

Data Sheet no. 1.22/4

Tuneable Modular Reactors of High Power, Types DERI...M, G

Brief Description

The design of this type of reactors for series resonant systems is characterized by their cylindrical case consisting of a steel tube in the middle and fiberglass reinforced plastic (FRP) tubes at both ends (see dimensional drawing on the last page). Usually, up to three modular reactors are arranged one on top of each other, and are therefore described in this Data Sheet. On special request a larger number of modules can be connected in series.

The modules are arranged on a base frame (on request provided for air cushions) which includes an insulating support, because the lowest reactor is connected to an exciter transformer of an output voltage of up to 100 kV. The lower steel cover of each modular reactor is provided for the arrangement on the mentioned insulating support or on the top of a lower reactor module. The upper steel cover can carry the additional reactor(s) or the top electrode.

Modular reactors are designed with two HV coils on a horizontally arranged magnetic core consisting of two parts with exactly adjustable gaps in between. Therefore, one of the U-shaped core parts can be moved by a gear of high precision and an external drive via insulating rods. In this way, the inductance can be continuously varied in a ratio of 1:20. The core as well as the outer steel tube are connected to the middle potential between the two HV coils. The internal design of the windings, high-quality insulating oil, dielectric shields and the other components guarantee both, a very low PD level and the resistance against transient phenomena (overvoltage and overcurrent in case of breakdown of the test object).

The table on the next page contains the technical data of tuneable modular reactors. The mentioned duty cycle is related to rated current and voltage. For lower current longer duty cycles up to continuous operation can be applied. Continuous operation of up to 80 % of output voltage can also be guaranteed at related parameters on special request. In such cases depending on the requested parameters external radiators at the steel tube or external coolers (oil-air or oil-water) are applied. An optimum thermal utilization of the reactors at alternating load cycles can be reached by a temperature measurement at the steel tube.

The external design with top and control electrodes completes the described internal design and enables the extremely low PD levels at the connection point of the test object. There are special electrodes for the partial operation of the reactor cascade or for the parallel connection of reactors for higher current than given in the following table.

The low acoustic noise level of a single reactor of < 80 dB (A) at rated voltage is the result of the robust overall design, especially of that for the core adjustment. The acoustic noise level is measured in a distance of 4 m, according to the IEC Standard 60551: 1993.

Tuneable modular reactors are mainly provided for indoor operation. Temporary outdoor operation under fair weather conditions, e. g. for on-site testing, can be guaranteed (special all-weather outdoor reactors on request).

Technical Specifications

| rated voltage | rated current | rated power ¹⁾ | duty cycle ²⁾ | load range including basic load capacitor | | | | type | design group ³⁾ | number of reactors | weight of single reactor | | height of reactor | tube | electrode of reactor | height of cascade | top electrode | total weight |
|---------------|---------------|---------------------------|---------------------------------|---|---------------------|---------------------|---------------------|---------------------|----------------------------|--------------------|--------------------------|--------|-------------------|------|----------------------|-------------------|---------------|--------------|
| | | | | C _{min} nF | C _{max} nF | C _{min} nF | C _{max} nF | | | | kg | oil kg | H1 mm | d mm | D1 mm | H2 mm | D2 mm | |
| V kV | I A | P kVA _r | | 50 Hz | | 60 Hz | | | | | | | | | | | | |
| 250 | 30.0 | 7500 | 1 h ON 2 h OFF 3x per day | 19.10 | 382.0 | 15.92 | 318.3 | 1x DERI 7500 / 250 | M | 1 | 16000 | 5600 | 2990 | 2040 | 2470 | 4110 | 2470 | 17700 |
| 300 | 25.0 | | | 13.26 | 265.3 | 11.05 | 221.0 | 1x DERI 7500 / 300 | | | 19000 | | | | | | | |
| 350 | 21.4 | | | 9.74 | 194.9 | 8.12 | 162.4 | 1x DERI 7500 / 350 | | | | | | | | | | |
| 400 | 18.8 | | | 7.46 | 149.2 | 6.22 | 124.3 | 1x DERI 7500 / 400 | | | | | | | | | | |
| 500 | 30.0 | 15000 ⁵⁾ | 1 h ON 2 h OFF 3x per day | 9.55 | 191.0 | 7.96 | 159.2 | 2x DERI 7500 / 250 | M | 2 | 16000 | 5600 | 2990 | 2040 | 2470 | 7400 | 2670 | 33900 |
| 600 | 25.0 | | | 6.63 | 132.6 | 5.53 | 110.5 | 2x DERI 7500 / 300 | | | 36500 | | | | | | | |
| 700 | 21.4 | | | 4.87 | 97.4 | 4.06 | 81.2 | 2x DERI 7500 / 350 | | | | | | | | | | |
| 800 | 18.8 | | | 3.73 | 74.6 | 3.11 | 62.2 | 2x DERI 7500 / 400 | | | | | | | | | | |
| 900 | 25.0 | 22500 ⁵⁾ | 1 h ON 2 h OFF 3x per day | 4.42 | 88.4 | 3.68 | 73.7 | 3x DERI 7500 / 300 | M | 3 | 16000 | 5600 | 2990 | 2040 | 2470 | 10690 | 2870 | 50300 |
| 1050 | 21.4 | | | 3.25 | 65.0 | 2.71 | 54.1 | 3x DERI 7500 / 350 | | | 54300 | | | | | | | |
| 1200 | 18.8 | | | 2.49 | 49.7 | 2.07 | 41.4 | 3x DERI 7500 / 400 | | | 55100 | | | | | | | |
| 250 | 56.0 | 14000 | 1 h ON 2 h OFF 2x per day | 35.65 | 713.0 | 29.71 | 594.2 | 1x DERI 14000 / 250 | G | 1 | 20500 | 7400 | 3100 | 2240 | 2770 | 4220 | 2670 | 22400 |
| 300 | 46.7 | | | 24.76 | 495.1 | 20.63 | 412.6 | 1x DERI 14000 / 300 | | | 24000 | | | | | | | |
| 350 | 40.0 | | | 18.19 | 363.8 | 15.16 | 303.2 | 1x DERI 14000 / 350 | | | | | | | | | | |
| 400 | 35.0 | | | 13.93 | 278.5 | 11.61 | 232.1 | 1x DERI 14000 / 400 | | | | | | | | | | |
| 500 | 56.0 | 28000 ⁵⁾ | 1 h ON 2 h OFF 2x per day | 17.83 | 356.5 | 14.85 | 297.1 | 2x DERI 14000 / 250 | G | 2 | 20500 | 7400 | 3100 | 2240 | 2770 | 7620 | 2870 | 43200 |
| 600 | 46.7 | | | 12.38 | 247.6 | 10.32 | 206.3 | 2x DERI 14000 / 300 | | | 46400 | | | | | | | |
| 700 | 40.0 | | | 9.09 | 181.9 | 7.58 | 151.6 | 2x DERI 14000 / 350 | | | | | | | | | | |
| 800 | 35.0 | | | 6.96 | 139.3 | 5.80 | 116.1 | 2x DERI 14000 / 400 | | | | | | | | | | |

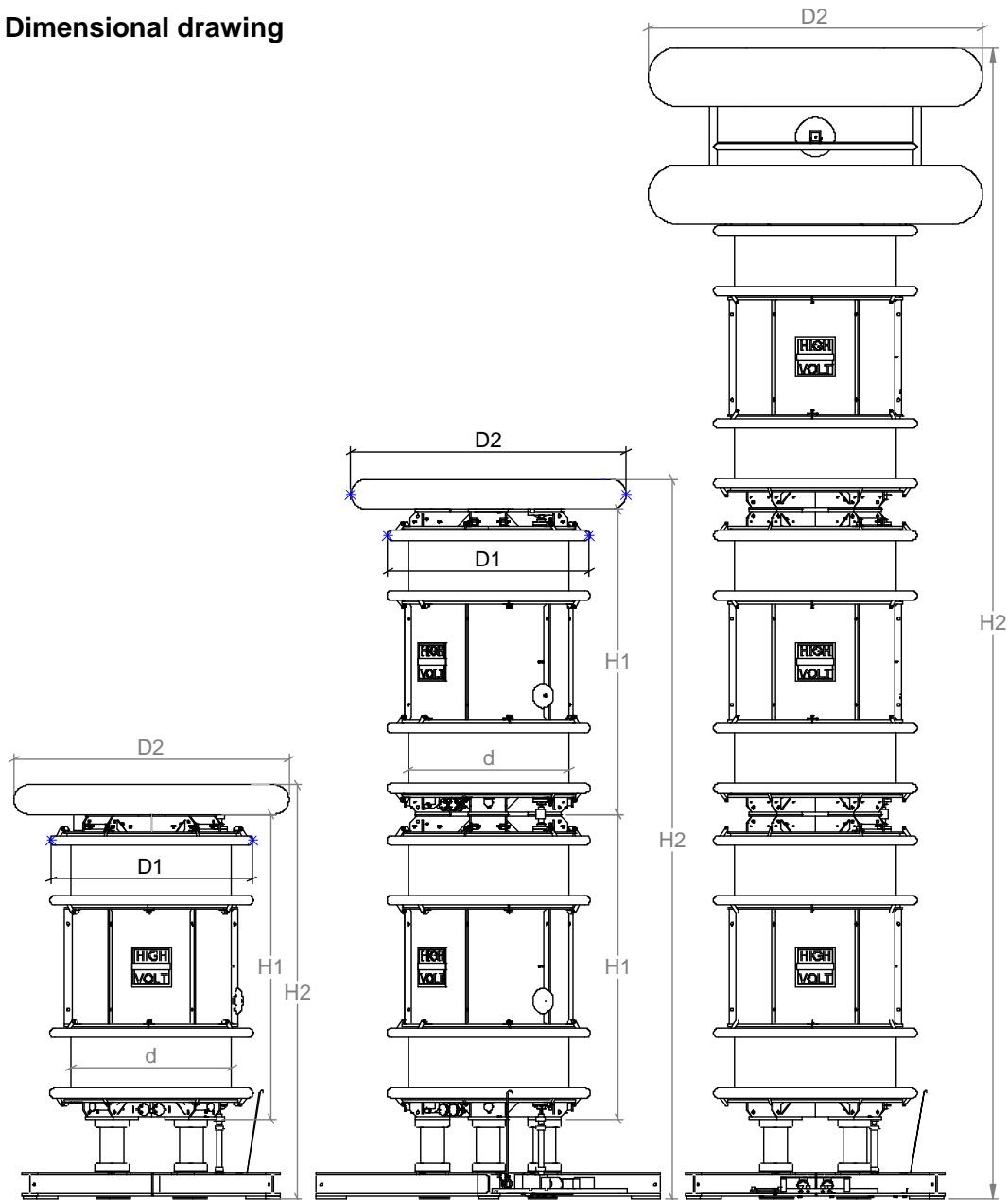
Explanations:

- 1) The feeding power depends on the characteristics of the load and the correspondingly selected exciter transformer. As a general rule for capacitive test object the max. feeding power can be assumed to 2.5 % of the rated power (quality factor Q= 40).
- 2) Parameters are valid for max. ambient temperature of 40 °C and max. medium temperature per month of 30 °C. The given duty cycle is related to the rated values for modules without any additional cooler. For reduced power longer duty cycles can be used. Longer duty cycles at rated values may be obtained by using additional oil-air or oil-water cooling devices or by using radiators or corrugated tank.

- 3) The design groups are selected according to the rated power of single modules.
- 4) The height is including insulating support and top electrode, but without rollers or air cushions.
- 5) The parameters are related to the series connection of two or three reactors respectively. The reactors may also be connected in parallel. The parameters with two or three reactors respectively in parallel are:
-load capacity, current and power are two respectively three times higher than for one reactor,
-voltage is the same as for one reactor.

Please note: Dimensions and weights mentioned in the table above are approximate values.

Dimensional drawing



Standard components:

- 1 ... 3 pieces **modular reactor**
type DERI ... kVA / ... kV
- 1 piece **HV control electrode**
- 1 piece **base frame** including
drive for reactors
- 1 piece **insulating support**

Accessories on special request:

- HV control electrode adapted to small clearances in the test room
- cylindrical electrodes and accessories for parallel connection of reactors
- air cushions for moveable base frame
- external oil cooler for extended duty cycle
- outdoor design

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