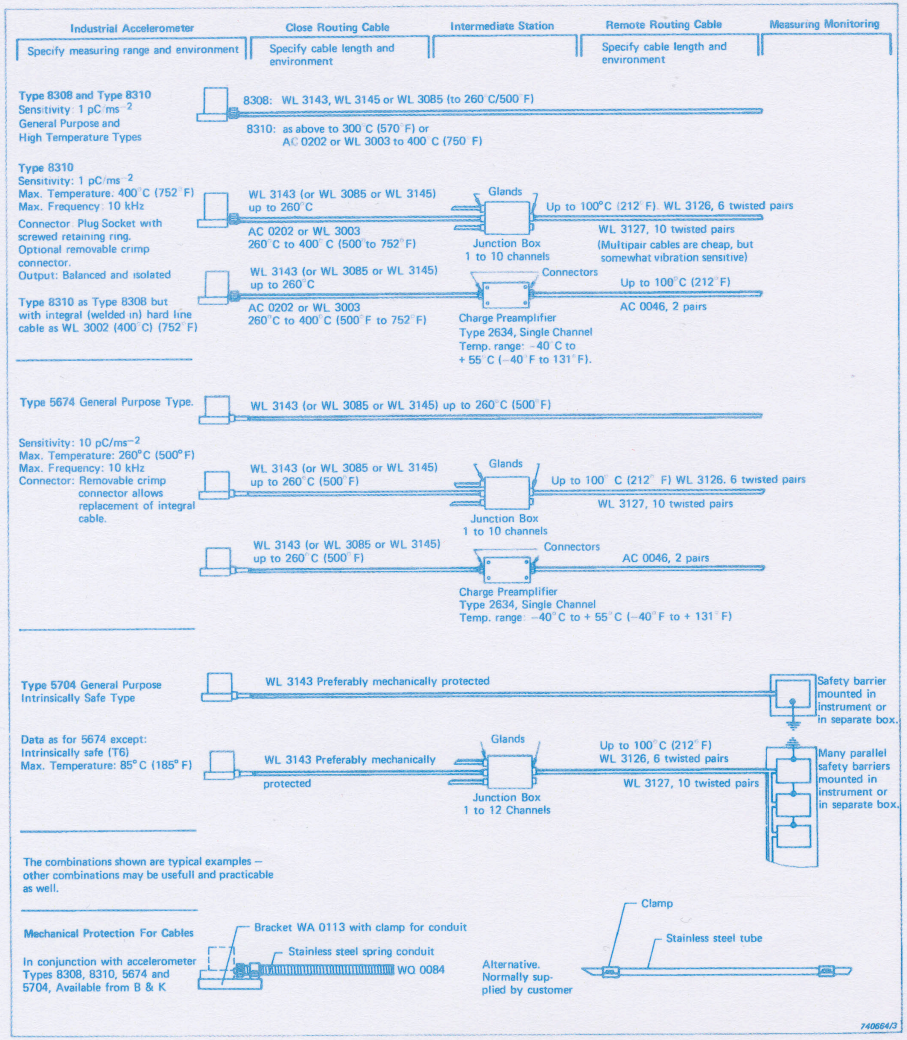
Cable Configurations for Monitor Systems (Examples)

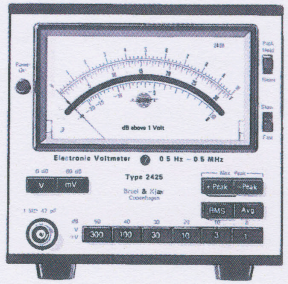


This equipment is a development of the Brüel & Kjær Systems Engineering Group and are not standard production items. Specifications can be modified, on a contract basis, to meet individual requirements.
For price and delivery time, please contact your local representative.

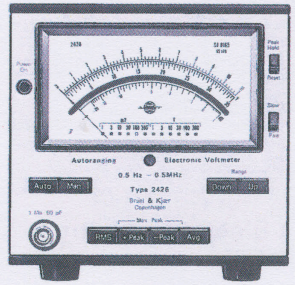
Volt, Phase and Flutter Meters, Measuring Amplifiers

types 2425, 2426 and 2427

Electronic Voltmeters



2425



2426

2427

COMMON FEATURES:

- True RMS detector with 40 dB range
- Crest Factor of 5
- Average detector
- + Peak, —Peak and Max. Peak detectors, rise time 50 µs
- Peak Hold function
- Wide frequency range 0,5 Hz to 0,5 MHz
- Indication of Volts, dBV and dBm
- Two built-in meter time constants
- Sensitivities from 1 mV to 300 V FSD
- Calibrated amplifier
- AC and DC outputs
- Input for external meter time constants

ADDITIONAL FEATURES 2425:

- Conformity to VU-meter standards
- Mains or external battery operation

ADDITIONAL FEATURES 2426:

- Automatic range selection
- Range indicator lamps
- Binary input for external range control
- Conformity to VU-meter standards

ADDITIONAL FEATURES 2427:

- 3 1/2 digit display
- BCD output of reading
- DC range from 100 mV to 400 V with indication of sign
- Automatic range selection
- Variable display rate

USES:

- Voltage measurement of —Peak, + Peak, Max. Peak, true RMS and Average values
- Calibrated amplifier
- General purpose EVM
- VU measurements (2425 and 2426 only)

Electronic Voltmeters Types 2425, 2426, and 2427 have the same basic functions with similar specifications. They differ mainly in read-out and range selection. Each has a true RMS rectifier with dynamic range of 40 dB and crest factor capability of 5 (14 dB), permitting measurement of complex, distorted and phase shifted signals. An average detector is included which with Voltmeters Types 2425 and 2426 conforms to standards for VU measurements. For measurement of impulses and other types of transient signal there is a peak detector which can detect signal peaks as short as 50 µs and has positive

peak, negative peak and maximum peak modes. There is also a hold mode where the display holds the peak value of a measured signal after the signal has disappeared from the input of the Voltmeters. This enables very short single impulses to be measured.

The Voltmeters have a wide frequency range which is linear to within ± 0,5 dB from 0,5 Hz up to 0,5 MHz, and use fixed gain amplifiers to ensure constant phase characteristics in all ranges. They are equipped with AC and DC outputs which are well suited for connection of a level recorder and enable them to be used as calibrated amplifiers.

Type 2425 Electronic Voltmeter

This is an AC Voltmeter with moving coil meter and manual range selection. Ranges are selected by means of push buttons arranged in 10 dB steps over a 110 dB range from 1 mV to 300 V for full scale meter deflection. Interchangeable scales are available which are calibrated for dBm and VU measurements. An external battery or AC mains supply may be used to power the Voltmeter.

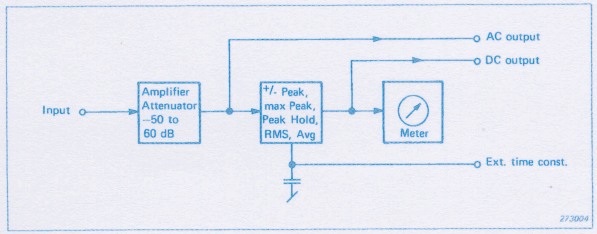


Fig.1. Block diagram of Type 2425

Type 2426 Autoranging Electronic Voltmeter

Voltmeter Type 2426 is identical to Type 2425 in functions and specifications, but is further equipped with an automatic range selector. This makes it extremely simple to operate in that it automatically selects one of twelve ranges from 1 mV to 300 V so that its moving coil meter indicates the correct voltage level without overload. To prevent instability at the points of range change, automatic range shift occurs at a higher voltage when the range is shifted upwards than when it is shifted downwards (hysteresis). The range may also be shifted manually if the measured signal is very unstable, or it may be shifted using a digital control signal, thus permitting remote control as may be required when using the Voltmeter as a calibrated amplifier.

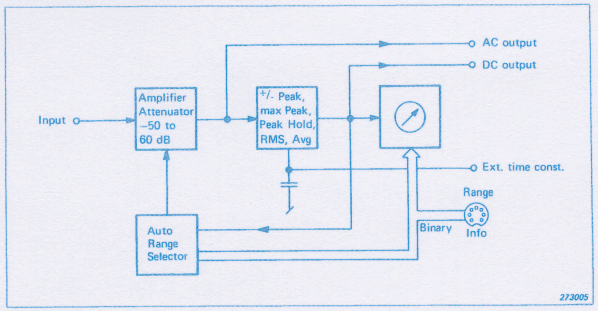


Fig.2. Block diagram of Type 2426

Aside from selecting the correct range, the automatic range selector also operates range indicator lamps. These are located just below the meter scale and indicate the particular V_{FSD} range selected at any given instant. Range information is also available as a digital signal at a DIN socket on the rear panel of the Voltmeter.

Type 2427 Autoranging Digital Voltmeter

Voltmeter Type 2427 is similar to Types 2425 and 2426 in basic functions, but is far more sophisticated in that it makes extensive use of TTL logic and ROMs. It is equipped with a seven segment digital display which simplifies reading of measured values by indicating the correct polarity, decimal place and measurement unit as well as providing an out of range indication. It can display the measured value in volts, dBV (re 1 V), dBm (re 1 mV) and dB μV re (1 μV). The conversion to decibels is performed digitally using a ROM containing the dB values. Errors due to drift and offset, inherent in analog lin/log converters are thus eliminated. The A/D converter is a digital type giving high accuracy and an excellent normal mode rejection of 60 dB in the two lower ranges and 80 dB in the three upper ranges. The autoranging circuit is extremely stable as the range steps are 20 dB with 4 dB of hysteresis for AC signals and 10 dB for DC signals. DC measurements are made over five ranges extending from 100,0 mV to 400 V.

With Voltmeter Type 2427 the reading rate may be adjusted from 2 to 10 readings per second or the reading may be "frozen" by activating a data hold function. For interfacing with a tape punch or computer, there is a 25 pin digital output socket on the rear panel which provides BCD information on the displayed value, sign, measurement unit and range.

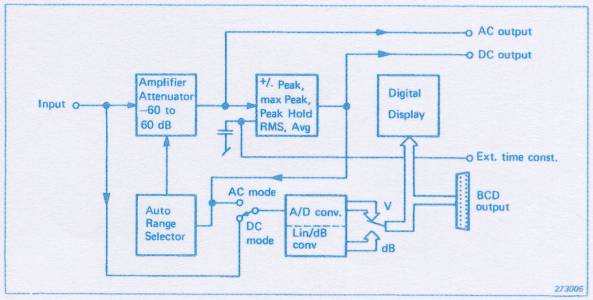


Fig.3. Block diagram of Type 2427

Examples of Use

As can be seen in Fig.4, the Voltmeters may be combined with the Phase Meter Type 2971 and the portable Oscilloscope Type 4714. This forms a test set-up for measurement of the voltage, frequency and phase necessary for performance checks, fault finding and repair of electronic equipment.

Phase Meter Type 2971 measures the phase angle (degrees or radians) between two signals of the same frequency. It has a frequency range extending from 2 Hz up to 200 kHz and is equipped with digital as well as analogue read-out and display.

Oscilloscope Type 4714 is a dual trace, portable oscilloscope with measurement bandwidth from DC up to 5 MHz. With its 10:1 input attenuator and a 10:1 oscilloscope probe, signal waveforms with voltages up to 400 V may be displayed.

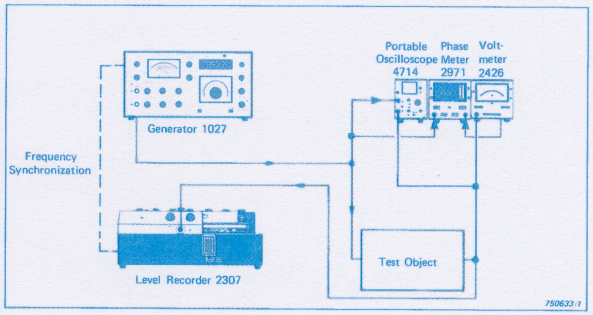


Fig.4. Set-up for phase measurement with 2971

Common Specifications 2425, 2426, 2427

Frequency Range:

	0,5 Hz	2 Hz	20 Hz	0,2 MHz	0,5
Fast				± 0,2 dB	± 0,5 dB
Slow	± 0,5 dB		± 0,2 dB		± 0,5 dB

Rectifier Characteristics:
(Also valid for DC output)
Dynamic range: > 40 dB
Accuracy: + 10 dB to —20 dB: ± 0,5 dB
—20 dB to —30 dB: ± 1 dB

Indication:
RMS: Reading within ± 0,5 dB of signals with crest factors up to 5
Averaging time: fast ~ 270 ms
slow ~ 3 s
External capacitor: 1 s per 2,5 μF

Peak: + Peak, —Peak, Max Peak and Peak Hold functions selectable on front panel

Time constants in Peak mode:

Fast	
Rise time constant	Discharge time constant
Reset < 50 μs Hold < 50 μs	2,7 s at full < 0,05 dB/s scale deflec
Slow	
Reset < 500 μs Hold < 500 μs	30 s at full < 0,005 dB/s scale deflec.

External time constant and rise time via socket on rear panel
Reset Function: Internal by switch on front panel or external via socket on rear panel
Average: Fast (according to standards for VU measurements 2425 and 2426 only) and Slow

Attenuator Accuracy:
Better than 1%

Meter Scale Accuracy:
Better than 1% of full scale deflection (Types 2425 and 2426 only)

Signal Outputs:
1 V ± 2% for full scale deflection (2426: 1,1 V)
Max. output: 5,6 Vp
Output Impedance AC: ~ 100 Ω
Min. load impedance: 10 kΩ // 200 pF
Output Impedance DC: ~ 10 Ω
Min. load impedance: 1 kΩ

Signal to Noise Ratio: (Ref. 3,16 V RMS)
Range 10 mV to 1000 V: > 60 dB
Range 3 mV: > 50 dB
Range 1 mV: > 40 dB

Inherent Noise:
31,6 μV (typical with max. amplification and input short circuited)

Temperature Range:
5 to 40°C (41 to 104°F)

Individual Specifications

Type Number	2425	2426	2427
AC Voltage Ranges*	1 mV to 300 V	1,1 mV to 350 V	1,00 mV to 380 V
Max. AC Input Voltage	mV Ranges 110 V peak V Ranges 600 V peak	mV Ranges 110 V peak V Ranges 600 V peak	mV Ranges 110 V peak V Ranges 600 V peak
DC Voltage Range	—	—	100,0 mV to 400 V
Max. DC Input Voltage	250 V	250 V	400 V
dB Range (ref. 1 V)*	—60 dB to + 50 dB	—59 dB to + 51 dB	—60 dB to + 52 dB
dBm Range (ref. 0,775 V)*	—60 dB to + 52 dB	—60 dB to + 53 dB	—60 dB to + 54 dB
dB Range (ref. 1 µV)*	—	+ 60 dB to + 171 dB	+ 60 dB to + 172 dB
Input Impedance AC	1 MΩ // 47 pF	1 MΩ // 60 pF	1 MΩ // 70 pF
Amplification	+ 60 dB to —50 dB (in 10 dB steps)	+ 60 dB to —50 dB (in 10 dB steps)	+ 60 dB to —60 dB (in 20 dB steps)
Power Supply	100 V to 240 V AC 9 V A ± 10%, 50 Hz to 400 Hz 2 × 22 V to 35 V DC	100 V to 240 V AC 12 V A ± 10%, 50 Hz to 400 Hz	100 V to 240 V AC 25 V A ± 10%, 50 Hz to 400 Hz
Cabinet	KK 0024, 4/12 of standard 19" rack width		
Dimensions	Height: 132,6 mm (5,2 in) Width: 139,5 mm (5,5 in) Depth: 200,0 mm (7,9 in)		
Weight	2,1 kg (4,7 lbs)	2,3 kg (5,1 lbs)	3,0 kg (6,7 lbs)
Accessories Included	Various fuses, lamps and power cable Plugs for input and output		
Accessories Available	dBm scale SA 0163 VU scale SA 0168	dBm scale SA 0166 dB µV scale SA 0171 VU scale SA 0169	

* Full scale deflection

Special Specifications 2427

AC Characteristics — Accuracy:

Function	Range	1 kHz		20 Hz to 20 kHz		0,5 Hz to 0,5 MHz	
		% of reading	% of range	% of reading	% of range	% of reading	% of range
RMS and Average	1,00 mV	1%	0,5%	3%	0,5%	6%	1%
	10,00 mV to 1000 V*	1%	0,5%	2%	0,5%	4%	0,8%
+ Peak —Peak Max. Peak	1,00 mV	1%	**10%	3%	**10%	6%	**10%
	10,00 mV to 1000 V*	1%	1%	2%	1%	4%	1,5%

* max. input voltage 380 V (sine value)
** Peak noise ≈ 10% of range ≈ 100 µV

DC Characteristics:

Range	Accuracy		Input resistance	Typical values	
	% of reading	% of range		Normal mode rejection**	Max. normal mode voltage**
100,0 mV	0,3%	0,5%	1 MΩ	60 dB	12 V pk
1000 mV	0,3%	0,2%	1 MΩ	60 dB	12 V pk
10,00 V	0,3%	0,2%	10 MΩ	80 dB	200 V pk
100,0 V	0,3%	0,2%	10 MΩ	80 dB	400 V pk
1000 V	0,3%	0,2%	10 MΩ	80 dB	400 V pk

* max. DC input voltage = 400 V
** at 50 Hz

Accuracy of Voltage to dB conversion:
± 0,1 dB

Reading Rate:
2 to 10 readings/s

Digital Output:
Signal level: 8-4-2-1 BCD — 13 bits total
Range information: 4-2-1 BCD signal
Sign: + or —
Out of range
Data transfer
Data hold
All outputs TTL compatible, can drive at least four TTL loads