Analyser Reference System

Type ARS 16

Harmonic Analysis / Flicker Analysis

Fig. 1: Front view ARS 16/1

The Relating Standards:

IEC/EN 61000-3-2
-am 1 (2001-08) Ed. 2.0
-am 2 (2004-10) Ed. 2.0
(2004-11) Ed. 2.2
(2009-04) Ed. 3.2

IEC/EN 61000-3-3
-am 1 (2001-01) Ed. 1.0
(2002-03) Ed. 1.1
(2008-06) Ed. 2.0

IEC/EN 61000-3-11
(2000-08) Ed. 1.0

IEC/EN 61000-3-12
(2004-11) Ed. 1.0
(2011-05) Ed. 2.0

Special features:

- ✓ "Double FFT for simultaneous check of the source during the EUT measurement" in harmonic analysis
- ✓ Simultaneous two-channel measurement for source check (flicker measurement)
- ✓ Calibratable Line Impedance Simulating Network meets IEC/EN 60725 (2012-06)
- ✓ Digital flickermeter meets IEC/EN 61000-4-15 (2010-08) Ed. 2.0
- ✓ Real-time Harmonic Analyser meets IEC/EN 61000-4-7 (2009-10) Ed. 2.1

The **A**nalyser **R**eference **S**ystem type **ARS** contains the core of the well known and reliable analyser (Ducati/Boconsult B10) for the measurement part, the standard impedance according to IEC/EN 60725 as well as a phase- and current range switching.
It allows **harmonics** measurements according to IEC/EN 61000-3-2 and **flicker** measurement according to IEC/EN 61000-3-3. All the required diagram connections for the two types of measurement are performed automatically by **ARS** without any manual operation: this increases the reliability of the measurement avoiding any possible wiring error of the operator and ensures fast and reasonable operation with the test system.
In fact, flicker and harmonics measurement can be performed automatically in succession with the EMC test software. Thereby, the standard impedance switches uninterrupted between both measurement modes. In addition, the current ranges of the harmonics measurement are switched overlapping.
The inside measuring module is compliant to the latest IEC standard amendments, including the **harmonics** measuring technique prescribed by IEC/EN 61000-4-7 Ed. 2.1, with 200ms time windows and grouping inter-harmonics function, as well as the IEC/EN 61000-4-15 Ed. 2.0 d-values calculation.

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TECHNICAL DATA - REAL-TIME HARMONIC ANALYSER

Reference standards	IEC/EN 61000-4-7 (2002-08) Ed. 2.0 / (2009-10) Ed. 2.1 / IEC/EN 61000-3-2 -am1 (2001-08) Ed. 2.0 / -am2 (2004-10) Ed. 2.0 / IEC/EN 61000-3-2 (2004-11) Ed. 2.2 / (2009-04) Ed. 3.2 / IEC/EN 61000-3-12 (2004-11) Ed. 1.0 / (2011-05) Ed. 2.0
Frequency	45Hz … 65Hz (PLL locked)
Voltage range	$90V_{rms}$ … $300V_{rms}$
Current range	$5mA_{rms}$ … $16A_{rms}$ with crest factor =3
Shunt ranges	4 user selectable: $0.16A_{rms}$ / $0.8A_{rms}$ / $4A_{rms}$ / $20A_{rms}$
Accuracy	< 0.2% of the rated current of the EUT *(selecting appropriate shunt range)*
Voltage input impedance	Higher than 0.8MΩ
Current input impedance	Depends on the shunt range selected. Impedance <3mΩ within the highest range
Max. drop on current channel	$150mV_p$ (any selected range)
Measured values	Magnitude and phase of fundamental up to 40^{th} (TW=200ms) or 50^{th} (TW=320ms), for both U,I dc component (U,I); voltage U_{rms}; current I_{rms} active power (W); apparent power (VA); circuit power factor (λ) harmonic distortion for voltage and current (Thd_U%, Thd_I%)
Measuring techniques	16 periods rectangular windows (320ms @50Hz; 266.7ms @60Hz) 10 periods rectangular windows (200ms @50Hz) 12 periods rectangular windows (200ms @60Hz) windows period user selectable, sampling rate synchronised to the fundamental
Anti aliasing filter	70dB
Smoothing filter for transitory harmonics	Digital 1^{st} order low-pass filter (τ =1.5s); software selectable on Harmonics and/or on active Power
Grouping function	Harmonics and adjacent inter-harmonics - as per IEC 61000-4-7 Ed. 2.1 (current grouping and voltage harmonics subgroups)
Operating modes	Steady-state harmonics / single-shot (1 time window); transitory harmonics / 2.5 minutes (469 time windows @50Hz or 563 @60Hz; 750 time windows in 200ms mode); continuous monitoring; continuous mode with automatic stop if limits are exceeded (only in 16-cycle mode) continuous mode with real-time data transmission allowing the complete EUT cycle period measurement (*Quasi-stationary, Short cyclic, Random, Long cyclic*)
Stop trigger condition (user selectable)	Class C and D limits are dynamically computed each time window (only in 16-cycle mode) Automatic management of 1.5 times overriding for 10% of periods for 2^{nd} … 10^{th} and 3^{rd} … 19^{th} transitory harmonics
Storage	Last 2.5 minutes in continuous mode (embedded mode) No time-limited period in continuous mode (with PC connection)
Analogue outputs (user programmable)	Real-time spectrum or shape for voltage and current or dynamic monitoring of any harmonic versus time
Self calibration	Automatically at power-up

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TECHNICAL DATA - FLICKERMETER

Reference standards	IEC/EN 61000-4-15-am1 (2003-01) Ed. 1.0 / IEC/EN 61000-4-15 (2003-02) Ed. 1.1 / (2010-08) Ed. 2.0 IEC/EN 61000-3-3-am1 (2001-01) Ed. 1.0 / IEC/EN 61000-3-3 (2002-03) Ed. 1.1 / (2008-06) Ed. 2.0 IEC/EN 61000-3-11 (2000-08) Ed. 1.0
Input channels	2
Input channel voltage range	$40V_{rms}$ … $504V_{rms}$ (independent auto ranging on each channel)
Input channel frequency	50Hz or 60Hz ±5%
Flicker produced by fluctuating harmonics	Measurement up to the 50^{th} harmonic or 40^{th} for 200ms TW
Input channels impedance	Higher than 1.5MΩ
Input channels insulation	3kV (transformer coupled)
Missing-input-signal conditions	Automatic recognition and handling
Analogue outputs (user selectable)	(W) Weighted voltage fluctuation (L) Linear flicker indication (R) Instantaneous flicker sensation (D) Relative voltage change characteristic d(t)
Flicker related measurements	CPF, $P_{50\%S}$, $P_{10\%S}$, $P_{1\%S}$, $P_{0,1\%}$, P_{MAX}, P_{ST}, P_{LT}
Accuracy	Higher than specified by IEC 61000-4-15
Flicker classifier scales	Logarithmic
Flicker scales	2 (user selectable): 10% (1600PU) and 40% (25600PU)
Voltage fluctuation measurement	d_c, d_{max}, time with d(t) exceeding a programmable threshold
d_c and d_{max} maximum error	0.2%
d(t) evaluation	RMS every half-cycle
Observation period	User selectable (1 / 5 / 10 / 15 min; fast mode for d_{max} evaluation)

Fig. 2: Front View ARS 16/3

Fig. 3: Rear View ARS 16/3

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TECHNICAL DATA - GENERAL

Processors	Motorola DSP56002, Intel 80C186
Input channel resolution	18 bit Σ/Δ A/D converter on each channel
Analogue output resolution	12 bit
Interface	IEEE 488 galvanic isolated
Digital outputs	8 (TTL levels) to control external range selection and reference impedance
Self test	Automatically at power-up – operator-driven (extended)
Calibration	Traceable to the national measurement standard published by the PTB (Federal Institute of Physics and Technology)
U_{input}	Harmonic: AC: $80V_{rms}$ … $300V_{rms}$ / DC: 0V – 48V (1) Flicker: AC: $40V_{rms}$ … $504V_{rms}$ (auto ranging) / DC: 0V – 48V (1)
$I_{cont.}$	$16A_{rms}$
$I_{short\text{-}time}$	$32A_{rms}$
Internal resistance	Phase conductor R + jX = (0.24Ω+j0.15Ω) @50Hz Neutral conductor R + jX = (0.16Ω+j0.10Ω) @50Hz Phase conductor to neutral conductor R + jX = (0.40Ω+j0.25Ω) @50Hz
Measuring inputs	CH1 $0V_{rms}$ … $300V_{rms}$ CH2 $0V_{rms}$ … $300V_{rms}$ HAR $0V_p$ … $10V_p$ (2)
Mains supply	$230V_{rms}$ (+6% / -10%) 50Hz … 60Hz
Ambient temperature	0°C up to +40°C
Housing	ARS 16/1 and ARS 16/3: 19“-plug-in unit (4U) approx. H=178mm; W=483mm; D=450mm ARS 16/3/TPM: 19“-plug-in unit (8U) approx. H=355mm; W=483mm; D=450mm

Weight	ARS 16/1	ARS 16/3	ARS 16/3/TPM
	approx. 21kg	approx. 25kg	approx. 40kg

Remarks:

(1) At DC-voltages >48V it is **absolutely necessary** to make sure that switching on and off as well as changing the operation mode is to do off load and/or off power.

(2) $3V_{rms}$ correspond the end value of current range.

ARS is a highly integrated component, including the 3 above mentioned functions in 1 box, thus providing a compact and reasonable solution, without any loss of our high measurement quality in the low-frequency EMC field.

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