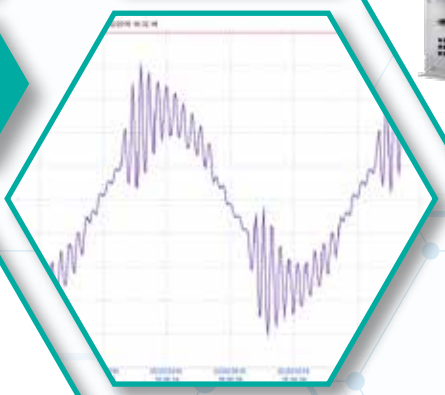
EMC solutions



The Technical Solution

www.etngroup.com

Edition No.2

A strong national and international presence

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PROCESSING ELECTROMAGNETIC INTERFERENCE

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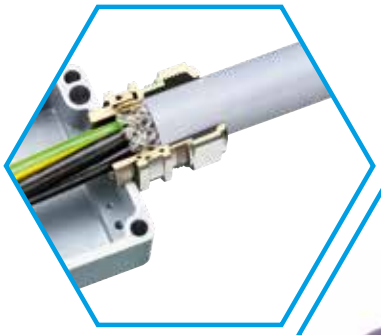
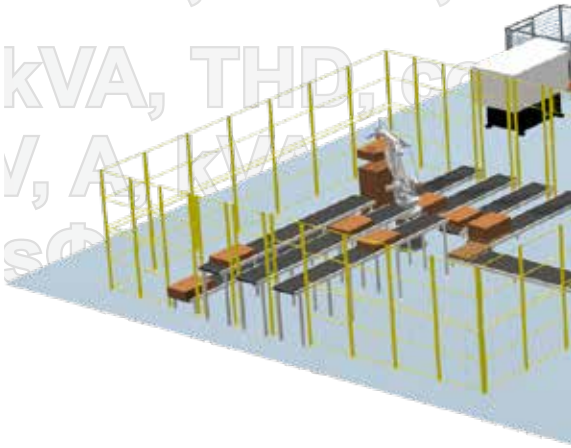
PROCESSING LIGHTNING AND OVERVOLTAGE

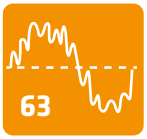
APPENDICES

Electromagnetic interference



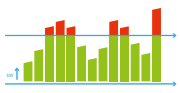


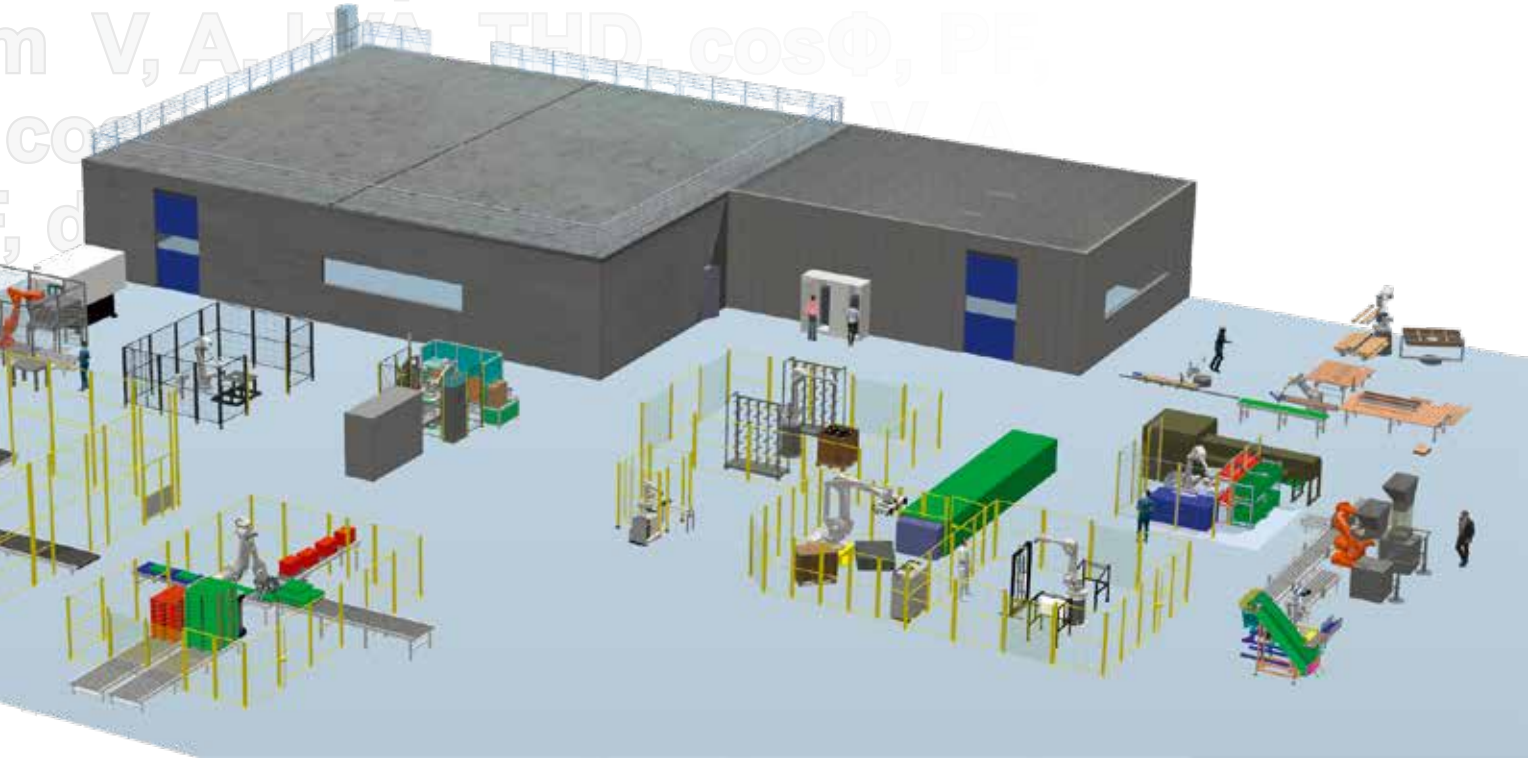
Harmonic pollution



Leakage currents & isolation

Energy quality





Simulation performed by our robotics teams

Training and technical support

Lightning & overvoltage

EMC, a crucial element for 4.0 industry

> **More** sensitive electronics
> **More** interference
> **More** centralised integration
> **More** hard-wired and radio communication

The problems are:

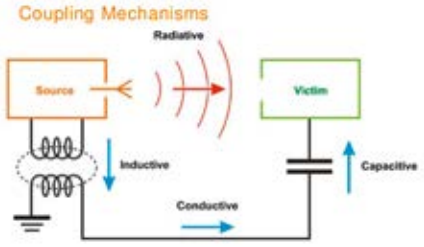
> Communication **faults**
> Random **failures** on your systems
> Premature **ageing** of sensitive electronics
> Network **overvoltage**
> Energy **quality**

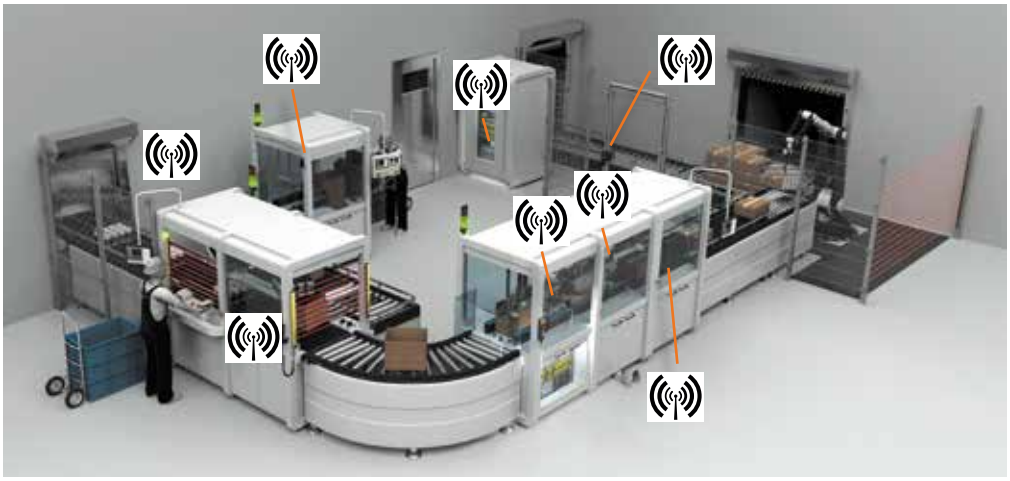
We can assist you with adapted solutions

Introduction

A large number of signal interactions are present in the industrial electromagnetic environment:
- power supply and motorisation
- automation
- instrumentation
- data networks

E.M.C. constraints need to be addressed, bearing in mind that installations develop technically over time.
This means upgrading the electromagnetic interference mitigation measures used on the source of the interference and the victims, whilst providing adapted wiring solutions.





Grouping together cables of different families increases the risk of interference on sensitive equipment.
Most cables are **shielded** and shielding coverage is not sufficient to eliminate interference.

Wire gauge

ICO39800

Innovative shielding continuity solutions exist to protect sensitive installations.

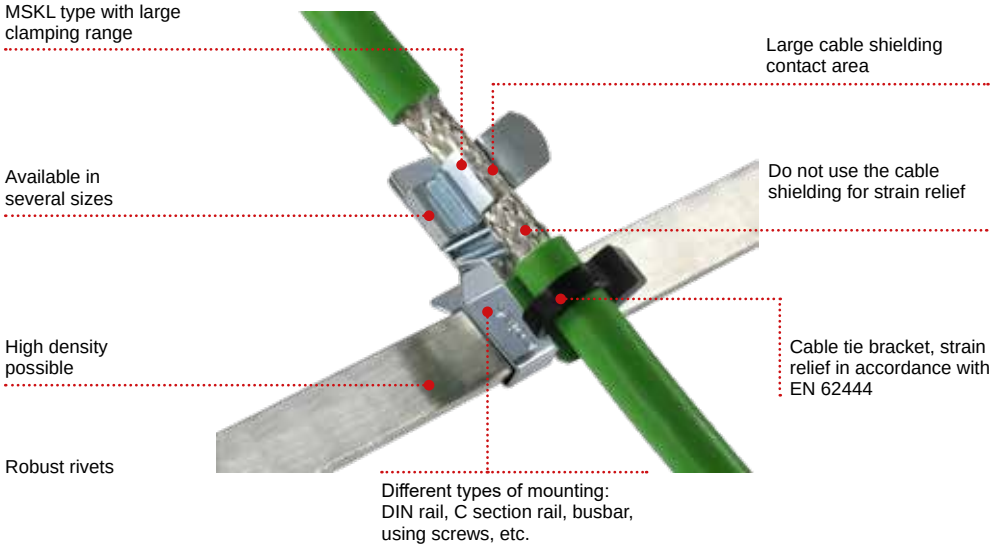
Practical tips:
Shielding on cables must be bonded **over 360° at both ends** and on an equipotential ground plane **for high frequencies.**

Measurement signal shielding

Motor cable shielding

See page 34 for shield bonding theory.

SKL series EMC cable shield clamps




STFZ|SKL


SFZ-M|MSKL

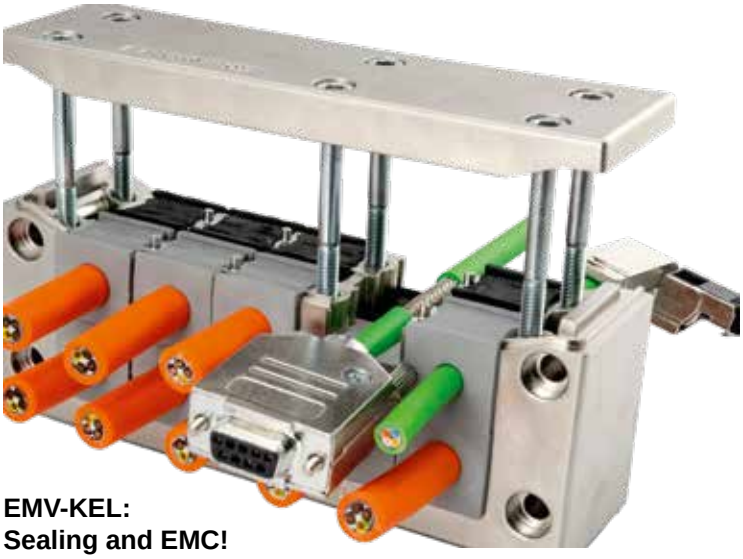

SKL

=> Strip your shielded cable and clip it to the terminal: that's all there is to it!
=> The ICOTEK EMC terminal adapts to your wiring, not the reverse.

Contact area on shielding up to 50% greater than conventional shielding systems.


LFC-MSKL

EMC cord and cable entry system



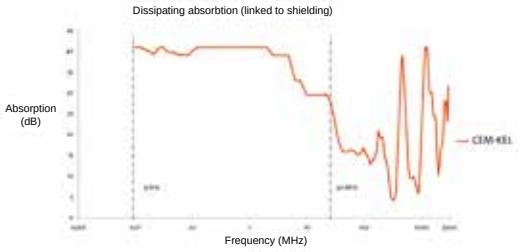
**EMV-KEL:
Sealing and EMC!**

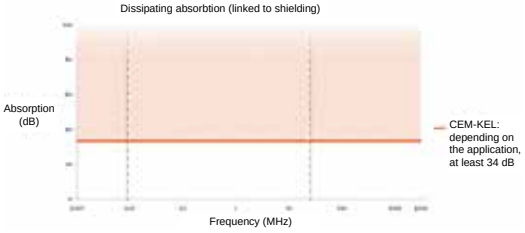

CEM-KT


EMV-KVT-DS


EMC-KVT

Attenuation performance on conducted and radiated electromagnetic interference





=> Route all your cables already fitted with connectors directly into your enclosures!
=> Sealing and shielding continuity in a single operation.

We propose two ranges from our cable gland solutions:
easyCONNECT for all network or automation cables
powerCONNECT for power cables

easyCONNECT cable glands: Nickel-plated brass with contact spring

L = Short metric connection thread L = Long metric connection thread*

Reference	L	Reference*	L*	Designation
AGR108317	5	AGR118317	10	M16 x 1.5 easyCONNECT Ø6 to 10.5
AGR108320	6	AGR118320	10	M20 x 1.5 easyCONNECT Ø8 to 15
AGR108325	7	AGR118325	11	M25 x 1.5 easyCONNECT Ø12.5 to 20.5
AGR108332	8	AGR118332	13	M32 x 1.5 easyCONNECT Ø17 to 25.5
AGR108340	8	AGR118340	13	M40 x 1.5 easyCONNECT Ø24 to 33
AGR108350	9	AGR118350	14	M50 x 1.5 easyCONNECT Ø33 to 42
AGR108360	10	AGR118363	14	M63 x 1.5 easyCONNECT Ø40 to 52

EMC CABLE GLAND FOR ULTRA-EASY, EFFICIENT INSTALLATION

Installation film

powerCONNECT cable glands: Nickel-plated brass with advanced compression sleeve

L = Short metric connection thread L = Long metric connection thread*

Reference	L	Reference*	L*	Designation
AGR108417	5	AGR118417	10	M16 x 1.5 powerCONNECT Ø6 to 10.5
AGR108420	6	AGR118420	10	M20 x 1.5 powerCONNECT Ø8 to 15
AGR108425	7	AGR118425	11	M25 x 1.5 powerCONNECT Ø12.5 to 20.5
AGR108432	8	AGR118432	13	M32 x 1.5 powerCONNECT Ø17 to 25.5
AGR108440	8	AGR118440	13	M40 x 1.5 powerCONNECT Ø24 to 33
AGR108450	9	AGR118450	14	M50 x 1.5 powerCONNECT Ø33 to 42
AGR108463	10	AGR118463	14	M63 x 1.5 powerCONNECT Ø40 to 46
AGR108475	11	AGR118475	15	M75 x 1.5 powerCONNECT Ø50 to 63

RECOMMENDED FOR DRIVE/ MOTOR CONNECTION APPLICATIONS

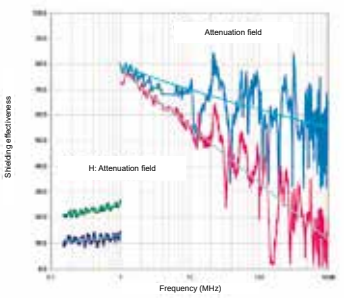
Installation film

Toothed locknut

Reference	Th.	Designation
AGR801785	3.5	M16 x 1.5 brass EMC locknut
AGR802085	4.0	M20 x 1.5 brass EMC locknut
AGR802585	4.0	M25 x 1.5 brass EMC locknut
AGR803285	5.0	M32 x 1.5 brass EMC locknut
AGR804085	5.3	M40 x 1.5 brass EMC locknut
AGR805085	6.3	M50 x 1.5 brass EMC locknut
AGR806385	7.0	M63 x 1.5 brass EMC locknut

A metal electrical enclosure is not in itself likely to be a victim or a source of interference for its environment. It provides effective protection against electromagnetic interference by its “Faraday cage” effect.

Composition:
- Conductive steel panels and walls
- Galvanised coating on the inside



Sealing against interference:
- “Hole-free” design
- Special conductive seal
- Addition of galvanic separations

Electrical continuity:
- Ensures electrical continuity between the various parts
- Paint-free contact points
- Impedance reduction

We offer a range of floor-mounted metal boxes and cabinets that are EMC-tested to **standard VG 95 373 part 15**, and numerous accessories enabling you to create the best possible EMC solution for your application.
To select the right enclosure, it is necessary to identify the attenuation needed to guarantee the effectiveness of your protection against electromagnetic fields.

Do not hesitate to use our expertise to design your solution

Our EMC enclosure solutions:


One-piece EMC cells and cabinets


19" EMC bays


EMC junction boxes

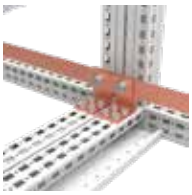

EMC enclosures

Accessories:
Accessories contribute to industrial E.M.C. state of the art to preserve the initial shielding effectiveness (dB) of the enclosure


EMC filter fan


Conductive seal and HF cable entry system


Anti-static button


Busbar


Shielding continuity on busbar

EMC cable gland and cap


Earth shunt – Earthing strap

Standard cable protection systems are far from ideal in terms of EMC protection.
For effective protection of your sensitive signals, a cable protection system providing electromagnetic shielding with coverage of over 90% is required.
In addition, adapted bonding of both ends is necessary to maintain the benefits of this solution.
Different solutions exist depending on the machine environment and the installation options.

Tinned copper braid conduits:

Good EMC protection, use in cable trays.

Reference	Designation	Int. Ø	Male fitting	EMC nut
PMAFCK10	Screening braid conduit	7 to 12 mm	-	-
PMAFCK125	Screening braid conduit	11 to 13 mm	PMABVEMV-M120-10	PMAGMM-M12
PMAFCK15	Screening braid conduit	13 to 18 mm	PMABVEMV-M162-10 PMABVEMV-M207-10	PMAGMM-M16 PMAGMM-M20
PMAFCK20	Screening braid conduit	16 to 35 mm	PMABVEMV-M253-10	PMAGMM-M25
PMAFCK25	Screening braid conduit	22 to 40 mm	PMABVEMV-M329-13	PMAGMM-M32
PMAFCK30	Screening braid conduit	27 to 44 mm	PMABVEMV-M406-13	PMAGMM-M40

The PMA BVEMV-Mxxx connection kit includes the following parts:
- Male metal connector and braided conduit terminal fitting.
- Plastic fitting with adapter sleeve for any protective corrugated conduit.

Hybrid braid conduits:

Very flexible copper and polyamide braid.
Excellent EMC protection, easy to install, for use near cabinets and on the machine.

Reference	Designation	Int. Ø
PMAFHY10	Screening braid conduit	8 to 13 mm
PMAFHY12	Screening braid conduit	10 to 15 mm
PMAFHY15	Screening braid conduit	12 to 18 mm
PMAFHY20	Screening braid conduit	19 to 27 mm
PMAFHY35	Screening braid conduit	30 to 40 mm

EMC collars must be used to connect this conduit. See page 6.

FCE type MULTITITE conduit: Very flexible, economical conduit providing good mechanical protection

Black conduit, resistant to crushing (1250 N), impacts (6 J) and traction (1000 N)

Thin-wall galvanised steel single-interlock core conduit with corrugated PVC cover. IP67, -20°C to +80°C

Reference	Int. Ø (mm)	Ext. Ø (mm)	Bend radius (mm)	Pack-aging (in m)	Multitite FCE DN (in mm)
ANA3710102	7	10	30	25	10
ANA3710122	10	14	37	25	12
ANA3710162	13	17	45	25	16
ANA3710202	17	21.5	55	25	20
ANA3710252	21.2	26	70	25	25
ANA3710322	28.1	34	95	25	32
ANA3710402	37.7	45	115	25	40
ANA3710502	48.4	56	135	25	50
ANA3200501	51.6	59.9	250	15	2"

Nickel-plated brass ISO straight fitting. Delivered with ferrule. IP65, -40°C to +105°C

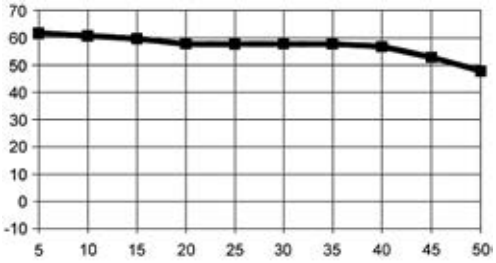
Reference	ISO thread	Max. int. Ø (mm)	Pack-aging	Sealtite EF Ø (in inch-es)
ANA8120122	M12x1.5	5.2	10	1/4"
ANA7120150	M16x1.5	8.3	10	5/16"
ANA7120161	M16x1.5	11	10	3/8"
ANA7120171	M20x1.5	11	10	3/8"
ANA7120201	M20x1.5	14.5	10	1/2"
ANA7120251	M25x1.5	19.4	5	3/4"
ANA7120321	M32x1.5	24.7	5	1"
ANA7120401	M40x1.5	33.3	2	1.1/4"
ANA7120501	M50x1.5	38	2	1.1/2"
ANA7120631	M63x1.5	49	2	2"

SHIELDTITE conduit:
Military qualification, test laboratories

Very robust, double-interlock bronze conduit with smooth PVC cover. Specially designed to protect cables against electromagnetic pulses and interference. Resistant to UV, oil and temperatures up to 105°C.

Reference	Designation	Int. Ø	EMC fittings
ANA3040121	3/8" Sealtite conduit	12.6 mm	8126171 M20
ANA3040161	½" Sealtite conduit	16 mm	8126221 M25
ANA3040201	3/4" Sealtite conduit	21 mm	8126281 M32
ANA3040261	1" Sealtite conduit	26.5 mm	8126351 M40

EMP shielding (dB/MHz)

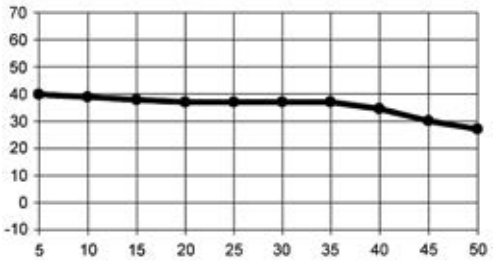


Black HTDL conduit: UL/CSA approved machines or equipment

Robust galvanised steel conduit with smooth PVC cover.
Shields cables against electromagnetic pulses and interference.
Resistant to UV, oil and temperatures up to 105°C

Reference	Designation	Int. Ø	EMC fittings
ANA3300122	3/8" Sealtite conduit	12.6 mm	8126171 M20
ANA3300162	½" Sealtite conduit	16 mm	8126221 M25
ANA3300202	3/4" Sealtite conduit	21.1 mm	8126281 M32
ANA3300261	1" Sealtite conduit	26.8 mm	8126351 M40

EMP shielding (dB/MHz)

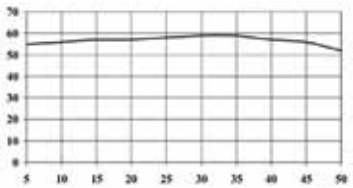


ANAFLEX conduit: IP69 and high temperatures

Click-fit flexible stainless steel pipe.
IP69 liquid-tight conduit resistant to high temperatures up to 250°C providing high shielding thanks to its construction.

Reference	Designation	Int. Ø
ANA4650121	DN12 conduit	12.2 mm
ANA4650161	DN16 conduit	16.2 mm
ANA4650201	DN20 conduit	20.3 mm
ANA4650251	DN25 conduit	25.4 mm

EMP shielding (dB/MHz)

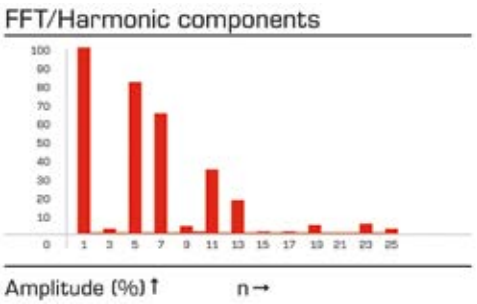


Harmonic currents are caused by non-linear loads (power electronic devices). This leads to pollution in the electricity supply which may cause problems if the sum of the harmonic currents is greater than certain limit values.

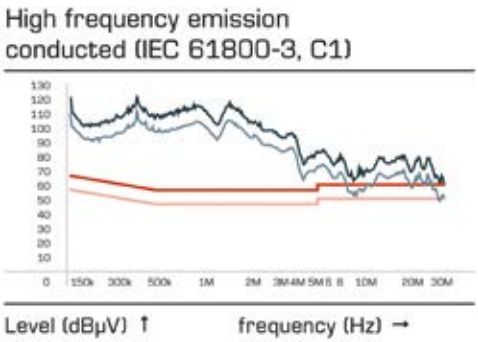
In a variable frequency drive environment, there are two forms of harmonic pollution

Low-frequency harmonic pollution
THD up to and including the 40th harmonic according to standard EN 61003-2
THDi (Total Harmonic Distortion of Current)
THDi > 50%: High pollution, malfunctions probable.
THDi of 10 to 50%: Significant pollution, harmful effects possible.
THDi < 10%: No pollution.
THD = Total Harmonic Distortion

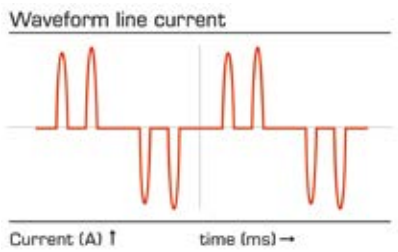
Odd (or uneven) harmonics: 3,5,7,9, 11,13, etc., are the most common in industrial networks.
In practice, a THDi of 30% is tolerable to limit the pollution of equipment and therefore to reduce consumption.



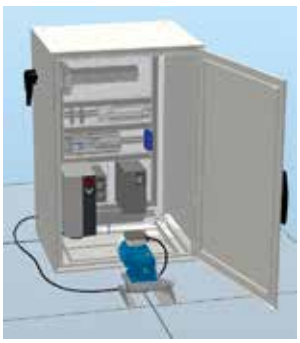
High-frequency harmonic pollution - 150 kHz to 30 MHz
In this frequency range, the reference level is 60 dBµV
Reference limit according to standard EN 61800-3

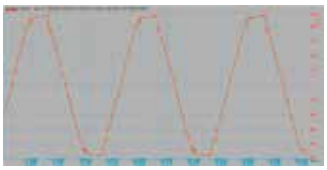


The standardisation of variable frequency drives in industry increases the adverse effects linked to harmonics:
- Network voltage distortion.
- Nuisance tripping of fuses and circuit breakers (differential and magnetic).
- Conductor overheating.
- Premature ageing of electronic equipment (PLCs, power supplies, etc.).
- Energy consumption.
- Interference with sensitive equipment.



Here without low-frequency harmonic filtration





ECM filter technical information on page 37.

Line reactor to reduce THDi to around 30%*.

Limitation of inrush currents and peak currents
Low residual ripple
Increased equipment life time

Electricity supply filtration by line reactor			
Reference	**Designation**	**Voltage drop**	**Current range**
BLONKE XX/X.XX	230 VAC or 400 VAC single-phase line reactor	4%	4 to 25 A
BLOLR3-AXXXX-404-0	400 VAC to 690 VAC three-phase line reactor New 4D mechanical concept based on curved copper-plated aluminium bars*	4%	4 to 900 A
*	Available with copper winding + standard insulating film with the BLOLR3 40-4/XXX and/or different inductance values for voltage drops of 3% or 5%	3%, 4% or 5%	2 to 1600 A

BLOLR3-A

** Depending on the initial pollution level.*

Harmonic filter to reduce THDi to around 10%*

Increase in the power factor to around 1 at full load
Reduction of THDi to <10%
Increased equipment life time

Electricity supply filtration by line reactor			
Reference	**Designation**	**THDi at 100% load**	**Current range**
BLOHF1P X.XX-230	Single-phase harmonic filter voltage range 207 to 253 VAC	< 10%	0.19 to 5.7 kW
BLOHF1K XXX-400	Three-phase harmonic filter voltage range 360 to 440 VAC	< 8%	5.5 to 90 kW
BLOHFM-FB XXX-400	Three-phase harmonic filter voltage range 380 to 420 VAC	< 7%	5 to 250 kW

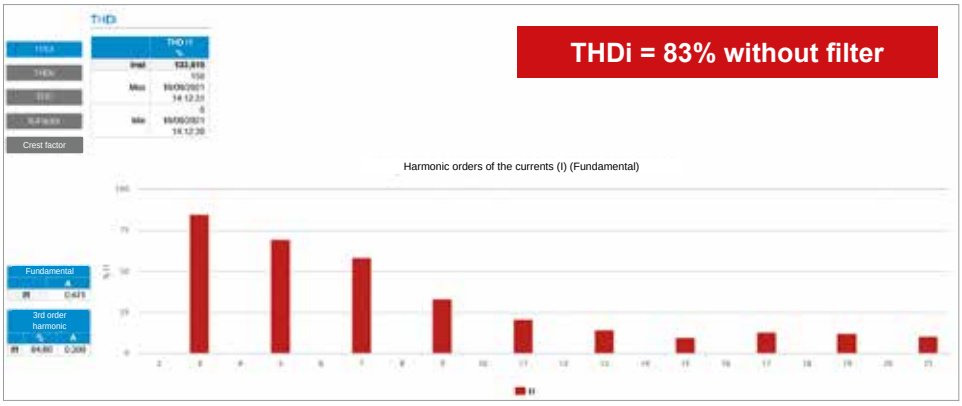
HF1P

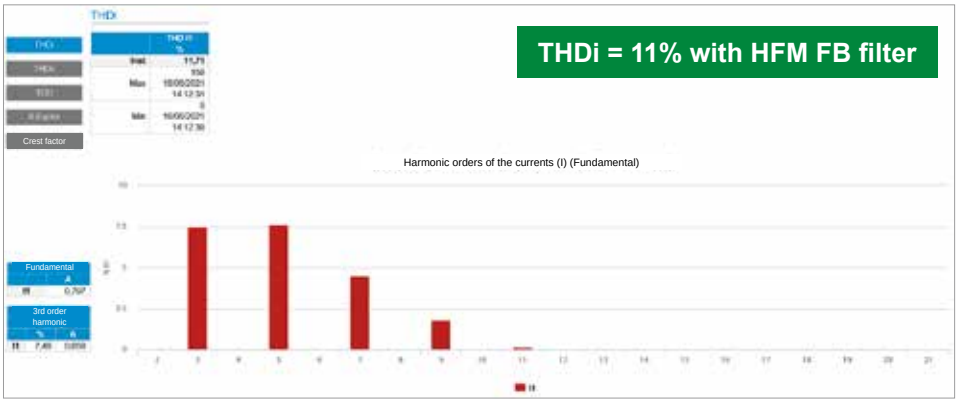
HF1K

HFM

** Depending on the initial pollution level.*

Example case study on variable frequency drive load





The result depends on several criteria concerning the installation.
An analysis of the electrical network should preferably be conducted before and after filtration.

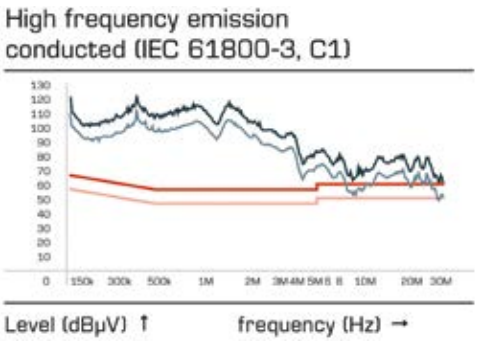
How to choose the right EMC filter:

1. Network voltage: single-phase, three-phase or three-phase + neutral
2. Network neutral system: TT, TN or IT
3. Acceptable leakage current: issue of differential protection
4. Maximum load current
5. Length of drive output cables for good attenuation (compliance with standards)

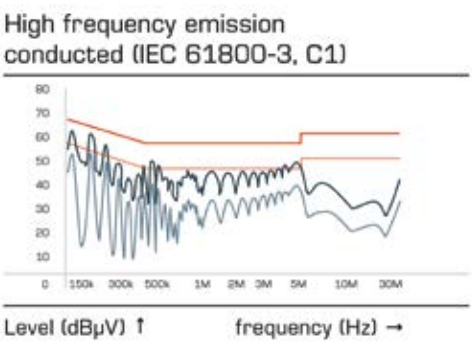
Selection table with max. cable lengths to guarantee filtration levels B (C1) or Class A (C2 < 20 kVA)							
Type of power supply	**Filter series**	**Applications**	**Neutral system**	**Nominal leakage current (mA)**	**Current range (A)**	**Max. cable length (m) class C1**	**Max. cable length (m) class C2**
Single-phase	BLOHFE 104-230/XX	Power supply & electronic devices	TN,TT	0.37	1 to 65	not C1	3
	BLOHFE 156-230/XX		TN,TT	8	1 to 16	not C1	25
	BLOHFE 200-230/XX		TN,TT	0.4	1 to 16	not C1	25
	BLOHLE 110-230/XX	Individual devices, frequency converters or all types of device	TN,TT	8.5	4 to 55	25	50
	BLOHLE 310-230/XX		TN, TT	3	4 to 55	5	10
	BLOHLE 810-230/XX	Specifically for IT networks	IT	0	4 to 55	5	10
Three-phase	BLOHFD 156-400/XX	Power supply & electronic devices	TN,TT	1	3 to 16	not C1	25
	BLOHFD 510-500/XXX		TN	43	8 to 180	50	100
	BLOHLD 103-500/XXXX	Individual devices, frequency converters or all types of device	TN	60	270 to 2500	50	100
	BLOHLD 110-500/XXX		TN	37	8 to 250	50	100
	BLOHLD 310-500/XXX		TN,TT	0.4	8 to 250	5	10
	BLOHLD 710-500/XXX		TN,TT	6	8 to 250	25	50
	BLOHLD 810-500/XXX	Specifically for IT networks	IT	0	8 to 250	5	10
Three-phase + neutral	BLOHFV 510-400/XXX	Individual devices, frequency converters or all types of device	TN	22	8 to 180	50	100
	BLOHLV 110-500/XXX		TN	37	8 to 250	50	100
	BLOHLV 310-500/XXX		TN, TT	1	8 to 250	5	10
	BLOHLV 710-500/XXX		TN, TT	7	8 to 250	25	50
	BLOHLV 810-500/XXX	Specifically for IT networks	IT	0	8 to 250	5	10

Important note:

The peak values for EMC filter leakage currents are higher than the nominal values.
This must be taken into account when using residual current devices.
See Appendix page 37



Unfiltered drive input HF signal



Filtered drive input HF signal

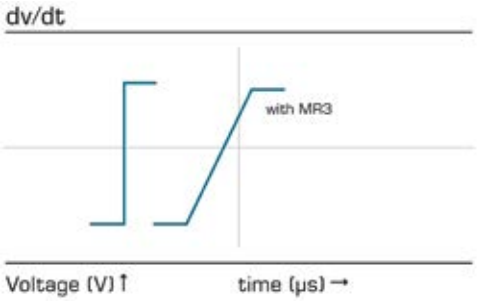
Improvement of interference on the motor line

A. Cancellation of motor leakage and bearing currents, increased component life time

B. Less pollution and overheating on the cable. Reduction of electromagnetic interference

C. Reduction of energy losses: less current consumed and less leakage current

D. Use of long motor cable lengths, shielded cable no longer necessary to limit interference emissions



Filtration with motor reactor to reduce dV/dt in differential mode

Reduction of the dV/dt, limitation of peak voltages and currents, reduction of motor leakage current

Drive output filtration by motor reactor					
Reference	**Designation**	**Power range**	**Drive switching frequency**	**Motor rotation speed**	**Type of improvement**
BLOMDB 400/XX	3x400 VAC three-phase motor inductance	2.2 x 90 kW	2 to 6 kHz	0 to 120 Hz	B
BLOMR3 400/XX	3x400 VAC three-phase motor inductance	0.75 x 30 kW	3 to 8 kHz	0 to 50 Hz	B

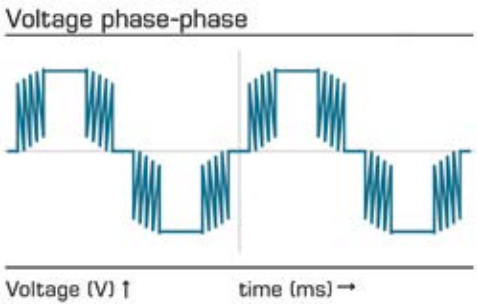
Available in other sizes

Filtration with standard sine wave filter (differential mode) and all-pole filter (differential and common mode)

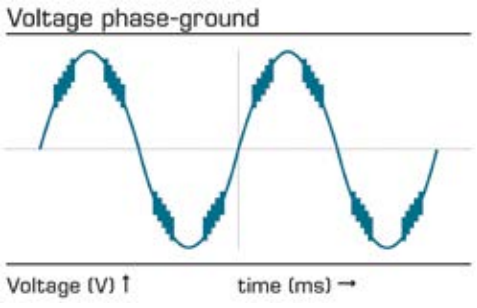
Reduces noise, motor leakage currents and bearing currents (all poles), accepts long, unshielded cables, saves energy (all poles)

SF4 all-pole sine filter

Drive output sine wave filter					
Reference	**Designation**	**Power range**	**Drive switching frequency**	**Motor rotation speed**	**Type of improvement**
BLOSFB 400/XXX	3x500 V standard three-phase sine wave filter	1.5 x 260 kW	4 to 8 kHz	0 to 150 Hz	B, D
BLOSFA 400/XX	3x500 V all-pole three-phase sine wave filter	0.55 x 30 kW	from 8 kHz	0 to 60 Hz	A, B, C, D
BLOSF4-CXXX-500-X	3x500 V all-pole three-phase sine wave filter	2.2 x 75 kW	from 4 kHz	0 to 150 Hz	A, B, C, D



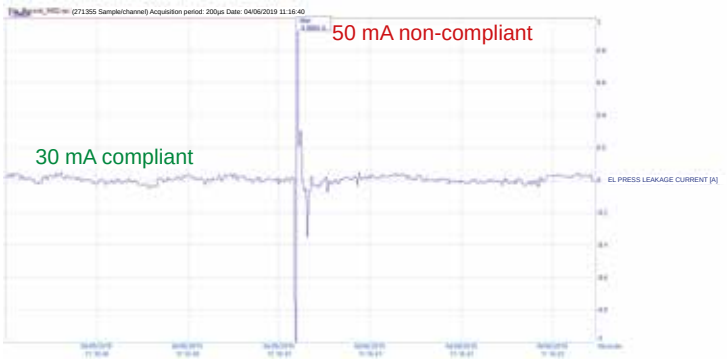
drive output signal phase-phase voltage with motor reactor



drive output signal phase-earth voltage with SF4 filter

Saving of approximately 6.6% in energy consumption with an all-pole sine wave filter
All-pole sine wave filters provide variable active energy savings depending on the components

Introduction



The modernisation of electrical installations leads to an increase in leakage currents.
These leakage currents are created by parasitic capacitance caused by power electronics (e.g. variable frequency drives).

This may adversely affect the proper functioning of the installation by nuisance tripping, interference on sensitive equipment and premature wear of motor bearings caused by bearing currents.

In EMC, the rule is that **all exposed conductive metal parts must be interconnected and connected to the earth.**

A **meshed** bonding network allows the parasitic currents (known as common mode currents) linked to electromagnetic interference to be better distributed.
The common mode parasitic currents loop via the conductive metal parts.
It is a well-known fact that these currents always follow the **path of least resistance.**

Different earthing rules may be imposed according to the risk considered. This is the case for **ATEX** environments, in which the risk of sparks must be controlled, and **lightning**, in which the risk of a difference in potential must be avoided.

In EMC, a specific requirement is given for the management of earthing and bonding.

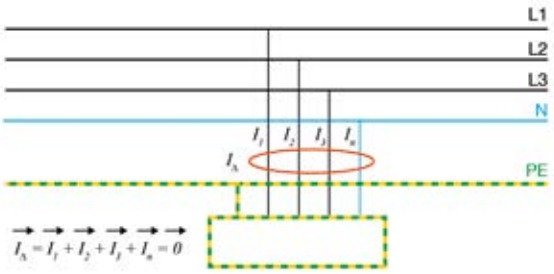
Foundation earth electrode

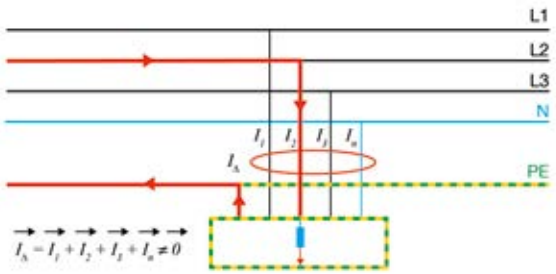
Electrical and mechanical continuity

Earth connection to protect people and property

Bonding conductor to manage interference currents generated by the drive

Earth leakage currents are known as residual currents.
Depending on the earthing system (neutral system), various problems may be encountered such as differential tripping or insulation faults.



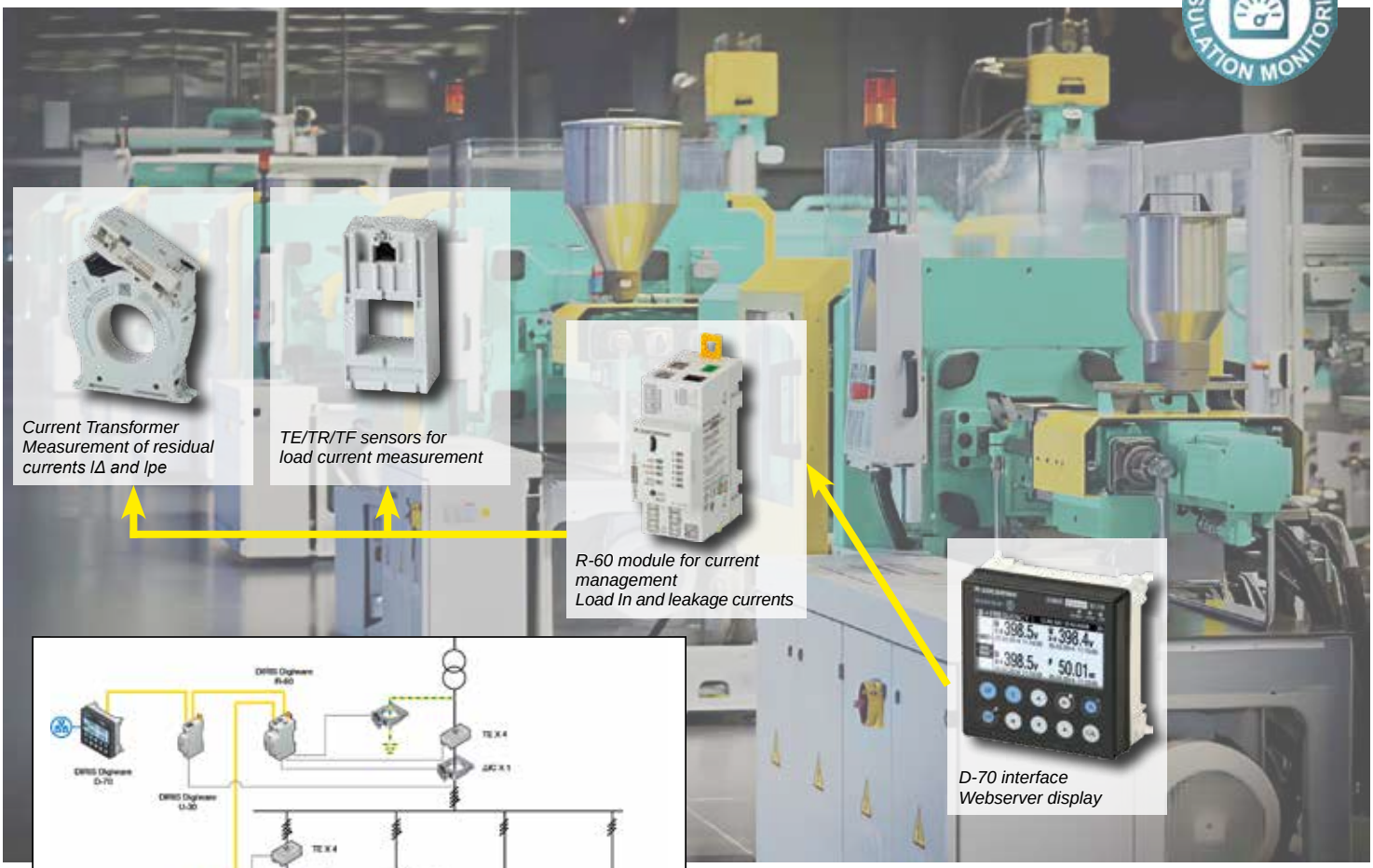


Residual currents are composed of a capacitive part and a resistive part.

Capacitive currents which are of electronic origin can generate nuisance tripping without the installation having any electrical faults.

Resistive currents are created by insulation faults between the phase and earth voltages.

The **DIRIS Digiware RCM** smart measurement solution pools residual current and load current monitoring **to anticipate insulation faults before protection devices trip**.



In accordance with standard NF C 15-100 relative to low-voltage electrical installations, constant monitoring by an RCM solution, such as the DIRIS Digiware RCM solution, means periodical measurement of the insulation resistance is no longer necessary.

Meter Selector:
Find the best DIRIS Digiware configuration for your projects in just a few clicks!
https://meter-selector.com/#/FR/home

Insulating cable tray 66

Improved installation by the use of Unex insulating cable trays

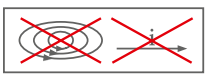
EMC advantages of Unex solutions:

In many industrial contexts, managing electromagnetic interference can be complicated, as multiple factors must be taken into account. As the Unex cable tray is insulating and unaffected by electromagnetic sources, it simplifies the issue and helps to implement EMC rules:

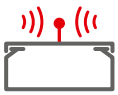
- It does not create interference (no creation of unwanted loops, no antenna effect and no induction on the material)
- It does not propagate conducted interference
- and it does not amplify interference in an electrical installation (energy/data/instrumentation)

H (mm)	W (mm)	Perforated Base	Continuous Base	Cover	Junction + 2 bolts	Dividers		Flat corner 90°	Flat corner cover 90°	End cover	Joint cover piece	Corner junction 45°	Level change		Hinge	Bracket		Steel bracket	
													Convex	Concave		Horiz.	Vert.	Epoxy	Sendzimir
																			
60	75	66090	66091	66072	66824	-	-	66060	66061	66093	66094	66841	66842	66843	66813	66103	66075	66106	66107
	100	66100	66101	66102		66821		66110	66111	66113	66114					66103	66155		
	150	66150	66151	66152			66826	66160	66161	66163	66164					66153	66155	66206	66207
	200	66200	66201	66202				66210	66211	66213	66214					66203	66205		
	300	66300	66301	66302				66310	66311	66313	66314					66303	66305	66306	66307
	400	66400	66401	66402				66410	66411	66413	66414					66403	66405	-	-
100	200	66220	66221	66202	66834	66831	66836	66230	66211	66233	66234	66851	66852	66853	66833	66203	66205	-	-
	300	66320	66321	66302				66330	66311	66333	66334					66323	66305		
	400	66420	66421	66402				66430	66411	66433	66434					66403	66405		
	500	66520	66521	66502				66530	66511	66533	66534					66503	66605		
	600	66620	66621	66602				66630	66611	66633	66634					66603	66605		

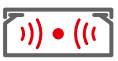
For ETN references, add the prefix: UNX



Simplification of earthing systems.
No leakage currents in the cable trays.
Surface resistance > than 108 Ω
Dielectric strength: 18±5 kV/mm



No antenna effect by the creation of fields.



Limitation of self-induction effects.

Simplified implementation and electrical safety.

Benefits for the customer:

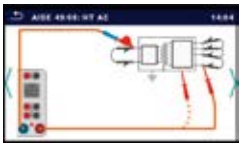
The Unex solution reinforces the electrical safety of your installation and its longevity, even in corrosive or chemically harsh environments, both indoors and outdoors.
The Unex solution simplifies EMC management of cable trays and reduces implementation and maintenance costs.

Machine and Installation meters

To guarantee the safety of people and property whilst at the same time avoiding the costs incurred by production downtime, your new and renovated electrical installations need to be regularly inspected.

We offer a range of devices used to perform measurements in compliance with the standards currently applicable *(IEC/EN 60204 Ed.6, NF C 15-100, VDE 701/702, etc.)*.

The benefit of a clear, intuitive interface with illustrations showing the connections makes it quick for operators to master.

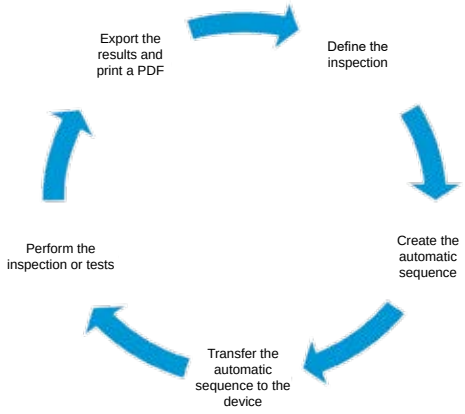


Machine meter reference	MI3325	MI3394EU	MI3360	MW9665	Installation meter reference
5000 VAC dielectric test	yes	yes	no	yes	Earth measurement with rods
6000 VDC dielectric test	no	yes	no	yes	Earth loop testing
Continuity test with 25 A	yes	yes	yes	yes	Continuity test with 25 A
Insulation test	yes	yes	yes	yes	Insulation measurement
Leakage current	yes	yes	yes	yes	Differential circuit breaker test
Customisable sequences	yes	yes	yes	yes	Customisable sequences
Communication	USB/LAN/ BLUETOOTH	USB/LAN/ BLUETOOTH	USB/LAN/ BLUETOOTH	USB/ BLUETOOTH	Communication
RENTAL/DEMONSTRATION	yes			yes	RENTAL/DEMONSTRATION

Processing software

The STANDARD version delivered with the device can be used to import your results and create a report.

The optional PRO ES Manager version (ref.P1101) allows you to configure or create manual and automatic test sequences, export them to the device and generate a full report of your measurements. It is also available on tablet or smartphone with an ANDROID version (ref.P1102).



Earth leakage current

We have a solution to measure parasitic currents generated by the power electronics of your installation (starter, drive, lighting, etc.).

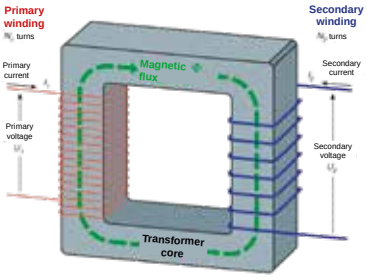
MW3950B

EMC performance

All transformers are composed of separate windings and have galvanic insulation.
There are various practices:
- Galvanic insulation: main insulation, also available in reinforced insulation, double insulation or more
- Change of neutral system
- Adaptation of the voltage and frequency of the LV network
- Harmonic pollution filtration

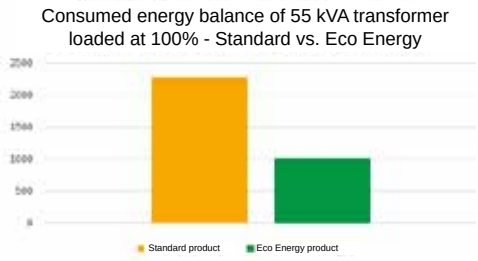
The transformer and harmonic pollution

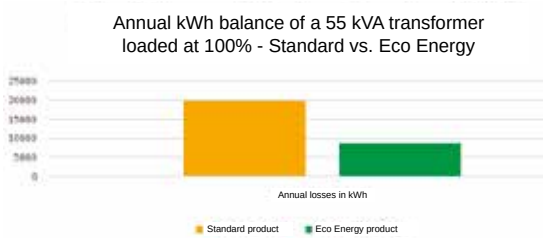
The transformer **acts as a natural harmonics filter** thanks to its inductive effect.
The addition of an electrostatic screen *(Conductive metal sheet placed between the primary and secondary windings and connected to the earth)* evacuates parasitic currents to the earth.



Energy efficiency: ECO ENERGY high-efficiency transformers

In terms of energy saving, a transformer is a source of overconsumption which is often not taken into account in an energy balance.
The arrival of high-efficiency transformers means a significant saving can be made.





Reference table

Power kVA with 400 VAC	ECO ENERGY OPEN FRAME single screen ref.	ECO ENERGY COVERED single screen ref.
16 kVA	7T163-TN-Y897 400V D / EC / 400V Y+N	7T163-AB-Y898 400V D / EC / 400V Y+N
20 kVA	7T203-TN-Y900 400V D / EC / 400V Y+N	7T203-AB-Y901 400V D / EC / 400V Y+N
40 kVA	7T403-TN-Y902 400V D / EC / 400V Y+N	7T403-AB-Y903 400V D / EC / 400V Y+N
50 kVA	7T503-TN-Y904 400V D / EC / 400V Y+N	7T503-AB-Y905 400V D / EC / 400V Y+N

Other powers and voltages available

Custom-built transformer questionnaire see page 38

Type B, Bfq and B+ RCDs for machines and electric drive systems

Applications

Photovoltaic inverter Power supply Vehicle charging station Medical device	Industrial machine equipped with variable frequency drive for brushless and asynchronous motors	Application exposed to a fire risk: - service station - agriculture - paint workshop - warehouse - biogas production plant
Type B RCCB Insensitive to all residual current flows up to 1 kHz	**Type Bfq** RCCB Insensitive to high frequency earth leakage currents generated by electronic switching systems	**Type B+** RCCB For higher protection against fires (tripping at 420 mA)

Type G/Bfq Isc = 10 kA

RCCB type 300 mA Isc 10 kA

RCM type B

Compliant with IEC/EN 62 020, VDE 0663
- Detection of type B currents
- Detection of insulation faults in earthed networks
- Broken conductor detection
- Measurement range 10 mA to 3 A
- Analogue output
- Differential current transformer measuring option

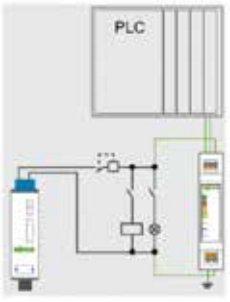
Reference	Designation
DOL0066451	Relay RN5883.12/61 AC/DC 80-230 V 10-3000 mA
DOL0066841	TI ND5015/035/61 Ø35 mm

24 VDC control signal insulation fault module

According to the machine directive **IEC 60204-1**, earth faults on a control circuit must not cause disruption (unexpected start-up, potentially dangerous movements, etc.).

- Immediate disconnection of the fuse in case of an earth fault - immediate stoppage of a machine
- Automatic test routine. Verification of earth insulation resistance every 10 seconds
- Early warning of earth faults by LED and “Iso OK” contact

789-665



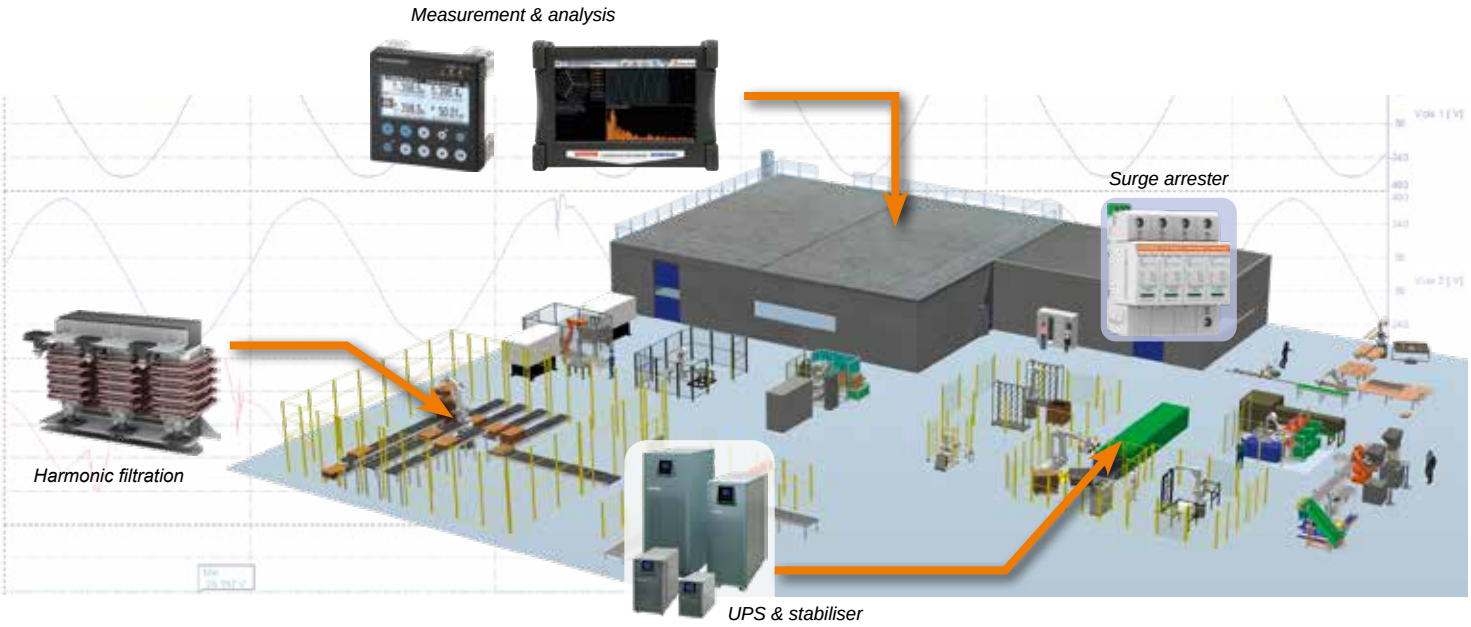
Introduction

Controlling the quality of the voltage on electrical distribution networks is a vital asset for companies.

Electrical disturbance can paralyse the production tool:
- **interference** on computer, automation and robotic equipment,
- **limited life time** on variable frequency drive equipment and asynchronous motors.

Electrical disturbance can impact the company's energy efficiency:
- **appearance of distorting power** by harmonic pollution,
- **functional failure** on LED lighting,
- **abnormal behaviour and wear** on reactive energy compensation systems.

There are effective measurement techniques and solutions to limit these issues.



The calculation algorithms built into modern measurement tools are capable of capturing voltage quality phenomena in accordance with standard EN 50160.

This standard defines all the electrical disturbance criteria which may impair voltage quality.

Example on a 230 VAC network - sample of measurements over a 7-day period.

Frequency	Classification of the fundamental frequency measured over 10 seconds (f10s) → 47 – 52 Hz
Voltage variation	Root mean square value (Urms) on 1 min sample → 195.50 – 253.00 V
Flicker	Long-term flicker perceptibility (Plt) linked to voltage fluctuation → Plt < 1
Harmonic distortion	Root mean square value of the harmonic distortion (max. 40th harmonic) → THDu < 8%
Overvoltage	Classification of overvoltages u% according to the maximum voltage and duration → example: u > 120% (duration in ms)
Dips	Classification of the number of voltage dips → e.g. nbr: 90 > U% ≥ 80 for 10 ≤ t ms ≤ 200
Swells	Classification of the number of voltage swells → e.g. nbr: 120 > U% > 110 for 10 ≤ t ms ≤ 500

There is a range of measuring instruments to perform a clear, accurate diagnosis of your installation in order to identify the sources of disturbance from an energy quality point of view.

Energy and electrical network quality analysers

This range of devices can perform all measurements in any neutral system (TT, TN (C/S) and IT).
These products use an intuitive graphic interface to simplify measurements.

- Measurement of TRMS voltage, current, frequency, cos Φ
- Apparent, active and reactive power
- Measurement on single-phase, three-phase and four-phase systems
- 4 voltage inputs/4 current inputs
- Harmonics analysis up to the 50th harmonic
- Power analysis for VFD*
- Inrush current, flicker measurement
- USB interface, Ethernet and RS232
- Verification of compliance in accordance with standard EN 50160
- 8 GB of memory (USB card up to 32 GB)
- Colour screen
- Dimensions: 230 x 140 x 80 mm
- Safety: 1000 V CAT III and 600 V CAT IV

** VFD (Variable Frequency Drive): function designed to perform measurements on variable frequency drives where the motor speed is controlled by the change of frequency.*

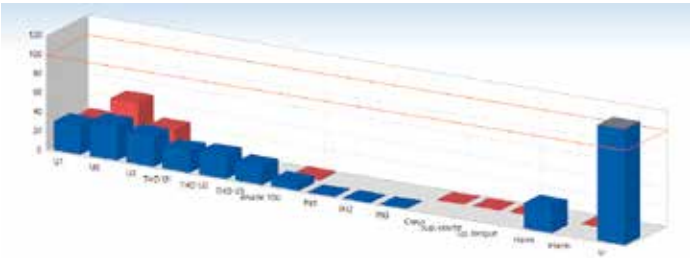
References	Technical characteristics
SEFMW9685B	IEC 61000-4-30 class S *** Measurement on 50/60 Hz networks
SEFMW9690B	IEC 61000-4-30 class A ** Measurement on 50/60/400 Hz networks Recording of waveforms and transients

Rental of measuring devices

*** class A: applications requiring precise measurements in compliance with the standards.*
**** class S: statistics applications, similar result to class A but with less demanding requirements.*

Once these measurements have been performed, the data recorded must be analysed.

The **PowerView** software application delivered free of charge with SEFRAM energy analysers is used to analyse the recorded data in order to create a report in accordance with standard EN 50160.



Delivered as standard:

probes, crocodile clips, measuring leads, PowerView software, RS232 and USB cables, mains adapter, mini SD card adapter, 6 rechargeable batteries, bag and user manual.

Supplied as options:

References	Technical characteristics	
SEFS2094	Kit of 4 flex clips – length 25 cm and Ø7 cm	
SEFS2096	Kit of 4 flex clips – length 48 cm and Ø14 cm	
SEFS2098	Kit of 4 flex clips – length 90 cm and Ø27 cm	
MUL66950921	Magnetic adapter XMA-7L black	
MUL66950923	Magnetic adapter XMA-7L blue	

Other accessories: consult us.

Data acquisition systems

This range of autonomous portable recorders is designed for the acquisition of data concerning all **electrical disturbance** phenomena. The user interface becomes interactive with its colour touchscreen.

- 6 isolated analogue channels
- Universal inputs
- 2 PT100/PT1000 channels
- 16 logical channels
- Network analysis function
  - Current, voltage, frequency
  - Apparent, active and reactive power & power factor
  - Harmonics up to the 50th harmonic
  - Oscilloscope mode
  - Fresnel diagram
- Inrush mode with hysteresis
- Measurements on PWM signals
- 100 kHz bandwidth
- Max. sampling rate: 1 Mech./sec per channel
- USB interface, Ethernet, WIFI option
- 64 GB internal hard drive
- Autonomy up to 9 hours and 30 minutes
- Dimensions: 295 x 210 x 121 mm
- Safety: IEC 1010 - 600 V CAT III

Reference	Software
SEFDAS60	An activation key for the FlexPro View OEM software is included in the purchase of this recorder.

Several versions possible on request.

Rental of measuring devices

The SEFDAS60 recorder has a high sampling rate of up to 1 MHz.
In comparison, the SEFMW9690B analyser goes up to 5 kHz.

Other applications already created

- Verification of proper sensor functioning
- Temperature control in a heating process
- Analysis of a battery charging and discharging time (renewable energy)
- Short circuit test for a high-speed line (railway)
- Data acquisition over a long period to discover the source of problems
- Analysis of electrical network disturbances
- Datalogger for multiple current measurements
- Remote measurement of PLC data
- Checking of current consumption
- and an infinite number of applications

DAS 60 presentation video

Supplied as options:

Flexible current clamp
SEFA1587

Banana plug shunt

and many other accessories.

Checking energy quality in 3 steps

A smart, modern measuring system can highlight issues relating to voltage quality and harmonic pollution and therefore reveal any impact on the energy efficiency and sizing of the installation.

Step 1

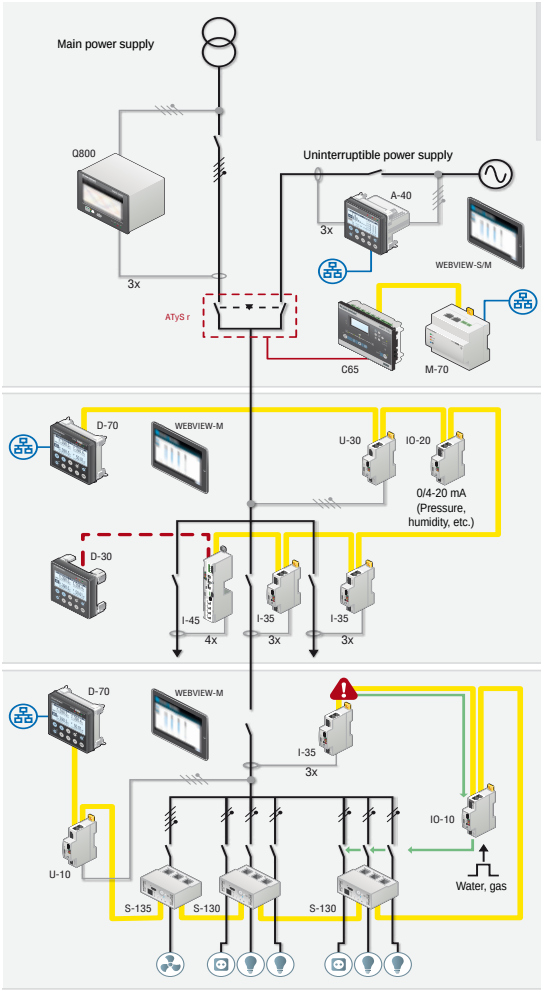
Accurately monitor the quality and availability of the electrical network at the point of entry into the installations

Be informed of any drift, power cuts, voltage dips and peaks

Be informed of total harmonic pollution and imbalances

Drafting of reports in accordance with standard EN 50160 allowing the quality of the energy delivered by the supplier to be checked

DIRIS Q800



Step 2

Analyse harmonic pollution in real time and check the proper sizing of the installation

Monitor harmonic pollution to assess the impact and establish the source of the disturbance

Guarantee that the installation (transformer, breaking equipment, cables) is correctly sized to avoid power cuts

Real-time monitoring of the plant's consumption

DIRIS D-70

Step 3

Analyse disturbance of electrical origin as close to the process as possible

Accurately identify the disrupted loads and the disruptive elements (variable frequency drive motor starter, lighting, IT, HVAC, etc.)

Monitor the impact of load peaks (motor start-up, current overload, voltage dips)

State of the equipment's energy efficiency

DIRIS A-40

TR/iTR split-core sensors

TF flexible sensors

Measurement monitoring software

Avoid penalties from energy providers

Penalties (France): **1.94 euro cents/kVAr.h** if tanφ > 0.4, from November to March, from 06:00 to 22:00 from Monday to Friday

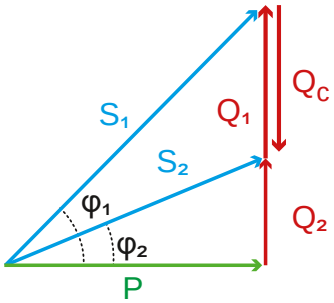
Reduce losses by relieving transformers and cables

1000kVA transformer with cosφ 0.75 and a 750 kW installation -> improving cosφ to 0.96 = **-22% current**

Increase the available active power (tariff optimisation)

For a 500 kW motor, the network needs to supply 714 kVA, thus **143% of the active power.**

The purpose of a capacitor bank is to reduce the capacitive reactive power Qc and bring the power factor (cos φ) as close as possible to 1.



Qc = capacitor reactive power
Q1 = reduced reactive power
Q2 = remaining reactive power

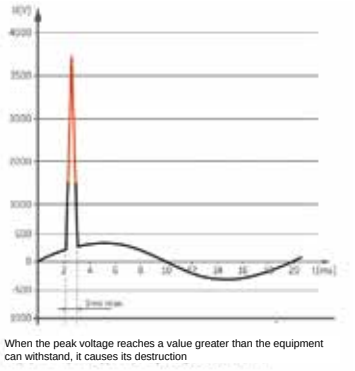
The COSYS PFC models reduce the current flowing through the battery, thereby enabling the battery to be preserved for longer.

		Overloads	Depollution	Advantages
Fixed 10 to 100 kVAr at 400 VAC	**PFC 21**	2 In (high-efficiency capacitors)	No	Compact size Robustness
	PFC 22		189 Hz	
Auto 17.5 to 900 kVAr at 400 VAC	**PFC 40**	1.5 In (reinforced capacitors)	No	Patented regulation Plug and Play
	PFC 41	2 In (high-efficiency capacitors)	No	
	PFC 42		189 Hz	
	PFC 43		1839 Hz	
	PFC 44		210 Hz	
Static 100 to 600 kVAr at 400 VAC	**PFC 62**	2 In (high-efficiency capacitors)	189 Hz	Ideal for rapid fluctuations

The sizing of a capacitor bank in industry involves a dimensional study.
(see page 39 for the sizing formula).

What is overvoltage?

Overvoltage is a surplus of electrical energy which can reach tens of kilovolts over periods lasting around a micro-second. Despite the short duration, the high energy content can cause serious problems for the equipment connected to the line, such as premature ageing of the electronic components, equipment failure or service interruptions and financial loss.



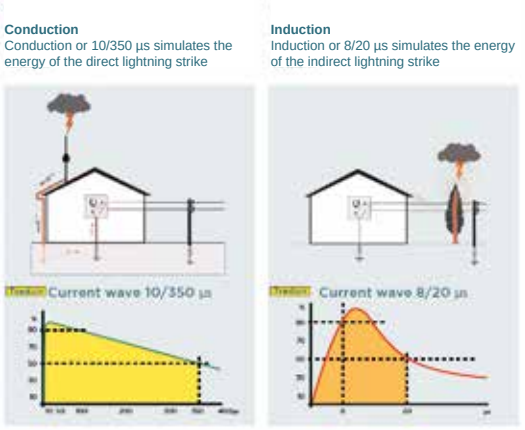
When the peak voltage reaches a value greater than the equipment can withstand, it causes its destruction

Types and sources of overvoltage

Overvoltage can be classed in two categories,

- Direct overvoltage (conduction). This is caused by a direct lightning strike on an installation.
- Indirect overvoltage (induction). This is caused by network disturbance (switching operations) and close lightning strikes where the current flow induces overvoltage on the power lines or other metal conductors

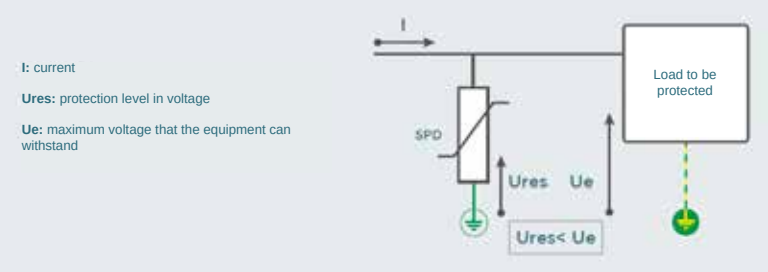
According to standard IEC 61643-12, these overvoltages can be listed in the form of shock waves, 10/350 µs for a direct hit and 8/20 µs for an indirect hit.



SPD (Surge Protection Device)

An overvoltage protection device acts like a voltage-controlled switch. It is fitted between the active conductors and the earth in parallel to the equipment to be protected. When the supply voltage is less than its activation voltage, the protection device acts as a high-impedance element so that no current flows through it.

When the supply voltage is higher than the activation voltage, the protection device acts as an impedance element close to zero, diverting the overvoltage to the earth and preventing it from affecting the equipment downstream.



Surge protection devices (SPD) Go to protection solutions for:

Type 1 / Class I

Ability to discharge lightning currents (10/350 µs). For incoming power supply panels of installations provided with external lightning rods and/or at high risk of direct lightning strikes. IEC 61643-11.

Type 1+2 / Class I+II

Ability to discharge lightning currents (10/350 µs) and induced voltage surges (8/20 µs). IEC 61643-11.

Type 2 / Class II

Ability to discharge induced voltage surges (8/20 µs). Suitable for the second level of protection in supply distribution panels in which Type 1 protectors are installed, or for the first level of protection for applications not exposed to direct strikes and with no external lightning protection system. IEC 61643-11

Type 2+3 / Class II+III

Ability to discharge induced voltage surges (8/20 µs), while offering very fine protection of sensitive equipment (1.2/50 µs). IEC 61643-11

Type 3 / Class III

For very fine protection of sensitive equipment (1.2/50 µs). Installation downstream of type 2 protection. IEC 61643-11.

Are you on a building equipped with a lightning rod or in contact within a radius of 50 m around the building?

YES

NO

Type 1+2 surge arrester limp 12.5 kA or 25 kA

Type 2 surge arrester/Imax 40 kA

1st protection step: MAIN SWITCHBOARD

STPT12 - 12 kA
TYPE 1+2 limp 12.5 kA

Reference	Designation	Nbr of phases	Neutral system
MER83120115	STPT12-12K275V-2PGM	1 PH+N	TT
MER83120121	STPT12-12K275V-2PM	1 PH+N	TNS
MER83120139	STPT12-12K275V-4PGM	3 PH+N	TT
MER83120145	STPT12-12K275V-4PM	3 PH+N	TNS

STPT12 - 25 kA
TYPE 1+2 limp 25kA

Reference	Designation	Nbr of phases	Neutral system
MER83120155	STPT12-25K275V-2PGM	1 PH+N	TT
MER83120157	STPT12-25K275V-2PM	1 PH+N	TNS
MER83120151	STPT12-25K275V-4PGM	3 PH+N	TT
MER83120161	STPT12-25K275V-4PM	3 PH+N	TNS

Selection according to the directives of the lightning analysis. If there are no precise details, standard IEC 61643 requires the use of a surge arrester with a minimum value of 12.5 kA

2nd protection step: DISTRIBUTION PANEL

STPT2 - 40 kA
TYPE 2 Imax 40 kA

Reference	Designation	Nbr of phases	Neutral system
MER83020117	STPT2-40K275V-2PGM	1 PH+N	TT
MER83020123	STPT2-40K275V-2PM	1 PH+N	TNS
MER83020147	STPT2-40K275V-4PGM	3 PH+N	TT
MER83020153	STPT2-40K275V-4PM	3 PH+N	TNS

3rd protection step: CLOSE TO SENSITIVE EQUIPMENT

Type 2+3 surge arresters/Imax 20 kA

STPT23 - 20 kA
TYPE 2 Imax 20kA

Reference	Designation	Nbr of phases	Neutral system
MER83230113	STPT23-20K320V-2PGM	1 PH+N	TT
MER83230117	STPT23-20K320V-2PM	1 PH+N	TNS
MER83230129	STPT23-20K320V-4PGM	3 PH+N	TT
MER83230133	STPT23-20K320V-4PM	3 PH+N	TNS

Protection of machine power supplies
Modular type 2 secure system surge arrester according to EN61643-11

Reference	Application
DEH952330	For 400 V three-phase power supply - TNC
DEH952341	For 400 V three-phase + N power supply - TT/TNS

Protection of PLC power supplies
Modular Type 3 surge arrester according to EN61643-11

Reference	Application
DEH953200	For 230 VAC single-phase - 2 poles
DEH953201	For 24 VDC and AC single-phase - 2 poles

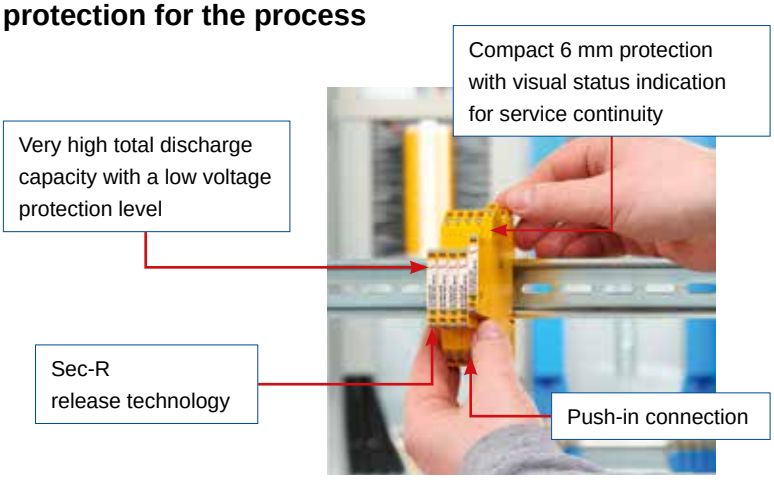
Data network protection

Reference	Application
DEH929121	For 230 VAC single-phase - 2 poles
DEH929044	For wireless network antenna

For interface/analogue/field bus signals

Reference	Application
DEH927224	Binary signal
DEH927271	RS485 - Profibus DP/FMS - MODBUS
DEH927222	Temperature measurement
DEH927244	0-20 mA / 4-20 mA

BLITZDUCTORconnect, space-saving overvoltage protection for the process



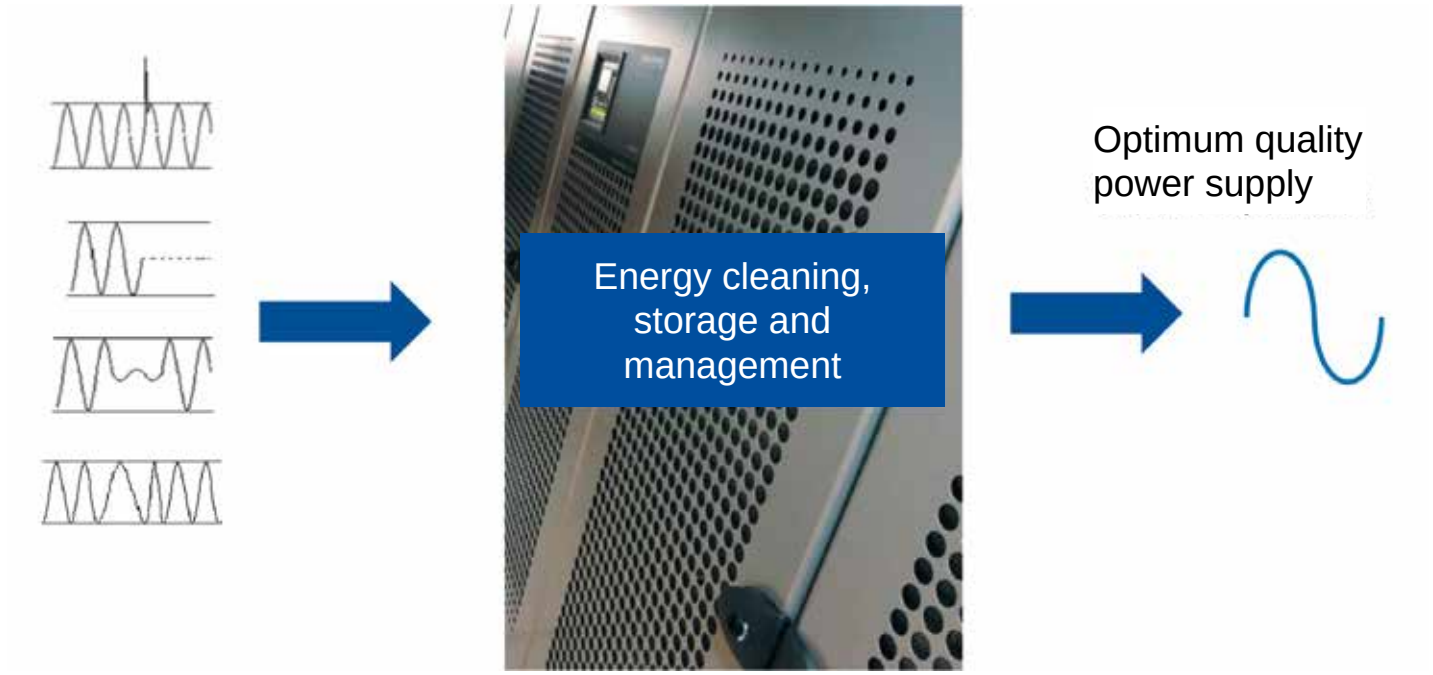
Problems: Causes and effects

Impurities:
Short interruptions
Overvoltages
Voltage dips
Lightning
Noise
Harmonics
Frequency variations
Data corruption
Premature wear of electronic components
Component failure

Power cut:
Accidental events
Short circuit
Switching (on heavy loads)
Overloads
Weather events
Loss of revenue
Data loss
Equipment damage

For example, a computer server can suffer up to 125 potentially destructive incidents/month (88% voltage fluctuations and transients):
• Electrical noise and transients 63 incidents/month,
• Power failures 0.5 incidents/months,
• Voltage dips and drops 14.4 incidents/month,
• Overvoltages and overcurrents 50.7 incidents/month.

Why install a UPS?



ITYS range - Online - Tower format

Addition of extra batteries possible for extended autonomy

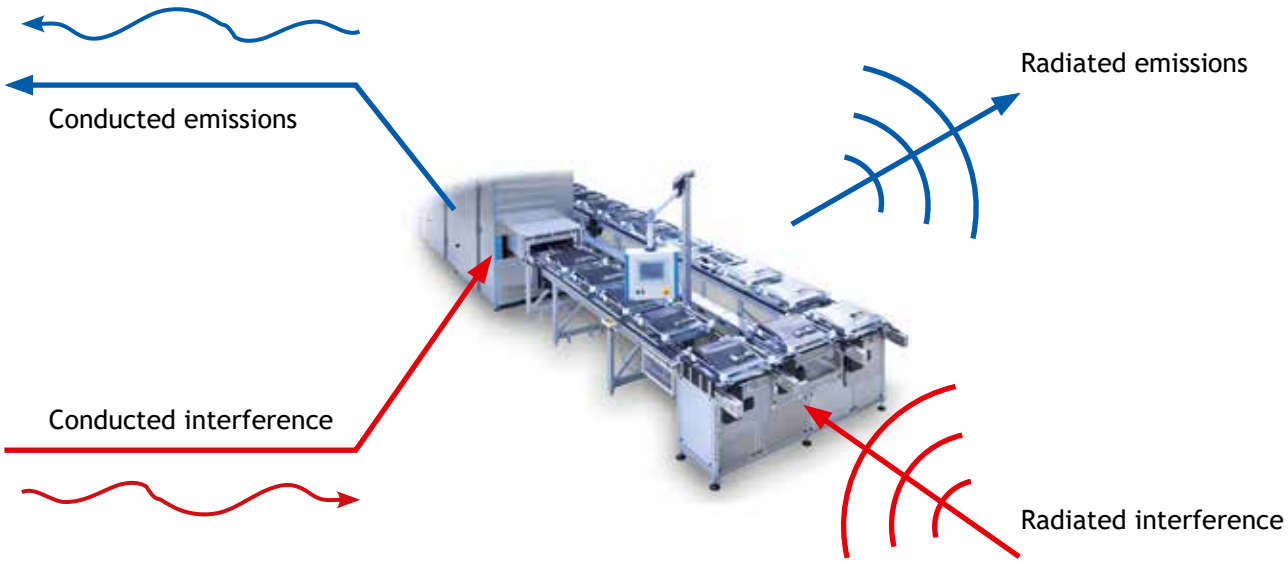
Reference	Power	Autonomy*	Connections
SOCITY2-TW010B	1000 VA/800 W	10 min	3 IEC 320 sockets
SOCITY2-TW020B	2000 VA/1600 W	17 min	6 IEC 320 sockets
SOCITY2-TW030B	3000 VA/2400 W	9 min	4 IEC 320 sockets - Terminal blocks
SOCITY2-TW060B	6000 VA/5400 W	13 min	Terminal blocks
SOCITY2-TW100B	10 kVA/9 kW	9 min	Terminal blocks
SOCITY2-TW110B	10 kVA/9 kW	10 min	Terminal blocks
SOCITY2-TW110B+	10 kVA/9 kW	30 min	Terminal blocks

** All autonomies given are for UPS with 75% load.*

Appendices

EMC (ElectroMagnetic Compatibility) is the **capacity** of equipment or installations **to function satisfactorily** in their environments **without causing interference.**

There are 4 types of interference:

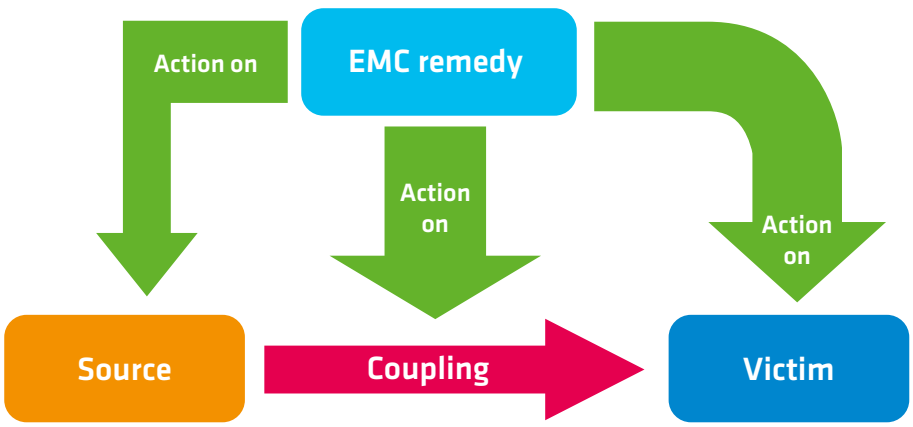


All electrical installations must comply with the EMC directive 2014/30/EU.
The limits for interference concerning electronic equipment integrated into electrical installations (e.g. machine) are set by the harmonised standards.

The generic standards are:

- EN 61000-6-1: generic standard covering immunity in the residential environment
- EN 61000-6-2: generic standard covering immunity in the industrial environment
- EN 61000-6-3: generic standard covering emissions in the residential environment
- EN 61000-6-4: generic standard covering emissions in the industrial environment

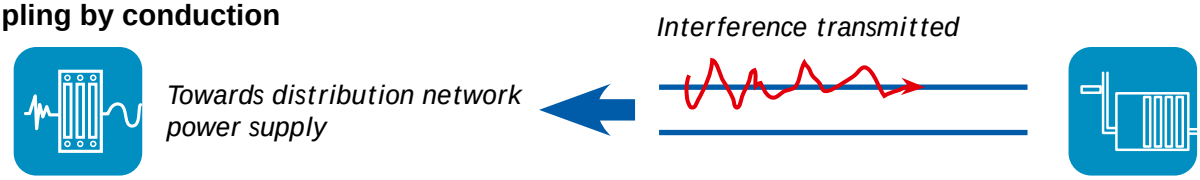
When faced with a problem of electromagnetic interference, a certain methodology is required.
In theory, you should identify the **source** of the interference and control its **path** in order to protect the **victim** equipment.
In practice, action is possible in several places, as there are many **solutions** adapted to each situation.



Electromagnetic interference propagation

The evolution of technologies has made equipment more sensitive and therefore vulnerable to EMI damage.
The wiring rules must be taken into account to avoid errors and therefore the risk of interference.
In EMC, there are 2 propagation paths (coupling).

Coupling by conduction

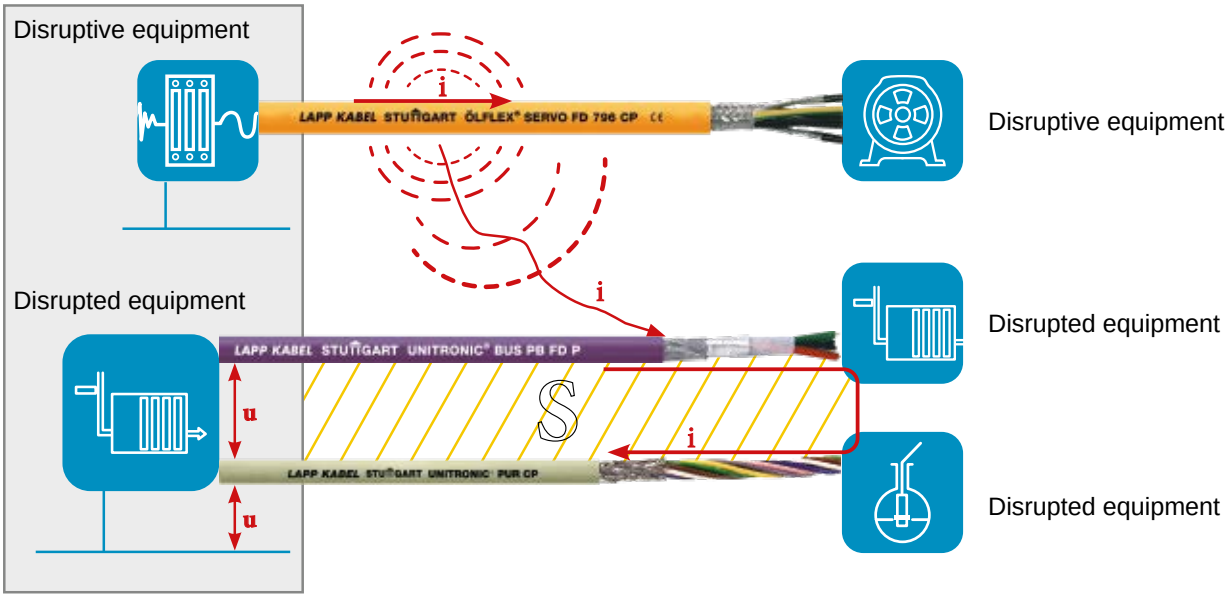


On a two-wire connection, a useful or parasite signal can move in two ways:
- in differential mode
- in common mode (via the earth)

In differential mode (example between two wires)

In common mode (example, between the wires and the earth)

Coupling by radiation



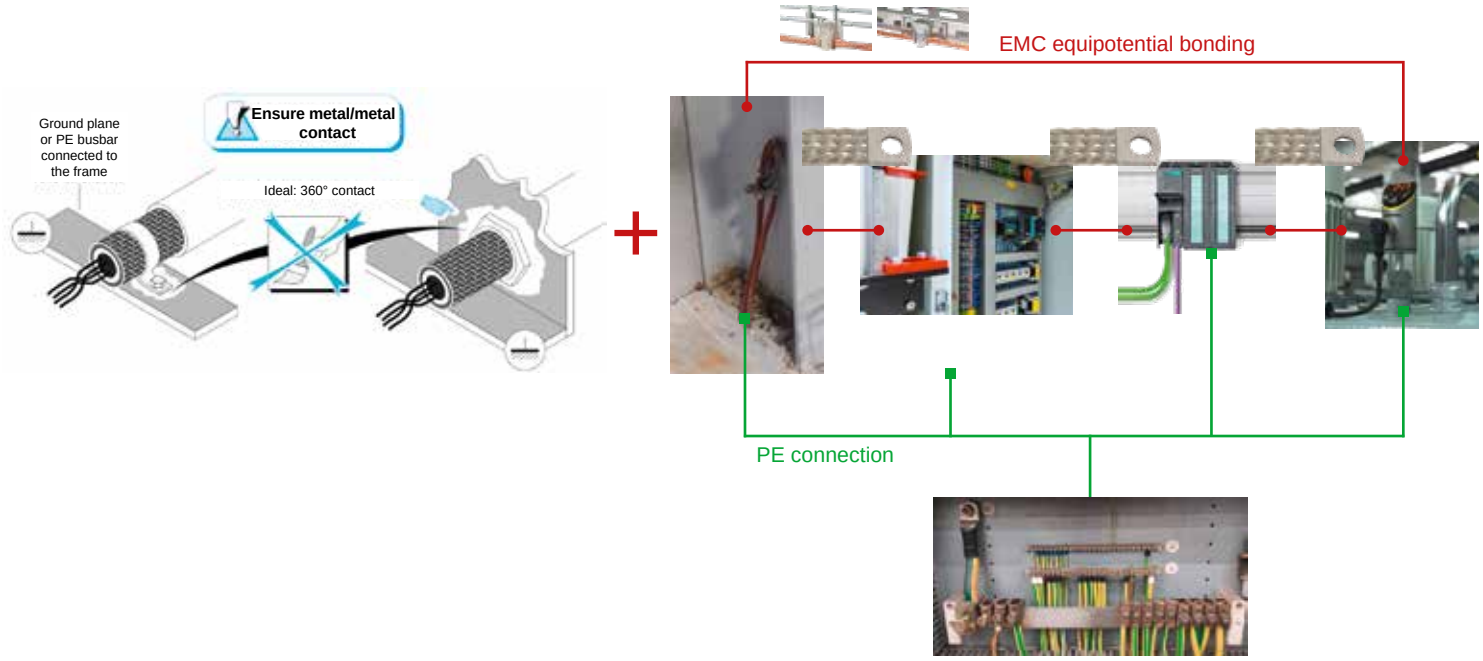
In radiation, interference coupling can be created by an inductive effect.
A **parasitic current I** flowing in an electrical conductor creates a magnetic field which radiates around the conductor.
If the sensitive cable forms a loop with a surface area S in a variable magnetic field, a voltage **u** appears on its terminals.

In radiation, interference coupling can be created by a capacitive effect.
Most cables today are shielded.
A non-zero capacity can exist between the electrical cable (disrupter) with another signal cable (sensitive) and another circuit close by, such as the earth and chassis ground.

A variable potential difference between these two circuits will generate the flow of a parasitic current and thus form a capacitor called a parasitic or stray capacitance.
The higher the frequency of the voltage on the terminals of the parasitic capacitance, the higher this parasitic current will be.

Shielding connection is vital in EMC.

Whatever the type of cable (motor, sensor, PLC, IP network), the shielding must be bonded **over 360° at both ends** on **equipotential bonding** at high frequency with a low contact impedance.



Treatment of shielding in cabinets

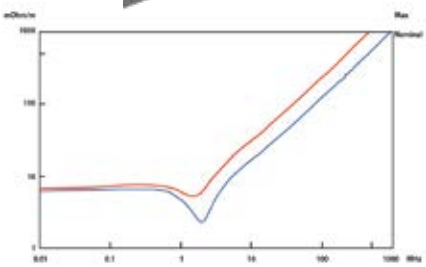
To achieve an **excellent level of attenuation**, the shielding continuity system must provide 360° contact.

The shielding continuity system must **be mounted** as **directly as possible** on its **immediate ground plane** (back panel, DIN rail, etc.) without any galvanic couple constraint.

Treatment of shielding on sensor and motorisation junction box

In practice, 360° can be achieved by **cable gland** type solutions at the entries to metal boxes and motor terminal boxes.

As mostly **high-frequency interference** must be eliminated, the shielding continuity system must offer the least resistance to parasitic currents. In EMC language, a low-impedance contact is required.



In addition, it will be noticed that the shielded cable has an important role in the assembly chain of a 360° shielding continuity system.

Depending on the frequency in Hz of the electromagnetic pollution, the shielding technology can impair the performances of the installation.

This is valid for power cables (e.g. motor) and data signal cables.

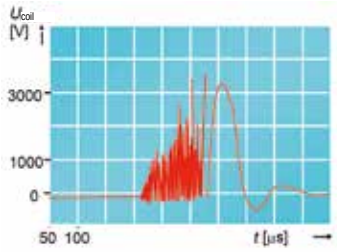
EMC performance of shielding

Type of cable	Radiated in LF < 1 MHz	Radiated in LF > 1 MHz
Aluminium sheet screen	☺	☹
Tinned copper braid screen	☺☺	☺
Aluminium sheet screen + braid	☺☺	☺☺

The level of shielding coverage by braid must be > than 83%

Interference suppression in the electric actuators:

Eliminating overvoltages caused by operating a coil.
Switching off the power to a contactor coil causes overvoltages.
Given the high resonance resistance of the coil deprived of current, the vibration amplitudes can reach several kV and the raised voltages are around 1 kV/µs.
These signals make it necessary to connect protection devices at the point where they appear on the contactor coil. These devices prevent the formation of overvoltages at the point where they appear and protect the electronic elements that are sensitive to the voltage.



Overvoltage due to the operation of an auxiliary contactor coil not fitted with a 230 V, 50 Hz, 10 VA protection device

New generation contactors with EMC management


3RT202xxx

Contactor interference suppressors


MUR2000685004400000


3RT2916

Interference suppressor solenoid valve connectors


MUR3124215


MUR3124163


MUR7000413410000000


HIR933929100

Universal interference suppressors


MUR26720


MUR26277

Improvement of the equipotentiality of the earths and exposed conductive metal parts

At high frequency, all round conductors have an impedance Z which increases with the frequency and may generate interference.
A meshed equipotential network composed of bonding conductors avoids this risk.

TO BUILD A PERFECT MESH, SHORT CONNECTIONS MUST BE USED

Cablet/bare copper


BARE-COPPER-xxx

Tubular lugs


MEC740xxx

Earthing


MEC7340171


MEC7341038

Prefabricated tinned copper braid earthing straps


TEKTMSxxx
Available in 304L/316L stainless steel version

Earth clips:

Earth clip used to earth and improve the equipotential bonding of the exposed metal parts of wire cable trays and sheet metal cable trays.


MEC734198x

INSTALLATION TIME DIVIDED BY 5

Machine cabinet environment metal duct

Ducts have a very useful reducing effect and are adapted to the field of automation drives.
/!\ A metal duct is not designed to replace a high coverage shielded cable.


C0012xxxxxx

Ferrite and nanocrystalline toroidal core

Passive components such as ferrite and nanocrystalline cores are used to block parasitic interference on low level cables such as field bus and instrumentation signal cables.
This is a supplementary solution to shielding continuity systems. It all depends on the desired result in terms of immunity.

Adapting the right connections to your data equipment

Using good quality cables for your Ethernet and field bus networks increases immunity to pollution encountered in industrial environments. */!\ Cable shielding is not designed to replace an earth cable.*

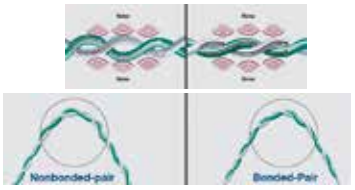
TELJ00026A4001

Shielded Ethernet cables and connectors

Industrial quality cable with adapted shielding offering better protection against interference from the external environment.
MFP8 connectors ensure good quality data transmission with full 360° shielding against electromagnetic interference.

Shielded overmoulded leads with bonded pairs

Bonded-pair cables provide the required reliable performances for high availability and high resilience environments.



HAR09628xx

EMC industrial connections

Shielding continuity can be removed at a standard industrial connector.
The electrical contact between the cover and the base is provided by a mechanical adaptation frame.
This assembly preserves a low impedance connection between the shielded cable and the metal enclosure.

Motor cables specific to variable frequency drive applications

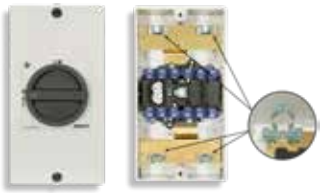
Experience in the field proves that the new drive technologies necessitate specific requirements with regard to the quality of the shielded cable.
The geometric construction, insulation of high voltage conductors and shielding are the guarantee of quality in a good motor cable.
/!\ Shielding must be bonded at both ends of the cable.

TOPROZ1KEMCxxx

Flexible shielded 3kV EMC LSZH cable for variable frequency drives (VFD cables)

EMC switching enclosure

Switching enclosures for connection compliant with the EMC of variable frequency drives are equipped with shielding supports with a large surface area or clamps mounted on rails for uninterrupted cable shielding.



KNA151332

Electrostatic discharges

Electrostatic discharges cause damage in electronic systems.
Static electricity generates high voltages, and a movement can generate a load of several thousand volts.
Insulating materials create electrostatic fields. They generate voltages close to the electrical circuits and damage the components when the current is discharged on the component.
Protection devices should therefore be used against these discharges in order to protect the sensitive elements of installations.

C600/C450/C300/ C70/C12S/CL12xx

Conductive brushes

These brushes are composed of thousands of carbon or stainless steel fibres which are particularly effective in eliminating static electricity.

ECA88B

Ionisers

Anti-static bars generate ionic emissions which neutralise electrostatic charges during the manufacturing process.

SUN20035x

Antistatic mat

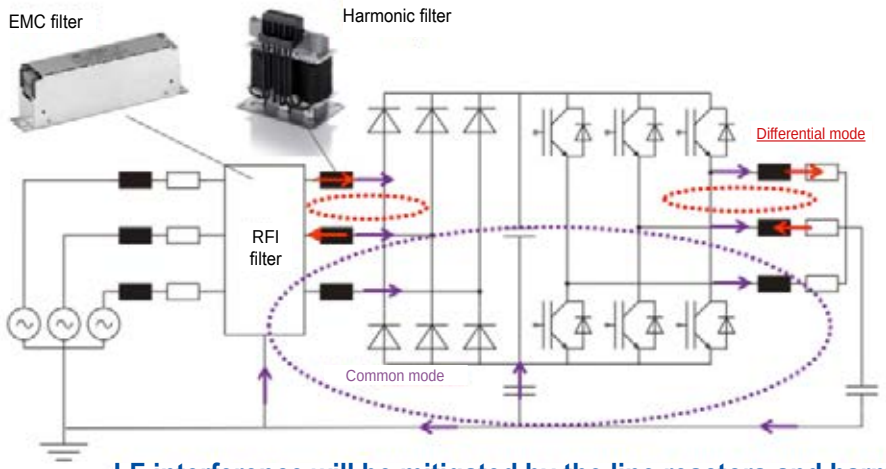
The antistatic mat is resistant to chemical products and intensive usage and is designed to protect sensitive equipment against electrostatic discharges on production lines or workstations.

MCE20

Electrostatic field strength meter

Handy field strength meter with digital display used to measure electrostatic fields.

High and low frequency filter wiring diagram



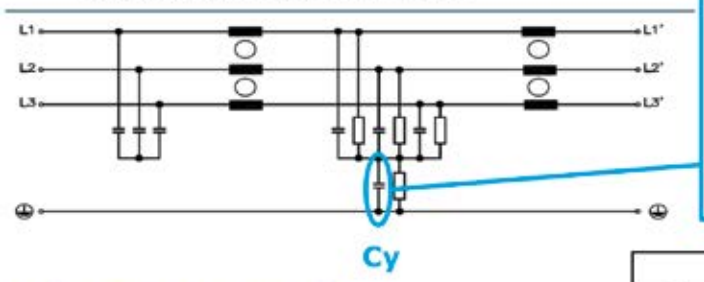
The network can be protected against interference of all frequencies.

Using an RFI filter in addition to a line reactor or a harmonic filter

LF interference will be mitigated by the line reactors and harmonic filters.

Leakage currents on high frequency filters (RFI)

HLD block diagram



Value of the capacity Cy with the resulting leakage current

HLD 110 = 4,7µF	I leakage = 29mA nominal / 280mA max
HLD 710 = 0,68µF	I leakage = 6,5mA nominal / 63mA max
HLD 310 = 0,033µF	I leakage < 0,4mA nominal / < 3,5mA max
HLD 810 = 0µF	I leakage = 0 A

Nominal leakage current = value if max. voltage fluctuation between two phases does not exceed ±10% (in accordance with standard IEC 38 Wc)
For other cases, take the max. leakage current value.

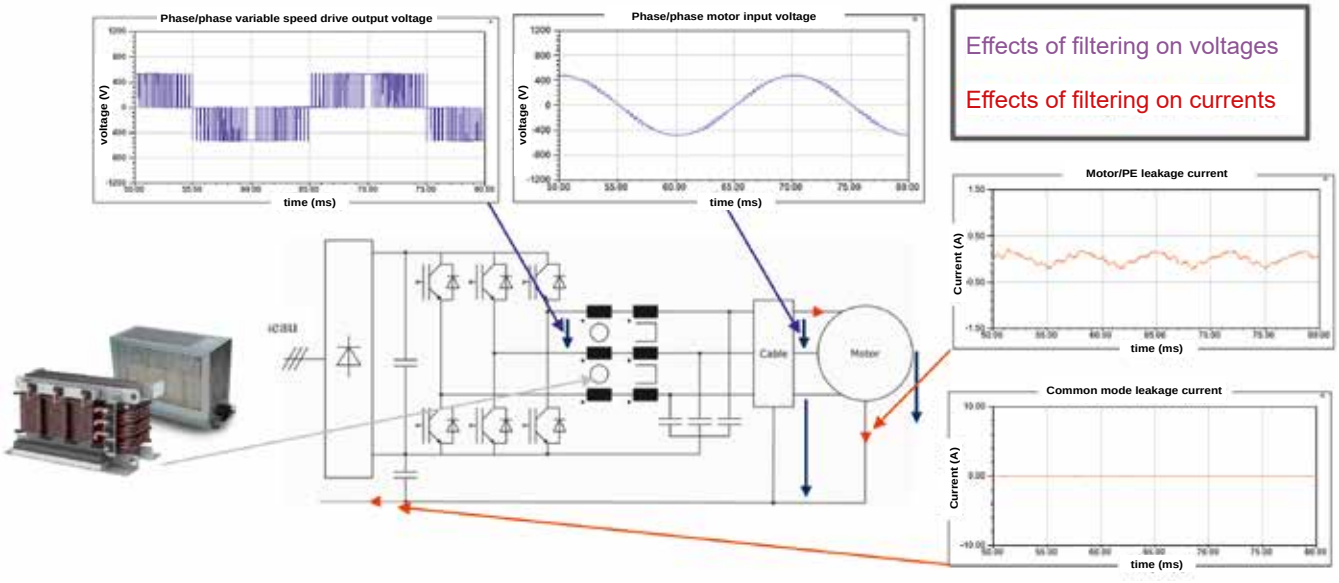
The maximum length of the cable supplying the motor to a filter is the sum of all the cable lengths connected to one or more variable speed drives.

	EN 55011		
	Class B	Class A	
	EN 61800-3		
Filter ref.	C1	C2	C3
HLD 110-500/x	50m	100m	150m
HLD 710-500/x	25m	50m	100m
HLD 310-500/x	5m	10m	25m
HLD 810-500/x	5m	10m	25m

Table of maximum shielded cable lengths
For the range
HLD X10-500/x:

Signal downstream of converter with an all-pole SF4 filter.

No impact of the cable lengths on the quality of the signal



Customised transformer sizing

Certifications

Application*:	Description of the load to supply:											
Products*:	❒	Transformer					❒	Autotransformer				
Power supply*:	❒	Single-phase	❒	Three-phase	❒	Three-Single	❒	Eco Energy				
Power*:	❒	VA					❒	KVA				
Voltages*:	Primary(ies) (in V): ± %						Secondary(ies) (in V): ± %					
Description*:	❒	Open-frame IP00	❒	Covered IP21	❒	Sealed IP54	❒	Others, to be defined:				
Frequency*:	❒	50/60Hz					❒	Others, to be defined:				
Ambient temperature*:	❒	35°/40°					❒	Others, to be defined:				
Electrical protection:	PRIMARY:						SECONDARY:					
	❒	Circuit breaker	❒	Fuse	❒	Disconnec-tor switch	❒	Circuit breaker	❒	Fuse	❒	Disconnec-tor switch
Temperature sensors:	❒	Alarm: *(NO contact 165°C)*					❒	Cut-off: *(NC contact 180°C)*				
Electrostatic screen:	❒	YES					❒	NO				
Tropicalisation:	❒	YES					❒	NO				
Rollers:	❒	YES					❒	NO				
Silent block:	❒	YES					❒	NO				

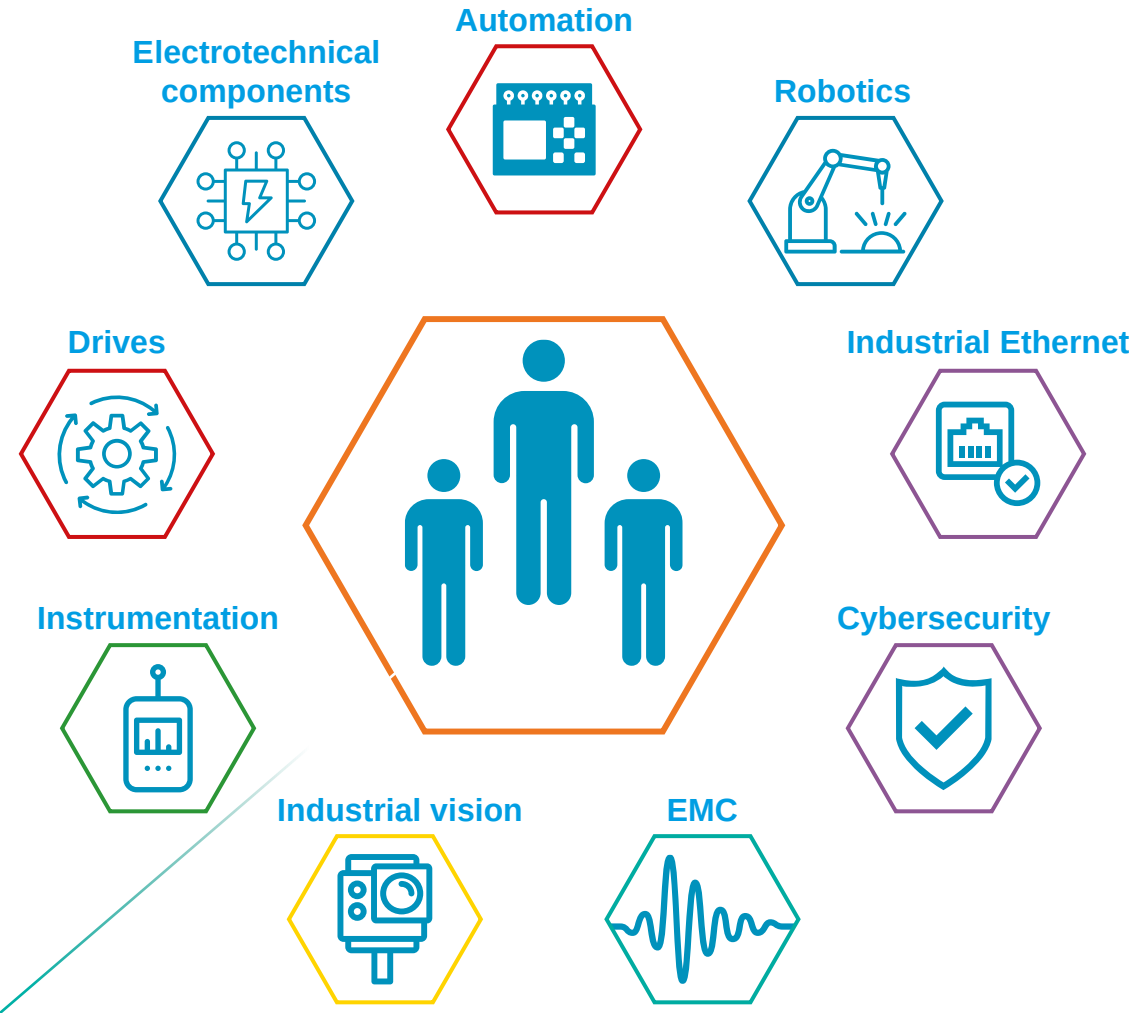
Additional information *(Specific dimensions, desired distance between centres, special colours, etc.)*

*** The zones marked with an asterisk are essential. The others are optional.**

Information sheet for Cosys sizing:
No determination will be possible without all of the information below.

Transformer characteristics:			
Name of transformer station:		Power in kVA:	
Number of transformers (if in parallel):		Primary U:	
Length of cable between Transformer/Main low voltage distribution panel:		Secondary U:	
If KVA, subscribed power:		short circuit voltage in % (Usc%):	
Characteristics of the MV network (information available from your energy supplier):			
Short circuit power (Scc in MVA):		Energy counting signal frequency:	
Metering:	MV ☐ LV ☐		
Environment of the room:			
Room ventilation:	☐ air-conditioned	☐ ventilated	☐ ambient
Dust level:	☐ low	☐ acceptable	☐ high
Humidity level:	☐ low	☐ acceptable	☐ high
Maximum temperature:		Minimum temperature:	

The right product with the best support.



- Technology watch
- Definition of products/solutions
- Study of specifications
- Simulations, tests, demos
- After-Sales support/Hotline
- Approved training courses

Training

Instrumentation & measurement

Installation products

Energy saving

Automation

Industrial Ethernet

Industrial robotics

Product range catalogue

Food industry

Electrical enclosures

The Technical Solution

www.etngroup.com

DISTRIBUTOR IN

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- Electrotechnical components
- Instrumentation
- Industrial Ethernet
- Variable speed drives
- Industrial vision
- Robotics
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