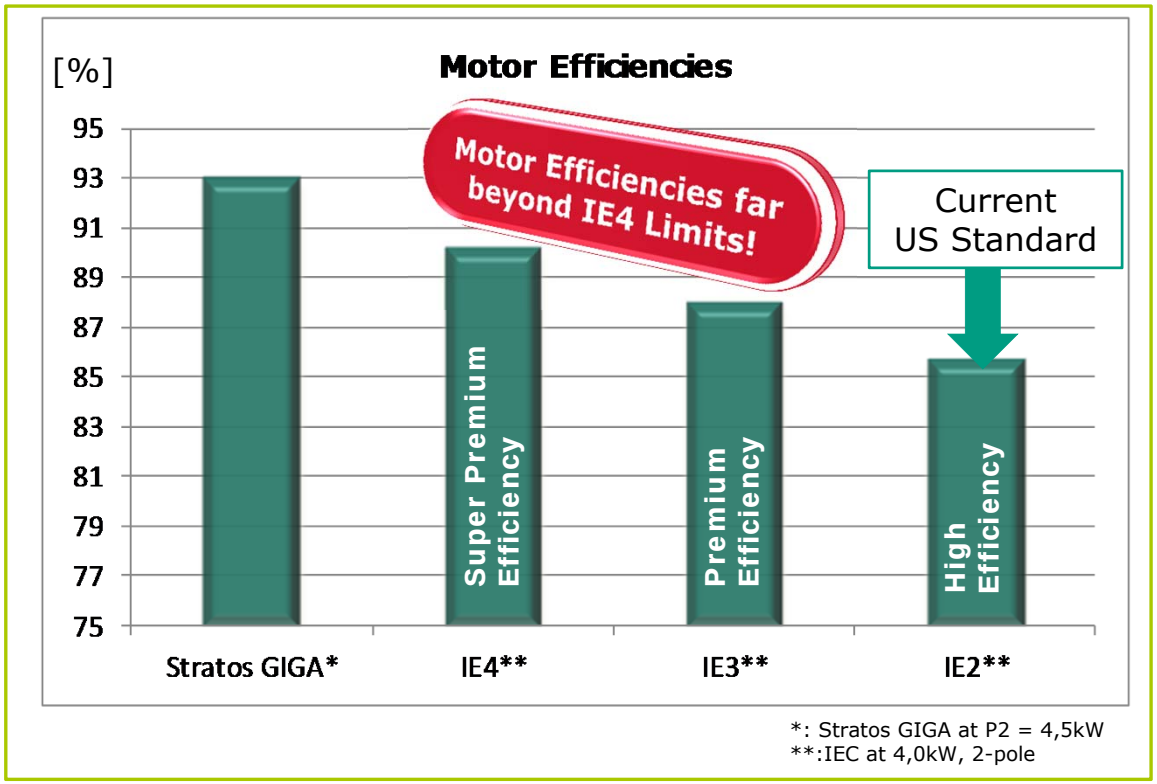
- **Principle of Stratos GIGA EC-Motors**
  (Permanent Magnet Synchronous Motor)
  - The windings of the stator are energized to create a rotating magnetic field. The rotor is permanently magnetized with rare earth magnets.
  - The rotor movement is induced due to the constant attraction and repulsion between the permanent magnets of the rotor interacting with the rotating stator winding.
  - Without inducing a rotor magnetic field, the rotor does not experience negative currents and the rotor moves at the same speed as the stator.
  - Efficiency is increased by reducing the slip to zero!

Motor Type	5 HP	7.5 HP
IE1	83.1 %	84.7 %
IE2	85.8 %	87.0 %
IE3	88.1 %	89.2 %
IE4*	90.3 %	91.1 %
HED Stratos GIGA	93.1%	93.1%

* According to IEC TS 60034-30 Ed. 1.0, "The aim is to reduce losses by about 15 % - with regard to IE3."



Technology – Motor & Drive

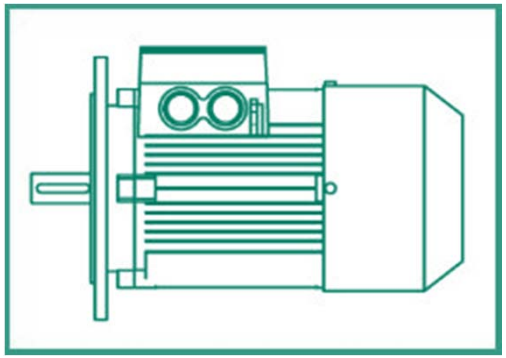


*: Stratos GIGA at P2 = 4,5kW
**:IEC at 4,0kW, 2-pole

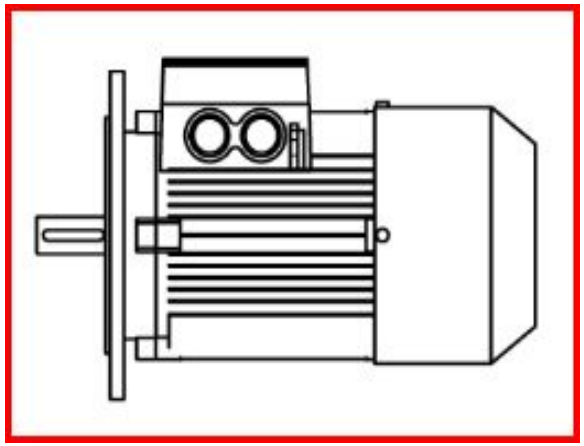
Technology – Motor & Drive

- **Motor Size Comparison:**
  - The motor size of the High Efficiency Drive (HED) is up to three times smaller than an asynchronous motor (scaled view below).

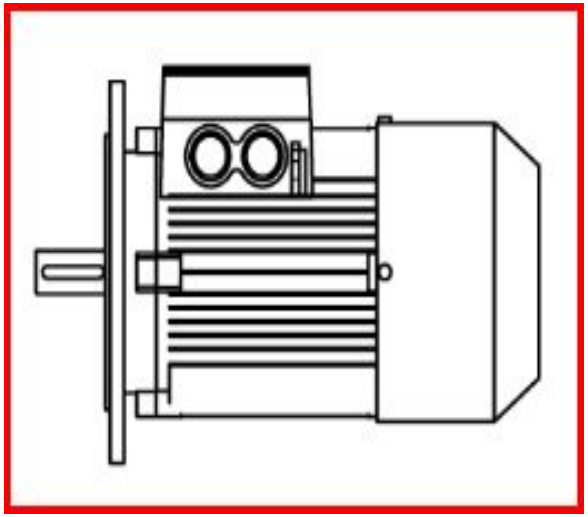
Wilo HED 6HP



Asynchronous 5HP



Asynchronous 7.5HP

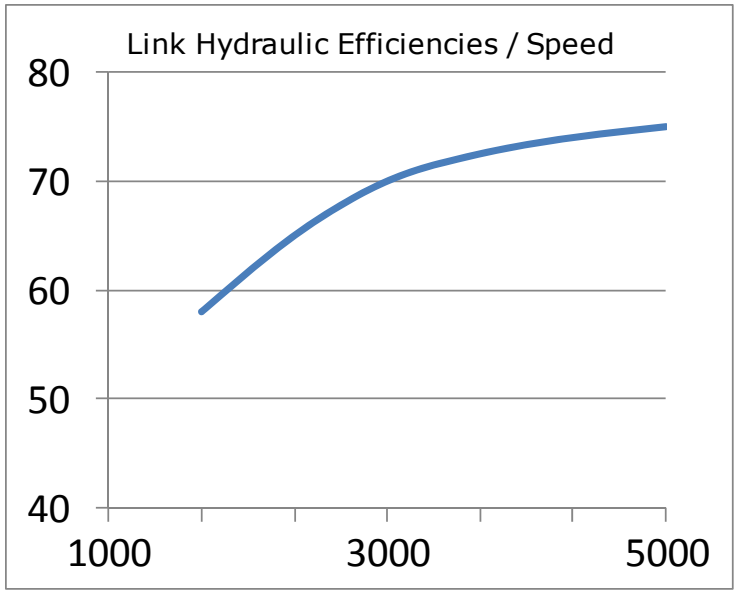


Technology – Motor & Drive

- **Pump Control**
  - As opposed to a generic controller, the frequency converter is directly tuned to the hydraulics.
  - The controller is programmed with the specific pump curves, hydraulics and characteristics, so control is via empirical data, not generic formulas, allowing for efficieny gains.
  - The data is utilized to ensure a very precise control feedback for head and flow.
  - The simple user interface ensures an easy & fast start-up with all pump data readily available for display and adjustment.

Technology – Hydraulics

- **Hydraulics**
  - The main focus for the Stratos GIGA pump was to design a Pump-System with the highest possible total efficiency.
  - Total system efficiency included empirical and modeling analysis of the hydraulics and losses occuring in the hydraulics.
  - Optimization of speed, 3-D fluid dynamics and surface reactions allow for a smaller impeller to achieve the same duty points.
  - Based on this system concept all hydraulic components of the Stratos GIGA are specially designed for the hydraulic performance we require.



Technology – Motor & Drive

- **Complete Pump Design Results**
  - Reduction of the weight by up to 55%
  - Reduction of the height by up to 39%
    - Reduced transportation costs!!
    - Easier installation and maintenance requiring smaller lifts and supportive devices
    - Easier handling and transport

Product Details & Advantages – Motor & Drive

- **Drive**
  - Five threaded cable connections for maximum number of connections & easy installation
  - Two IR – Interfaces (for Wilo IR-Monitor & IR-Stick) for easy remote set up and handling
  - 180° rotatable illuminated displays for easy information in horizontal and vertical pump installations
  - Quick Wire Plug Connectionsfor fast & safe maintenance
  - UL Certified IP55 Enclosure.
  - Specially designed venting for optimized electronic & motor cooling for maximum noise reduction

Product Details & Advantages – Electronic & Control

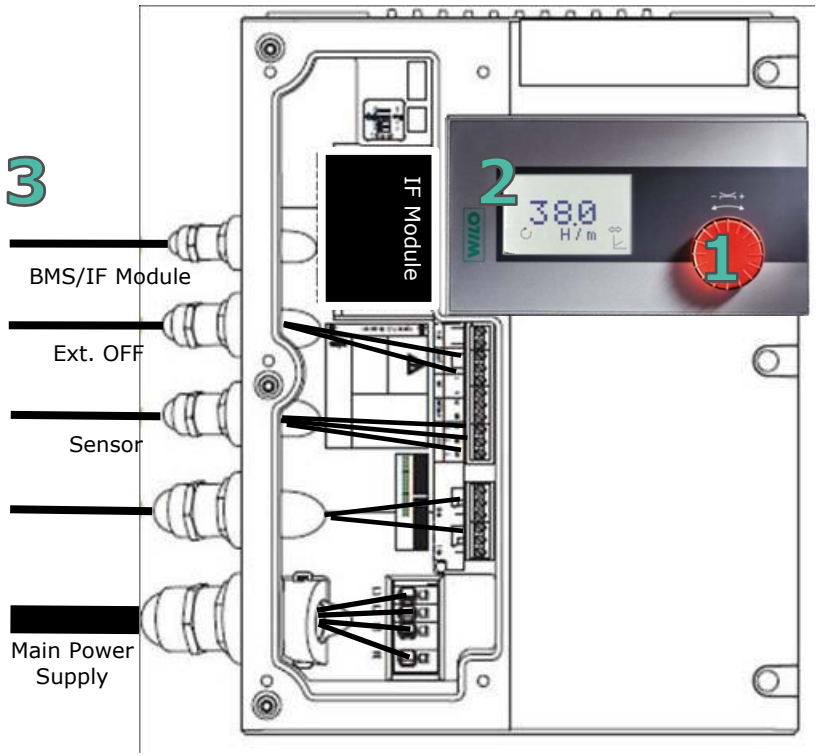
- **Simple Operation & Installation:**
  1. The Red-Button-Technology allows for easy operation

     All settings can be adjusted by the Red-Button

     No external unit needed for setup

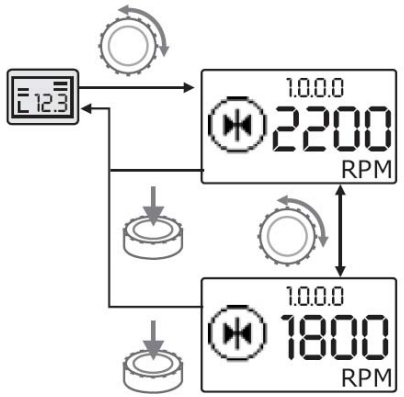
  2. Simple display feedback, no computers or external modules required

  3. Terminal Box Design for easy line connections



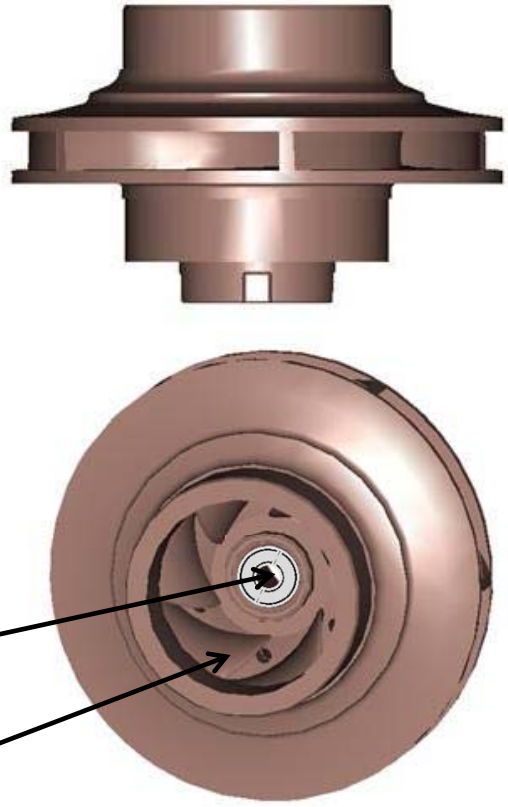
Product Details & Advantages – Electronic & Control

- **Adjustments**
  - The adjustment of the pump to the hydraulic system and other application parameters can be done directly at the pump.
  - With the familiar Red-Button-Technology the user can commission and service without any additional tools.
  - Alternatively it is possible to use external devices and modules to commission and service.



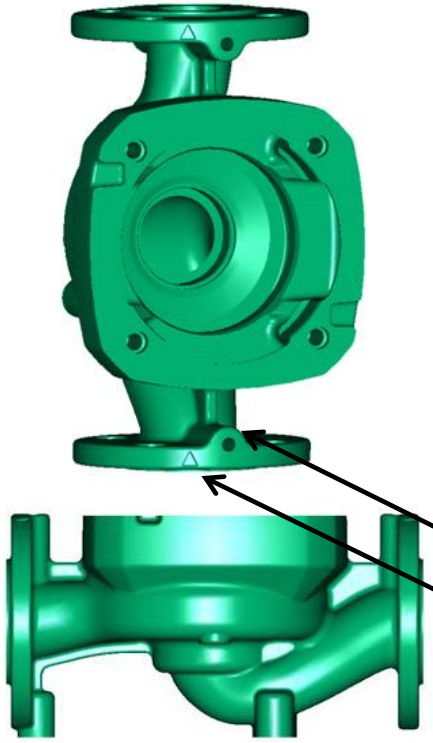
Product Details & Advantages – Pump & Hydraulic

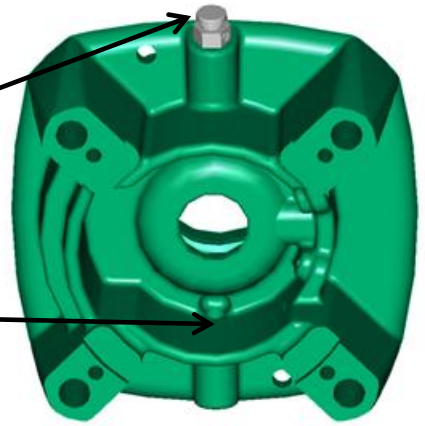
- **Impeller**
  - The impeller was specifically chosen as a high-grade comoposite Polyphenylene Sulfide (Ryton®) reinforced with 40% glass-fiber (PPS/GF40)
  - This composite material provides the best solution for:
    - Precise 3D Geometries for hydraulic optimization
    - Corrsion resistance for increased life
    - The ability to work in an extended range of fluids & temperatures
  - Stainless Steel Hub for reliable Shaft Fixation
  - Bore holes for the reduction of axial forces and optimized flush of the mechanical seal



Product Details & Advantages – Pump & Hydraulic

- **Pump Housing & Lantern**
  - The Pump Housing and Lantern are made from cast iron EN-GJL-250 (ASTM A-48 Grade 40) cataphoretic coated for maximum corrosion protection.





Venting Plug

Condensate/Leakage Drain

Pressure Tappings on Pump Housing

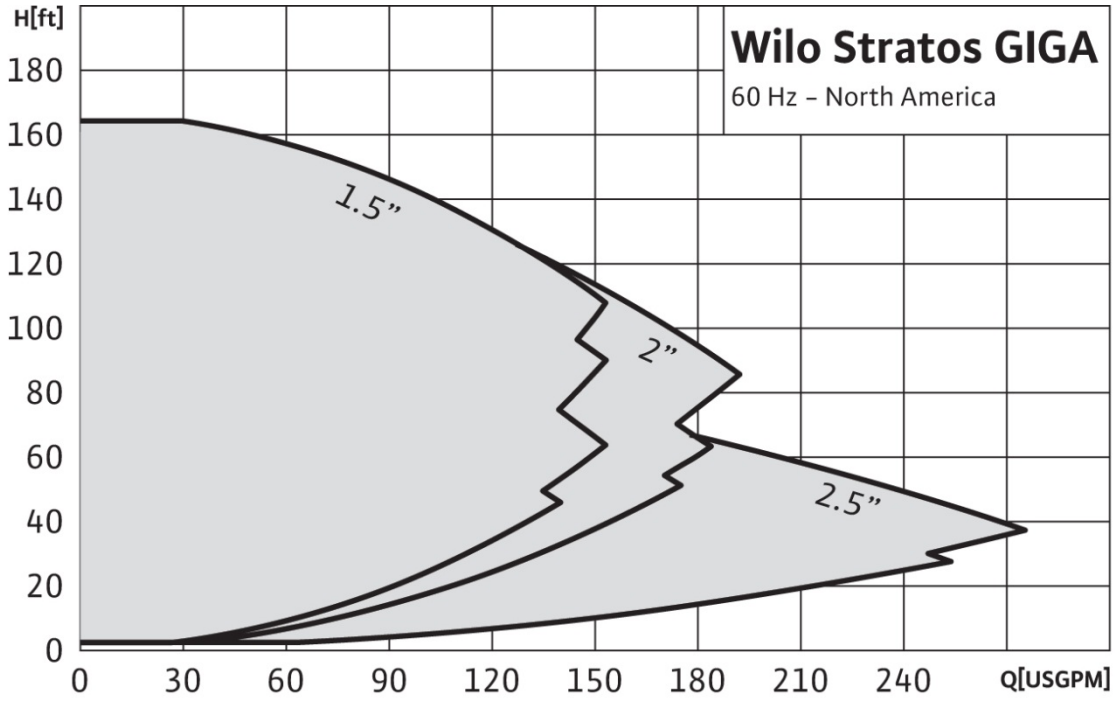
Flow Direction Arrows for easy & correct pipe installation

Product Details & Advantages – Pump & Hydraulic

Conditions for Operation	
Fluid Temperature	-4 °F (-20 °C) to 284 °F (+140 °C)
Power Supplies	3~380V up to 3~480V, ±10 %, 50/60Hz
Protection Class	IP55
Max Operating Pressure	232 PSI (16 bar) up to 248 °F (+120 °C) 189 PSI (13 bar) up to 284 °F (+140 °C)
Flange Size	150# ANSI 1.5" to ANSI 2.5"
Ambient Temperature	32 °F (0 °C) up to 104 °F (40 °C)
Fluid Compatability	Water 50/50 Water-Glycol Mixtures

Product Details & Advantages – Pump & Hydraulic

Overall Curve Field 2013

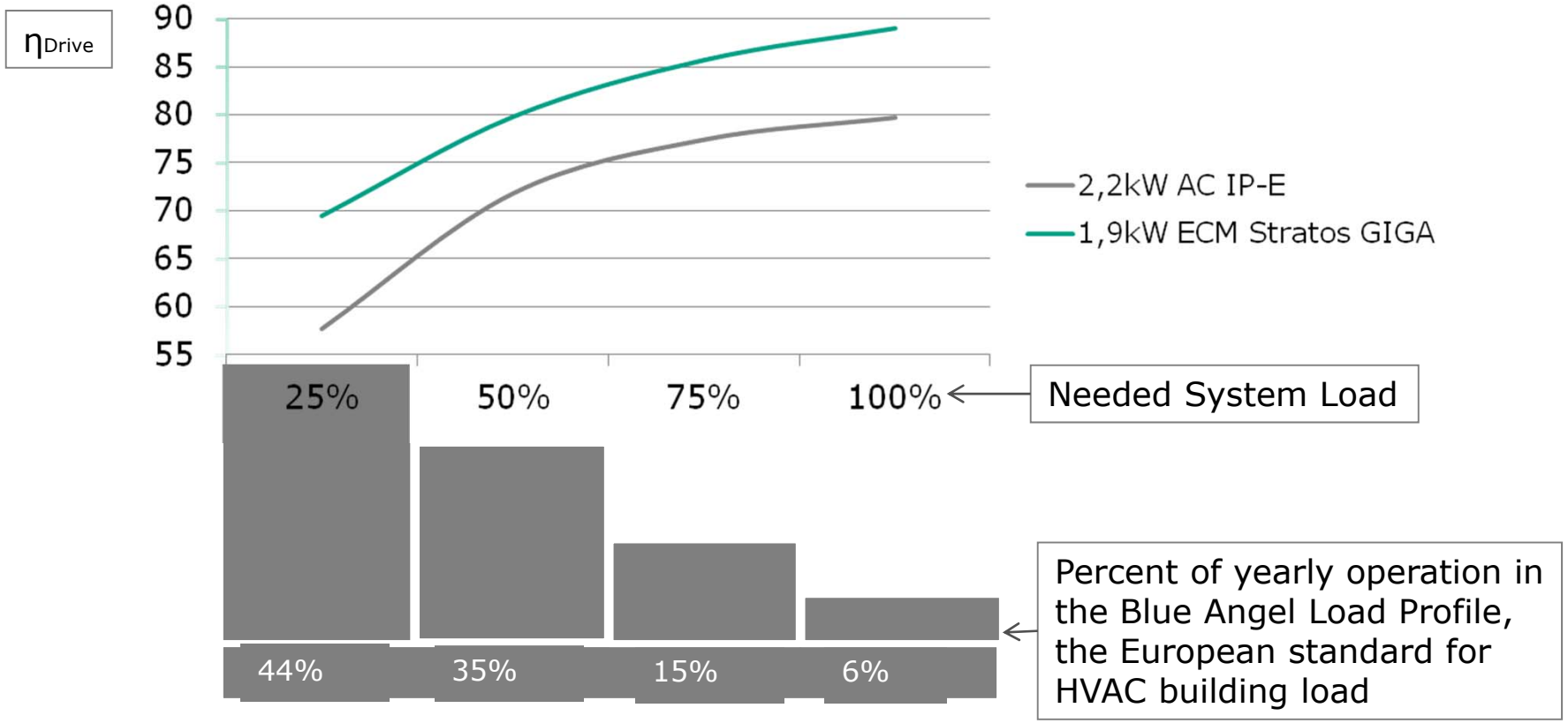


Product Details & Advantages – BMS Integration

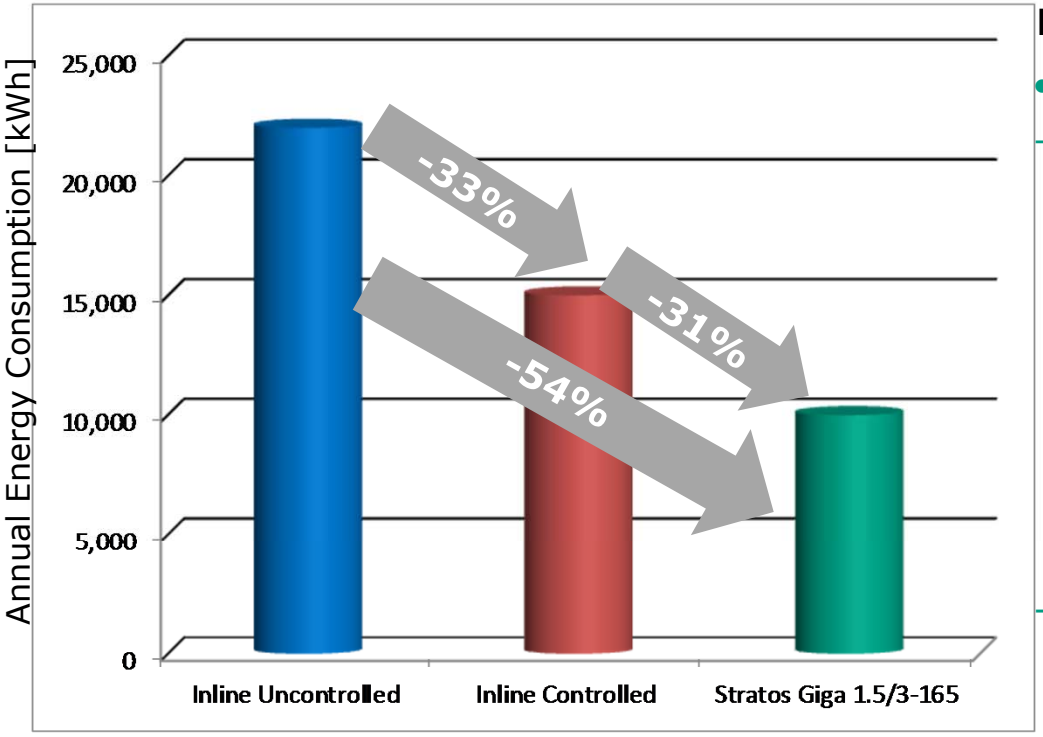
- **IF-Modules**
  - Simple connection to the building management system (BMS) due to modular design
  - Space-optimized, integrated solution without external gateways
  - Supports the common market standards for system integration
  - Complete remote control of the pump
  - Optimum operation due to detailed messages and measurements

Stratos GIGA – Part Load Advantages

Comparison of Giga Motor and Drive vs Squirrel Cage Motor With Integrated Drive:



Pay Back Examples



* Duty point 100GPM / 120FT,
Load profile "Blue Angel" @ 4000h/a

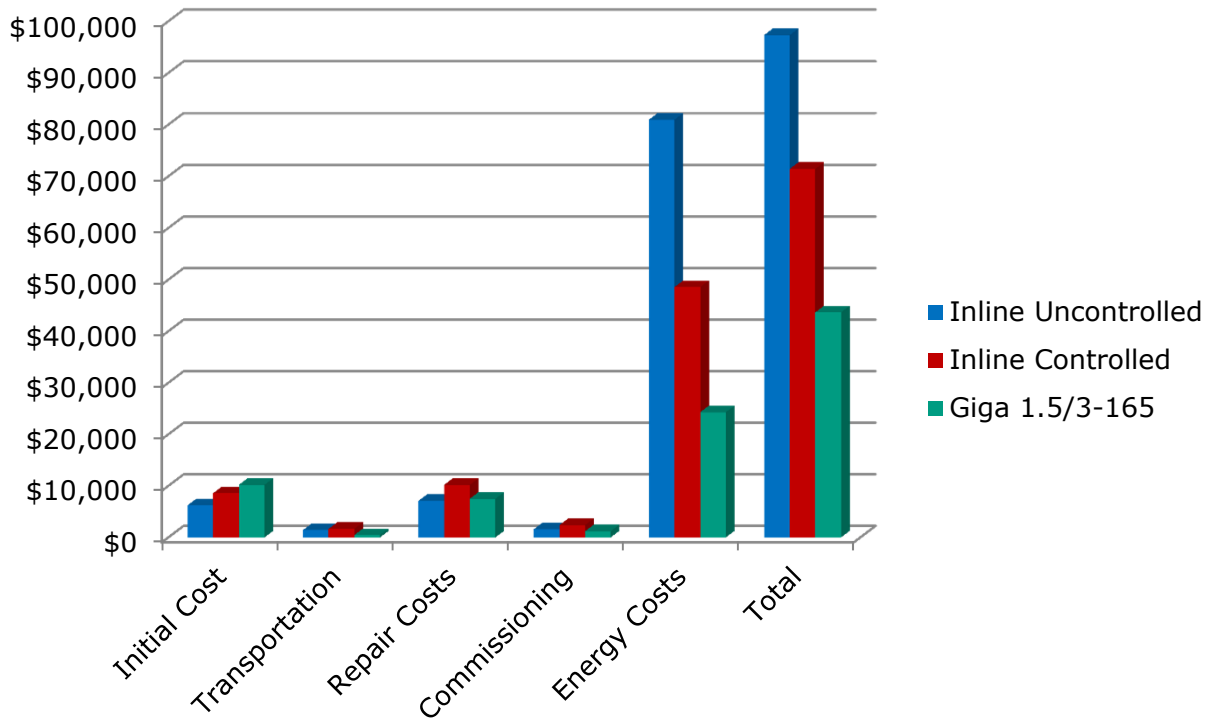
Comparison Stratos GIGA vs. Vertical Inline:

- **Energy savings**
  - ca. 12,000kWh per year, this equates approx. to the energy consumption of three family homes



  - Cost savings
    - approx. $52,800 (@ $0.12/kWh) with an assumed 20 years pump life.

Total Pump Ownership – 20 Year Pump Life



Duty Point: 100 GPM, 120 Ft

Energy Cost: $0.10/kWh

Load Profile: 4000 hours

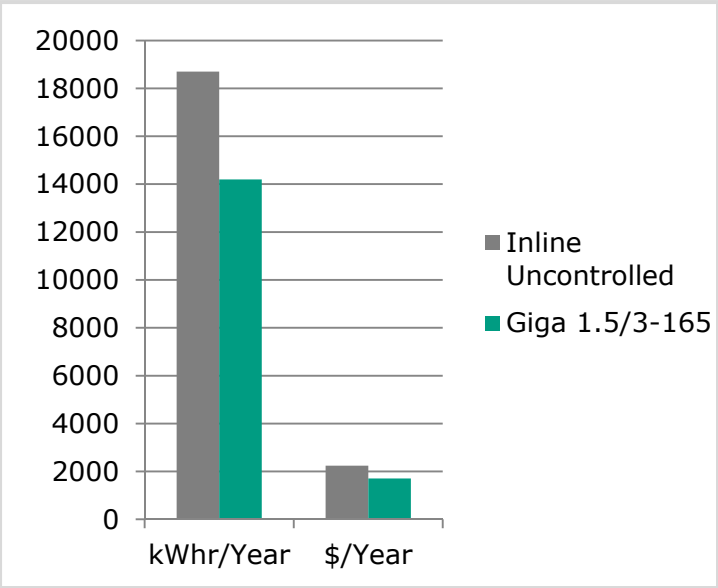
"Blue Angel" Load Profile

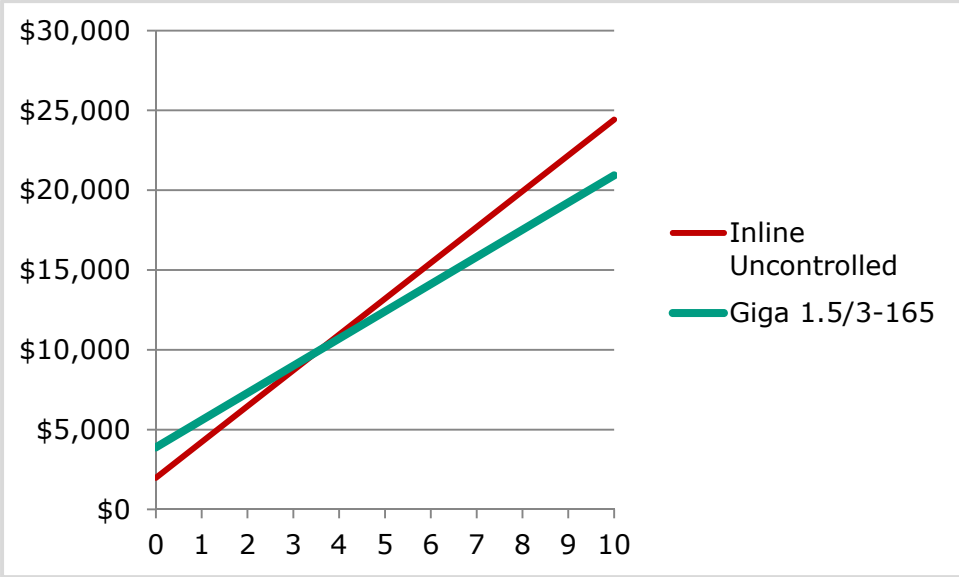
Pay Back Examples – Money Savings Even in Constant Speed

Over the pump life, the energy savings from Stratos GIGA pays for itself several times over, even in CONSTANT SPEED OPERATION !!!

Constant Speed Energy Savings Payback

Load profile: Constant Speed 5,000 operating hours/year, Duty Point 100 GPM @ 100 Ft
Control: Constant Speed, Energy Price: $0.12/kWh





Stratos GIGA – Official Reference TKT Ltd. in Bad Laer, Germany

Old pump in blue DN40/11kW from a competitor

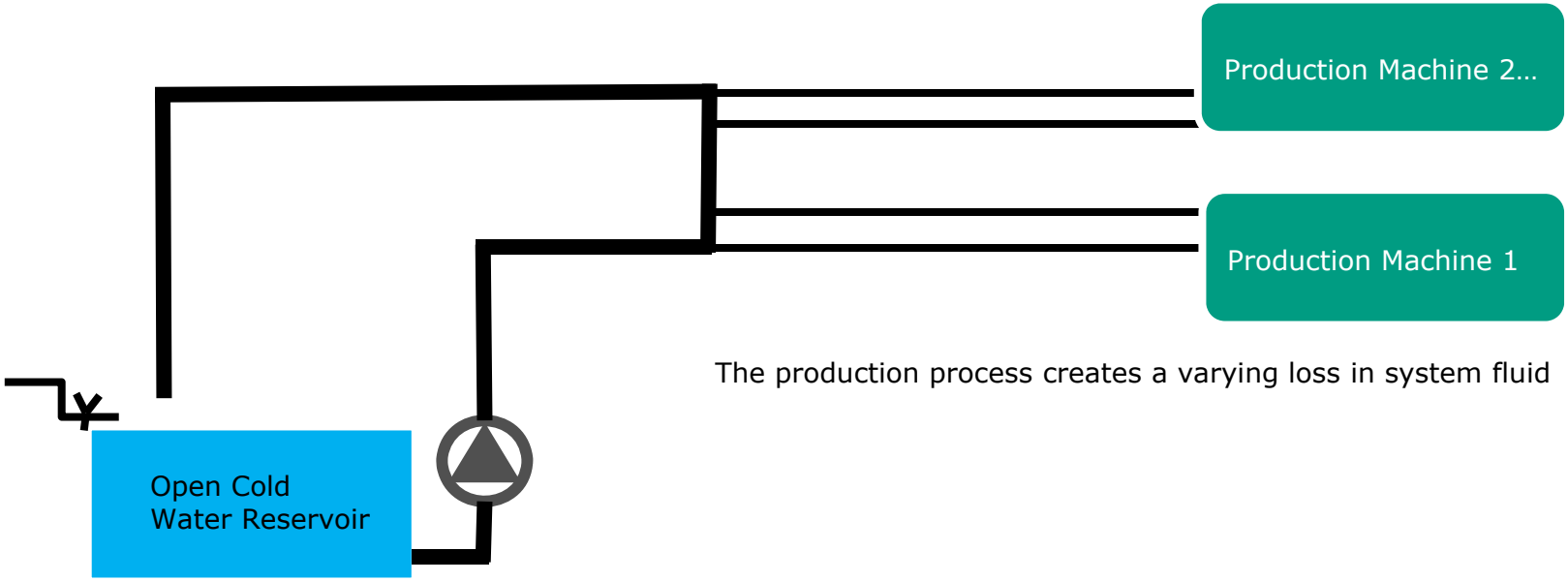
New pump: **Stratos GIGA 40/1- 51 /4.5** used for the same max. duty point.

Please contact us when you have an installation in your area. Wilo is also interested is additing case studies to our portfolio.

Stratos GIGA – Official Reference TKT Ltd. in Bad Laer, Germany

The System (less valves and fittings):

Constantly varying load profile by several machines working with different modes and different cooling needs.



The production process creates a varying loss in system fluid

Stratos GIGA – Official Reference TKT Ltd. in Bad Laer, Germany

- **Application: Open industrial cooling system for plastic component production lines.**

  Old pump in blue DN40/11kW from a German company, new pump Stratos GIGA 40/1- 51 /4,5 used for the same max. duty point as old pumps:

Energy Saving of 77 % measured by the customer in multiple week-long measurements:

	Old status	New status	Δ
Pump	Uncontrolled End-Suction	Wilo-Stratos GIGA 40/1-51/4,5	Savings due to new technology
Max pump energy consumption measured	11 kWh	3.8 kWh	- 7.2 kWh
Calculated yearly energy consumption (8.000 h/a)	88,000 kWh	30,400 kWh	-57,600 kWh
Energy Costs (0,15 € / KWh)	13,200 € / a	4,560 € / a	8,640 € / a
Cost of pump exchange	----------	4800,- €	ROI ca. 7 Month
CO_2 Emission*)	43.5 t	15.0 t	**-28,5 t**

*) CO_2-Emissionen based on German resource mix for production of electric energy: 0,494 kg pro kWh (source: BDEW)

Over $10,000 savings annually!! (Based on exchange rate of 1.33)

Questions