

**Technical Data Sheet for AvK-Alternators**

FM 7.3-5

|              |          |                |                             |
|--------------|----------|----------------|-----------------------------|
| Date:        | 09/01/14 | Customer:      | GENERIC DATASHEET only      |
| Project No.: |          | AvK Reference: | dig156p_8_50_10000_A048N160 |

|                                     |               |
|-------------------------------------|---------------|
| <b>Object data:</b>                 |               |
| Site:                               | Prime Mover:  |
| Application: Stationary Power Plant | Manufacturer: |

|                        |                                  |   |                      |                         |        |
|------------------------|----------------------------------|---|----------------------|-------------------------|--------|
| <b>Generator data:</b> |                                  |   |                      |                         |        |
| Generator:             | DIG 156 p/8                      | Poles:  | 8                    | Standards: IEC 60034    |        |
| Rated power:           | 6000 kVA                         | 4800 kWe  | 4943 kWm             |                         |        |
| Power factor:          | 0.80                             |   |                      |                         |        |
| Power at pf 1,0        | 4837 kVA                         | 4837 kWe  | 4943 kWm             |                         |        |
| Rated voltage:         | 10 kV                            |   |                      |                         |        |
| Speed:                 | 750 1/min                        |   |                      |                         |        |
| Frequency:             | 50 Hz                            | Voltage range / frequency range:                      |                      |                         |        |
| Rated current:         | 346.4 A                          | Zone A according IEC 60034-1 (dU = +/-5%, df = +/-2%) |                      |                         |        |
| Winding pitch:         | ca. 5/6                          |   |                      |                         |        |
| Insulation class:      | Stator: Class F                  | Rotor: Class F  | Temperature rise:    | F                       |        |
| Ambient temperature:   | 40 ° C                           | Environment:  | Standard environment |                         |        |
| Site altitude:         | 1000 m                           |   |                      |                         |        |
| Enclosure:             | IP23                             | Filter:   |                      |                         |        |
| Cooling:               | IC 01 - Open-circuit ventilation |   |                      |                         |        |
| Coolant:               | Ambient Air                      | Temperature   | 40 ° C               | Temperature Air inlet   | 40 ° C |
|                        |                                  | Coolant:  |                      | generator:              |        |
|                        |                                  | Cooling air vol.:                                     | 4.5 m³/s             | Cooling water quantity: | n/a    |
| Moment of inertia (I): | 1185 kgm²                        | Weight:   | 22400 Kg             | Losses (environment):   | 143 KW |
|                        |                                  |   |                      | Losses (cooling):       | n/a    |

|                    |  |
|--------------------|--|
| Wires:             | 4 terminals, starpoint connected in terminal box |
| Operation mode:    | Single mode                                      |
| Regulators:        |  |
| Voltage regulator: | DECS 100   |

|                                    |       |       |       |       |       |
|------------------------------------|-------|-------|-------|-------|-------|
| <b>Electrical data: (acc. IEC)</b> |       |       |       |       |       |
| Efficiencies:                      | 110%  | 100%  | 75%   | 50%   | 25%   |
| Power factor 0.8                   | 96,96 | 97,1  | 97,12 | 96,7  | 94,76 |
| Power factor 0.9                   | 97,35 | 97,48 | 97,41 | 96,83 | 94,94 |
| Power factor 1.0                   | 97,75 | 97,86 | 97,7  | 96,95 | 95,11 |

|                                      |             |       |           |                  |                           |             |      |                  |         |                   |           |
|--------------------------------------|-------------|-------|-----------|------------------|---------------------------|-------------|------|------------------|---------|-------------------|-----------|
| <b>Reactances and time constants</b> |             |       |           |                  |                           |             |      |                  |         |                   |           |
|                                      | unsaturated |       | saturated |                  |                           | unsaturated |      | saturated        |         |                   |           |
| X <sub>d</sub>                       | 1.78        | 1.60  | p.u.      | X <sub>q</sub>   | 0.89                      | 0.87        | p.u. | T <sub>d0'</sub> | 3.25 s  | T <sub>d0''</sub> | 0.04652 s |
| X <sub>d'</sub>                      | 0.276       | 0.276 | p.u.      | X <sub>q'</sub>  | 0.89                      | 0.87        | p.u. | T <sub>d'</sub>  | 0.51 s  | T <sub>q0'</sub>  | 0.6 s     |
| X <sub>d''</sub>                     | 0.196       | 0.178 | p.u.      | X <sub>q''</sub> | 0.195                     | 0.195       | p.u. | T <sub>d''</sub> | 0.03 s  | T <sub>q0''</sub> | 0.27385 s |
| X <sub>2</sub>                       | 0.206       | 0.187 | p.u.      | X <sub>0</sub>   | 0.058                     | 0.053       | p.u. | T <sub>a</sub>   | 0.095 s | T <sub>q'</sub>   | 0.6 s     |
| X <sub>1s</sub>                      | n.a.        | 0.107 | p.u.      |                  |                           |             |      |                  |         | T <sub>q''</sub>  | 0.06 s    |
| Short circuit ratio saturated: 0.62  |             |       |           |                  | Z <sub>n</sub> 16.667 Ohm |             |      |                  |         |                   |           |

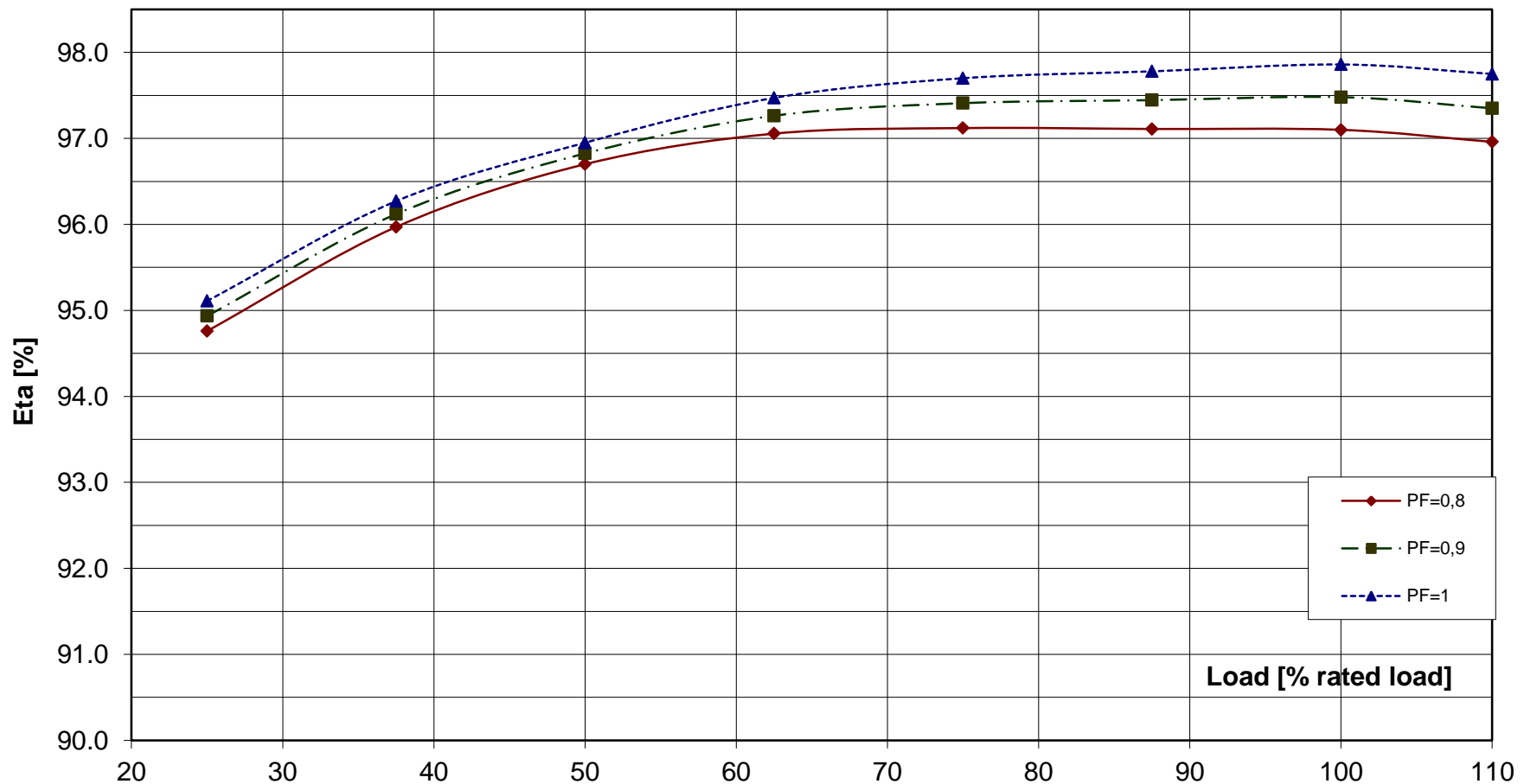
|  |                  |            |  |
|--|------------------|------------|--|
| <b>Short circuit data:</b>               |                  |            |  |
| Initial short circuit current (3-phase): | I <sub>k''</sub> | 1946 A     |  |
| Max. peak current (3-phase):             | I <sub>s</sub>   | 4954 A     |  |
| Sustained short circuit current:         | I <sub>k</sub>   | 1039 A     | Minimum 3 x rated current for max.10 s |
| Initial short circuit torque:            | M <sub>k2</sub>  | 557.9 kNm  |  |
|  | M <sub>k3</sub>  | 334.7 kNm  |  |
| Max. faulty synchron moment:             | M <sub>f</sub>   | 1199.5 kNm |  |
| Rated kVA torque:                        | M <sub>SN</sub>  | 76.40 kNm  |  |
| Rated torque                             | M <sub>N</sub>   | 61.12 kNm  |  |
| Shaft torque                             | M <sub>Sh</sub>  | 62.95 kNm  |  |

|   |   |
|---|---|
| <b>Load application:</b>  |   |
| max. load application: 3261 kVA (corresponds to 54,35 % from 6000 kVA) for Power factor 0.4<br>15% transient voltage drop | Power: 6000 kVA<br>Power factor: 0.8<br>transient voltage drop: -21.6 % |

**Remarks:**

|                      |                    |                     |     |                        |
|----------------------|--------------------|---------------------|-----|------------------------|
| <b>Alternator :</b>  | <b>DIG 156 p/8</b> |                     |     |                        |
| Rated output [kVA]   | 6000               | Rated power factor: | 0.8 | Rated voltage [kV]: 10 |
| Rated frequency [Hz] | 50                 | Rated speed [rpm]   | 750 |                        |

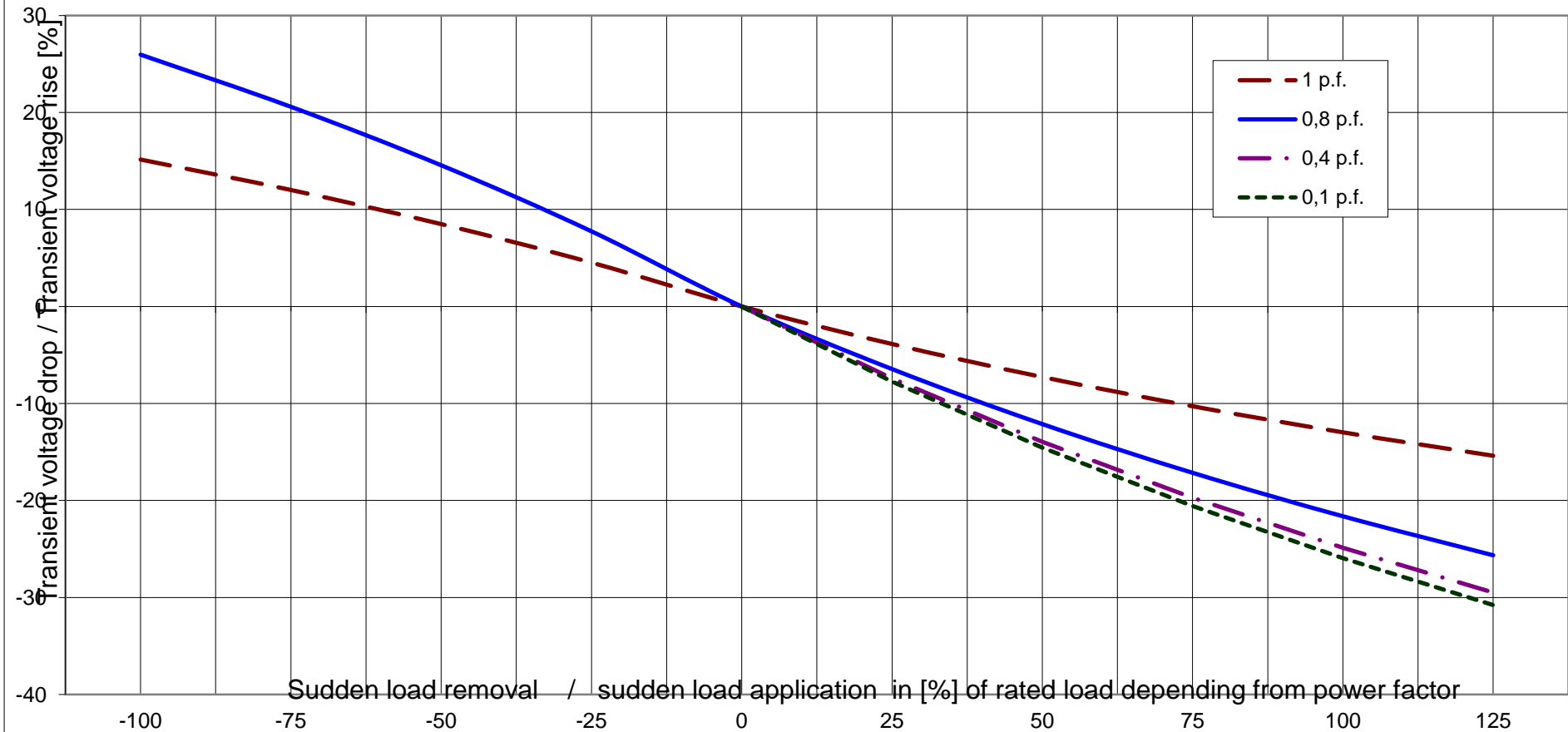
### Wirkungsgrad-Kennlinie - Efficiency Curve



**Alternator : DIG 156 p/8**

|                      |      |                     |     |                     |    |
|----------------------|------|---------------------|-----|---------------------|----|
| Rated output [kVA]   | 6000 | Rated power factor: | 0.8 | Rated voltage [kV]: | 10 |
| Rated frequency [Hz] | 50   | Rated speed [rpm]   | 750 |                     |    |

**Transient Voltage rise or drop for sudden load removal or application**





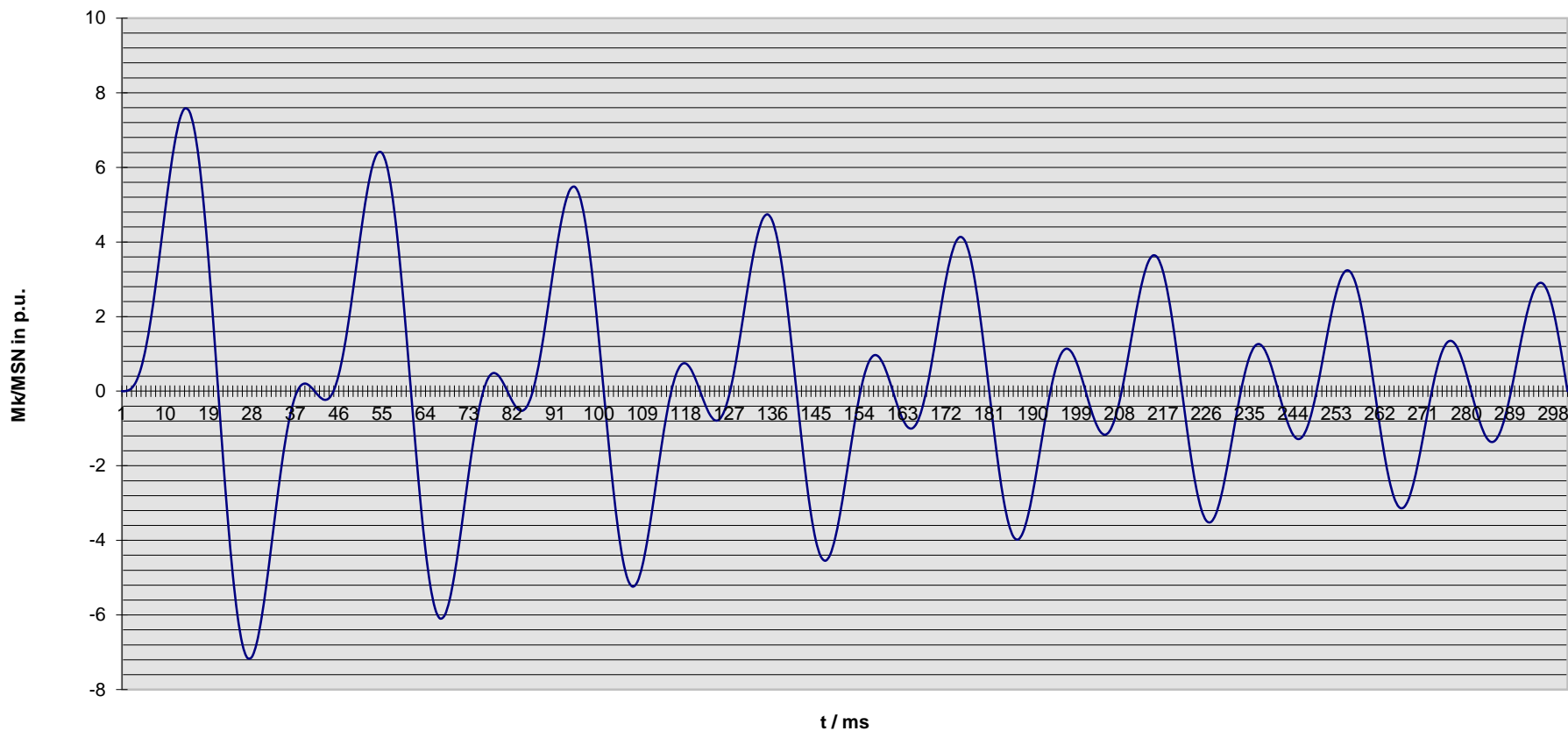
Technisches Datenblatt - Diagramme  
Technical data sheet - Diagrams

ING-FCD-0112

Alternator : **DIG 156 p/8**

|                      |      |                     |     |                     |           |
|----------------------|------|---------------------|-----|---------------------|-----------|
| Rated output [kVA]   | 6000 | Rated power factor: | 0.8 | Rated voltage [kV]: | 10        |
| Rated frequency [Hz] | 50   | Rated speed [rpm]   | 750 | MSN related to kVA: | 76.39 KNm |

Kurzschlußmomenten-Verlauf 2-poliger KS  
Short circuit torque at 2-phase SC



**Nenndaten / nominal data**

DIG 156 p/8

Leistung  $S_N$ : **6000** kVA

$\cos \varphi$ : **0.80**

*Rating*

*p.f.*

Spannung  $U_N$ : **10.00** kV

Strom  $I_N$ : **346** A

*Voltage*

*Current*

Frequenz  $f$ : **50** Hz

Drehzahl  $n$ : **750**  $\text{min}^{-1}$

*Frequency*

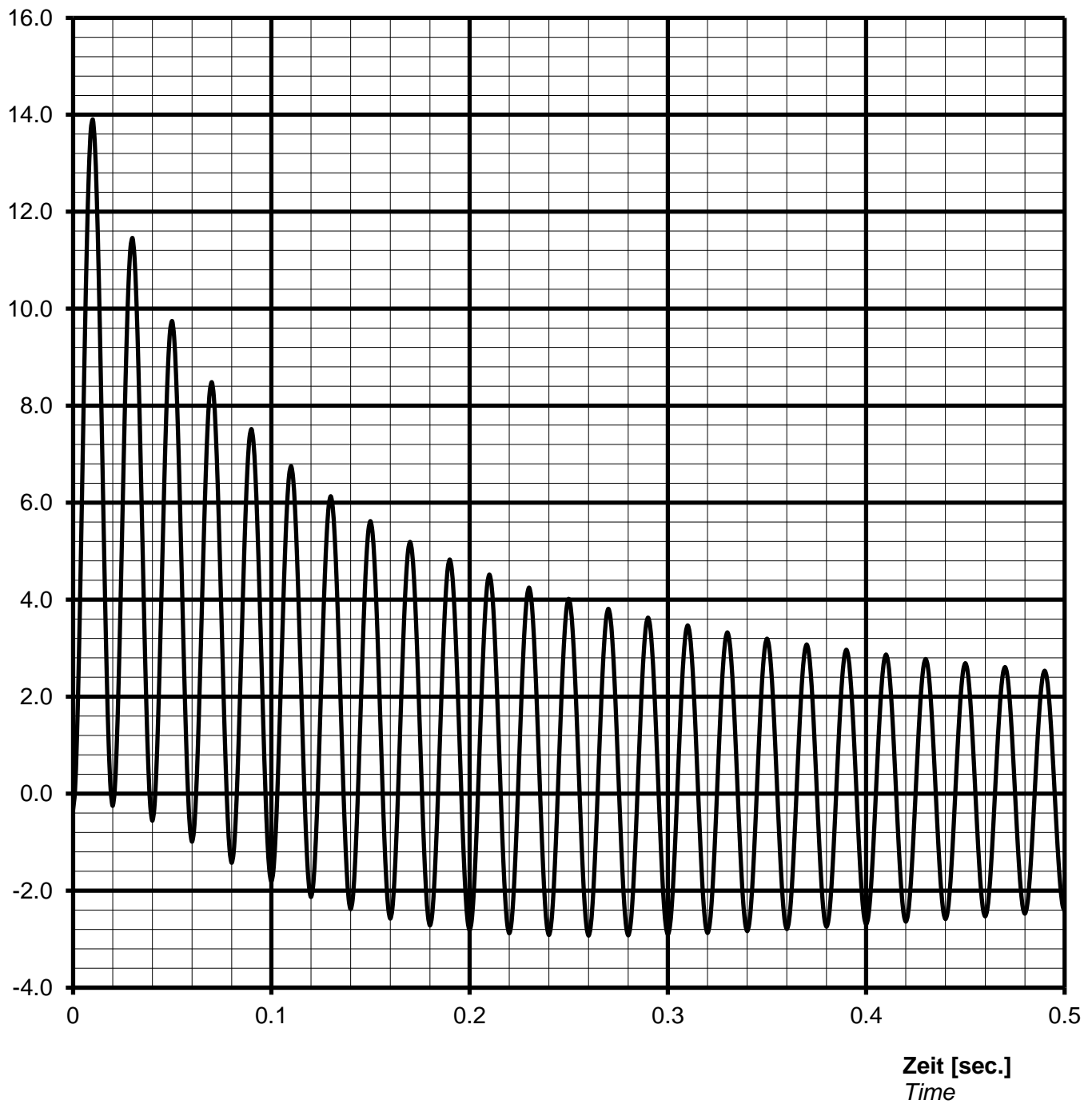
*Speed*

Schutzart **IP23**

*Protection*

**Kurzschlussstrom  $I_{k3\text{phasig}} / I_N$  [p.u.]**  
**Short-circuit current  $I_{k3\text{phase}} / I_N$  [p.u.]**

**Stosskurzschluss-Strom, 3-phasig, asymmetrisch /**  
*Sudden short circuit current, 3-phase, asymmetrical*



**Notizen / remarks:**

**Maximum asymmetric peak value**  $I_{\text{peak}} =$  **4816 A** or **13.90 p.u.**

#### Nennwerten / nominal data

DIG 156 p/8

Leistung  $S_N$ : **6000** kVA

$\cos \varphi$ : **0.80**

Rating

p.f.

Spannung  $U_N$ : **10.00** kV

Strom  $I_N$ : **346** A

Voltage

Current

Frequenz f: **50** Hz

Drehzahl n: **750** min<sup>-1</sup>

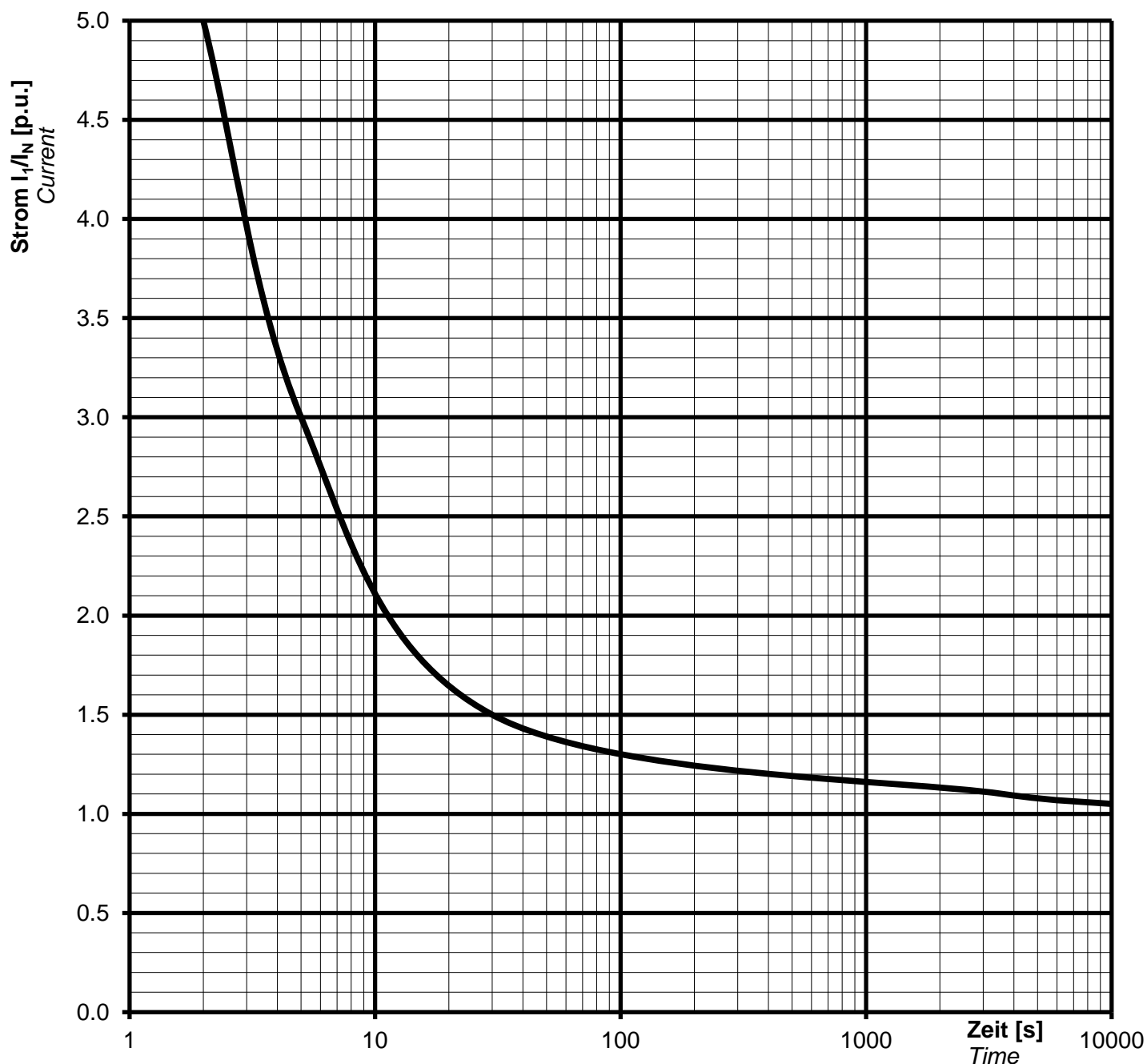
Frequency

Speed

Schutzart **IP23**

Protection

#### Überlast Kennlinie Overload capability



#### Notizen / remarks:

Strom / Zeit Kriterien:

$$(I / I_N)^2 \cdot t = 45s$$

Current/time characteristics:

1,5 \*  $I_N$  for 30 s

1,1 \*  $I_N$  for 1 h in 6h

#### Nennwerten / nominal data

DIG 156 p/8

Rating  $S_N$ : **6000 kVA**

*p.f.* **0.80**

*Bemessungsleistung*

Leistungsfaktor  $\cos \varphi$ :

Nominal voltage  $U_N$ : **10.00 kV**

Nominal current  $I_N$ : **346 A**

*Bemessungsspannung*

*Bemessungsstrom*

Frequency  $f_N$ : **50 Hz**

Speed  $n$ : **750 min<sup>-1</sup>**

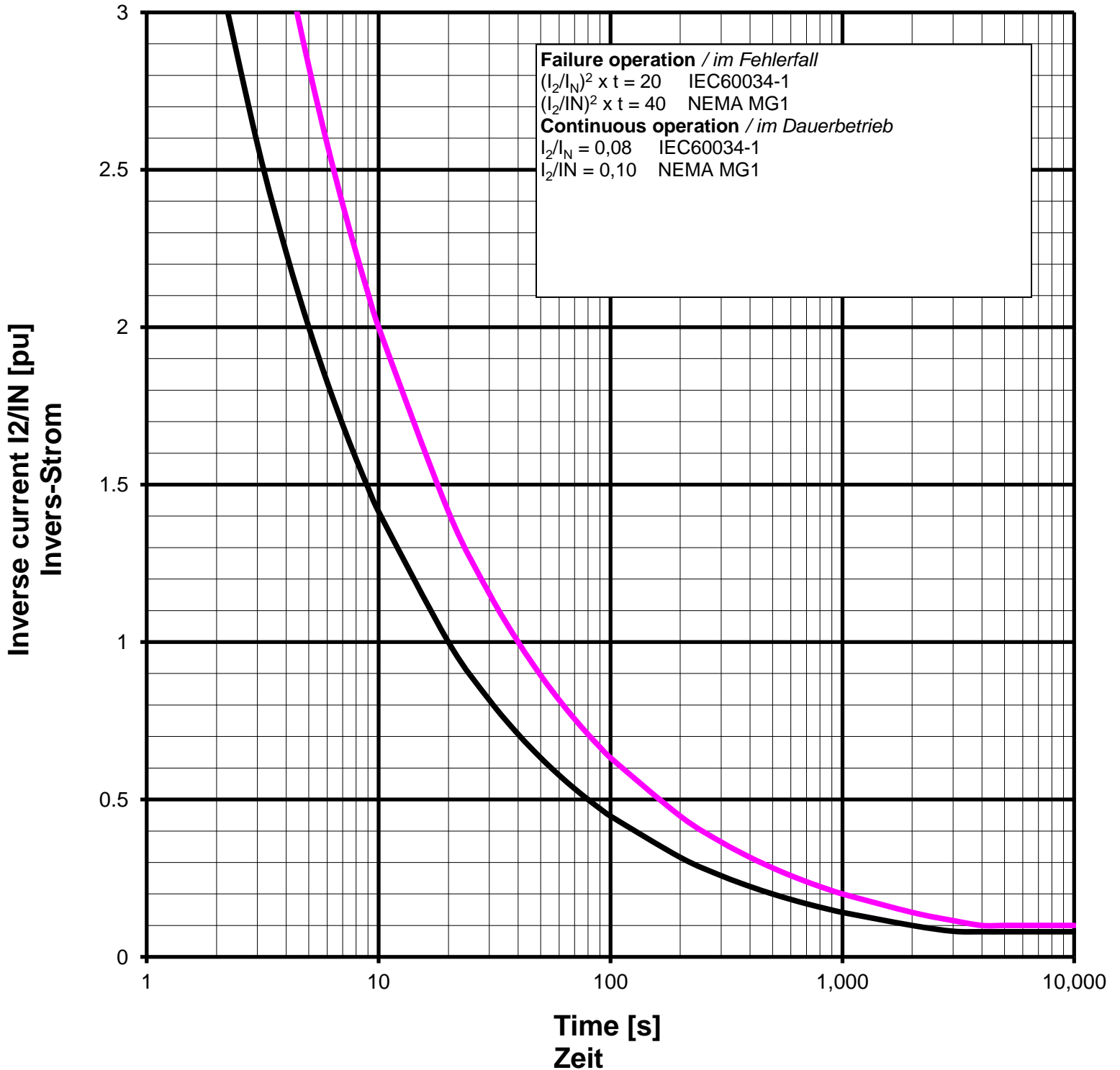
*Frequenz*

*Drehzahl*

Protection: **IP23**

*Schutzart*

#### Inverse current or unbalanced negative sequence current



Remarks / Notizen:



Technische Daten selbstregelnden Drehstrom-Synchrongenerator  
technical data for self regulating three phase alternator

ING-FCD-0112

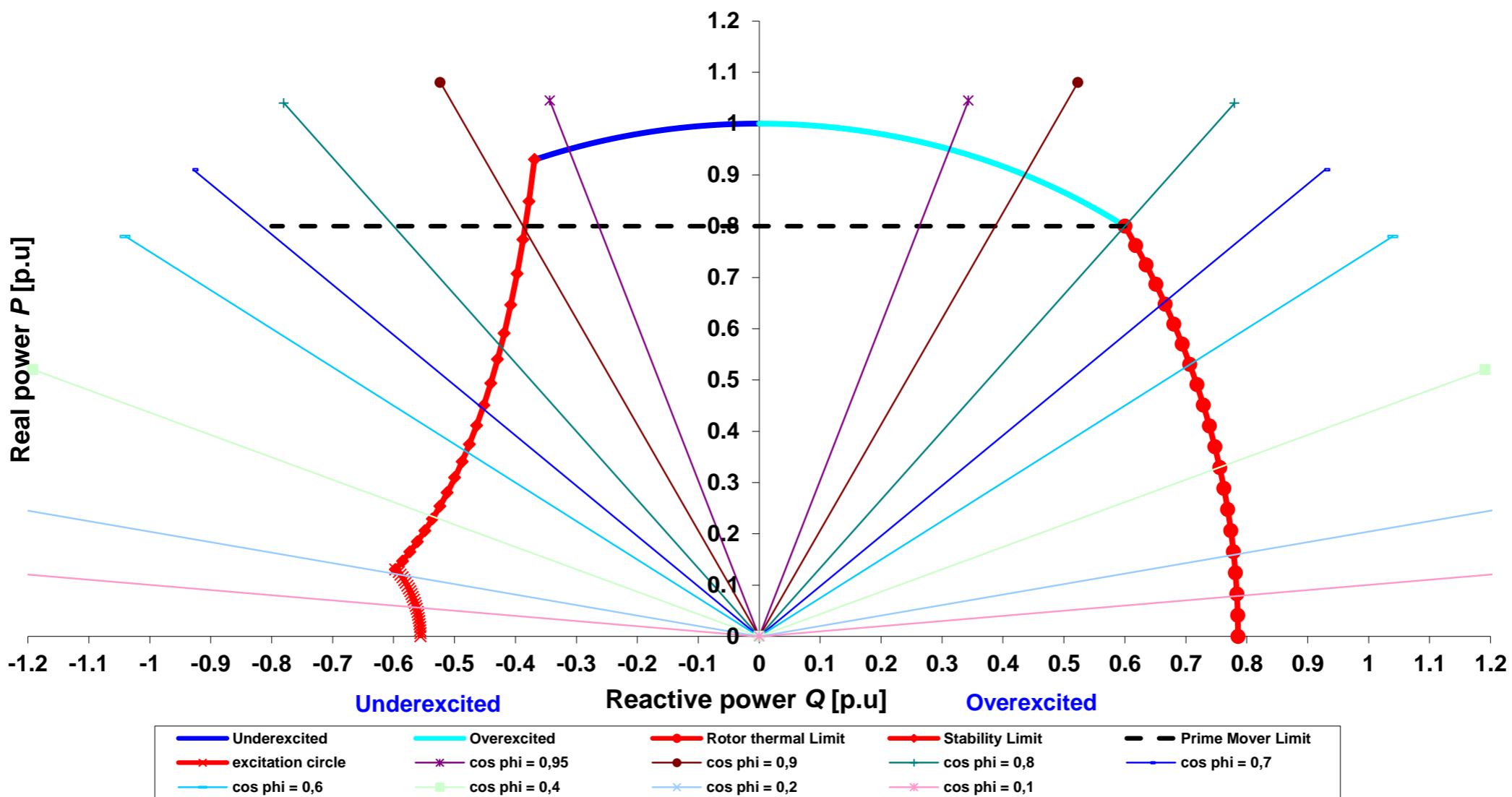
TYPE

DIG 156 p/8

Projekt:

Order Nr.:

### Capability (P-Q) Diagram



Cummins Generator Technologies

Datum / date:

21/01/2014



TYPE

DIG 156 p/8

Projekt:

Order Nr.:

