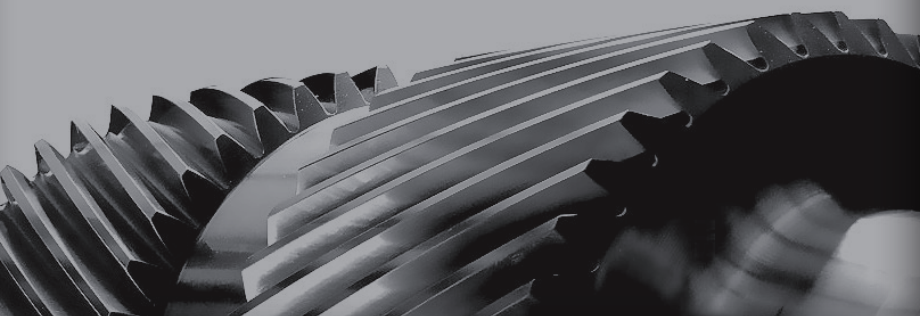




Power. Generation

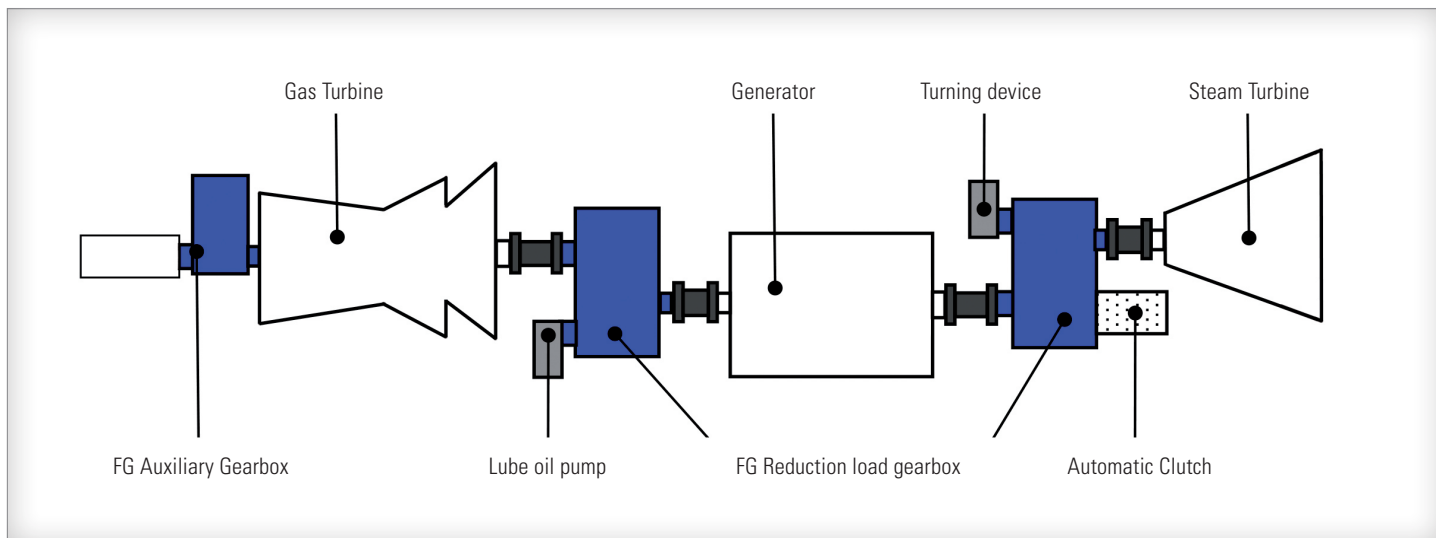
FLENDER
GRAFFENSTADEN




HIGH PERFORMANCE TRANSMISSION FOR ENERGY

Power Generation

With more than 60 years experience, Flender-Graffenstaden gearboxes are used in all processes in power plants, refineries, oil & gas offshore and onshore installations, chemical and petrochemical plants and industrial process plants throughout the world.



Design

Flender-Graffenstaden gear units are designed to your power transmission needs:

- Horizontal and vertical offset parallel shaft gearboxes
- Customised multi-stage gearboxes
- Planetary gearboxes
- Standard gearboxes for auxiliary drives
- Welded steel plate and cast iron casing
- Single helical, double helical or thrust collar arrangements

Applications

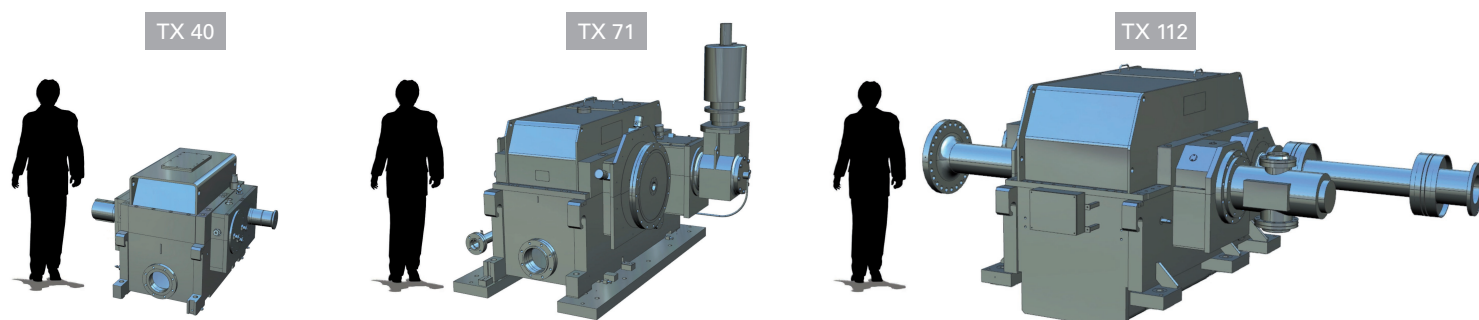
Flender-Graffenstaden gear units are located wherever energy is needed onshore and offshore for single-cycle, combined cycle and cogeneration applications:

- Standard industrial power generation gas turbines
- Power generation gas turbines on platforms and FPSO
- Combined heat and power solutions
- Steam turbines for solar applications
- Steam turbines for waste-to-energy and for waste biomass power plants

Scope of supply

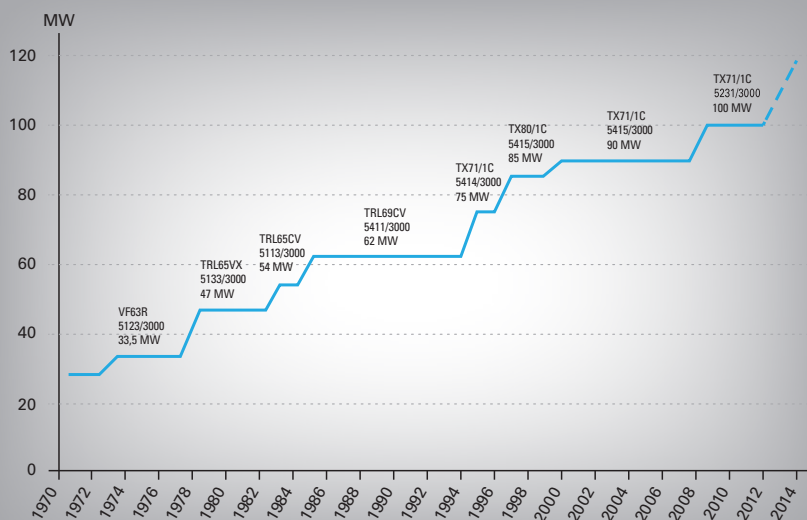
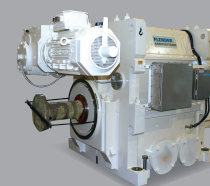
Flender-Graffenstaden gear units can be completed according to your on-site requirements:

- Lubricating oil pumps
- Turning device for start-up and slow roll
- Couplings, quillshafts and adapted coupling guards
- Nitrogen container for spare parts preservation
- Instrumentation for temperature, vibration and oil pressure monitoring



Load gearbox reference list for gas turbine/generator application

| GEAR RATED POWER (MW) | TURBINE TYPE | 2 POLES GENERATOR | | 4 POLES GENERATOR | |
|-----------------------|--------------------|--------------------|--------------------|-------------------|-----------------|
| | | 50Hz (3000 rpm) | 60Hz (3600 rpm) | 50Hz (1500 rpm) | 60Hz (1800 rpm) |
| 1,3 | Makila | X | X | TR25VX1 | TR25VX4 |
| 6,4 | SGT-100 / Typhon | X | X | PF90D | X |
| 7,5 | GE5 | X | X | PF100D | X |
| 11 | LM1600 | TX45/2CV | X | X | X |
| 15 | GE10 | X | X | PF100D | PF100D |
| 15 | LM2500 | X | X | X | TX56/2CV |
| 17,5 | SGT-400 / Cyclone | X | X | PF127D | X |
| 22,5 | SGT-500 / GT35 | X | X | TX80/2C | TX80/3C |
| 29 | SGT-600 / GT10B | X | X | TX90/5C | TX90/4C |
| 30 | LM2500+G4 | TX50/1CV | X | X | TX71/1C |
| 31,5 | FRAME 5 | VF63 | VF63 | TX80/3C | TX80/2C |
| 33 | LM2500RD | X | X | X | TX112/2C |
| 33,4 | RB211-GT62 / 61 | X | X | TX71/3C | TX63/2C |
| 37 | PGT25+G4 | X | X | TX90/4C | TX71/3C |
| 37 | SGT-700 / GT10C | X | X | TX90/4C | TX90/3C |
| 45 | RB211-H63 | X | X | TX90/4C | TX80/3C |
| 48 | SGT-750 | X | X | TX100/4C | TX90/3C |
| 52,2 | LM 6000 PC-PD | TX61/1CV | X | TX80/2CV | X |
| 54 | FRAME 6B | TRL65CV - TX61/1CV | TRL65CV - TX61/1CV | TX90/3C | TX90/2C |
| 55-60 | SGT-800 / GTX100 | X | X | TX112/4C | TX100/3C |
| 55-60 | SGT-800 BPack | X | X | TX112/4C | X |
| 62,75 | LM 6000 PG-PH | TX61/1CV | X | X | X |
| 85 | SGT-1000F / V64.3A | TX80/1C | X | X | X |
| 90 | FRAME 6FA | TX71/1C | X | X | X |
| 100 | FRAME 6FA+e | TX71/1C | X | X | X |



Manufacturing processes

Flender-Graffenstaden gear units benefit from 60 years of experience combined to state of the art manufacturing technology:

- Carburizing and nitriding
- ISO and AGMA grade 4 or better gear grinding
- CNC machine tools for cylindrical turning and high accuracy teeth grinding of bearing seats and shaft ends

Engineering

Flender-Graffenstaden gear units are tailored to meet your « turbo » expectations:

- Ratings according API 613, AGMA 421, AGMA 6011, ISO 6336
- Hydrodynamic bearings with dedicated performance determination
- Lateral vibration calculation and analysis of every unit
- Meshing load distribution calculation according AGMA 927
- Modal and structural finite-element analysis of casings
- Torsional analysis of complete shaft lines

Testing

Flender-Graffenstaden gear units are individually tested according to requirements:

- Standard full speed tests according API 613
- Partial load tests
- Back to back tests

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