



## Technical Data Sheet for AvK-Alternators

FM 7.3-5

|              |                        |                |                        |
|--------------|------------------------|----------------|------------------------|
| Date:        | 02/10/13               | Customer:      | GENERIC DATASHEET only |
| Project No.: | GENERIC DATASHEET only | AvK Reference: | DSG099L1_8_60_480      |

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

|   |                                  |                   |                     |                         |        |
|---|----------------------------------|-------------------|---------------------|-------------------------|--------|
| <b>Generator data:</b>  |                                  |                   |                     |                         |        |
| Generator:  | DSG 99 L1/8                      | Poles:            | 8                   | Standards: IEC 60034    |        |
| Rated power:  | 2850 kVA                         | 2280 kWe          | 2385 kWm            |                         |        |
| Power factor:   | 0.80                             |                   |                     |                         |        |
| Power at pf 1,0   | 2313 kVA                         | 2313 kWe          | 2385 kWm            |                         |        |
| Rated voltage:  | 0.48 kV                          |                   |                     |                         |        |
| Speed:  | 900 1/min                        |                   |                     |                         |        |
| Frequency:  | 60 Hz                            |                   |                     |                         |        |
| Rated current:  | 3428.0 A                         |                   |                     |                         |        |
| Voltage range / frequency range:<br>Zone A according IEC 60034-1 (dU = +/-5%, df = +/-2%) |                                  |                   |                     |                         |        |
| Winding pitch:  | ca. 5/6                          |                   |                     |                         |        |
| Insulation class:   | Stator: Class H                  | Rotor: Class H    | Temperature rise: H |                         |        |
| 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.: | 3.0 m³/s            | Cooling water quantity: | n/a    |
| Moment of inertia (I):  | 235 kgm²                         | Weight:           | 7400 Kg             | Losses (environment):   | 105 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                   | 95,38 | 95,6 | 95,9  | 95,75 | 94,35 |
| Power factor 0.9                   | 96,12 | 96,3 | 96,45 | 96,2  | 94,65 |
| Power factor 1.0                   | 96,85 | 97   | 97    | 96,65 | 94,95 |

|                                      |             |            |           |       |                 |             |         |            |           |
|--------------------------------------|-------------|------------|-----------|-------|-----------------|-------------|---------|------------|-----------|
| <b>Reactances and time constants</b> |             |            |           |       |                 |             |         |            |           |
|                                      | unsaturated |            | saturated |       |                 | unsaturated |         | saturated  |           |
| $X_d$                                | 2.05        | 1.85 p.u.  | $X_q$     | 1.02  | 1.00 p.u.       | $T_{d0'}$   | 2.2 s   | $T_{d0''}$ | 0.03062 s |
| $X_d'$                               | 0.310       | 0.310 p.u. | $X_q'$    | 1.02  | 1.00 p.u.       | $T_d'$      | 0.33 s  | $T_{q0'}$  | 0.32 s    |
| $X_d''$                              | 0.178       | 0.162 p.u. | $X_q''$   | 0.178 | 0.178 p.u.      | $T_d''$     | 0.016 s | $T_{q0''}$ | 0.18337 s |
| $X_2$                                | 0.187       | 0.170 p.u. | $X_0$     | 0.054 | 0.049 p.u.      | $T_a$       | 0.045 s | $T_{q1'}$  | 0.32 s    |
| $X_{1s}$                             | n.a.        | 0.097 p.u. |           |       |                 |             |         | $T_{q1''}$ | 0.032 s   |
| Short circuit ratio saturated: 0.54  |             |            |           |       | $Z_n$ 0.081 Ohm |             |         |            |           |

|  |          |           |  |
|--|----------|-----------|--|
| <b>Short circuit data:</b>               |          |           |  |
| Initial short circuit current (3-phase): | $I_k'$   | 21161 A   |  |
| Max. peak current (3-phase):             | $I_s$    | 53867 A   |  |
| Sustained short circuit current:         | $I_k$    | 10284 A   | Minimum 3 x rated current for max.10 s |
| Initial short circuit torque:            | $M_k2$   | 242.7 kNm |  |
|  | $M_k3$   | 145.6 kNm |  |
| Max. faulty synchron moment:             | $M_f$    | 521.8 kNm |  |
| Rated kVA torque:                        | $M_{SN}$ | 30.24 kNm |  |
| Rated torque                             | $M_N$    | 24.19 kNm |  |
| Shaft torque                             | $M_{Sh}$ | 25.30 kNm |  |

|   |   |
|---|---|
| <b>Load application:</b>  |   |
| max. load application: 1379 kVA (corresponds to 48,39 % from 2850 kVA) for Power factor 0.4<br>15% transient voltage drop | Power: 2850 kVA<br>Power factor: 0.8<br>transient voltage drop: -23.7 % |

**Remarks:**

**Alternator :** DSG 99 L1/8

Rated output [kVA]

2850

Rated power factor:

0.8

Rated voltage [kV]: 0.48

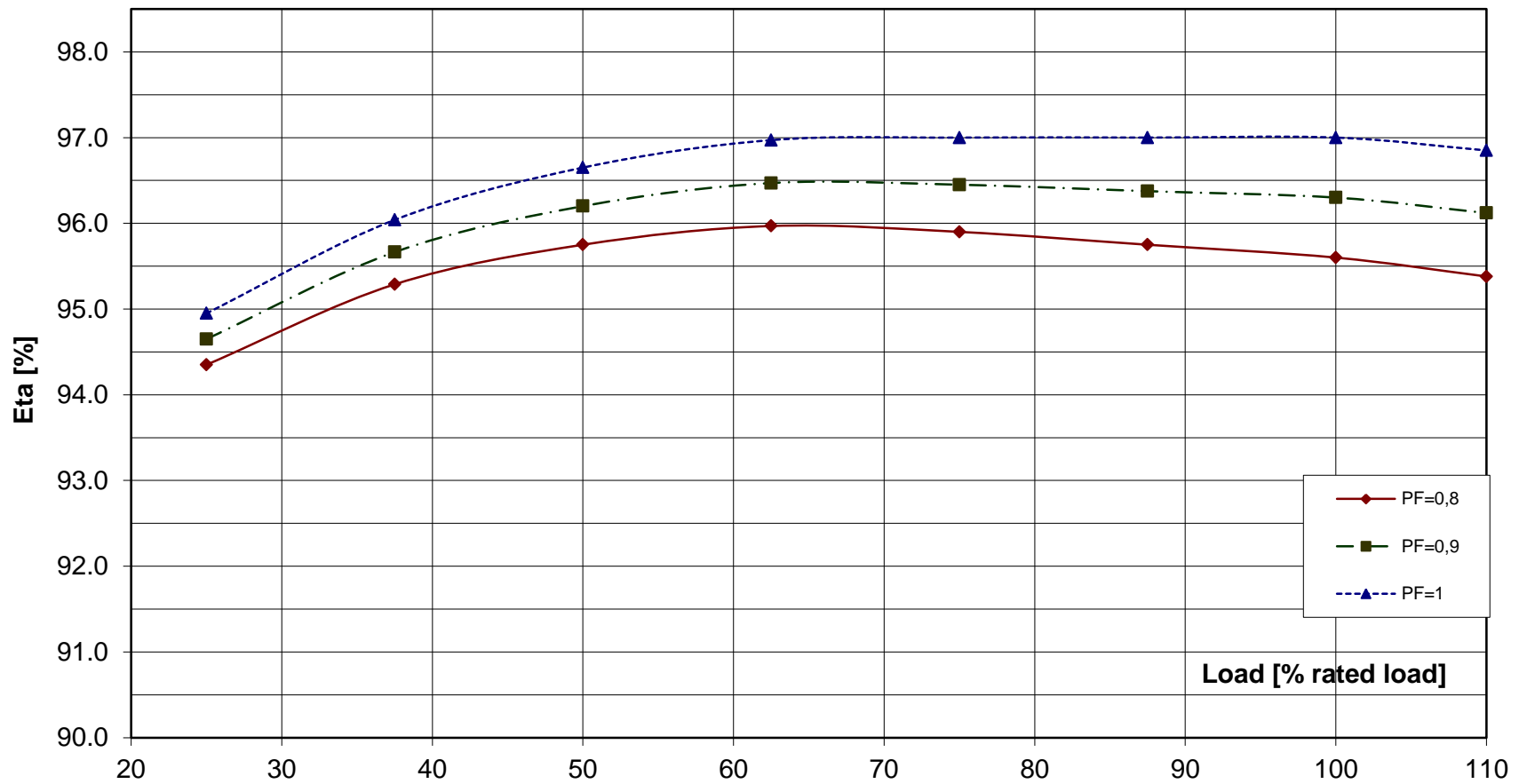
Rated frequency [Hz]

60

Rated speed [rpm]

900

### Wirkungsgrad-Kennlinie - Efficiency Curve



**Alternator : DSG 99 L1/8**

Rated output [kVA]

2850

Rated power factor:

0.8

Rated voltage [kV]: 0.48

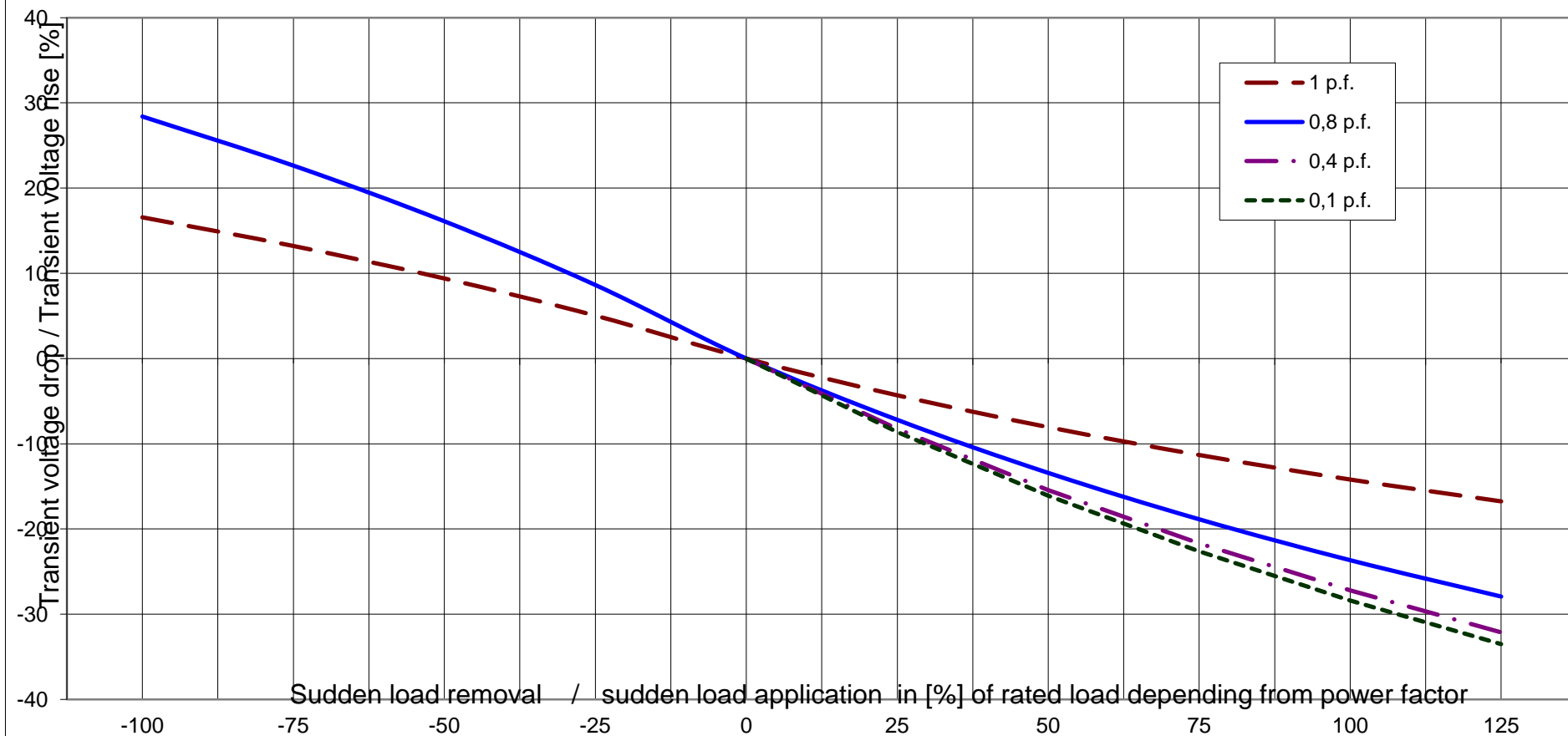
Rated frequency [Hz]

60

Rated speed [rpm]

900

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





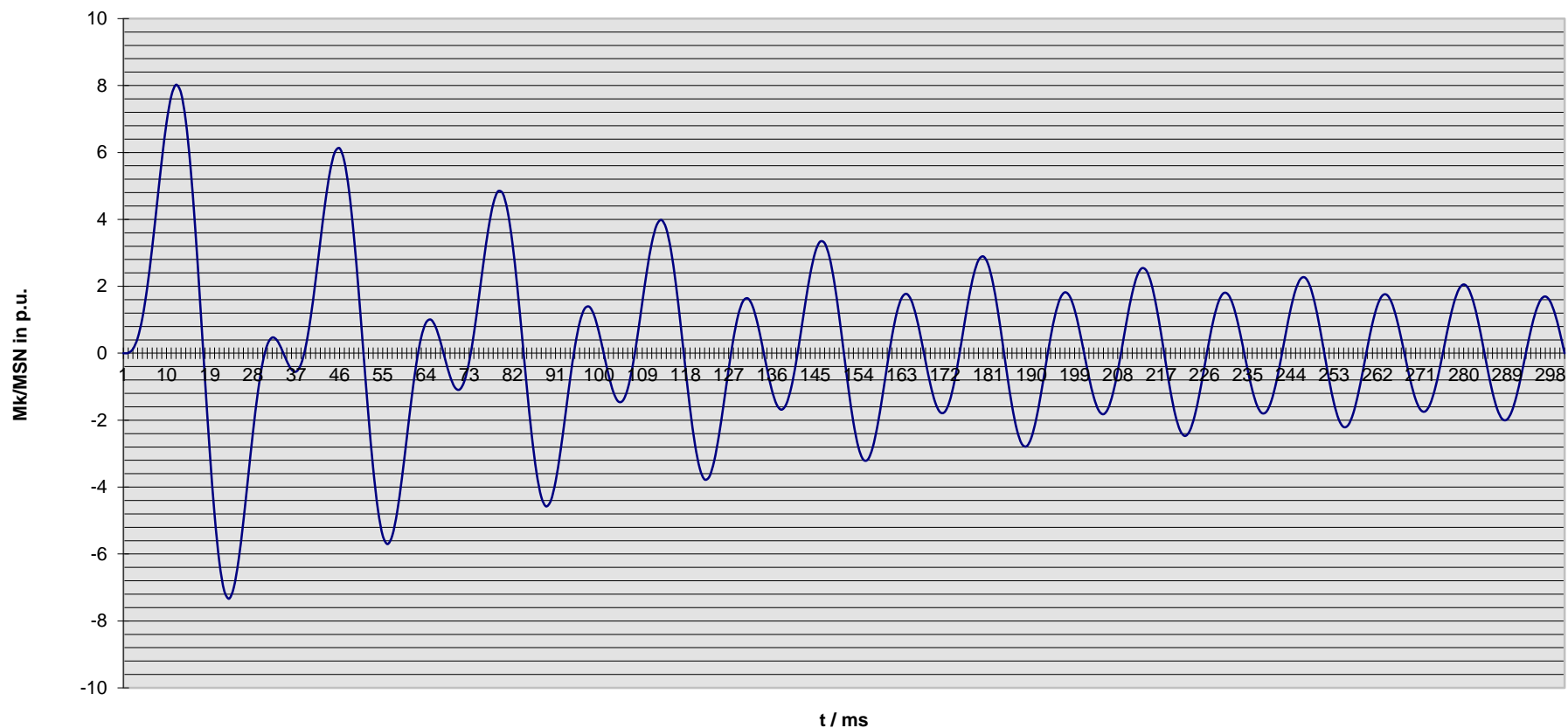
Technisches Datenblatt - Diagramme  
Technical data sheet - Diagrams

**ING-FCD-0112**

**Alternator : DSG 99 L1/8**

|                      |      |                     |     |                     |           |
|----------------------|------|---------------------|-----|---------------------|-----------|
| Rated output [kVA]   | 2850 | Rated power factor: | 0.8 | Rated voltage [kV]: | 0.48      |
| Rated frequency [Hz] | 60   | Rated speed [rpm]   | 900 | MSN related to kVA: | 30.24 KNm |

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



#### Nennenden / nominal data

DSG 99 L1/8

Leistung  $S_N$ : **2850** kVA

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

*Rating*

*p.f.*

Spannung  $U_N$ : **0.48** kV

Strom  $I_N$ : **3428** A

*Voltage*

*Current*

Frequenz  $f$ : **60** Hz

Drehzahl  $n$ : **900** min<sup>-1</sup>

*Frequency*

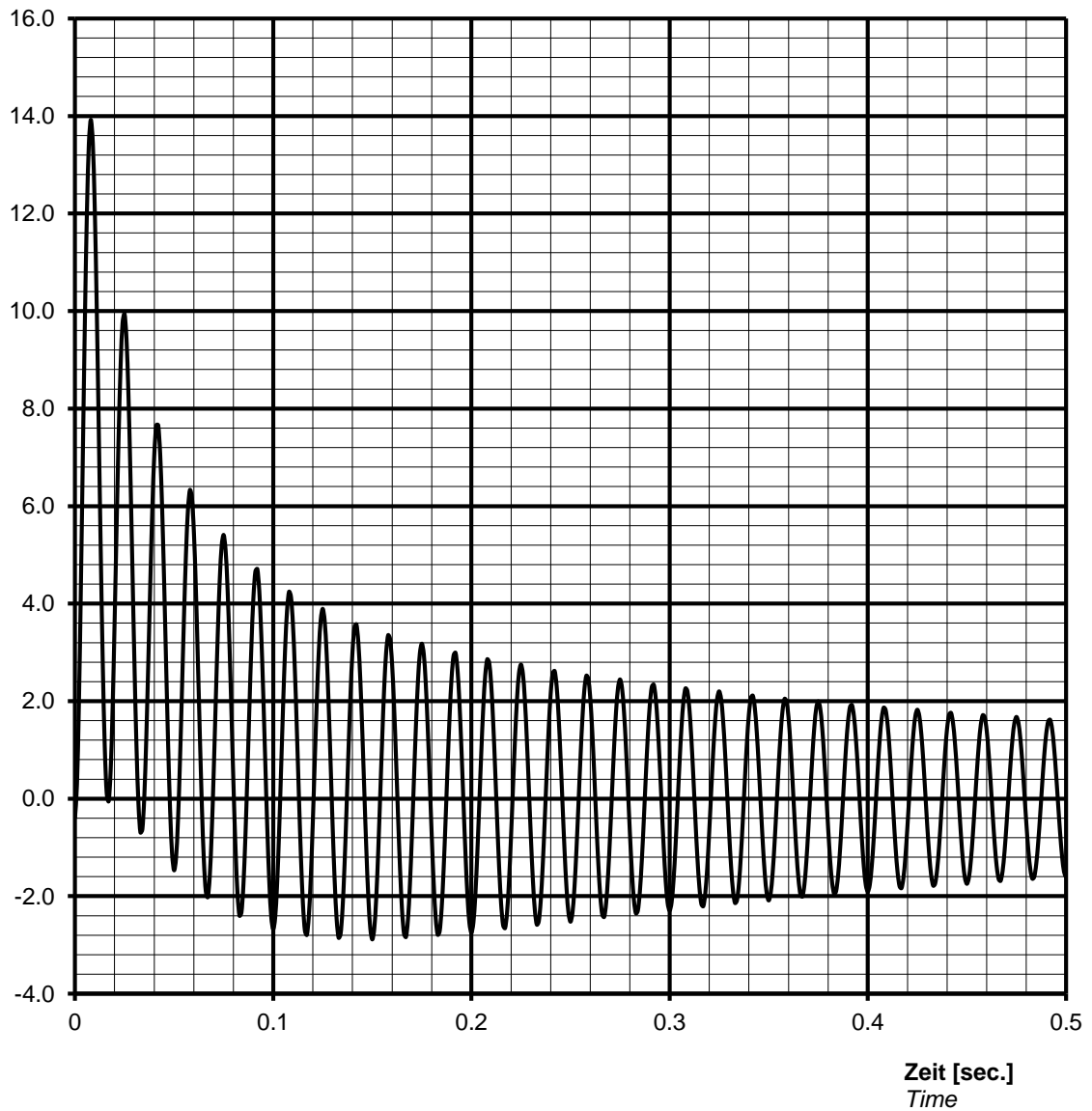
*Speed*

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

$I_{\text{speak}} =$  **47731** A or **13.92** p.u.

**Nenndaten / nominal data**

**DSG 99 L1/8**

Leistung  $S_N$ : **2850** kVA

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

Rating

p.f.

Spannung  $U_N$ : **0.48** kV

Strom  $I_N$ : **3428** A

Voltage

Current

Frequenz f: **60** Hz

Drehzahl n: **900** min<sup>-1</sup>

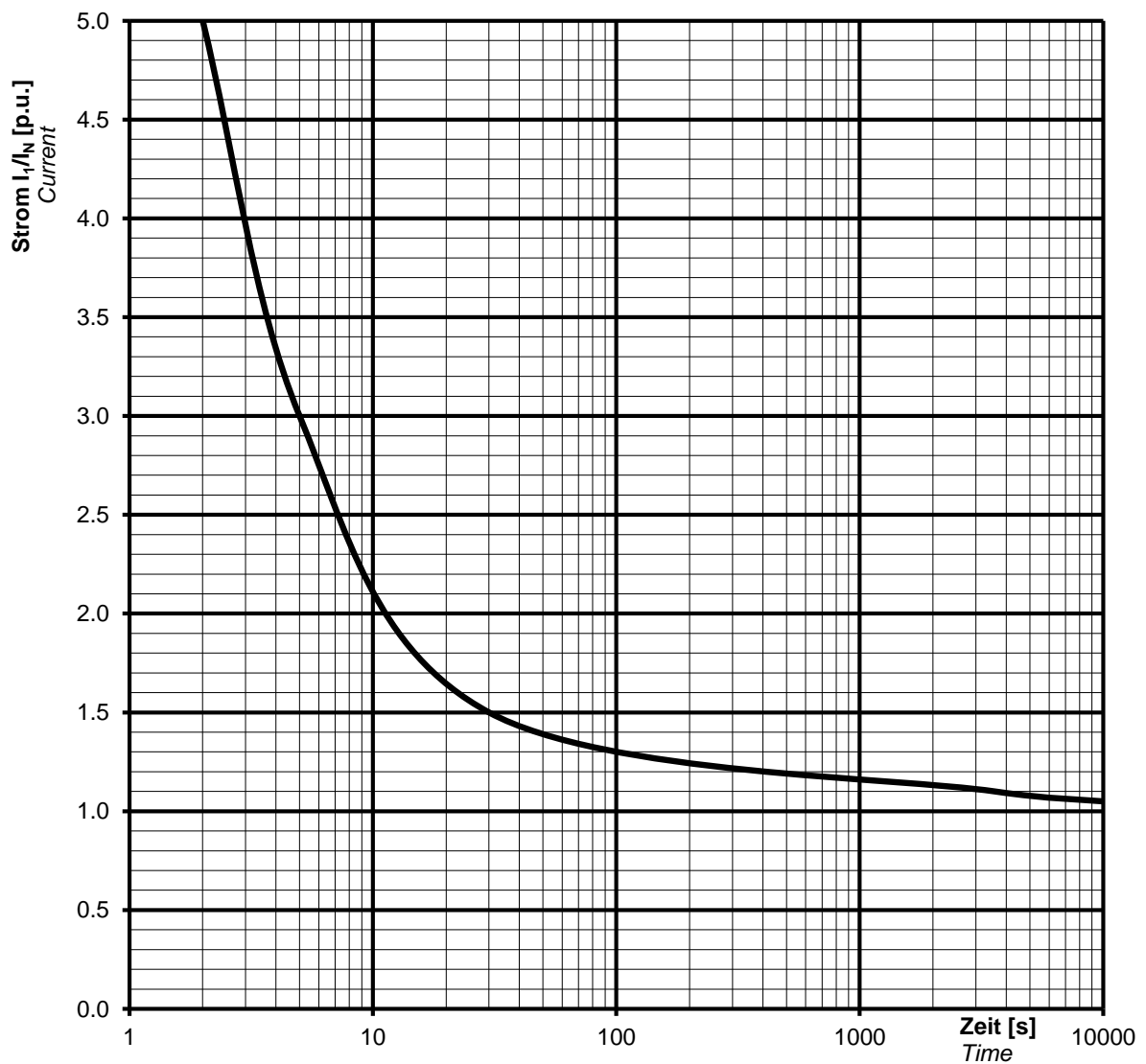
Frequency

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

#### Nennenden / nominal data

**DSG 99 L1/8**

Rating  $S_N$ : **2850 kVA**

*p.f.* **0.80**

*Bemessungsleistung*

Leistungsfaktor  $\cos \varphi$ :

Nominal voltage  $U_N$ : **0.48 kV**

Nominal current  $I_N$ : **3428 A**

*Bemessungsspannung*

*Bemessungsstrom*

Frequency  $f_N$ : **60 Hz**

Speed  $n$ : **900 min<sup>-1</sup>**

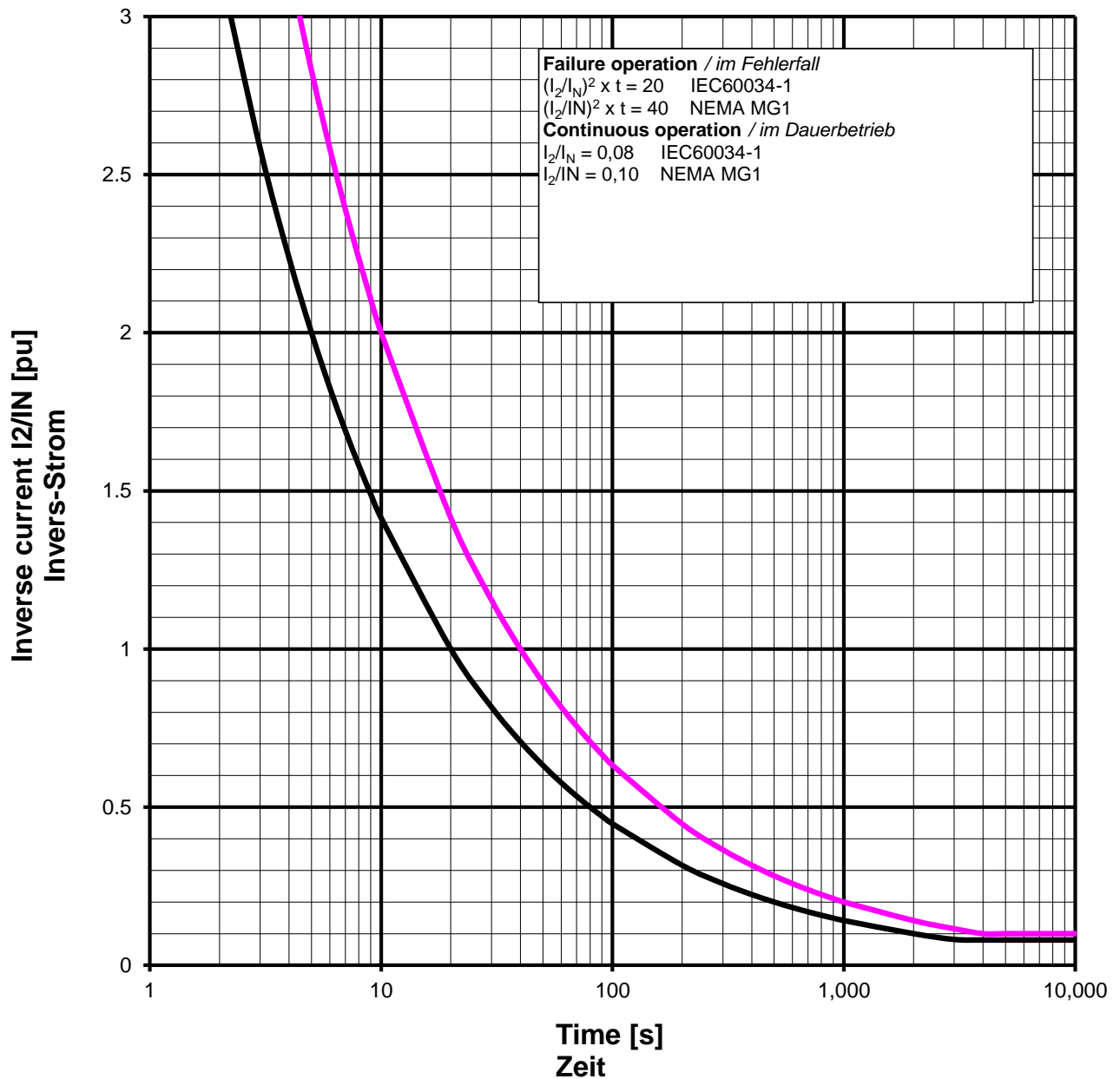
*Frequenz*

*Drehzahl*

Protection: **IP23**

*Schutzart*

#### Inverse current or unbalanced negative sequence current



Remarks / Notizen:

*All data according IEC 60034-1, NEMA MG1*



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

ING-FCD-0112

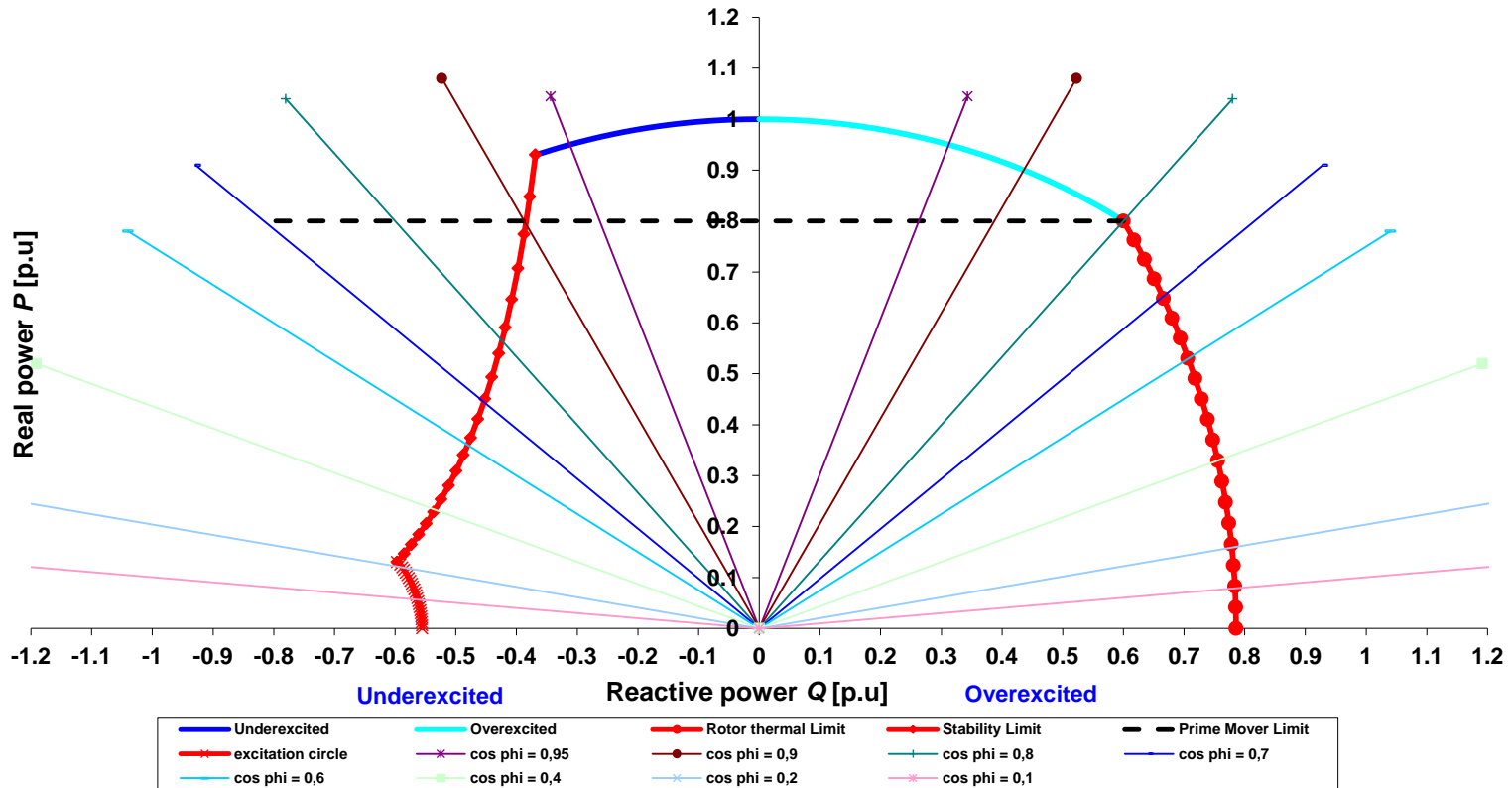
TYPE

DSG 99 L1/8

Projekt:

Order Nr.:

### Capability (P-Q) Diagram



Cummins Generator Technologies

Datum / date:

03/10/2013





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

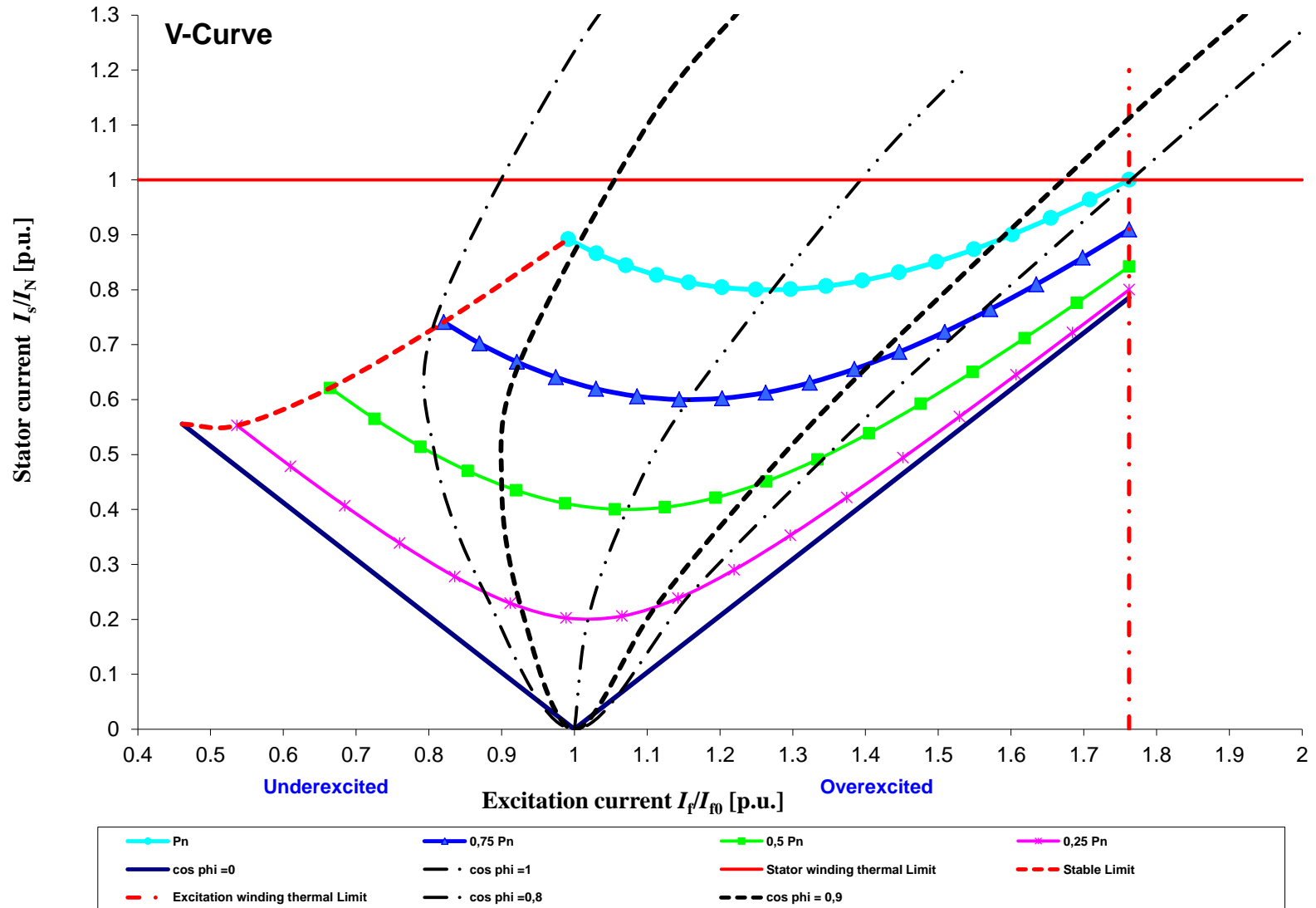
ING-FCD-0112

TYPE

DSG 99 L1/8

Projekt:

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