

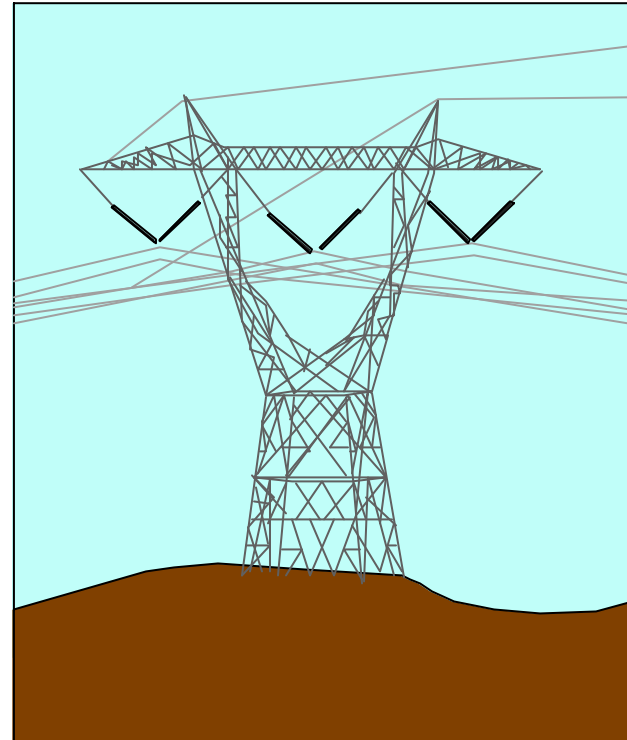
International Standard EN / IEC61010-1

- **Why a new standard?**
Second edition, June 1999
since Jan. 01 effective
- **What's new?**
Worldwide / Europe / Germany
- **Application Categories –
Measurement Categories**
- **Category Definitions,
Impulse Withstand Voltage**
- **Application with METRA *Hit*-DMM**



International Instrument Safety Regulations IEC61010 part 1.../ 2nd Edition

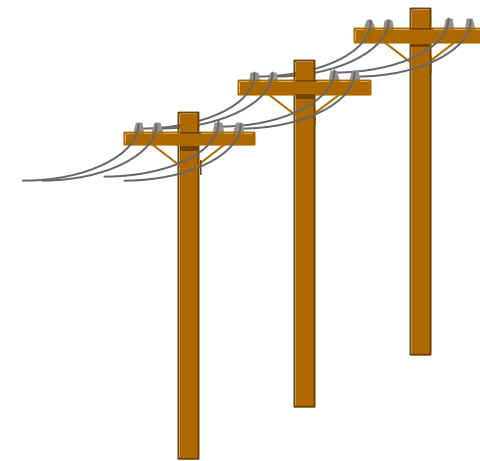
- **Increased occurrence of overvoltages and transients in power lines**
- **Higher overvoltages**
- **Creates need for improved instrument safety**
- **Transient voltages occur in
Transmission lines
Distribution systems
Mains outlets**
- **Measuring instruments must protect the user against dangerous situations**



International Standard **IEC61010-1**

Corresponds to German DIN IEC61010-1/**VDE 0411-1**

- **Replaces**
Current edition from March 1994,
which replaced former
- VDE 0411 2.80 Germany
IEC 348 International
- **Difference**
Specifies “**Measurement Categories**”
- **Categories have been expanded and more precisely specified for 3-phase systems.**

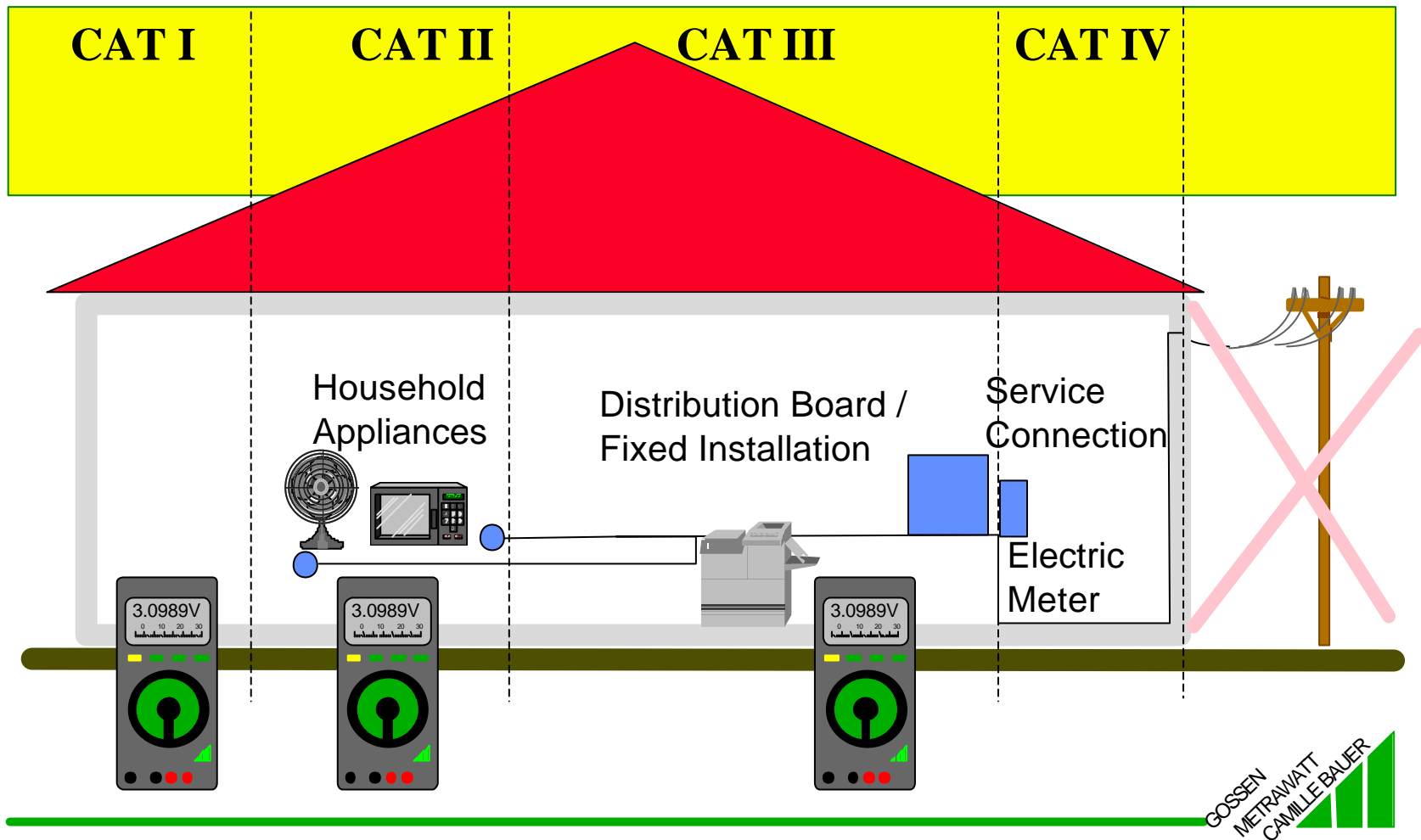


600V Cat. III 1000V Cat. II

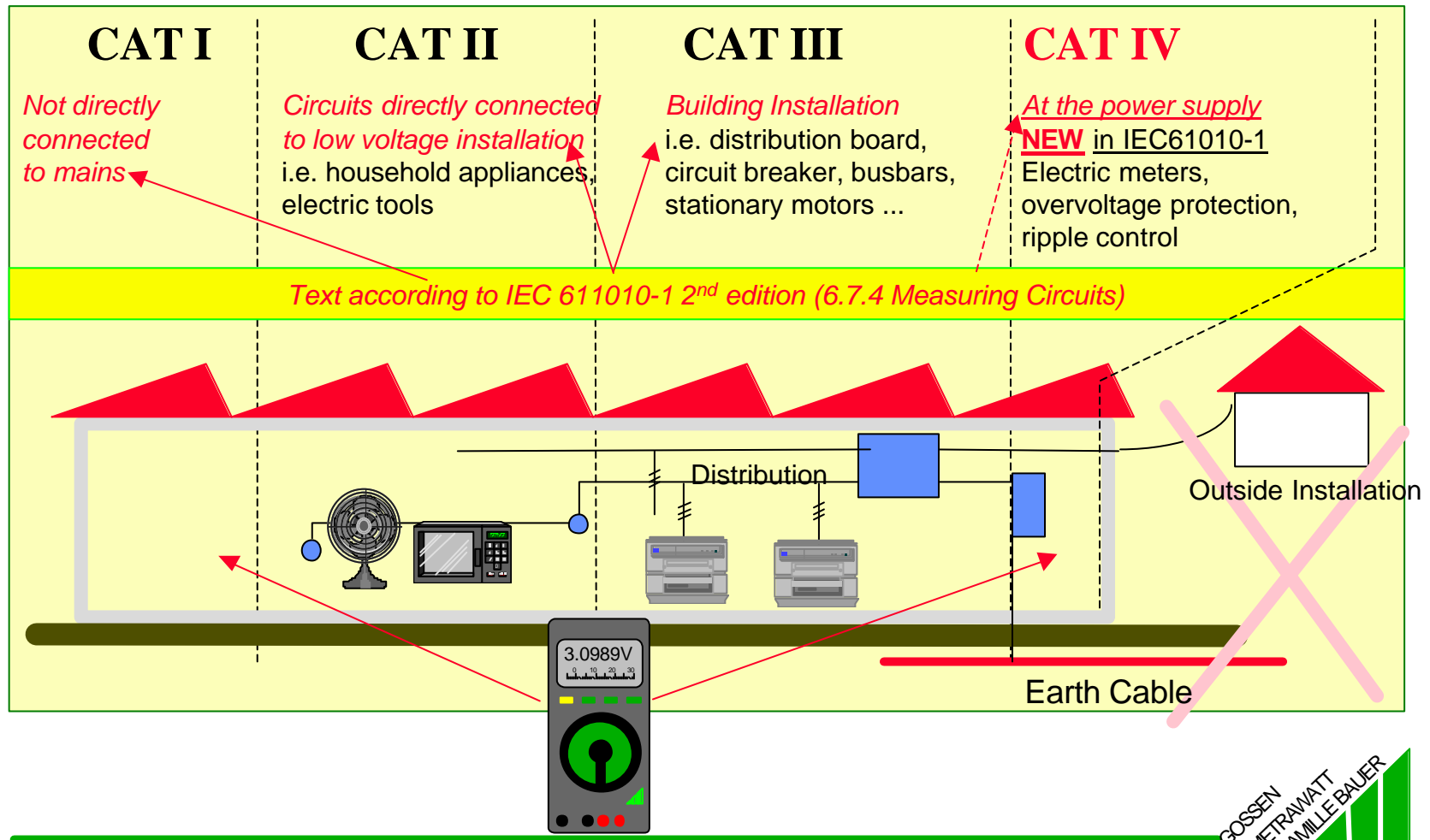
>>>>>
600V / Cat. IV
1000V / Cat. III

GOSSEN
METRAWATT
CAMILLE BAUER

IEC61010-1 / Measurement Categories



IEC61010-1 / Measurement Categories



Excerpt from EN 61010-1 1st edition

Covered by METRAHit 22-26 until end of 2000

Page 81 Table J1

Nom. voltage 3-phase 4-wire systems V	Nom. voltage 3-phase 3-wire systems V	Nom. voltage line to Neutral V	Preferred values of peak-voltage for Impulse testing “ Overvoltage ” Category		
			Cat. I	Cat. II	Cat. III
66/115	120	100	500	800	1500
120/208	240	150	800	1500	2500
120/240					
230/400	500	300	800	2500	4000
277/480					
400/690	1000	600	2500	4000	6000
		1000	4000	6000	8000

Utilization of the METRAHit20S

METRAHit20S
until end of 2000

METRAHit 20S old design

GOSSEN
METRAWATT
CAMILLE BAUER

Excerpt from EN61010-1 2nd edition New CAT. IV
METRAHit 22-26S design from end of 2000 meets new requirements

Excerpt from page 81 table 17: Impulse withstand voltages

Nominal voltage in 3-phase 4-wire systems V	Nominal voltage in 3-phase 3-wire systems V	Nominal voltage in single phase 2-wire systems V	Nominal voltage (on the instrum.) of line supply V	Specified impulse withstand voltage in V for "Measurement" CATegories CAT. II CAT. III CAT. IV		
230/400	230;240		300	2500	4000	6000
...	...	220				
277/480	440;480		600	4000	6000	8000
347/600		480				
400/690			1000	6000	8000	12000
480/830						
	600;690; ...1000	1000				

Utilization of the METRAHit20S

METRAHit New

METRAHit ...26S Design

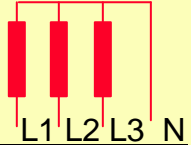
Because insulation and impulse withstand voltage is rated at 1000 V (L-N) Cat. III, the METRAHit22-26 may be used in all industrial 3-wire systems up to Cat. III and even in 4-wire systems up to Cat. IV.



METRAHit22S...26S in 3-Phase 4-Wire Systems

The NEW METRAHits are designed for:

Nominal voltage
3-phase
4-wire systems
V .



Nominal voltage
line to
neutral
V

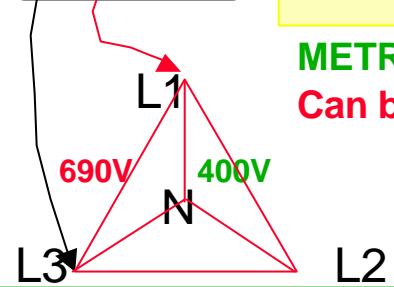
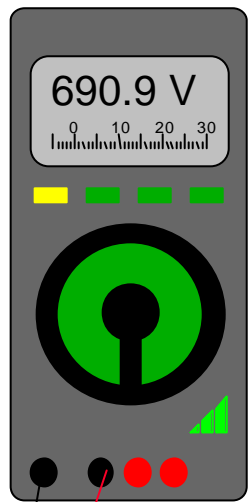
Specified impulse withstand
voltage for
measurement categories
Cat. III **Cat. IV**

400 / 690
480 / 830

600 **8000**

METRAHit22-26S :

Specified impulse withstand voltage: **8000 V**
Suitable for nominal voltage 600V/Cat. IV
Fuses tested with breaking voltage of 1000 V at 30 kA



METRAHit22...26

Can be utilized in all industrial 3-phase 4-wire-systems, CAT. IV

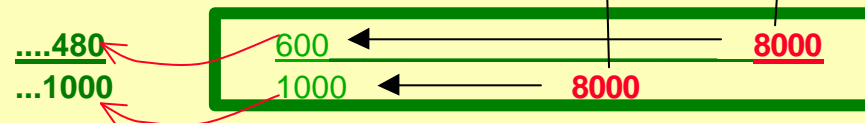


METRAHit22S...26S in 3-Phase 3-Wire Systems

Designed for (former table 17)



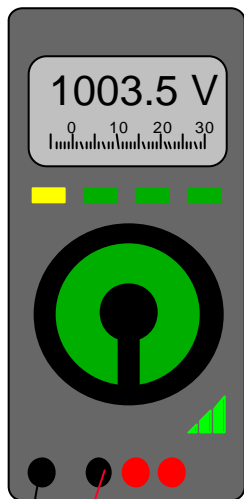
Nominal voltage 3-phase 3-wire systems V	Nominal voltage line to neutral V	Specified impulse withstand voltage for Measuring <u>categories</u> Cat. III Cat. VI
---	--	--



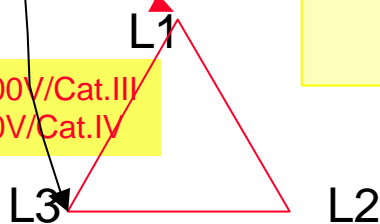
METRAHit22-26S : Specified impulse withstand voltage **8000 V**
 Suitable for nominal voltage 600V/CAT IV and 1000V/CAT III
 Fuses have been tested with breaking voltage of 1000 V at
 30kA short circuit current

Application

METRAHit22...26 in household 3-phase 3-wire systems, CAT. IV
in all industrial applications up to 480 V, CAT. IV,
up to 1000 V CAT. III



...1000V/Cat.III
 ...480V/Cat.IV

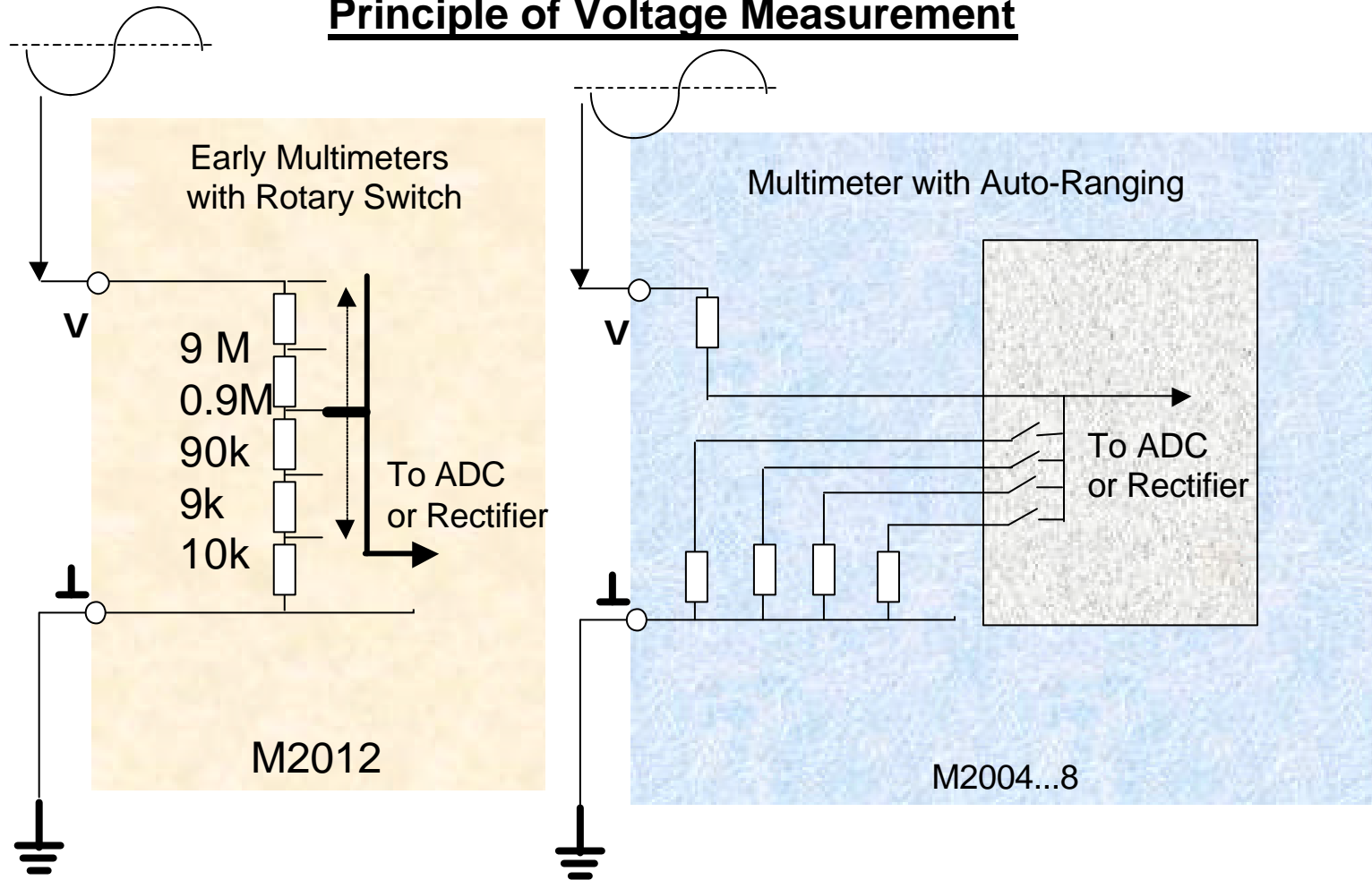


METRA*Hit* 22...26S Safety Features

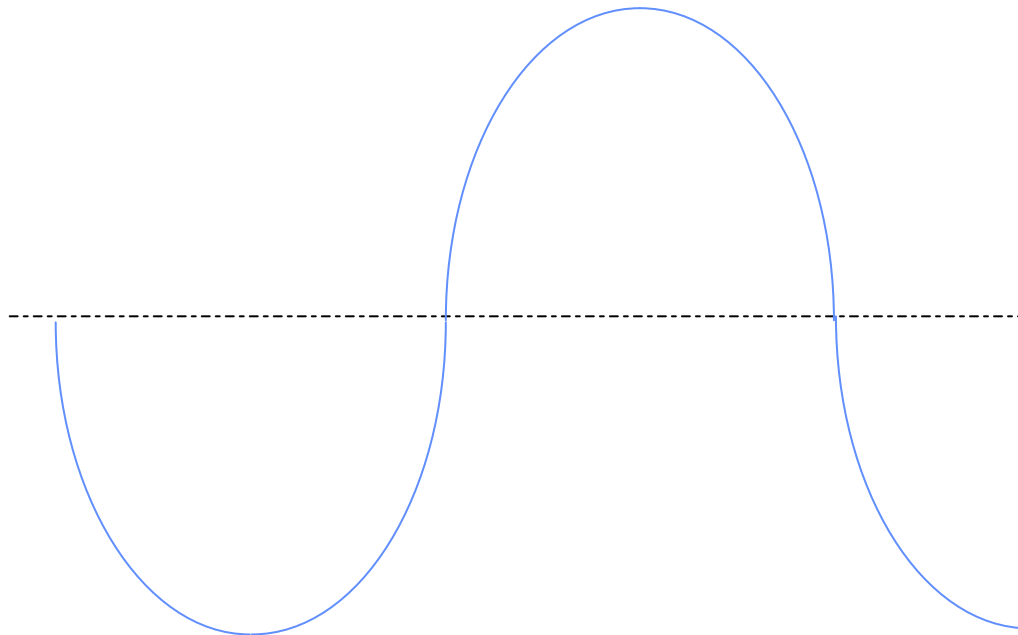
The METRA*Hit* 22S ... 26S has been designed to comply with IEC 61010-1(2nd edition) at the specified impulse voltage of 8000 V (1.2/50us). This means:

- Test voltage of 7.4 kV at 50Hz (previously 5.55 kV)
These values have been tested during type testing.
- Our FF1.6 A / 1000 V and FF16A / 1000 V fuses have been approved by an independent testing authority to 1000 V.
They safely interrupt overcurrents of 30,000 A at 1000 V and $R/L > 0.2$
- The “Automatic Blocking System” (ABS) is an additional safety feature which prevents operator errors at their source!

Principle of Voltage Measurement



Voltage Measurement: Normal Line Voltage and Voltage at Frequency Converters



Line Voltage

L1/N = 400 V

L1/L2 = 690 V,

$V_p = 690\sqrt{2}$
 $= \sim 975 V_p$

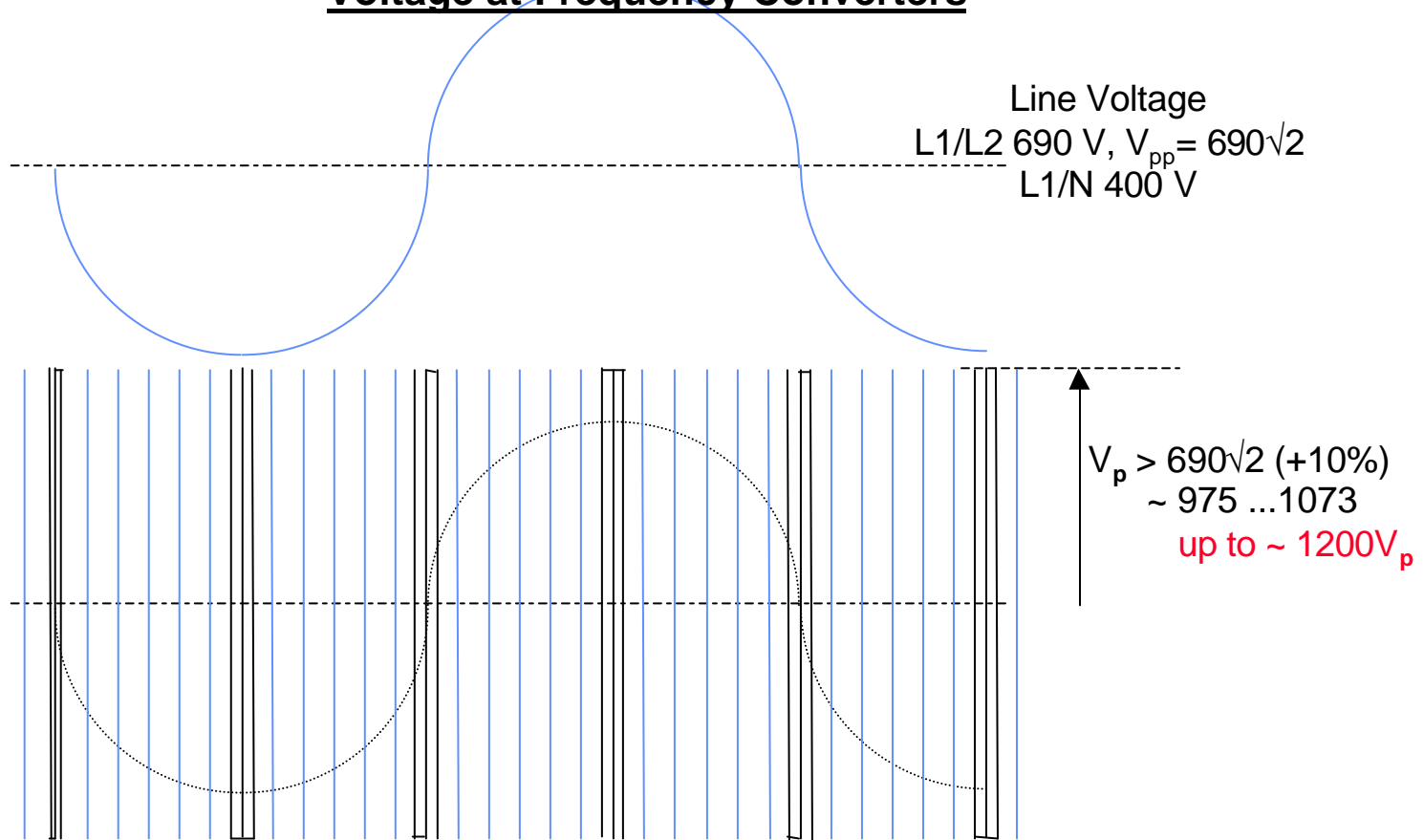
M2032 to IEC348

$U_n = \text{max. } 650 \text{ V}$

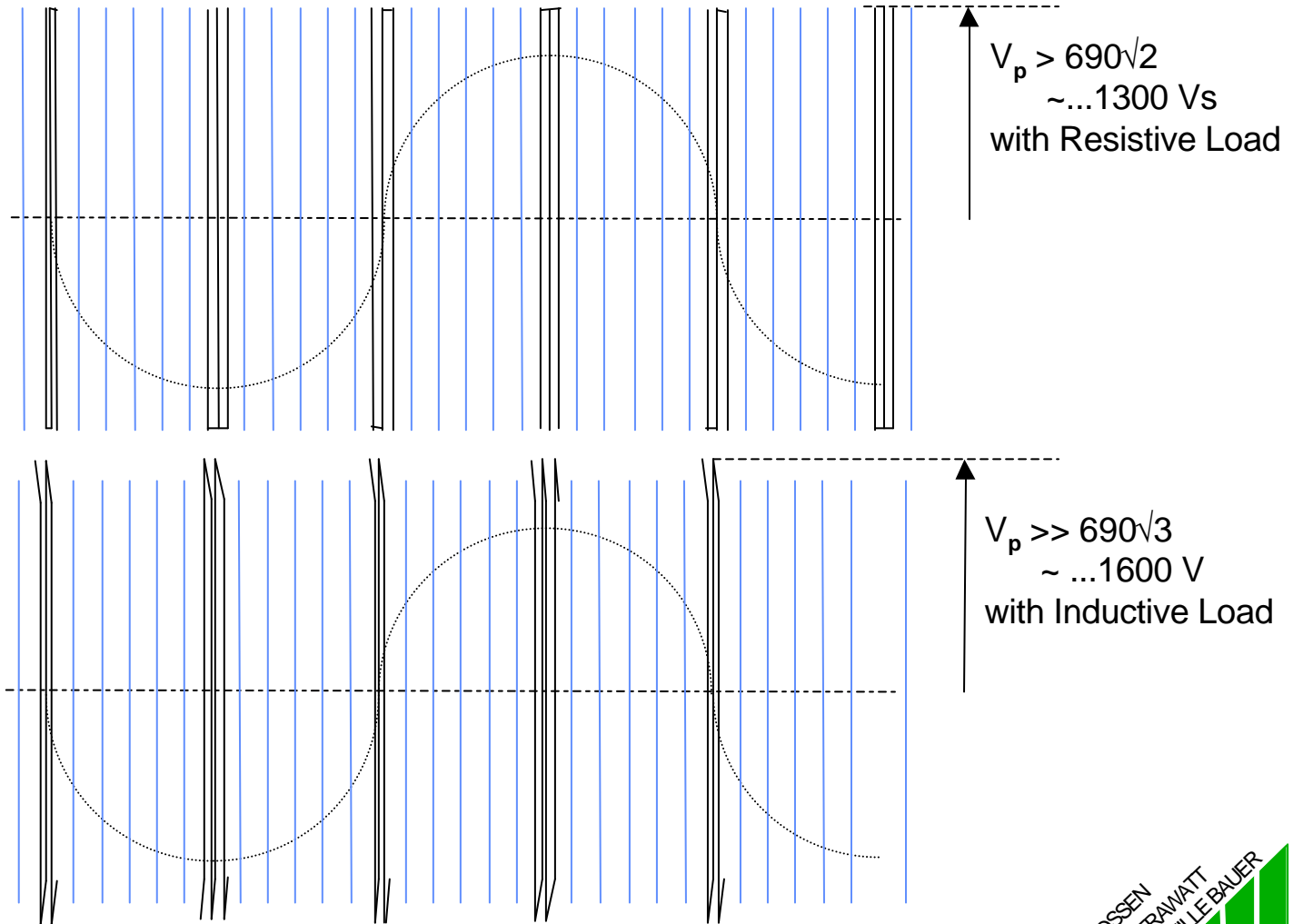
$U_{ov} = 780 \text{ Vac}$

$U_{ov} = 1103 V_p$

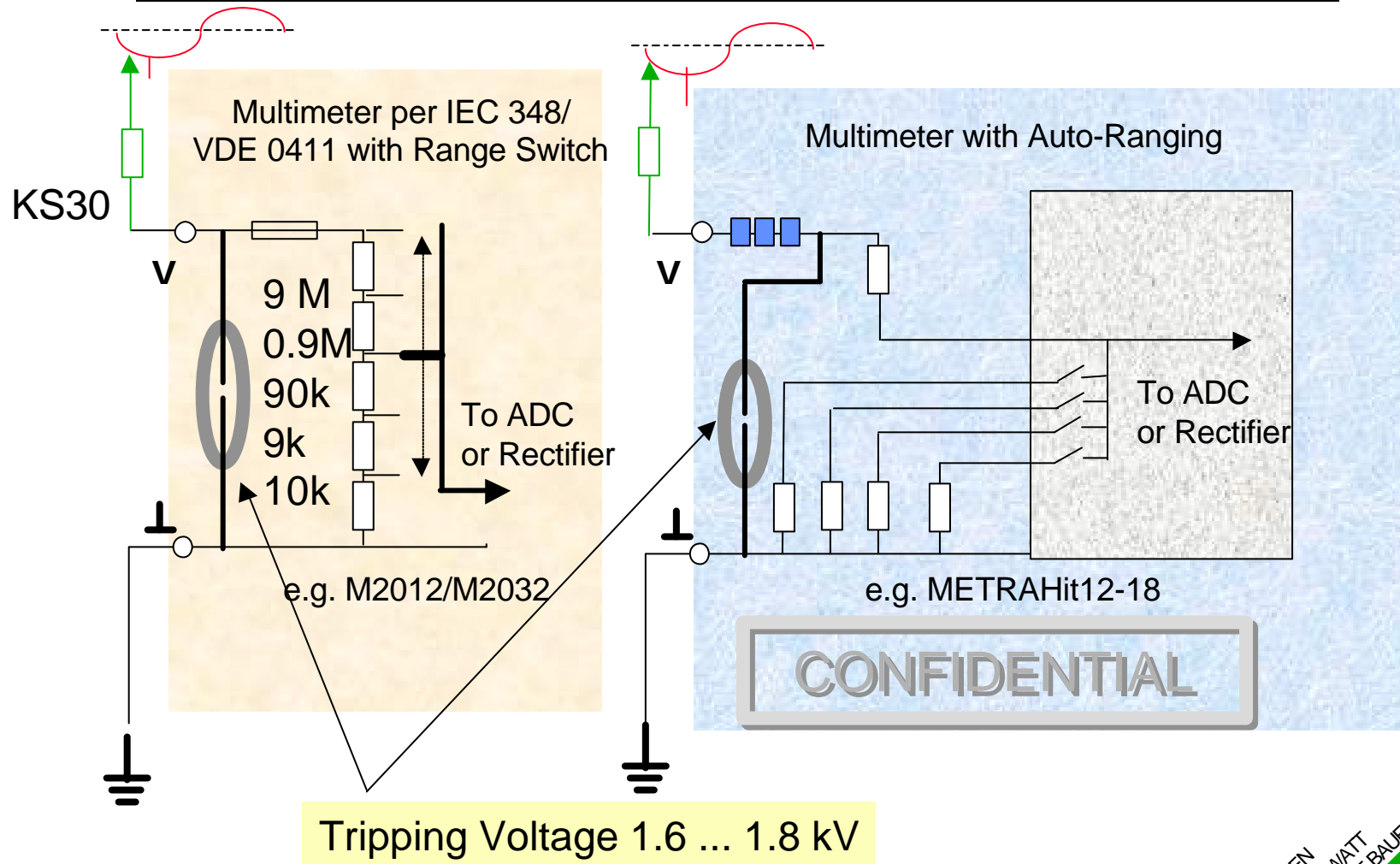
Voltage Measurement: Normal Line Voltage and Voltage at Frequency Converters



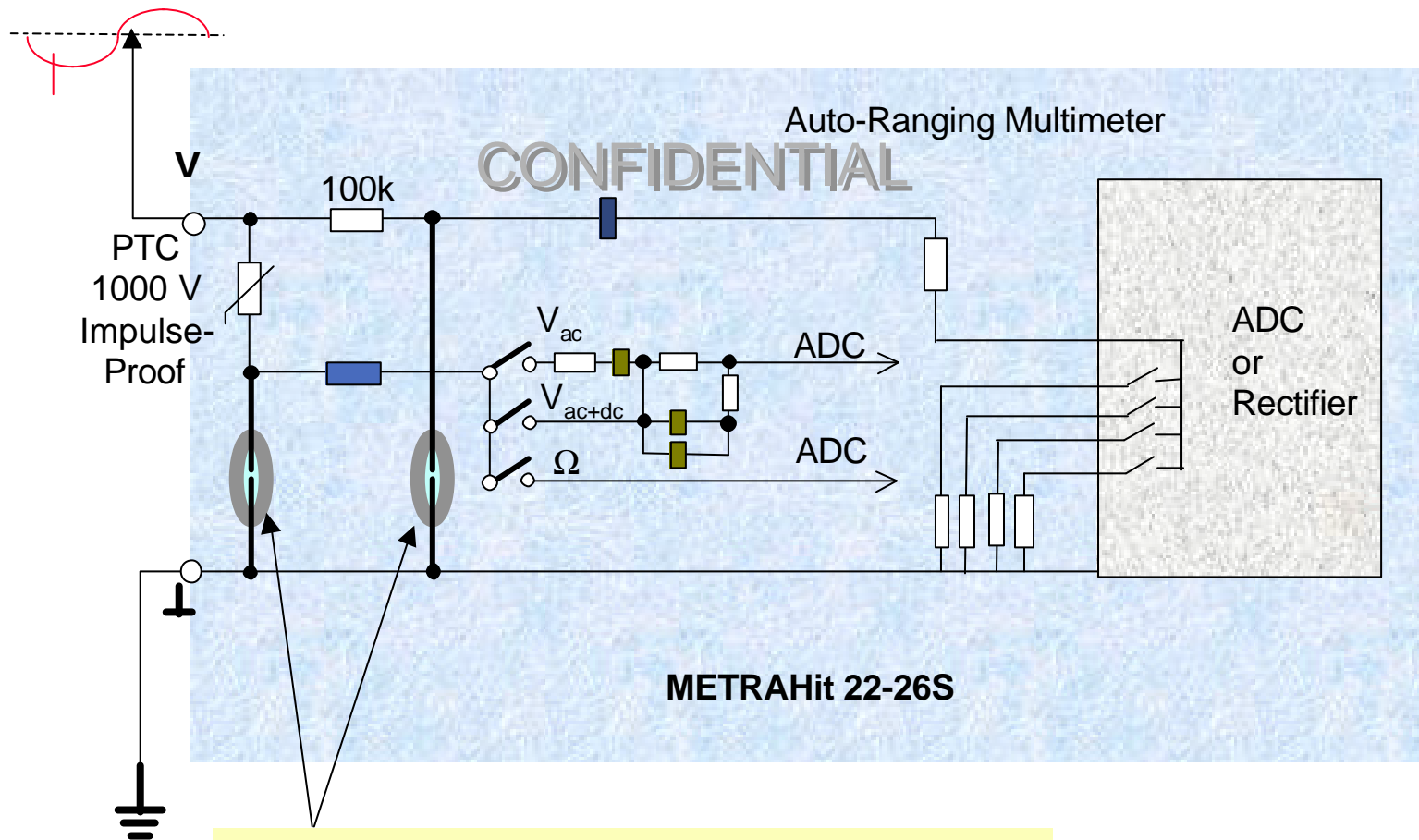
The Occurrence of Overvoltage at Frequency Converters



Voltage Measurement: Protection with Spark Gap (schematic)



Multimeter Protection with Varistors and Spark Gaps (schematic)



Spark Gap: Ignition Voltage 1.6 ... 1.8 kV