

Impulse Current Measuring Shunt

Tubular Shunt ICMS

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The Impulse Current Measuring Shunts ICMS are new designed tubular shunt types with best response behaviour to match the high performance of the TR-AS® digital recorder for comparative current measurements. A 1st partial response time T_a less than 10 ns and a settling time less than 20 ns show the advantage of these shunts. They show no initial overshoot peak, no oscillations and do not need a compensation box to optimize the transient behaviour as known from e.g. cage shunts.

Tubular shunts type ICMS are special designed and can be offered with values up to 0.5 Ohm, they are therefore ideal for current measurements during transformer tests. The resistance material of the inner tube show high energy absorption capability and very low temperature coefficient and therefore negligible non-linearity effect for impulses of different magnitude. This is very important for comparison of shapes e.g. of 50% and 100% test level during transformer tests. For ohmic values above 1 Ohm carbon resistors (*) are used.



The Impulse Current Measuring Shunts ICMS are designed for measurements of impulse currents with shape 8/20 μ s according to IEC 60060-1. For impulse currents with any shape the maximal action integral or the maximal voltage drop must not be exceeded.

The shunt value is considered in the WinTR-AS® software for easy application. Allow tolerance of the resistance up to $\pm 25\%$ because of tolerances in the resistance material and manufacturing process.

Technical Data	rated values	Type	ICMS 20	ICMS 10	ICMS 5	ICMS 2.5	ICMS 1
Nenn-Impulsstrom 8/20	rated Impulse current 8/20	A	20 000	10 000	5 000	2 500	1 000
Dauerstrom AC, DC	cont. current AC, DC	A	20	14	9	7	4
Widerstand ($\pm 25\%$)	Resistance ($\pm 25\%$)	Ω	0.025	0.05	0.1	0.2	0.5
Empfindlichkeit	Sensitivity	V / kA	25	50	100	200	500
Arbeitsbereich mit TR-AS® digital recorder	Working Area with TR-AS® digital recorder	A	≥ 200	≥ 100	≥ 50	≥ 20	≥ 8
Anstiegszeit Tr	Rise time Tr	ns	<30	<20	<20	<15	<15
Antwortzeit Ta	Response time Ta	ns	<20	<10	<10	<10	<10
Max. Energieintegral $\int j^2 \cdot dt$	max. Action integral $\int j^2 \cdot dt$	A ² s	18 000	5 000	1250	280	50
Minimale Pausezeit	repetition rate	s	60				
Spannungsabfall max.	Voltage drop max.	V _{peak}	1000				
Schutzfunkenstrecke	Protection spheregap	mm / kV	0,2 mm / approx. 1,5 - 2 kV				
Temperaturkoeffizient	Temperature coefficient	1 / K	$< 100 \cdot 10^{-6}$				
Messanschluß	Measuring socket		N-type				
Abmessungen ca.	Dimensions approx.	mm	120 ... 360 x 260 x 50				
Masse	Weight	kg	1,2				
Anschluß	Connection	mm	12.5 \emptyset				

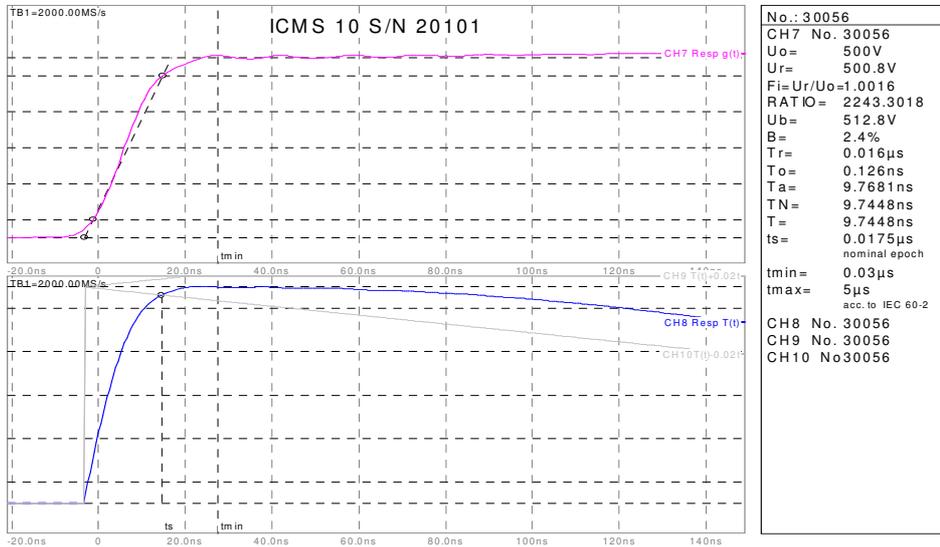
The inbuilt protection sphere gap limits the voltage drop to a value below the max. allowable input voltage of the connected TR-AS® digital recorder. In case of serious discharge caused by extreme overcurrent e.g. by flashover of the test object the gap must be cleaned and new adjusted. The characteristic impedance of the measuring cable connected to the Impulse Current Measuring Shunt ICMS is recommended to 75 Ω . To avoid reflections on the measuring cable a terminating resistor TERM 75 matching the impedance Z of the measuring cable must be connected to the far end at the input of the measuring system. Tri-axial cable only is recommended.

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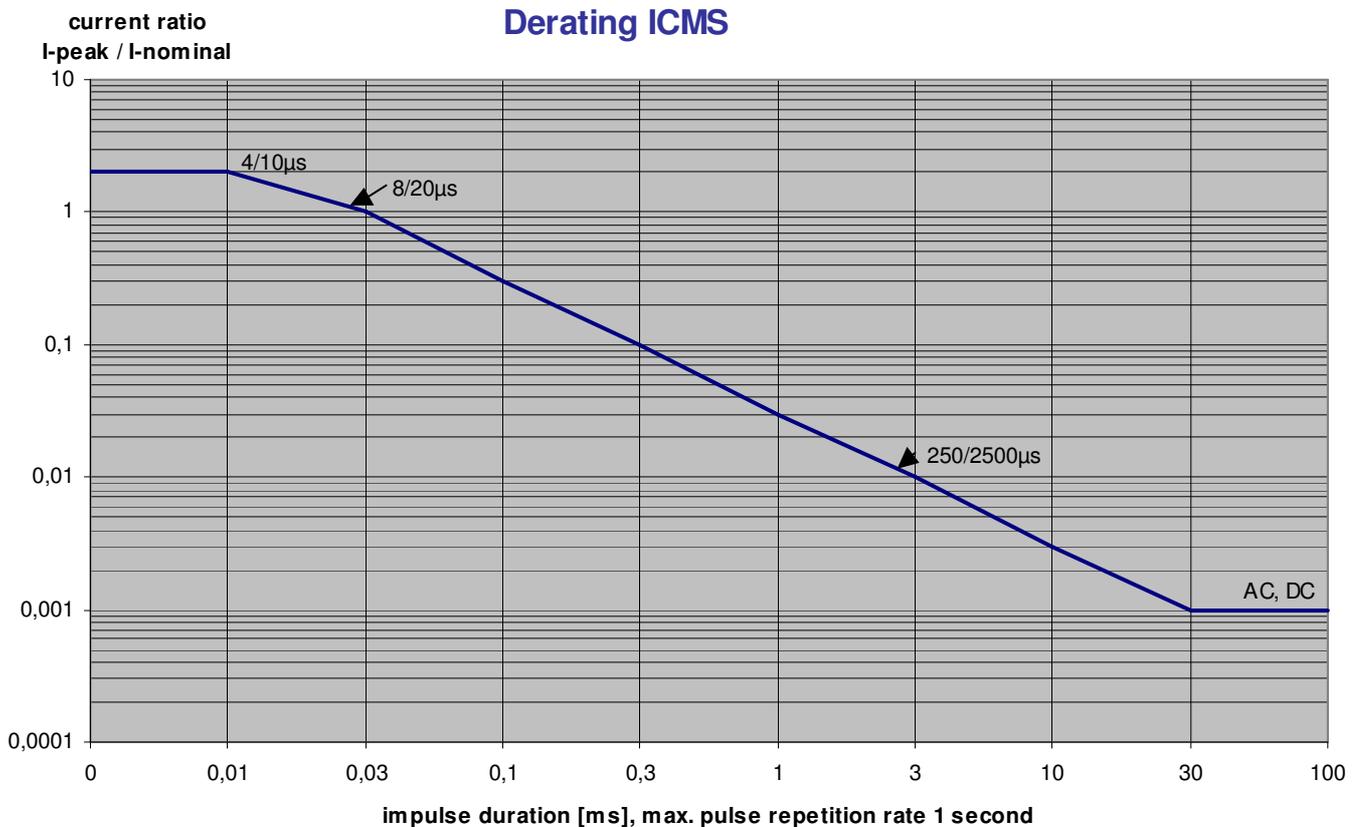
The influence of the terminating resistor with value Z connected in parallel to the measuring shunt R_m with respect to the resulting resistance value R is in most cases negligible, it can be calculated to $R = R_m \cdot Z / (R_m + Z)$.

Typical Result of STEP Response Measurement of ICMS 10



The STEP response measurement follows by feeding a steep impulse step current to the shunt, the response is measured with a digital recorder TR-AS 200-14 with repetitive sampling of 2 GHz and evaluated according to the parameter method specified in IEC 60060-1.

To avoid overload calculate always the applied energy and refer to the ICMS Derating diagram:



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Technical data and design subject to change without notice. Alternative design on request.