

**Technical Data Sheet for AvK-Alternators**

FM 7.3-5

|              |          |                |                        |
|--------------|----------|----------------|------------------------|
| Date:        | 17/10/13 | Customer:      | GENERIC DATASHEET only |
| Project No.: |          | AvK Reference: | dig142m_4_60_4160      |

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

|                        |                                  |                   |              |   |           |
|------------------------|----------------------------------|-------------------|--------------|---|-----------|
| <b>Generator data:</b> |                                  |                   |              |   |           |
| Generator:             | DIG 150 m/6                      | Poles:            | 6            | Standards:  | IEC 60034 |
| Rated power:           | 5750 kVA                         | 4600 kWe          | 4737 kWm     |   |           |
| Power factor:          | 0.80                             |                   |              |   |           |
| Power at pf 1,0        | 4633 kVA                         | 4633 kWe          | 4737 kWm     |   |           |
| Rated voltage:         | 4.16 kV                          |                   |              |   |           |
| Speed:                 | 1200 1/min                       |                   |              |   |           |
| Frequency:             | 60 Hz                            |                   |              | Voltage range / frequency range:                      |           |
| Rated current:         | 798.0 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.: | 4.2 m³/s     | Cooling water quantity:                               | n/a       |
| Moment of inertia (I): | 448 kgm²                         | Weight:           | 14200 Kg     | Losses (environment):                                 | 137 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    | 96,5 | 94,3  |
| Power factor 0.9                   | 97,32 | 97,45 | 97,28 | 96,7 | 94,55 |
| Power factor 1.0                   | 97,69 | 97,8  | 97,55 | 96,9 | 94,8  |

|                                      |             |       |           |                  |                          |             |      |                  |        |                   |           |
|--------------------------------------|-------------|-------|-----------|------------------|--------------------------|-------------|------|------------------|--------|-------------------|-----------|
| <b>Reactances and time constants</b> |             |       |           |                  |                          |             |      |                  |        |                   |           |
|                                      | unsaturated |       | saturated |                  |                          | unsaturated |      | saturated        |        |                   |           |
| X <sub>d</sub>                       | 1.75        | 1.58  | p.u.      | X <sub>q</sub>   | 0.88                     | 0.86        | p.u. | T <sub>d0'</sub> | 3.1 s  | T <sub>d0''</sub> | 0.03068 s |
| X <sub>d'</sub>                      | 0.270       | 0.270 | p.u.      | X <sub>q'</sub>  | 0.88                     | 0.86        | p.u. | T <sub>d'</sub>  | 0.48 s | T <sub>q0'</sub>  | 0.4 s     |
| X <sub>d''</sub>                     | 0.194       | 0.176 | p.u.      | X <sub>q''</sub> | 0.194                    | 0.194       | p.u. | T <sub>d''</sub> | 0.02 s | T <sub>q0''</sub> | 0.18144 s |
| X <sub>2</sub>                       | 0.204       | 0.185 | p.u.      | X <sub>0</sub>   | 0.058                    | 0.053       | p.u. | T <sub>a</sub>   | 0.08 s | T <sub>q'</sub>   | 0.4 s     |
| X <sub>1s</sub>                      | n.a.        | 0.106 | p.u.      |                  |                          |             |      |                  |        | T <sub>q''</sub>  | 0.04 s    |
| Short circuit ratio saturated: 0.63  |             |       |           |                  | Z <sub>n</sub> 3.010 Ohm |             |      |                  |        |                   |           |

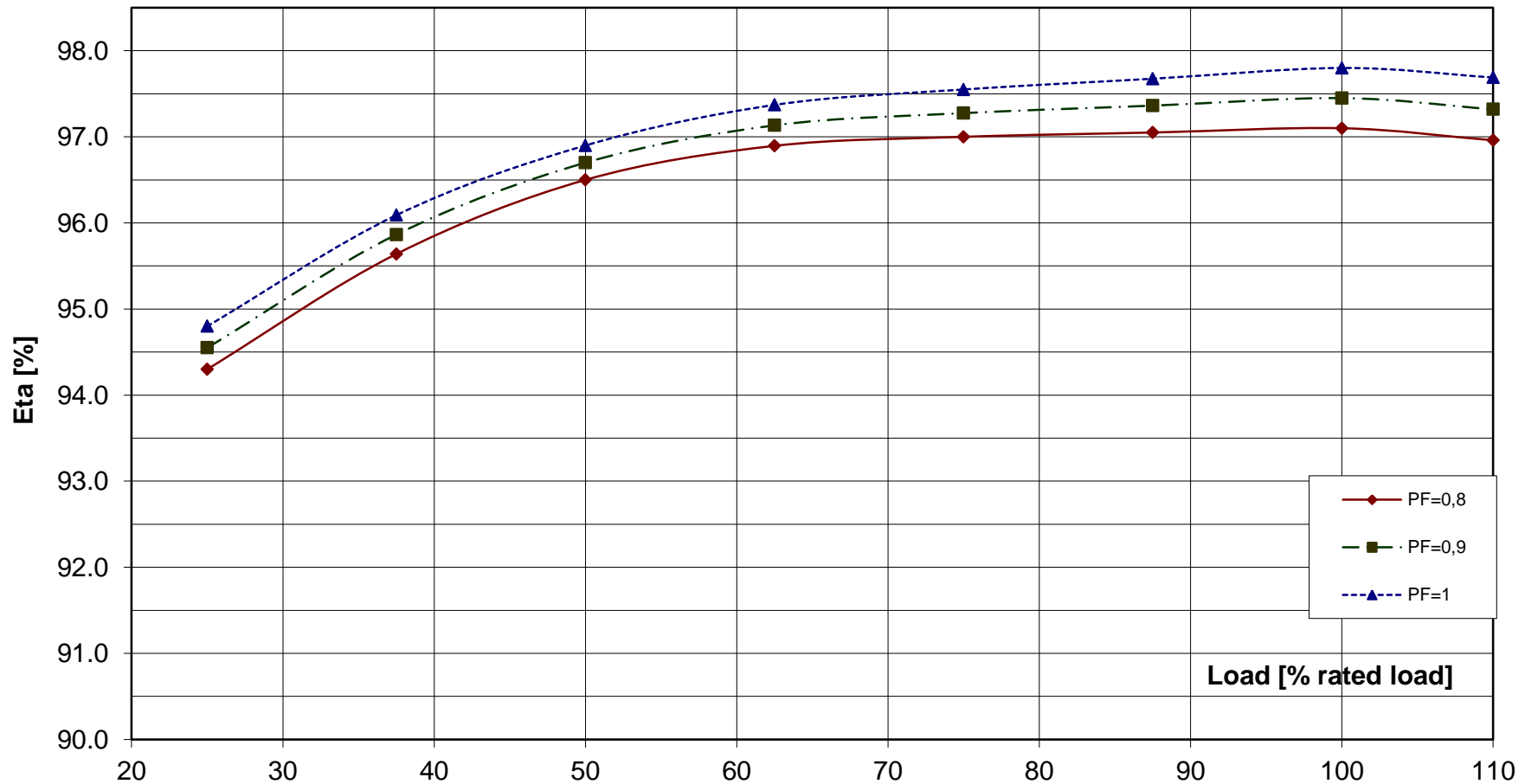
|  |                  |  |
|--|------------------|--|
| <b>Short circuit data:</b>               |                  |  |
| Initial short circuit current (3-phase): | I <sub>k''</sub> | 4534 A                                 |
| Max. peak current (3-phase):             | I <sub>s</sub>   | 11542 A                                |
| Sustained short circuit current:         | I <sub>k</sub>   | 2394 A                                 |
|  |                  | Minimum 3 x rated current for max.10 s |
| Initial short circuit torque:            | M <sub>k2</sub>  | 338.0 kNm                              |
|  | M <sub>k3</sub>  | 202.8 kNm                              |
| Max. faulty synchron moment:             | M <sub>f</sub>   | 726.7 kNm                              |
| Rated kVA torque:                        | M <sub>SN</sub>  | 45.76 kNm                              |
| Rated torque                             | M <sub>N</sub>   | 36.61 kNm                              |
| Shaft torque                             | M <sub>Sh</sub>  | 37.70 kNm                              |

|   |   |
|---|---|
| <b>Load application:</b>  |   |
| max. load application: 3194 kVA (corresponds to 55,55 % from 5750 kVA) for Power factor 0.4<br>15% transient voltage drop | Power: 5750 kVA<br>Power factor: 0.8<br>transient voltage drop: -21.3 % |

**Remarks:**

|                      |                    |                     |      |                          |
|----------------------|--------------------|---------------------|------|--------------------------|
| <b>Alternator :</b>  | <b>DIG 150 m/6</b> |                     |      |                          |
| Rated output [kVA]   | 5750               | Rated power factor: | 0.8  | Rated voltage [kV]: 4.16 |
| Rated frequency [Hz] | 60                 | Rated speed [rpm]   | 1200 |                          |

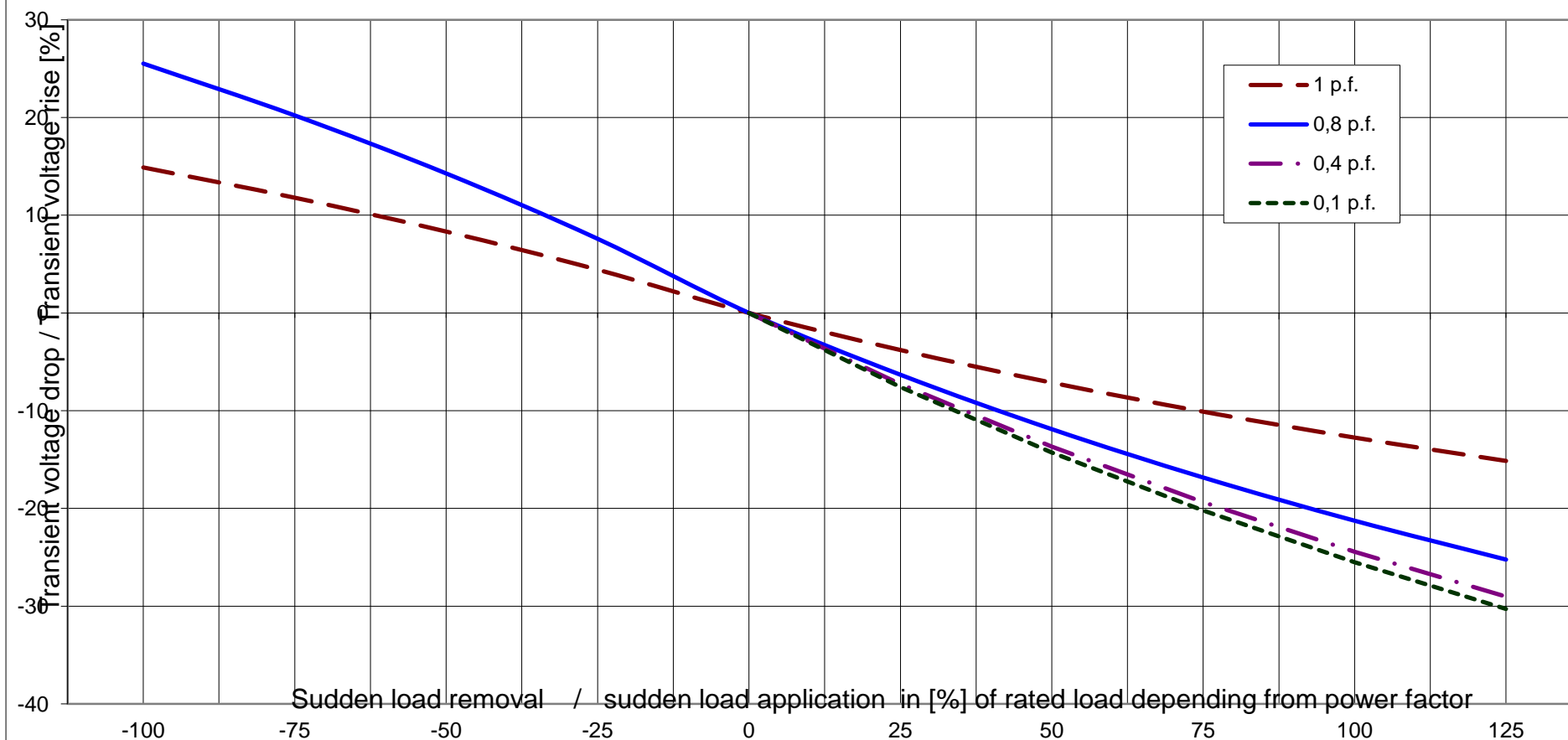
### Wirkungsgrad-Kennlinie - Efficiency Curve



**Alternator : DIG 150 m/6**

|                      |      |                     |      |                     |      |
|----------------------|------|---------------------|------|---------------------|------|
| Rated output [kVA]   | 5750 | Rated power factor: | 0.8  | Rated voltage [kV]: | 4.16 |
| Rated frequency [Hz] | 60   | Rated speed [rpm]   | 1200 |                     |      |

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



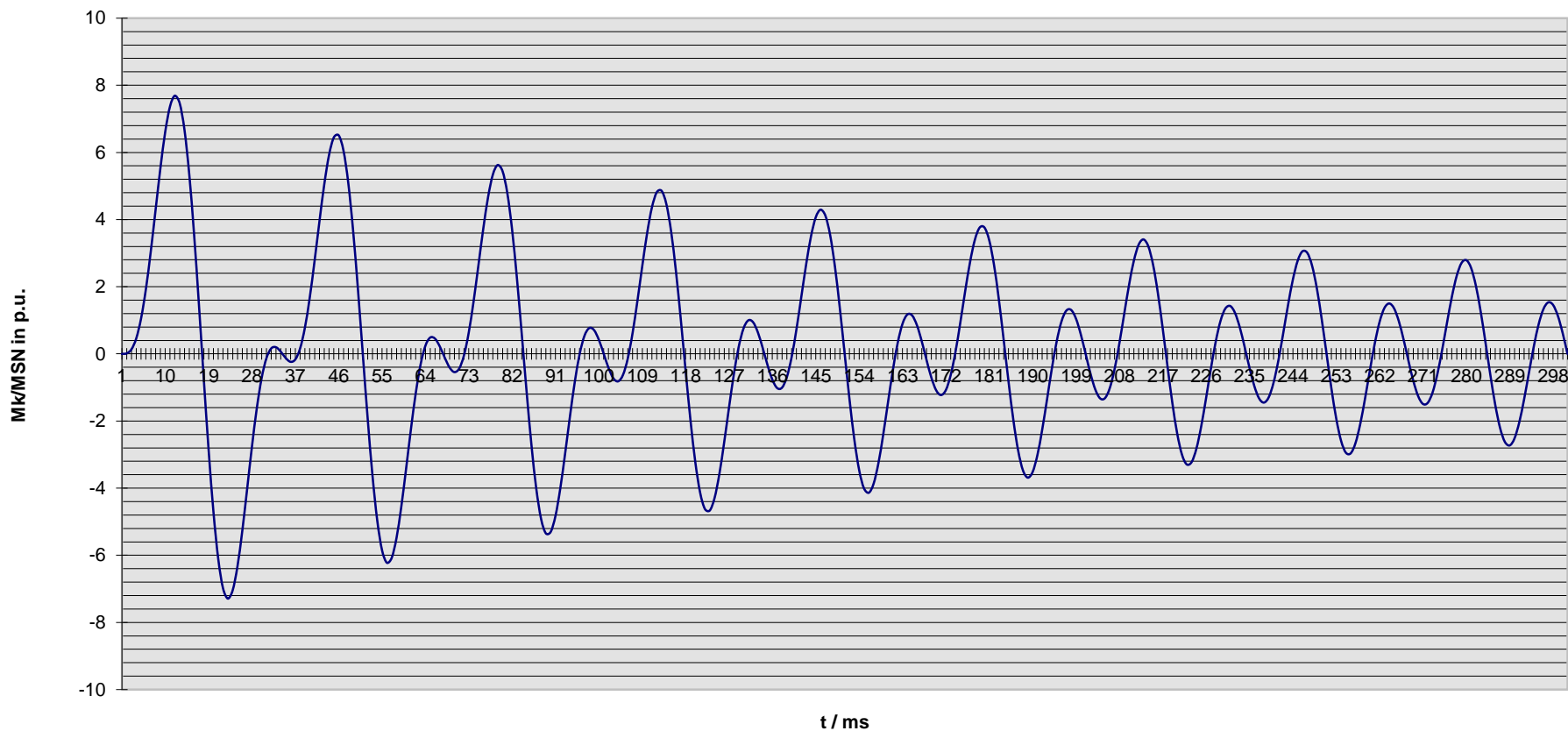


Technisches Datenblatt - Diagramme  
Technical data sheet - Diagrams

ING-FCD-0112

|                      |                    |                     |      |                               |
|----------------------|--------------------|---------------------|------|-------------------------------|
| <b>Alternator :</b>  | <b>DIG 150 m/6</b> |                     |      |                               |
| Rated output [kVA]   | 5750               | Rated power factor: | 0.8  | Rated voltage [kV]: 4.16      |
| Rated frequency [Hz] | 60                 | Rated speed [rpm]   | 1200 | MSN related to kVA: 45.76 KNm |

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



**Nenndaten / nominal data**

**DIG 150 m/6**

Leistung  $S_N$ : **5750 kVA**

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

*Rating*

*p.f.*

Spannung  $U_N$ : **4.16 kV**

Strom  $I_N$ : **798 A**

*Voltage*

*Current*

Frequenz  $f$ : **60 Hz**

Drehzahl  $n$ : **1,200 min<sup>-1</sup>**

*Frequency*

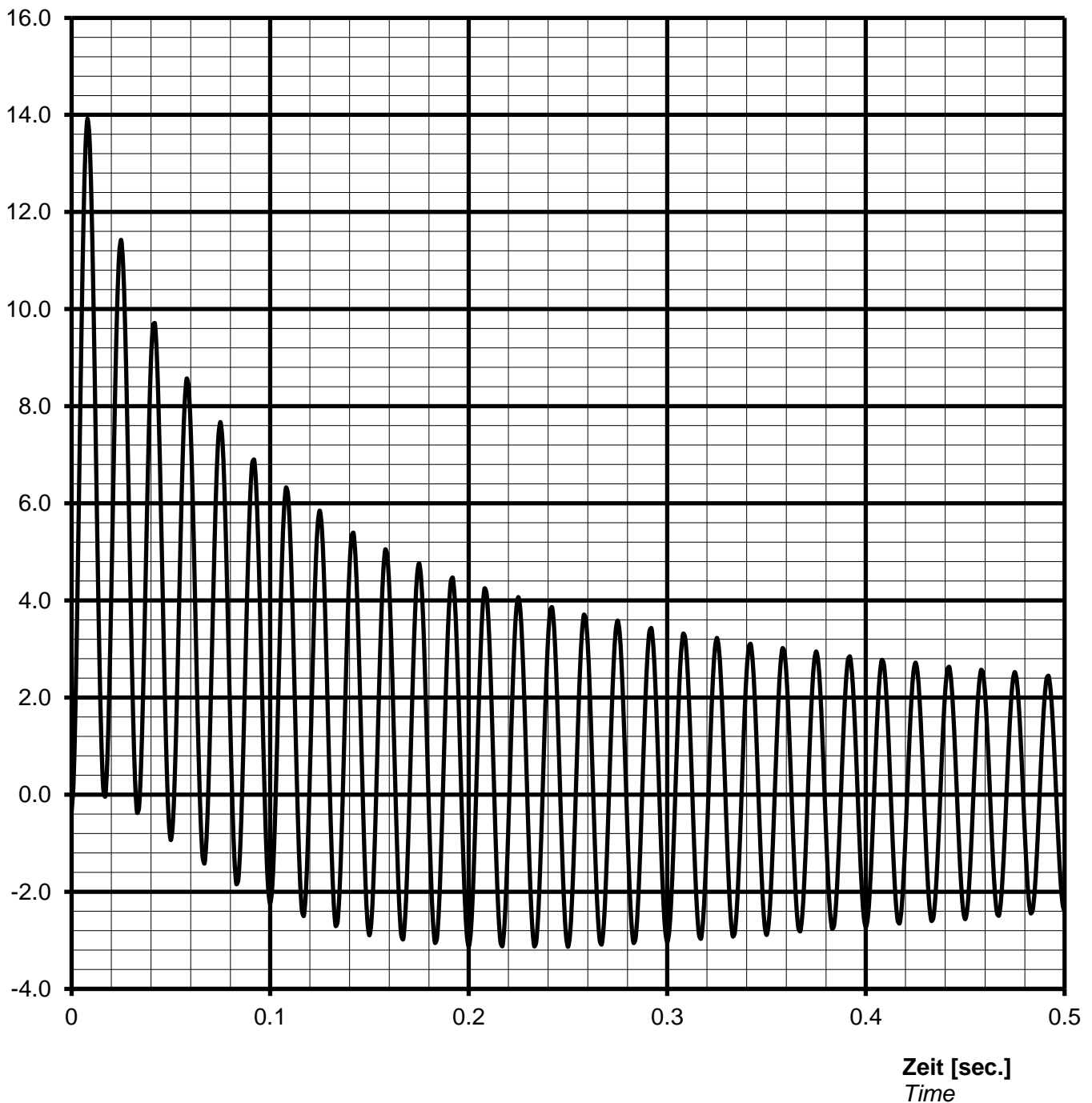
*Speed*

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**  $I_{\text{peak}} =$  **11108 A** or **13.92 p.u.**

#### Nennwerten / nominal data

DIG 150 m/6

Leistung  $S_N$ : **5750 kVA**

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

Rating

p.f.

Spannung  $U_N$ : **4.16 kV**

Strom  $I_N$ : **798 A**

Voltage

Current

Frequenz f: **60 Hz**

Drehzahl n: **1200 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 150 m/6

Rating  $S_N$ : **5750 kVA**

*p.f.* **0.80**

*Bemessungsleistung*

Leistungsfaktor  $\cos \varphi$ :

Nominal voltage  $U_N$ : **4.16 kV**

Nominal current  $I_N$ : **798 A**

*Bemessungsspannung*

*Bemessungsstrom*

Frequency  $f_N$ : **60 Hz**

Speed  $n$ : **1200 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

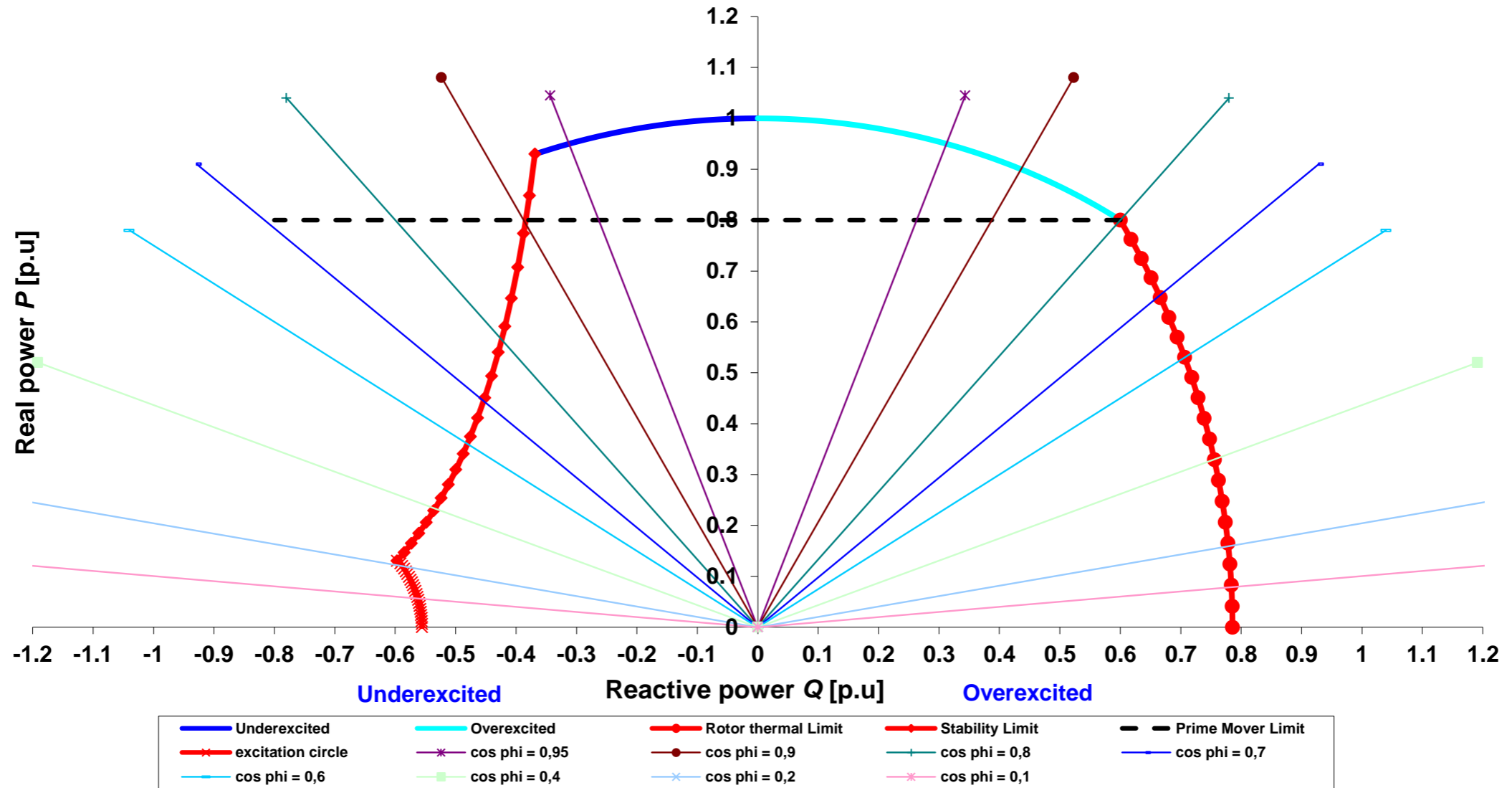
TYPE

DIG 150 m/6

Projekt:

Order Nr.:

### Capability (P-Q) Diagram



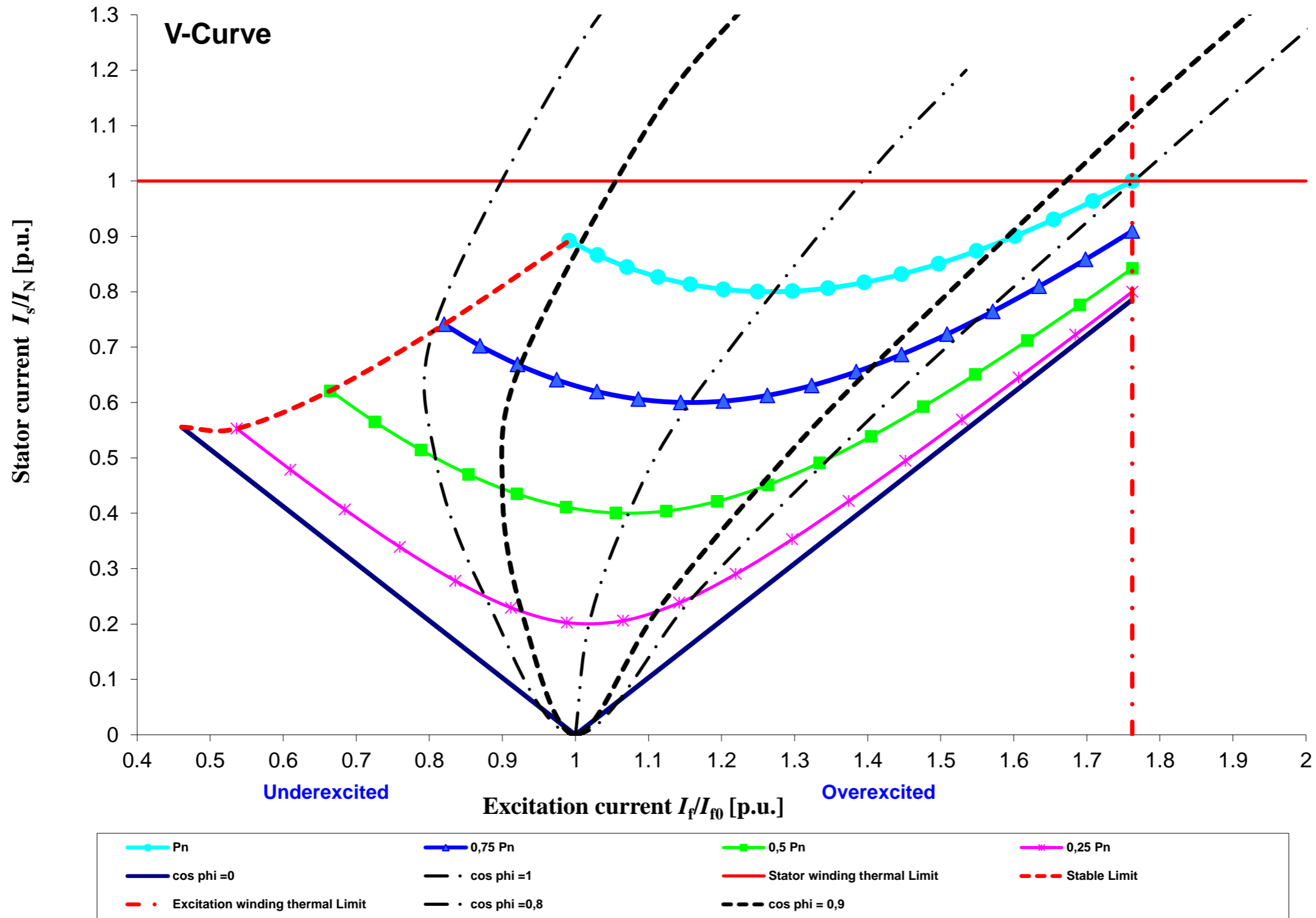
Cummins Generator Technologies

Datum / date:

17/10/2013



|      |             |          |  |            |  |
|------|-------------|----------|--|------------|--|
| TYPE | DIG 150 m/6 | Projekt: |  | Order Nr.: |  |
|------|-------------|----------|--|------------|--|



|                                |               |  |
|--------------------------------|---------------|--|
| Cummins Generator Technologies | Datum / date: |  |
|                                | 17/10/2013    |  |