mdexx
Magnetronic Devices

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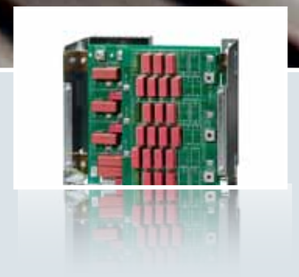

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Transformers, Power Supplies, Reactors and Filter 2010

Transformers, Power Supplies, Reactors and Filters

Safety and reliability for plant and machinery

When everything must run smoothly and safely:
mdexx Transformers, Power Supplies, Reactors and Filters

Electrical boards and modules must always be supplied with the correct voltage – especially when it comes to special requirements. With our mdexx industrial controls portfolio, we offer ideal products for all of your applications: Mdexx transformers and power supplies.

All of our products have one thing in common – they are in compliance with international Standards and approvals. This means that you have the security of knowledge that you can reliably equip and operate your plants and systems – worldwide.

Voltage guaranteed: mdexx transformers

To have the right voltage in every situation, you need to ensure you have the appropriate transformers. Mdexx transformers are the professionals for every application: They operate reliably and safely accross the globe.

Constant line supply voltage: mdexx power supplies

Mdexx power supplies are extremely reliable due to their rugged design. They are very stable against the influence of external line supply disturbances and dampen grid bound EMC.

Global reliability

Whether current smoothing or the suppression of interference signals is required, Mdexx reactors and filters can be used in almost every industry around the world. With a robust and innovative design, Mdexx meets virtually every international standard. Using Mdexx components, AC and DC drives can be equipped with the appropriate system components that match all rating classes and every industrial application industry.

Type-tested safety for all applications

As rough as the industrial environment can be – mdexx reactors and filters always work with a high degree of reliability. This is because all our product components have been tested under the most critical conditions – that exceed the test requirements of IEC 61558:

Climatic tests

IEC 60721-3-1/2/3 according to class:
3K3/1K4/2K3/3C3/1C2/2C2/3S2/1S2/2S2

Vibration and impact tests

IEC 60721-3-1/2/3 according to class:
1M2/2M2/3M4/1M2/2M2




Advantages at a glance	
High short-time rating for control transformers	High dynamic power rating, Lower transformer rated power for a large number of contactors
Wide power range	Reactor power: 0.1–2,000 kVA, currents: max. 2500 A, Filter power: for drives up to 900 kW, Transformers: 0,1-2.000 kVA
Voltage ranges	Reactors and filters 1 x 200...400 V AC, 3 x 380...750 V AC, Transformers and reactores customer-specific up to max. 7 kV
Operating safety	The rated voltage of reactors is higher than operating/supply voltage
Approvals	Worldwide use of components possible due to UL approval
Maintenance	Very long service life at minimum maintenance expense
Models and sizes	Comprehensive supply range matching standard applications
Quality Management	Management System certfied according to DIN EN ISO 9001 : 2005 Environmental Management System certfied according DIN ISO 14001 : 2008
Welded earthing connector	Safe earthing connection
Screw or plug-on screw terminals, flat-type terminals Spring-type-terminals	Fast and safe connections
TAV Power Supplies damping effect against EMI interference	Stability against external EMI disturbance

Product overview	
• Commutation reactors for power converters	• Radio interference (RFI) suppression filters
• Line reactors for frequency converters	• Dv/dt filters for frequency converters
• Output reactors for frequency converters	• Sine-wave filters for frequency converters
• Smoothing reactors for DC drives	• Transformers
• Filter reactors for reactive-power compensation systems	• Power Suplies
• Safety, Isolating, Control and Mains transformers	• Associated transformers
• Medium-frequency transformers	• Transformers for converter applications
• Special transformers for rail vehicles	• Special transformers according to EN 60601-1 (VDE 750) for medical equipment
• Transformers for noise-sensitive environments	• High-reactance transformers
• Autotransformers	• Power transformers
• Special transformers for marine applications and container cranes. Option: Vibration-resistant, low-noise version (available in enclosure only)	




First choice for the optimum voltage
mdexx transformers

Only with the correct transformer you will have the right voltage in every situation. The solution: mdexx. Our transformers master every task – reliably and safely – accross the globe.

The series of single- and three-phase mdexx transformers combine all of the features and properties of safety, isolating, control and line transformers. This means that you can handle each and every application with supreme confidence. Our single- and three-phase Mdexx power transformers with selectable input and output voltages can be used as line supply matching transformers, autotransformers or converter transformers in compliance with DIN VDE 0532-6.

mdexx transformers fulfill the highest demands – and the toughest required levels of safety. Mdexx transformers always offer the optimum level of protection in the widest range of applications. This is to the high permissible ambient temperatures up to 55 °C, their fuseless design and the integrated safety Standard according to EN 61558. Not only that but, our control transformers distinguish themselves due to their high short-time power rating.

TAM single-phase control transformers

TAP three-phase isolating transformers

TBU power transformer

TBU power transformer in degree of protection IP 20 /IP 23

Perfect products for all applications:
mdexx power supplies

Our mdexx power supplies provide you a complete range of first-class products. The complete series ensures uniform voltages and minimum failure times. In addition, they cover all of the important worldwide input voltages. The devices are available with cULus for the US and Canada.

The single- and three-phase mdexx TAV power supplies fulfill the requirements according to EN 61131-2, independent of the load (no-load operation up to the rated current) and independent of fluctuations in the line supply voltage (+6% to –10% according to IEC 60038). The electronic control is reliably supplied with the necessary output voltage as the Mdexx transformers used here were strictly dimensioned. They can be connected to public and industrial line supplies in compliance with EN 61000-3-2 and EN 61000-3-3.

The safety transformers used are designed in compliance with Standard EN 61558-2-6 and allow protective separation between safety extra-low-voltage and functional extra-low-voltage circuits (SELV and FELV) to other circuits. Higher-current requirements can be covered by connecting several of the same TAV units in parallel.

TAV singlephase, unregulated power supply for rail mounting

TAV2 singlephase, unregulated power supply

TAV3 three-phase, unregulated power supply

At a glance:
mdexx Transformers, power supplies

Unregulated power supplies								
Version	Ripple	Phases	Rated input voltage AC V	Rated output voltage acc. to EN 61131-2 suitable for SIMATIC systems DC V	Rated output current/ rated power DC A / W	Terminals	Mounting	cURus-certification
Filtered								
TAV21/23	< 5 %	1	115 ... 415	24	1 ... 4,2 A	Screw/flat terminals	Screw and/or rail mounting	yes
TAV20/22/ 24/26	< 5 %	1	115 ... 415	24	2,5 ... 18 A	Screw/flat terminals or Spring-type terminals	Screw and/or rail mounting	yes
TAV4	< 5 %	1	230 ... 415	24	1,5 ... 10 A	Screw/flat terminals or Spring-type terminals	Screw and/or rail mounting	no
TAV3	< 5 %	3	200 ... 600	24	15 ... 180 A	Screw/flat terminals	Schraub-montage	up to 50 A
TAV5	< 5 %	3	400 ... 415	24	25, 35 A	Screw/flat terminals	Screw mounting	no
Unfiltered								
TAV98	48,3 %	1	230 oder 400	24	50 ... 500 W	Screw/flat terminals	Screw mounting	no
TAV96	< 5 %	3	400	30-27-24	4 ... 25 A	Screw/flat terminals	Screw mounting	no

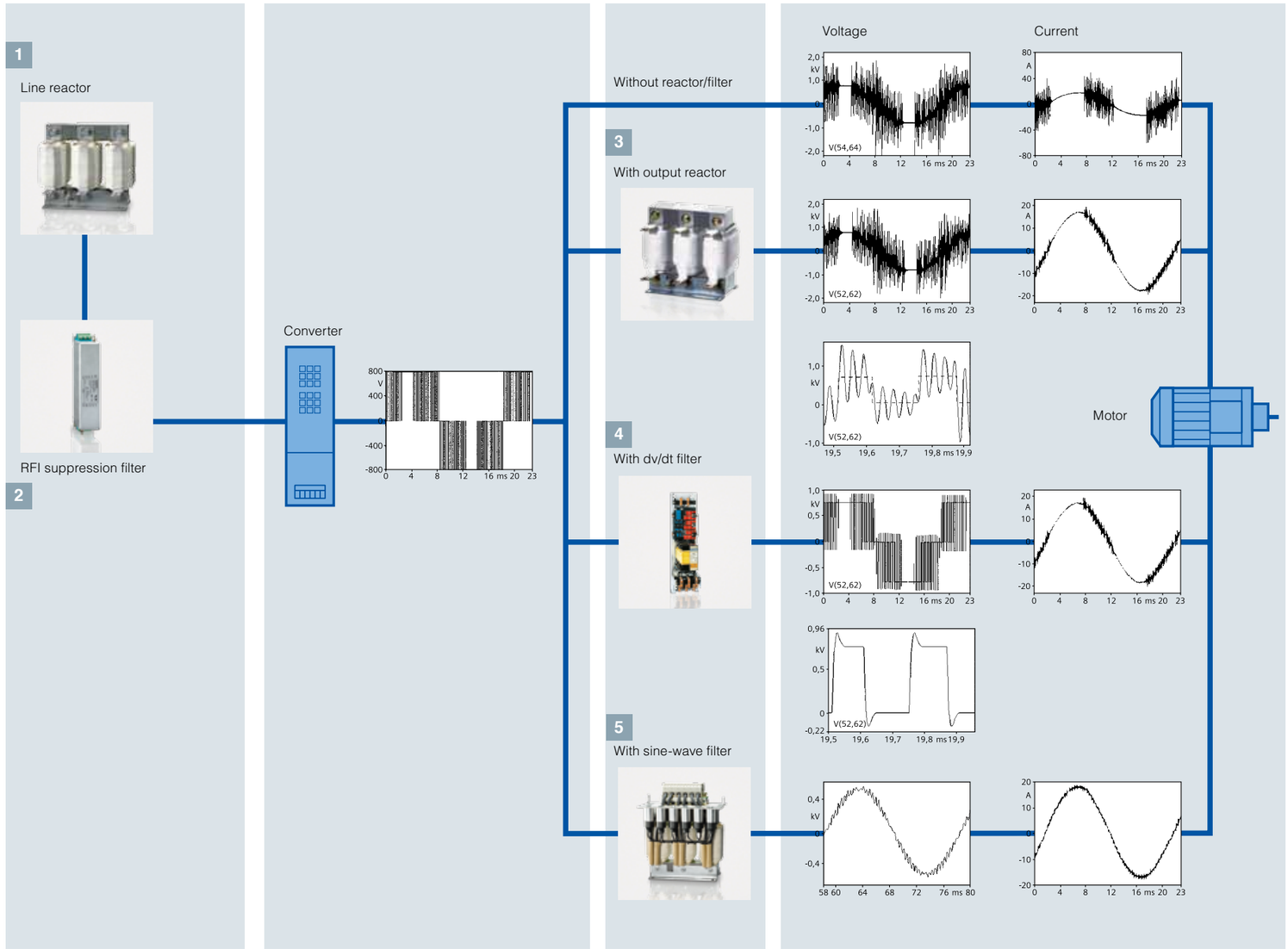
[1] cURus max. 600V
[2] When 3-ph. 380 V AC is connected to the input terminals, an output voltage of 3-ph. 220 V AC is obtained.

Single-phase transformers			
Version	Rated power kVA	Rated power AC V	Rated output voltage AC V
TAM, TAT safety, isolating, control and line transformers			
TAM safety, line and control transformers			
TAM with one input voltage	0,063 ... 1,0	230 ± 5 %; 400 ± 5 %; 440 ± 5 %; 500 ± 5 %	24; 42
TAM in a Euro-voltage version	0,063 ... 1,0	400/230 ± 15 V	24; 42
TAM in a multi-voltage version	0,063 ... 1,0	550 ... 208; 600 ... 230	24; 42
TAM safety and line transformers			
TAM with one input voltage	0,025 ... 0,04	230 ± 5 %; 400 ± 5 %; 440 ± 5 %; 500 ± 5 %	24; 42
TAM, TAT isolating, control and line transformers			
TAM and TAT with one input voltage	TAM: 0,063 ... 2,5; TAT: 4 ... 10	230 ± 5 %; 400 ± 5 %; 440 ± 5 %; 500 ± 5 %	110; 2 x 115; 230
TAM and TAT with one input voltage, without cURus	TAM: 0,063 ... 2,5; TAT: 4 ... 10	660 ± 5 %; 690 ± 5 %	230
TAM in a Euro-voltage version	0,063 ... 2,5	400/230 ± 15 V	2 x 115
TAM and TAT in a multi-voltage version	TAM: 0,063 ... 2,5; TAT: 4 ... 10	550 ... 208; 600 ... 230	2 x 115
TAM isolating and line transformers			
TAM with one input voltage	0,025 ... 0,04	230 ± 5 %; 400 ± 5 %; 440 ± 5 %; 500 ± 5 %	110; 230
TAM and TAT with one input voltage, without cURus	0,025 ... 0,04	660 ± 5 %; 690 ± 5 %	230
TAM, TAT transformers with selectable voltages			
TAM and TAT safety, isolating, control, line and autotransformers	TAM: 0,025 ... 2,5; TAT: 4 ... 16	Selectable; TAM: 12 … 690[1]; TAT: 24 … 690[1]	Selectable; TAM: 12 … 690[1]; TAT: 24 … 690[1]
TBT power transformers			
TBT transformers with selectable voltages			
TBT line matching transformers, autotransformers or converter transformers	18 ... 250	Selectable; 100 … 1000[1]	Selectable; 100 … 1000[1]
TAT isolating transformers to supply rooms used for medical purposes			
TAT isolating transformers to supply rooms used for medical purposes	2,5 ... 10	230	230 ... 115

Three-phase transformers			
TAP, TAU safety, isolating, control and line transformers			
TAP, TAU isolating, control and line transformers			
TAP and TAU in a 2-voltage version	0,063...16	⋎ 500 ... 400/ △ 289 ... 230	⋎ 400/ △ 230
TAP and TAU in a multi-voltage version	0,063...16	⋎ 520 ... 360/ △ 300 ... 208	⋎ 400/ △ 230
TAP isolating and line transformers			
TAP and TAU in a 2-voltage version	0,16 ... 0,4	⋎ 500 ... 400/ △ 289 ... 230	⋎ 400/ △ 230
TAP, TAU transformers with selectable voltages			
TAP and TAU safety, isolating, control, line and autotransformers	TAP: 0,16 … 5; TAU: 6,3 … 16	Selectable; TAP: 12 ... 690[1]; TAU: 24 ... 690[1]	Selectable; TAP: 12 ... 690[1]; TAU: 24 ... 690[1]
TAP, TAU Autotransformers			
for line supply adaptation according to EN 61558-2-13	TAP: 5 ... 22,5; TAU: 12,5 ... 50	TAP, TAU: 480 ... 380 TAP, TAU: 480 ... 400 (380)[2]	TAP, TAU: 400 TAP, TAU: 230 (220)[2]
TBU power transformers			
TBU line matching transformers			
with one input voltage TBU; vector groups Dyn5 and Yyn0	18 ... 400	480; 440; 400 480 ± 5 %; 440 ± 5 %; 400 ± 5 %	400; 208
TBU line matching transformers with cURus-certification			
with one input voltage TBU; vector groups Dyn5 and Yyn0	18 ... 400	480; 440; 400 480 ± 5 %; 440 ± 5 %; 400 ± 5 %	400; 208
TBU transformers with selectable voltages			
TBU line adaptation, auto or converter transformers	18 ... 400	Selectable; 100 ... 1000[1]	Selectable; 100 ... 1000[1]
TBU line adaptation, auto or converter transformers with cURus certification	18 ... 400	Selectable; 100 ... 1000[1]	Selectable; 100 ... 1000[1]

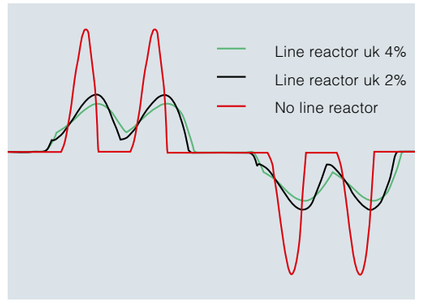
Smooth operation from network to motor:
mdexx reactors and filters for AC drives

In every industry or application where frequency converters are used, such as electrical and mechanical engineering, process industry, fans, conveyor belts or hoisting gear, mdexx reactors and filters are essential components. They reduce harmonic currents as well as the effects of the converter supply to the motor. They protect and take care of the converter, thus ensuring the trouble-free operation of your machinery and systems. Suitable devices and typical applications are outlined in the following description.



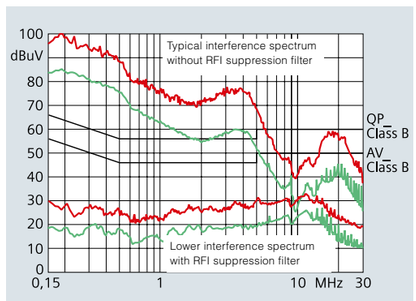
1 **Reducing harmonic currents: mdexx line reactors**

The right choice for every grid and application: mdexx line reactors. For all standard applications, we offer reactors with a voltage drop uk of 2%. For grids with very low line impedance our reactors with a uk of 4% are available. The inductance of mdexx line reactors is characterized by a high linearity, which prevents troublesome DC link fluctuations as a result of load changes. Insulation rated voltages of the line reactors are at least 40% higher than the operating voltage.



2 **Frequency converter screening: mdexx RFI suppression filters**

To reduce interference from individual frequency converters, mdexx RFI suppression filters are indispensable components. The RFI suppression filters reduce grid-bound radio interferences according to relevant standards, thus ensuring a trouble-free operation of nearby devices. In conjunction with mdexx line reactors they provide a perfect team for an optimized reduction of low and high frequency interferences.



3 **Masters in minimizing charging current peaks: mdexx output reactors**

In applications with pulse width modulated voltages (PWM) mdexx output reactors reduce the charging currents caused by parasitic line capacitances. Convenient: with unshielded lines motor cable lengths are up to 300 m and with shielded lines the max. cable length is 200 m. Owing to a rated voltage of 500 V + 10%, mdexx output reactors can be used in almost any common power grid in Europe and North America.

4 **Safe motor protection: mdexx dv/dt filters**

mdexx dv/dt filters reduce the peak voltage rise at the motor terminals acc. to curve A of the IEC 60034-25 and provide a voltage rise ratio of < 500 V/µs. Their rated operation voltage of 500 V + 10% and permissible clock frequency of 4 kHz make them suitable for the greatest variety of applications. With unshielded lines, the max. permissible motor cable length is 300 m, with shielded lines, it is 200 m.

5 **Shaping voltages in sine waves: mdexx sine-wave filters**

If a motor in industrial or commercial application has to be supplied with an almost sinusoidal voltage, mdexx sine-wave filters should be used. They are excellent in noisesensitive areas of application, since they reduce magnetic motor noise. With a rated voltage of 500 V + 10% and a permissible clock frequency of 4...8 kHz, they are suitable for many applications. Long motor cables can, of course, be used here, too: the maximum lengths are 300 m for unshielded cables and 200 m for shielded cables.

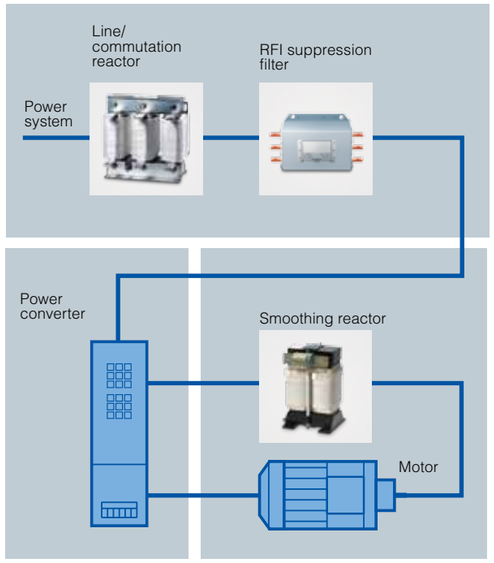
Proven technology for an increased availability:
mdexx reactors and filters for DC drives

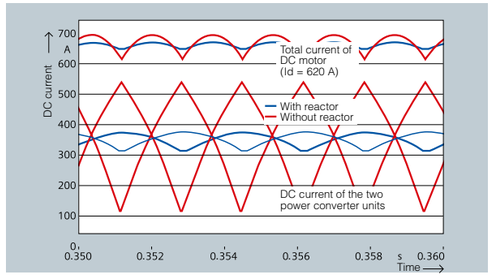
Depending on the field of application, DC drives can provide a cost-effective alternative to AC drives using frequency converters. In these cases, mdexx reactors and filters make a remarkable contribution by significantly increasing the operating safety and availability of power converter systems.

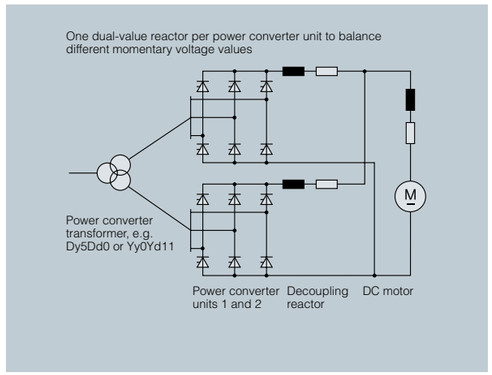
System perturbations under control:
mdexx line/commutating reactors and
mdexx RFI suppression filters
Whether frequency converters or DC converter drives are used, their system perturbations are similar. This is why the same components are used at the line side as for AC drives: line and commutating reactors as well as RFI suppression filters. With large DC drives in particular, a sufficiently high inductance will be ensured – a requirement that is easily met by Mdexx reactors and filters with top-standard criteria such as robust design and high availability.

Reliable reduction of current ripples:
mdexx smoothing reactors
DC drives are typically used as main drives for printing machines, rolling mill or coiling drives as well as traction and hoisting gear drives in the crane and elevator industry. Mdexx smoothing reactors reliably reduce current ripples in the motor circuit. Reactor models are available from the kW to the MW range. Upon request, we will rate and determine the required component parameters for you. You would certainly benefit from our long-term experience about sizing and rating drive components.

Smoothing reactors for decoupling on
a printing machine: mdexx in use
In the application example on the right, a 12-pulse DC main drive of a printing machine, smoothing reactors are used as decoupling reactors. The reactors reduce the current ripples of the converter units and thus the harmonic stress of the DC motor. This is a clear advantage in terms of motor service life. Using reactors for decoupling the two power converters enables two 6-pulse rectifier sets to be operated in parallel, creating a 12-pulse phase effect at the primary side of the system transformer. In short: Mdexx reactors make a remarkable contribution to reducing system harmonics and improving system conditions.







Safe and stable network conditions:
mdexx filter reactors

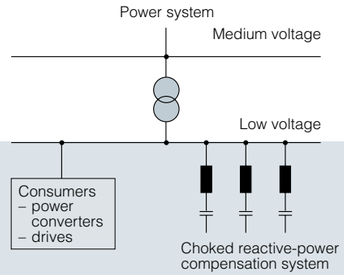
In our networks, more and more consumers are using inductive loads. As a result, the harmonic load and THD-V (Total Harmonic Distortion – Voltage) of the network are rising. This increases the cost of electricity, maximizes transmission losses and adds to the stress of transmission and distribution systems. But there is a solution. The use of filter reactors prevents capacitors connected in the network from resonating with the network inductances at an undefined level. The filter reactors are tuned to a defined series resonant frequency with the capacitors, in consideration of an applied ripple control system.

High safety in extreme applications
Filter reactors in reactive-power compensation systems are connected to the network in combination with capacitors. Depending on the level of choking, capacitors and filters form a series resonant circuit with a defined resonant frequency.

A high harmonic load has already been taken into account for the rated current. In addition, mdexx filter reactors permit continuous overloading, which may be 5% above the harmonic level. This ensures the safety for extreme applications. An integrated temperature monitoring system reliably signals any overload. In addition, the high linearity of the inductance provides precise tuning of the filter circuit even when short-time surge loads are applied, during start-up of large consumers.

Constant inductance under any condition
Filter reactors are interconnected with capacitors to form filter banks with a defined reactive power in kvar. mdexx filter reactors are available in the customary sizes of 5 to100 kvar. They are characterized by a high degree of overloading capability, which increases the operational safety of the network in conditions of varying harmonic contents.

Depending on the level of choking, the linearity of the inductance remains constant up to 1.8 times the fundamental current. This ensures that the filter circuit remains tuned to the resonant frequency even when excessive currents are applied. Not even high inrush currents can saturate mdexx filter reactors. The inductance remains constant and undefined detuning of the filter circuit is prevented.



At a glance:
mdexx reactors and filter

								
Product	**Line/commutation reactors TEM, TEP, TEU**	**Output reactors TEP, TEU**	**Smoothing reactors TEM, TET**	**Filter reactors TEP, TEU**	**RFI suppression filter (A) TEF151**	**RFI suppression filter (B) TEF151**	**Dv/dt filter**	**Sine-wave filter TEF11**
Function	Reduction of harmonics in the power system and of current rise speeds in the input circuit of the converter.	Increase of motor service life. Increase of system availability, option of using longer motor cables.	Reduction of harmonics, permitting the use of high-speed DC switches.	Choking of reactive-power compensation systems. They form a defined resonant circuit with the power factor correction capacitors.	Damping of line-related radio interference voltages. Avoiding mutual interference by high-frequency interference voltages.	Damping of line-related radio interference voltages. Avoiding mutual interference by high-frequency interference voltages.	Reduction of the voltage rise speed at the motor terminals.	Motor supply with almost sinusoidal-like current and voltage. Increase of the motor service life and system availability.
Operating voltage	1 x 230 V AC 50 Hz 1 x 400 V AC 50 Hz 3 x 480 V AC 60 Hz 3 x 500 V AC 50 Hz 3 x 690 V AC 50 Hz 3 x 750 V AC 50 Hz	3 x 500 V AC	TET: 1,150 V DC TEM: 750 V DC	3 x 400 V AC	1 x 250 V AC 3 x 520 V AC	1 x 250 V AC 3 x 480 V AC	3 x 500 V AC	3 x 500 V AC
Power range [1]	For drives of 0 to 2,500 kW	For drives of 1.5 to 75 kW	For drives up to 30 kW, energy contents of 0.38 Ws to 6,300 Ws	For filter bank rating of 5 to 100 kvar	For drives of 0.55 to 900 kW	For drives of 0.55 to 90 kW	Available upon request	For drives of 1.5 to 132 kW
Currents	1.5 to 2,500 A	4 to 150 A	1.75 to 40 A	8 to 175 A	10 to 1,600 A	8 to 200 A		4 to 250 A
Frequency	50 Hz / 60 Hz	Max. 200 Hz		50 Hz / 60 Hz	50 Hz / 60 Hz	50 Hz / 60 Hz	Available upon request	Max. 150 Hz
Rated temperature	ta 40 °C	ta 40 °C	ta 40 °C	ta 40 °C	ta 40 °C	ta 40 °C	ta 40 °C	ta 40 °C
Degree of protection	IP00	IP00	IP00	IP00	≤ 220 A IP20, > 220 A IP00	IP20	IP00	IP00
Connection	Terminal, flat connector	Terminal, flat connector	Terminal, flat connector	Terminal, flat connector	Terminal, flat connector	Terminal	Terminal, flat connector	Terminal, flat connector
Approval	cULus	cULus	cULus	cULus	cULus partially ENEC partially	cULus partially ENEC partially		cULus
Special features	Voltage drop of 2% related to model, and/or 4%. Permissible voltage stressing: TEM 690 V AC, TEU/TEP 1,000 V AC, TEP with terminals 690 V AC.	Applicable: • Clock frequency 4 kHz to 8 kHz • Motor cable max. 300 m unshielded, 200 m shielded	Ripples of the overlaid AC current ≤ 30%. Permissible voltage stressing: TEM 690 V AC, TET with terminals 800 V AC, TET with flat connectors 1,000 V.	Considered harmonic load: Basic wave I1 (50 Hz) = 110 % 5th harmonic I5 (250 Hz) = 6 % 7th harmonic I7 (350 Hz) = 5% 11th harmonic I11 (550) = 3.5% Permissible overload 5 %	Filter recommended for interference suppression in accordance with EN 55011 Class A	Filter recommended for interference suppression in accordance with EN 55011 Class B	4 kHz	Applicable: • Clock frequency 4 kHz to 8 kHz • Motor cable max. 300 m unshielded, 200 m shielded

[1] All models are also available with a higher power range. Should you be interested or if you would like further advice, please contact e-mail: trafo@mdexx.com

The extensive range of perfect solutions:
mdexx transformers, power supplies, reactors, filters and fans

mdexx devices can provide you with optimum solutions for all industry sectors. It doesn't make any difference whether in medical engineering or in conveyor systems, in shipbuilding yards, for textile machines, cranes, for machine, plant and equipment manufacturers or for manufacturers of wind turbines. mdexx stand for absolute reliability, for the highest degree of innovation and functionality and that all of the relevant international regulations are complied with. Often, customized versions are indispensable – whether due to the technical necessity or for economic reasons. It is precisely here that our standard products form the basis for solutions that perfectly match the application.

Experience pays off

When implementing your individual solution, we can fully leverage our extensive product and application know-how as well as our many years of experience in designing standard products. It doesn't make any difference whether it involves complying with product or industry sector-specific standards or fulfilling your specific electrical or mechanical requirements: We check, qualify and implement the solution to ensure that it precisely fulfills your specifications. Many well-known companies are satisfied customers of ours – the best example:

The German Federal Railways (Deutsche Bahn) with whom we have a Q1 supplier relationship. The development and production in compliance with the specifications of well-known classification societies are part of our day-to-day business.

With system to create a system

It is often just a small step from the customer-specific solution to a customer-specific system – at least with us. In this case, we optimally harmonize the individual product solutions regarding the requirements that you have defined – both electrically and mechanically. The result – a system that completely fulfills a required function in the particular application.

You can benefit from our clearly structured approach: You can completely concentrate on your core business and benefit from an optimum result by using modules that are ready to install and connect up. And, not only this, you'll also be able to reduce your logistics costs as the number of suppliers and components is reduced.