تستر رله AMT

مقدمه



دستگاه‌های AMT 105 و AMT 205 دو محصول پیشرفته و تخصصی از شرکت وبکو هستند که با هدف تسهیل و ارتقای فرآیند تست و ارزیابی رله‌ها و تجهیزات حفاظتی در شبکه‌های قدرت طراحی و تولید شده‌اند. این تجهیزات با تکیه بر فناوری‌های نوین سخت‌افزاری و نرم‌افزاری، امکان اجرای انواع تست‌های دقیق، قابل‌اعتماد و منطبق با استانداردهای بین‌المللی را برای مهندسان و متخصصان حوزه حفاظت فراهم می‌سازند. هر دو دستگاه به مجموعه‌ای از منابع ولتاژ و جریان قابل تنظیم، ورودی و خروجی‌های باینری و کانال‌های آنالوگ مجهز هستند که به کاربر اجازه می‌دهند شرایط واقعی عملکرد رله‌ها و سیستم‌های حفاظتی را به‌صورت کامل شبیه‌سازی کنند. این ویژگی موجب می‌شود تست‌ها با دقت بالا و در شرایط مشابه با میدان واقعی انجام شوند.

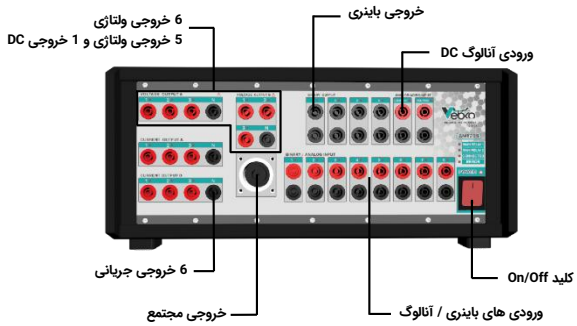


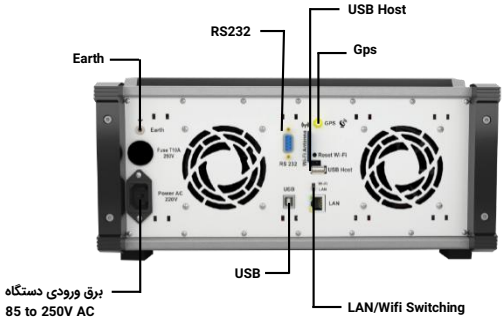
در مقایسه با مدل AMT 105 ، دستگاه AMT 205 از لحاظ فنی پیشرفته‌تر بوده و با برخورداری از توان خروجی بالاتر، نرخ نمونه‌برداری بیشتر، محدوده وسیع‌تر اندازه‌گیری و دقت بالاتر در کنترل سیگنال‌ها، گزینه‌ای ایده‌آل برای پروژه‌های سنگین‌تر و تست‌های پیچیده‌تر محسوب می‌شود. یکی از مزایای برجسته دستگاه AMT 205 ، پشتیبانی از پروتکل‌های مدرن و استانداردهای بین‌المللی نظیر IEC 61850 است. این قابلیت به کاربران اجازه می‌دهد تا تست‌های پیشرفته مبتنی بر شبکه‌های ارتباطی دیجیتال را با سهولت انجام دهند.

در کنار این سخت‌افزار قدرتمند، شرکت وبکو نرم‌افزار اختصاصی خود با نام AMPRO را ارائه می‌دهد که وظیفه کنترل، مانیتورینگ و اتوماسیون فرآیند تست را برعهده دارد. نرم‌افزار AMPRO با رابط کاربری ساده و در عین حال حرفه‌ای، تمامی مراحل تست را به‌صورت لحظه‌ای کنترل کرده و متناسب با سناریوهای تعریف‌شده، خروجی‌های دستگاه را مدیریت می‌کند.

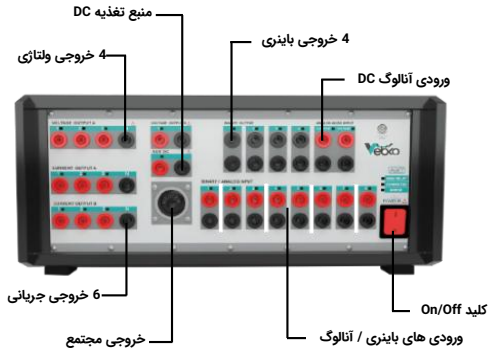
مشخصات الکتریکی و فیزیکی دستگاه

AMT205



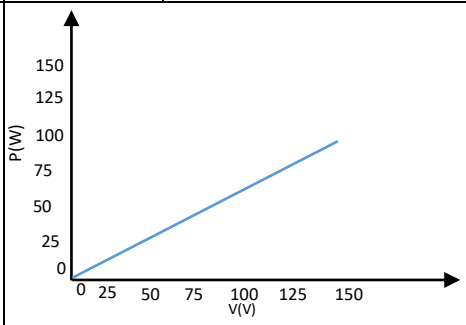


AMT105



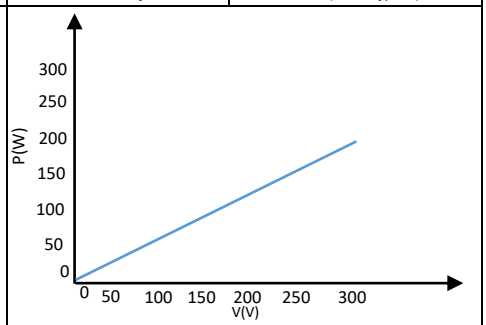
تستر رله AMT

Power Supply AMT105	
Power supply range	85-240 VAC or 100-330VDC
Input frequency range	47-63 Hz
Consumption	up to 2 KVA
Nominal current	3 A at 230 VAC
Connection	According to IEC60320

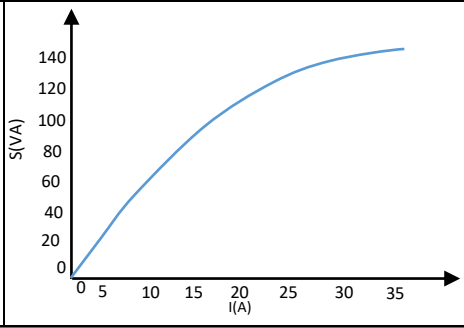
High Voltage, Low Current Generators AMT105 (Input Voltage≥ 220V)			
Voltage	4 Phase (L-N)	AC: 4 X 0 ... 150 V	
		DC: 4 X 0 ... 210 V	
	Series and parallel	Yes	
	Resolution	400 µV	
	Accuracy	Guar.: 0.15% of rd. + 0.015% of rg.	
		Typ.: 0.05% of rd. + 0.005% of rg.	
Current	No		
Phase	Range	0° to 360°	
	Resolution	1µ°	
	Accuracy	Guar.: 0.1°	
		Typ.: 0.01°	
Frequency	Range	0 ... 1 kHz	
	Resolution	1µHz	
	Accuracy	Guar.: 10 µHz , Typ.: 1 µHz	
Power			
Harmonic Injection	Inter Harmonic	Yes	2 Free Harmonic Order
	Harmonic Order	No	
Recording	Sampling Rate	1.2 ms	
	Variable	Currents and Voltages	
Protection	Detection	Power according to power curves	
		Yes	
	Type	Test Off	
Connection Banana Sockets	4mm (0.16 in) banana sockets		
Connection Combination Socket	Group A		
LED	Green (1 Color)		

Low Voltage, High Current Generators AMT105			
Current	Normal Mode	6 Phase (L-N)	AC: 6 X 0 ... 32 A
			DC: 6 X 0 ... 32 A
		Resolution	1.2 mA
		Accuracy	Guar.: 0.15% of rd. + 0.015% of rg
			Typ.: 0.05% of rd. + 0.005% of rg.
	Internal Booster Mode	No	
	Maximum Compliance Voltage	12V	
	Series and parallel	Yes	
Voltage	No		

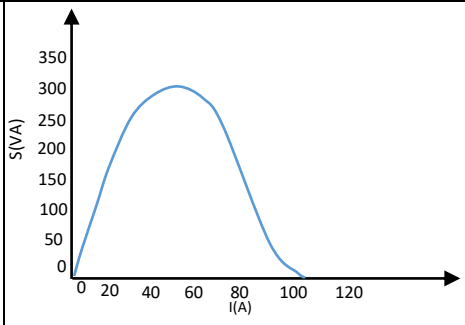
Power Supply AMT205	
Power supply range	85-240 VAC or 100-330VDC
Input frequency range	47-63 Hz
Consumption	up to 3 KVA
Nominal current	5 A at 230 VAC
Connection	According to IEC60320

High Voltage, Low Current Generators AMT205 (Input Voltage≥ 220V)				
Voltage	6Phase (L-N)	AC: 6 X 0 ... 300 V		
		DC: 6 X 0 ... 420 V		
	Series and parallel	Yes		
	Resolution	800µV		
	Accuracy	Guar.: 0.15% of rd. + 0.015% of rg.		
		Typ.: 0.05% of rd. + 0.005% of rg.		
Current	Normal Mode	6Phase (L-N)	AC: 6 X 0 ... 0.25 A	
			DC: 6 X 0 ... 0.4 A	
	Internal Booster Mode time<200ms	6Phase (L-N)	AC: 6 X 0 ... 0.85 A	
			DC: 6 X 0 ... 1.2 A	
	Series and parallel	Yes		
	Resolution	20 µA		
	Accuracy	Guar.: 0.15% of rd. + 0.015% of rg.		
		Typ.: 0.05% of rd. + 0.005% of rg.		
Phase	Range	0° to 360°		
	Resolution	1µ°		
	Accuracy	Guar.: 0.1°		
		Typ.: 0.01°		
Frequency	Range	0 ... 5 kHz		
	Resolution	1µHz		
	Accuracy	Guar.: 10 µHz , Typ.: 1 µHz		
Power				
Harmonic Injection	Inter Harmonic	Yes	Maximum Order 100 for 50Hz(5KHz)	
	Harmonic Order	Yes		
Recording	Sampling Rate	25 µs		
	Variable	Currents and Voltages		
Protection	Detection	Power according to power curves		
		Yes		
	Type	Test Off		
Connection Banana Sockets	4mm (0.16 in) banana sockets			
Connection Combination Socket	Group A			
LED	Green (1 Color)			

Low Voltage, High Current Generators AMT205			
Current	Normal Mode	6 Phase (L-N)	AC: 6 X 0 ... 32 A
			DC: 6 X 0 ... 45 A
		Resolution	85 µA
		Accuracy	Guar.: 0.15% of rd. + 0.015% of rg.
			Typ.: 0.05% of rd. + 0.005% of rg
	Mode amplificateur interne temps < 300 ms	6 Phase (L-N)	AC: 6 X 0 ... 67 A
		Resolution	DC: 6 X 0 ... 95 A
			180 µA
		Accuracy	Guar.: 0.15% of rd. + 0.015% of rg.
			Typ.: 0.05% of rd. + 0.005% of rg.
	Maximum Compliance Voltage	22V	
	Series and parallel	Yes	
Voltage	6 Phase (L-N)	AC: 6 X 0 ... 12 V	
		DC: 6 X 0 ... 20 V	
	Series and parallel	Yes	
	Resolution	40 uV	
	Accuracy	Guar.: 0.15% of rd. + 0.015% of rg.	
		Typ.: 0.05% of rd. + 0.005% of rg.	

(continue) Low Voltage, High Current Generators AMT105			
Phase	Range		0° to 360°
	Resolution		1µ°
	Accuracy		Guar.: 0.1°
			Typ.: 0.01°
Frequency	Range		0 ... 1 kHz
	Resolution		1 µHz
	Accuracy		Guar.: 10 µHz
			Typ.: 1 µHz
Recording	Sampling Rate		1.2 ms
	Variable		Currents
Protection	Detection	Maximum Neutral Current	32A: Unlimited
			64 A: 3 s
			100 A: 300 ms
	Setting	Soware Controlled: Time , Enable	
	Type		Test off
Maximum Neutral Current	4 mm (0.16 in) banana sockets / 32 A continuously		
Connection Banana Sockets	Group A (30 A continuously max)		
LED	Green (1 Color)		
Harmonic Injection	Enter Harmonic	Yes	2 Free Harmonic
	Harmonic Order	No	
Power			

AC/DC Analog Binary Inputs AMT105			
Number	8		
Dry	Open Circuit Voltage	5V	
	Short Circuit Voltage	Soware controlled	
Wet	Range 1: 0 ... ±4.5 V(Peak)	Accuracy	0.05% of rg.
		Accuracy (Avg)	0.02% of rg.
		Resolution	35µV
		Impedance	493.75 KΩ
	Range 1: 0 ... ±30 V(Peak)	Accuracy	0.05% of rg.
		Accuracy (Avg)	0.02% of rg.
		Resolution	250µV
		Impedance	414.783 KΩ
	Range 1: 0 ... ±180 V(Peak)	Accuracy	0.05% of rg.
		Accuracy (Avg)	0.02% of rg.
		Resolution	1.5mV
		Impedance	405.267 KΩ
	No		
Recording	Sampling Rate	1.2 ms	
Protection	Detection	Over voltage	
	Setting	Soware Controlled: Time , Enable	
	Type	Test Off, Change to Dry	
Galvanic Isolation	8 Group (1+1+1+1+1+1+1+1)		
LED	Green (1 Color)		

(continue) Low Voltage, High Current Generators AMT205			
Phase	Range		0° to 360°
	Resolution		1µ°
	Accuracy		Guar.: 0.1°
			Typ.: 0.01°
Frequency	Range		0 ... 2.5 kHz
	Resolution		1 µHz
	Accuracy		Guar.: 10 µHz
			Typ.: 1 µHz
Recording	Sampling Rate		25 µs
	Variable		Currents & Voltages
Protection	Detection	Maximum Neutral Current	32A: Unlimited
			64 A: 3 s
			100 A: 300 ms
	Setting	Soware Controlled: Time , Enable	
	Type		Test off
Maximum Neutral Current	4 mm (0.16 in) banana sockets / 32 A continuously		
Connection Banana Sockets	Group A (30 A continuously max)		
LED	RGB (16 Million Color)		
Harmonic Injection	Enter Harmonic	Yes	Maximum Order 40 for 50Hz (2KHz)
	Harmonic Order	Yes	
Power			

AC/DC Analog Binary Inputs AMT205			
Number	8		
Dry	Open Circuit Voltage	5V	
	Short Circuit Voltage	Soware controlled	
Wet	Range 1: 0 ... ±4.5 V(Peak)	Accuracy	0.05% of rg.
		Accuracy (Avg)	0.02% of rg.
		Resolution	35 µV
		Impedance	493.75 KΩ
	Range 1: 0 ... ±30 V(Peak)	Accuracy	0.05% of rg.
		Accuracy (Avg)	0.02% of rg.
		Resolution	250µV
		Impedance	414.783 KΩ
	Range 1: 0 ... ±180 V(Peak)	Accuracy	0.05% of rg.
		Accuracy (Avg)	0.02% of rg.
		Resolution	1.5mV
		Impedance	405.267 KΩ
	Range 1: 0 ... ±520 V(Peak)	Accuracy	0.05% of rg.
		Accuracy (Avg)	0.02% of rg.
		Resolution	4mV
		Impedance	404.298 KΩ
Recording	Sampling Rate	12.5 µs	
Protection	Detection	Over voltage	
	Setting	Soware Controlled: Time , Enable	
	Type	Test Off, Change to Dry	
Galvanic Isolation	8 Group (1+1+1+1+1+1+1+1)		
LED	RGB (16 Million Color)		

Binary Outputs AMT105			
Type	Electro mechanical relay contacts		
	-		
Control	Soware controlled		
Number	4		
Maximum Voltage in open mode	Electro Mechanic	750V (Rms)	
	No		
Maximum Current	Electro Mechanic	5A (Rms)	
	No		
Break Capacity AC	Electro Mechanic	2500 VA	
	No		
Break Capacity DC	Electro Mechanic	300 W	
	No		
Recording	No		
Protection	No		
Galvanic Isolation	4 Group (1+1+1+1)		
LED	Green (1 Color)		

AC/DC Current Measuring Input AMT105		
Range 1: 0 ... ± 10 A	No	
Range 2: 0 ... ± 750 mA	Accuracy	0.05% of rg
	Accuracy (Avg)	0.02% of rg.
	Resolution	6 µA
	Shunt	1Ω
Range 3: 0 ... ± 39 mA	No	
Range 4: 0 ... ± 250 µA	No	
Recording	Resolution	400 µs
Protection	Detection	Overcurrent
	Setting	Soware Controlled: Time , Enable
	Type	Test off, Change to open circuit
Galvanic Isolation	1 Group	
LED	Green (1 Color)	

AC/DC Voltage Measuring Input AMT105		
Range 1: 0 ... ±400 mV(Peak)	Accuracy	0.05% of rg.
	Accuracy (Avg)	0.02% of rg.
	Resolution	3µV
	Impedance	54.7826 KΩ
Range 2: 0 ... ±120 mV(Peak)	No	
Range 1: 0 ... ±50 mV(Peak)	No	
Range 2: 0 ... ±10 mV(Peak)	No	
Recording	Sampling Rate	400 µs
Protection	Detection	Over Voltage
	Setting	Software Controlled: Time , Enable
	Type	Test off
Galvanic Isolation	1 Group	
LED	Green (1 Color)	

AUX. DC AMT105		
Aux. DC	Only On Specified AUX. DC	0... 212 V
		0... 0.4 A

GPS AMT105	
Internal GPS Module	Yes
Accuracy	8ns
Time To Lock	10s
Delay Adjustment	Yes

Binary Outputs AMT205			
Type	Electro mechanical relay contacts		
	Transistor		
Control	Soware controlled		
Number	4		
Maximum Voltage in open mode	Electro Mechanic	750V (Rms)	
	Transistor	50 V	
Maximum Current	Electro Mechanic	5A (Rms)	
	Transistor	50 mA	
Break Capacity AC	Electro Mechanic	Smax	2500 VA
	Transistor	Smax	2.5 VA
Break Capacity DC	Electro Mechanic	Pmax	300 W
	Transistor	Pmax	2.5 W
Recording	Sampling Rate	50 µs	
	Resolution	2 mA	
	Accuracy	0.3 mA	
Protection	Detection	Overcurrent	
	Setting	Soware Controlled: Time , Enable	
	Type	Test Off, Open Relays	
Galvanic Isolation	4 Group (1+1+1+1)		
LED	RGB (16 Million Color)		

AC/DC Current Measuring Input AMT205		
Range 1: 0 ... ± 10 A	Accuracy	0.05% of rg
	Accuracy (Avg)	0.02% of rg.
	Resolution	1.5mA
	Shunt	5mΩ
Range 2: 0 ... ± 750 mA	Accuracy	0.05% of rg
	Accuracy (Avg)	0.02% of rg.
	Resolution	6 µA
	Shunt	1Ω
Range 3: 0 ... ± 39 mA	Accuracy	0.05% of rg
	Accuracy (Avg)	0.02% of rg.
	Resolution	0.3 µA
	Shunt	22 Ω
Range 4: 0 ... ± 250 µA	Accuracy	0.05% of rg
	Accuracy (Avg)	0.02% of rg.
	Resolution	6 nA
	Shunt	3 KΩ
Recording	Resolution	12.5 µs
Protection	Detection	Overcurrent
	Setting	Soware Controlled: Time , Enable
	Type	Test off, Change to open circuit
Galvanic Isolation	1 Group	
LED	RGB (16 Million Color)	

AC/DC Voltage Measuring Input AMT205		
Range 1: 0 ... ±400 mV(Peak)	Accuracy	0.05% of rg.
	Accuracy (Avg)	0.02% of rg.
	Resolution	3 µV
	Impedance	54.7826 KΩ
Range 2: 0 ... ±120 mV(Peak)	Accuracy	0.05% of rg.
	Accuracy (Avg)	0.02% of rg.
	Resolution	1 µV
	Impedance	133.75 KΩ
Range 1: 0 ... ±50 mV(Peak)	Accuracy	0.05% of rg.
	Accuracy (Avg)	0.02% of rg.
	Resolution	500 nV
	Impedance	54.7826 KΩ
Range 2: 0 ... ±10 mV(Peak)	Accuracy	0.05% of rg.
	Accuracy (Avg)	0.02% of rg.
	Resolution	100 nV
	Impedance	133.75 KΩ
Recording	Sampling Rate	12.5 µs
Protection	Detection	Over Voltage
	Setting	Software Controlled: Time , Enable
	Type	Test off, Change to open circuit
Galvanic Isolation	1 Group	
LED	RGB (16 Million Color)	

AUX. DC AMT205		
Aux. DC	Any combination of 6 channels	0... 424 V
		0... 1.2 A

GPS AMT205	
Internal GPS Module	Yes
Accuracy	8ns
Time To Lock	10s
Delay Adjustment	Yes

Protocol AMT105		
IEC 61850	GOOSE Publish	10
	Goose Subscribe	10
	Virtual Binary I/O	32 IN / 32 OUT
	SV Publish Streams	NO
	SV Subscribe Streams	NO
	SV Sample Rates	NO
	Ethernet Ports	1x RJ45 100Base
	Time Sync	PPS
	Time Accuracy	±80 ns (PPS)
Combination Cable AMT105		
3Voltage, 3 Current	Yes	
6Current	Yes	
PC Connection AMT105		
Wifi	Yes	
LAN	1 Port	
Programming USB Port	No	
Physical Characteristic AMT105		
Weight	14kg	
Dimension	35cm-35cm-15cm	
Operating Temperature	-10 to 55° C	
Storage Temperature	-20 to 85° C	
Humidity	70%	
Transformer Test Specification AMT105		
HV & LV outputs-power	Frequency	
	Power	
HV & LV outputs-Voltage	3-phase AC (RMS)	0-150 V(LN)....550mA peak
	1-phase AC (RMS)	0-450V(LN)....550 mA peak
	3-phase DC	0-220V(LN)....550 mA
	1-phase DC	0-630V(LN)....550mA peak
HV & LV outputs-Current	3-phase AC (RMS)	0-32A....12V
	1-phase AC (RMS)	
	3-phase DC	0-10A....12V
	1-phase DC	0-10A....40V
HV & LV input-Voltage	0 ... 400m V 0.05 % range 0 ... 4.5 V 0.05 % range 0 ... 30V 0.05 % range 0 ... 188V 0.05 % range	
HV & LV input-Current	0 ... 800 mA 0.05 % range	
CT Test SPECIFICATION AMT105		
Test Standard	IEC61869 / 60044	
Voltage Output Range	0-450V	
Current Output Range	0-128A	
Output Frequency Range	DC & 5-2500HZ	
CT Ratio Measurement Accuracy	Ratio: 1-30000 accuracy: 0.2	
Phase displacement: Resolution Accuracy	0.01 min 3 min (typical) / 5 min (guaranteed)	
Minimum Knee Point	0.5V	
Maximum Knee Point	4500V	
"Winding Resistance Resolution Accuracy"	1 mΩ 0.05 % (typical) / 0.1 % + 1 mΩ (guaranteed)	
Current Input Range(CT Secondary Side)	1mA - 500mA	
Minimum Knee Current	1mA	
Maximum Knee Voltage	1.5A Up to 4KV	

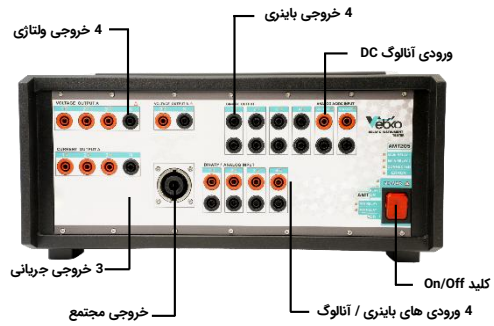
Protocol AMT205		
IEC 61850	GOOSE Publish	128
	Goose Subscribe	128
	Virtual Binary I/O	360 IN / 360 OUT
	SV Publish Streams	10
	SV Subscribe Streams	10
	SV Sample Rates	80-256 samples/cycle
	Ethernet Ports	3x RJ45 100Base , 1x External Fiber 100Base (Optional)
	Time Sync	PTP (IEEE-1588), IRIG-B, PPS, SNTP
	Time Accuracy	±1 µs (PTP), ±80 ns (PPS)
Combination Cable AMT205		
3Voltage, 3 Current	Yes	
6Current	No	
PC Connection AMT205		
Wifi	Yes	
LAN	3 Port	
Programming USB Port	Yes	
Physical Characteristic AMT205		
Weight	14kg	
Dimension	35cm-35cm-15cm	
Operating Temperature	-10 to 55° C	
Storage Temperature	-20 to 85° C	
Humidity	70%	
Transformer Test Specification AMT205		
HV & LV outputs-power	Frequency	
	Power	
HV & LV outputs-Voltage	3-phase AC (RMS)	0-600 V(LN)....1.2 A peak
	1-phase AC (RMS)	0-1200V(LN)....1.2 A peak
	3-phase DC	0-850V(LN)....1.2 A
	1-phase DC	0-1700V(LN)....1.2 A peak
HV & LV outputs-Current	3-phase AC (RMS)	0-32A....22V
	1-phase AC (RMS)	
	3-phase DC	0-10A....22V
	1-phase DC	0-10A....60V
HV & LV input-Voltage	0 ... 10 mV 0.05 % range 0 ... 50 mV 0.05 % range 0 ... 120m V 0.05 % range 0 ... 400m V 0.05 % range 0 ... 4.5 V 0.05 % range 0 ... 30V 0.05 % range 0 ... 188V 0.05 % range 0 ... 520 V 0.05 % range	
HV & LV input-Current	0 ...82 uA 0.05 % range 0 ... 35 mA 0.05 % range 0 ... 800 mA 0.05 % range 0 ... 10 A 0.05 % range	
CT Test SPECIFICATION AMT205		
Test Standard	IEC61869 / 60044	
Voltage Output Range	0-1200V	
Current Output Range	0-128A	
Output Frequency Range	DC & 5-2500HZ	
CT Ratio Measurement Accuracy	Ratio: 1-30000 accuracy: 0.1	
Phase displacement: Resolution Accuracy	0.01 min 3 min (typical) / 5 min (guaranteed)	
Minimum Knee Point	0.01V	
Maximum Knee Point	10KV	
"Winding Resistance Resolution Accuracy"	1 mΩ 0.05 % (typical) / 0.1 % + 1 mΩ (guaranteed)	
Current Input Range(CT Secondary Side)	1 mA - 7 A	
Minimum Knee Current	100 uA	
Maximum Knee Voltage	10A up to 50V 2.5A Up to 10KV	

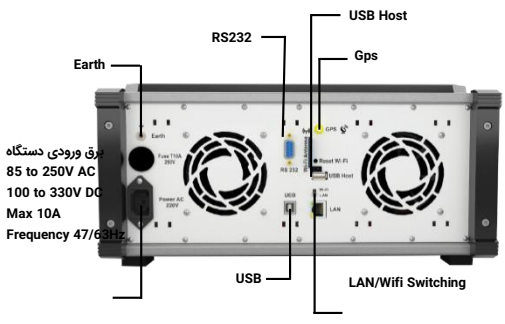
تستر رله AMT

PT Test SPECIFICATION AMT105	
Test Standard	IEC61869 / 60044
Voltage Output Range	0-450V AC
Current Output Range	0-128A
Ratio Measurement Voltage Level Typical accuracy	Ratio: 1-500KV accuracy: 0.2
Phase displacement measurement Voltage level Typical accuracy	0.01 min 3 min (typical) / 5 min (guaranteed)
Winding Resistance: Resolution Guaranteed Accuracy Typical accuracy	1 mΩ 0.1% + 1 mΩ 0.05 %
Circuit Breaker Test Specification AMT205	
Commands for control of trip or close coils	2.5 A DC or 1.5A AC for 200 ms
Resistance measurements(100A)	4 μΩ ... 400 μΩ — 0.1 % rd + 4 μΩ
	45 μΩ ... 4.5Ω — 0.1 % rd + 45 μΩ
Maximum Sampling rate	2.5 KHz
Minimum resolution	400 μs
Voltage measurements	0 ... 400 mV — 0.05 % range
	0 ... 4.5 V — 0.05 % range
	0 ... 30 V — 0.05 % range
	0 ... 188 V — 0.05 % range
Current measurements	0 ... 800 mA — 0.05 % range

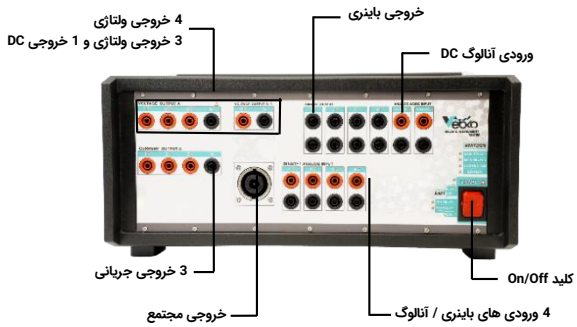
PT Test SPECIFICATION AMT205		
Test Standard	IEC61869 / 60044	
Voltage Output Range	0-1200 V AC	
Current Output Range	0-128A	
Ratio Measurement Voltage Level Typical accuracy	Ratio: 1-500KV accuracy: 0.1	
Phase displacement measurement Voltage level Typical accuracy	0.01 min 3 min (typical) / 5 min (guaranteed)	
Winding Resistance: Resolution Guaranteed Accuracy Typical accuracy	1 mΩ 0.1% + 1 mΩ 0.05 %	
Circuit Breaker Test Specification AMT205		
Commands for control of trip or close coils	6A DC or3.5 A AC for 200ms	
Resistance measurements(100A)	0.1 μΩ ... 10 μΩ	0.1 % rd + 0.1 μΩ
	0.5 μΩ ... 50 μΩ	0.1 % rd + 0.5 μΩ
	1.2 μΩ ... 120 μΩ	0.1 % rd + 1.2 μΩ
	4 μΩ ... 400 μΩ	0.1 % rd + 4 μΩ
	45 μΩ ... 4.5 Ω	0.1 % rd + 45 μΩ
Maximum Sampling rate	80 KHz	
Minimum resolution	12.5 μs	
Voltage measurements	0... 10 mV	0.05 % range
	0 ... 50 mV	0.05 % range
	0... 120 mV	0.05 % range
	0 ... 400 mV	0.05 % range
	0 ... 4.5 V	0.05 % range
	0 ... 30 V	0.05 % range
	0 ... 188 V	0.05 % range
	0 ... 520 V	0.05 % range
Current measurements	0 0...82 uA	0.05 % range
	0 ... 35 mA	0.05 % range
	0 ... 800 mA	0.05 % range
	0 ... 10 A	0.05 % range

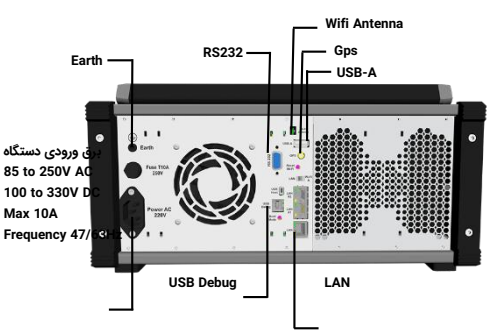
AMT103



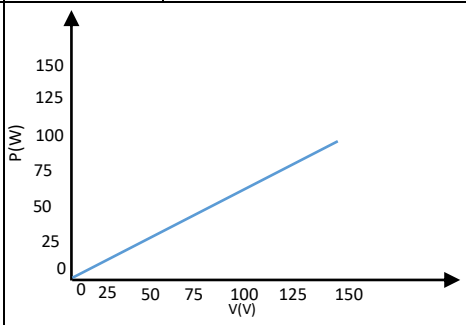


AMT203





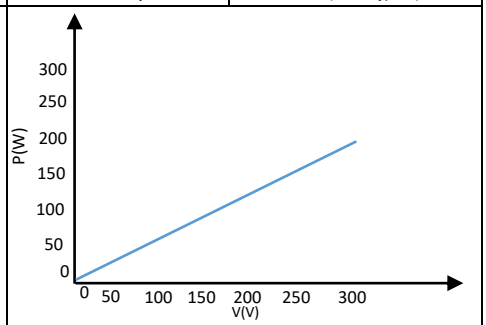
Power Supply AMT103	
Power supply range	85-240 VAC or 100-330VDC
Input frequency range	47-63 Hz
Consumption	up to 2 KVA
Nominal current	3 A at 230 VAC
Connection	According to IEC60320

High Voltage, Low Current Generators AMT103 (Input Voltage≥ 220V)		
Voltage	4 Phase (L-N)	AC: 4 X 0 ... 150 V
		DC: 4 X 0 ... 210 V
	Series and parallel	Yes
	Resolution	400 µV
	Accuracy	Guar.: 0.15% of rd. + 0.015% of rg.
		Typ.: 0.05% of rd. + 0.005% of rg.
Current	No	
Phase	Range	0° to 360°
	Resolution	1µ°
	Accuracy	Guar.: 0.1°
		Typ.: 0.01°
Frequency	Range	0 ... 1 kHz
	Resolution	1µHz
	Accuracy	Guar.: 10 µHz , Typ.: 1 µHz
Power		

Harmonic Injection	Inter Harmonic	Yes	2 Free Harmonic Order
	Harmonic Order	No	
Recording	Sampling Rate	1.2 ms	
	Variable	Currents and Voltages	
Protection	Detection	Power according to power curves	
		Yes	
	Type	Test Off	
Connection Banana Sockets	4mm (0.16 in) banana sockets		
Connection Combination Socket	Group A		
LED	Green (1 Color)		

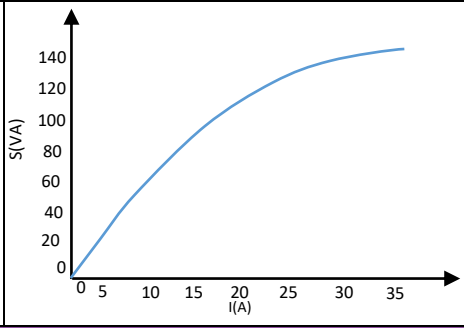
Low Voltage, High Current Generators AMT103			
Current	Normal Mode	6 Phase (L-N)	AC: 3 X 0 ... 32 A
			DC: 3 X 0 ... 32 A
		Resolution	1.2 mA
		Accuracy	Guar.: 0.15% of rd. + 0.015% of rg
			Typ.: 0.05% of rd. + 0.005% of rg.
	Internal Booster Mode	No	
	Maximum Compliance Voltage	12V	
	Series and parallel	Yes	
Voltage	No		

Power Supply AMT203	
Power supply range	85-240 VAC or 100-330VDC
Input frequency range	47-63 Hz
Consumption	up to 3 KVA
Nominal current	5 A at 230 VAC
Connection	According to IEC60320

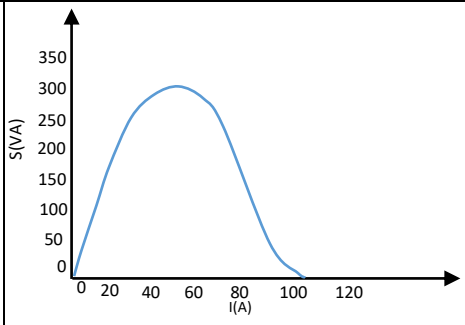
High Voltage, Low Current Generators AMT203 (Input Voltage≥ 220V)			
Voltage	6Phase (L-N)	AC: 4 X 0 ... 300 V	
		DC: 4 X 0 ... 420 V	
	Series and parallel	Yes	
	Resolution	800µV	
	Accuracy	Guar.: 0.15% of rd. + 0.015% of rg.	
		Typ.: 0.05% of rd. + 0.005% of rg.	
Current	Normal Mode	6Phase (L-N)	AC: 4 X 0 ... 0.25 A
			DC: 4 X 0 ... 0.4 A
	Internal Booster Mode time<200ms	6Phase (L-N)	AC: 4 X 0 ... 0.85 A
			DC: 4 X 0 ... 1.2 A
	Series and parallel	Yes	
	Resolution	20 µA	
	Accuracy	Guar.: 0.15% of rd. + 0.015% of rg.	
		Typ.: 0.05% of rd. + 0.005% of rg.	
Phase	Range	0° to 360°	
	Resolution	1µ°	
	Accuracy	Guar.: 0.1°	
		Typ.: 0.01°	
Frequency	Range	0 ... 5 kHz	
	Resolution	1µHz	
	Accuracy	Guar.: 10 µHz , Typ.: 1 µHz	
Power			

Harmonic Injection	Inter Harmonic	Yes	Maximum Order 100 for 50Hz(5KHz)
	Harmonic Order	Yes	
Recording	Sampling Rate	25 µs	
	Variable	Currents and Voltages	
Protection	Detection	Power according to power curves	
		Yes	
	Type	Test Off	
Connection Banana Sockets	4mm (0.16 in) banana sockets		
Connection Combination Socket	Group A		
LED	Green (1 Color)		

Low Voltage, High Current Generators AMT203			
Current	Normal Mode	6 Phase (L-N)	AC: 3 X 0 ... 32 A
			DC: 3 X 0 ... 45 A
		Resolution	85 µA
		Accuracy	Guar.: 0.15% of rd. + 0.015% of rg.
			Typ.: 0.05% of rd. + 0.005% of rg
	Mode amplificateur interne temps < 300 ms	6 Phase (L-N)	AC: 3 X 0 ... 67 A
		Resolution	DC: 3 X 0 ... 95 A
			180 µA
		Accuracy	Guar.: 0.15% of rd. + 0.015% of rg.
			Typ.: 0.05% of rd. + 0.005% of rg.
	Maximum Compliance Voltage	22V	
	Series and parallel	Yes	
Voltage	6 Phase (L-N)	AC: 3 X 0 ... 12 V	
		DC: 3 X 0 ... 20 V	
	Series and parallel	Yes	
	Resolution	40 uV	
	Accuracy	Guar.: 0.15% of rd. + 0.015% of rg.	
		Typ.: 0.05% of rd. + 0.005% of rg.	

(continue) Low Voltage, High Current Generators AMT103				
Phase	Range			0° to 360°
	Resolution			1µ°
	Accuracy			Guar.: 0.1°
				Typ.: 0.01°
Frequency	Range			0 ... 1 kHz
	Resolution			1 µHz
	Accuracy			Guar.: 10 µHz
				Typ.: 1 µHz
Recording	Sampling Rate			1.2 ms
	Variable			Currents
Protection	Detection	Maximum Neutral Current		32A: Unlimited
				64 A: 3 s
				100 A: 300 ms
	Setting	Soware Controlled: Time , Enable		
	Type			Test off
Maximum Neutral Current	4 mm (0.16 in) banana sockets / 32 A continuously			
Connection Banana Sockets	Group A (30 A continuously max)			
LED	Green (1 Color)			
Harmonic Injection	Enter Harmonic	Yes		2 Free Harmonic
	Harmonic Order	No		
Power				

AC/DC Analog Binary Inputs AMT103			
Number	4		
Dry	Open Circuit Voltage	5V	
	Short Circuit Voltage	Soware controlled	
Wet	Range 1: 0 ... ±4.5 V(Peak)	Accuracy	0.05% of rg.
		Accuracy (Avg)	0.02% of rg.
		Resolution	35µV
		Impedance	493.75 KΩ
	Range 1: 0 ... ±30 V(Peak)	Accuracy	0.05% of rg.
		Accuracy (Avg)	0.02% of rg.
		Resolution	250µV
		Impedance	414.783 KΩ
	Range 1: 0 ... ±180 V(Peak)	Accuracy	0.05% of rg.
		Accuracy (Avg)	0.02% of rg.
		Resolution	1.5mV
		Impedance	405.267 KΩ
	No		
Recording	Sampling Rate	1.2 ms	
Protection	Detection	Over voltage	
	Setting	Soware Controlled: Time , Enable	
	Type	Test Off, Change to Dry	
Galvanic Isolation	4 Group (1+1+1+1)		
LED	Green (1 Color)		

(continue) Low Voltage, High Current Generators AMT203				
Phase	Range			0° to 360°
	Resolution			1µ°
	Accuracy			Guar.: 0.1°
				Typ.: 0.01°
Frequency	Range			0 ... 2.5 kHz
	Resolution			1 µHz
	Accuracy			Guar.: 10 µHz
				Typ.: 1 µHz
Recording	Sampling Rate			25 µs
	Variable			Currents & Voltages
Protection	Detection	Maximum Neutral Current		32A: Unlimited
				64 A: 3 s
				100 A: 300 ms
	Setting	Soware Controlled: Time , Enable		
	Type			Test off
Maximum Neutral Current	4 mm (0.16 in) banana sockets / 32 A continuously			
Connection Banana Sockets	Group A (30 A continuously max)			
LED	RGB (16 Million Color)			
Harmonic Injection	Enter Harmonic	Yes		Maximum Order 40 for 50Hz (2KHz)
	Harmonic Order	Yes		
Power				

AC/DC Analog Binary Inputs AMT203			
Number	4		
Dry	Open Circuit Voltage	5V	
	Short Circuit Voltage	Soware controlled	
Wet	Range 1: 0 ... ±4.5 V(Peak)	Accuracy	0.05% of rg.
		Accuracy (Avg)	0.02% of rg.
		Resolution	35 µV
		Impedance	493.75 KΩ
	Range 1: 0 ... ±30 V(Peak)	Accuracy	0.05% of rg.
		Accuracy (Avg)	0.02% of rg.
		Resolution	250µV
		Impedance	414.783 KΩ
	Range 1: 0 ... ±180 V(Peak)	Accuracy	0.05% of rg.
		Accuracy (Avg)	0.02% of rg.
		Resolution	1.5mV
		Impedance	405.267 KΩ
	Range 1: 0 ... ±520 V(Peak)	Accuracy	0.05% of rg.
		Accuracy (Avg)	0.02% of rg.
		Resolution	4mV
		Impedance	404.298 KΩ
Recording	Sampling Rate	12.5 µs	
Protection	Detection	Over voltage	
	Setting	Soware Controlled: Time , Enable	
	Type	Test Off, Change to Dry	
Galvanic Isolation	4 Group (1+1+1+1)		
LED	RGB (16 Million Color)		

Binary Outputs AMT103			
Type	Electro mechanical relay contacts		
	-		
Control	Soware controlled		
Number	4		
Maximum Voltage in open mode	Electro Mechanic	750V (Rms)	
	No		
Maximum Current	Electro Mechanic	5A (Rms)	
	No		
Break Capacity AC	Electro Mechanic	2500 VA	
	No		
Break Capacity DC	Electro Mechanic	300 W	
	No		
Recording	No		
Protection	No		
Galvanic Isolation	4 Group (1+1+1+1)		
LED	Green (1 Color)		

AC/DC Current Measuring Input AMT103		
Range 1: 0 ... ± 10 A	No	
Range 2: 0 ... ± 750 mA	Accuracy	0.05% of rg
	Accuracy (Avg)	0.02% of rg.
	Resolution	6 µA
	Shunt	1Ω
Range 3: 0 ... ± 39 mA	No	
Range 4: 0 ... ± 250 µA	No	
Recording	Resolution	400 µs
Protection	Detection	Overcurrent
	Setting	Soware Controlled: Time , Enable
	Type	Test off, Change to open circuit
Galvanic Isolation	1 Group	
LED	Green (1 Color)	

AC/DC Voltage Measuring Input AMT103		
Range 1: 0 ... ±400 mV(Peak)	Accuracy	0.05% of rg.
	Accuracy (Avg)	0.02% of rg.
	Resolution	3µV
	Impedance	54.7826 KΩ
Range 2: 0 ... ±120 mV(Peak)	No	
Range 1: 0 ... ±50 mV(Peak)	No	
Range 2: 0 ... ±10 mV(Peak)	No	
Recording	Sampling Rate	400 µs
Protection	Detection	Over Voltage
	Setting	Software Controlled: Time , Enable
	Type	Test off
Galvanic Isolation	1 Group	
LED	Green (1 Color)	

AUX. DC AMT103	
Aux. DC	No

GPS AMT103	
Internal GPS Module	Yes
Accuracy	8ns
Time To Lock	10s
Delay Adjustment	Yes

Binary Outputs AMT203			
Type	Electro mechanical relay contacts		
	Transistor		
Control	Soware controlled		
Number	4		
Maximum Voltage in open mode	Electro Mechanic	750V (Rms)	
	Transistor	50 V	
Maximum Current	Electro Mechanic	5A (Rms)	
	Transistor	50 mA	
Break Capacity AC	Electro Mechanic	Smax	2500 VA
	Transistor	Smax	2.5 VA
Break Capacity DC	Electro Mechanic	Pmax	300 W
	Transistor	Pmax	2.5 W
Recording	Sampling Rate	50 µs	
	Resolution	2 mA	
	Accuracy	0.3 mA	
Protection	Detection	Overcurrent	
	Setting	Soware Controlled: Time , Enable	
	Type	Test Off, Open Relays	
Galvanic Isolation	4 Group (1+1+1+1)		
LED	RGB (16 Million Color)		

AC/DC Current Measuring Input AMT203		
Range 1: 0 ... ± 10 A	Accuracy	0.05% of rg
	Accuracy (Avg)	0.02% of rg.
	Resolution	1.5mA
	Shunt	5mΩ
Range 2: 0 ... ± 750 mA	Accuracy	0.05% of rg
	Accuracy (Avg)	0.02% of rg.
	Resolution	6 µA
	Shunt	1Ω
Range 3: 0 ... ± 39 mA	Accuracy	0.05% of rg
	Accuracy (Avg)	0.02% of rg.
	Resolution	0.3 µA
	Shunt	22 Ω
Range 4: 0 ... ± 250 µA	Accuracy	0.05% of rg
	Accuracy (Avg)	0.02% of rg.
	Resolution	6 nA
	Shunt	3 KΩ
Recording	Resolution	12.5 µs
Protection	Detection	Overcurrent
	Setting	Soware Controlled: Time , Enable
	Type	Test off, Change to open circuit
Galvanic Isolation	1 Group	
LED	RGB (16 Million Color)	

AC/DC Voltage Measuring Input AMT203		
Range 1: 0 ... ±400 mV(Peak)	Accuracy	0.05% of rg.
	Accuracy (Avg)	0.02% of rg.
	Resolution	3 µV
	Impedance	54.7826 KΩ
Range 2: 0 ... ±120 mV(Peak)	Accuracy	0.05% of rg.
	Accuracy (Avg)	0.02% of rg.
	Resolution	1 µV
	Impedance	133.75 KΩ
Range 1: 0 ... ±50 mV(Peak)	Accuracy	0.05% of rg.
	Accuracy (Avg)	0.02% of rg.
	Resolution	500 nV
	Impedance	54.7826 KΩ
Range 2: 0 ... ±10 mV(Peak)	Accuracy	0.05% of rg.
	Accuracy (Avg)	0.02% of rg.
	Resolution	100 nV
	Impedance	133.75 KΩ
Recording	Sampling Rate	12.5 µs
Protection	Detection	Over Voltage
	Setting	Software Controlled: Time , Enable
	Type	Test off, Change to open circuit
Galvanic Isolation	1 Group	
LED	RGB (16 Million Color)	

AUX. DC AMT203		
Aux. DC	Any combination of 4 channels	0... 424 V
		0... 1.2 A

GPS AMT203	
Internal GPS Module	Yes
Accuracy	8ns
Time To Lock	10s
Delay Adjustment	Yes

Protocol AMT103		
IEC 61850	GOOSE Publish	10
	Goose Subscribe	10
	Virtual Binary I/O	32 IN / 32 OUT
	SV Publish Streams	NO
	SV Subscribe Streams	NO
	SV Sample Rates	NO
	Ethernet Ports	1x RJ45 100Base
	Time Sync	PPS
	Time Accuracy	±80 ns (PPS)
Combination Cable AMT103		
3Voltage, 3 Current	Yes	
6Current	Yes	
PC Connection AMT103		
Wifi	Yes	
LAN	1 Port	
Programming USB Port	No	
Physical Characteristic AMT103		
Weight	14kg	
Dimension	35cm-35cm-15cm	
Operating Temperature	-10 to 55° C	
Storage Temperature	-20 to 85° C	
Humidity	70%	
Transformer Test Specification AMT103		
HV & LV outputs-power	Frequency	
	Power	
HV & LV outputs-Voltage	3-phase AC (RMS)	0-150 V(LN)....550mA peak
	1-phase AC (RMS)	0-450V(LN)....550 mA peak
	3-phase DC	0-220V(LN)....550 mA
	1-phase DC	0-630V(LN)....550mA peak
HV & LV outputs-Current	3-phase AC (RMS)	0-32A....12V
	1-phase AC (RMS)	
	3-phase DC	0-10A....12V
	1-phase DC	0-10A....40V
HV & LV input-Voltage	0 ... 400m V 0.05 % range 0 ... 4.5 V 0.05 % range 0 ... 30V 0.05 % range 0 ... 188V 0.05 % range	
HV & LV input-Current	0 ... 800 mA 0.05 % range	
CT Test SPECIFICATION AMT103		
Test Standard	IEC61869 / 60044	
Voltage Output Range	0-450V	
Current Output Range	0-128A	
Output Frequency Range	DC & 5-2500HZ	
CT Ratio Measurement Accuracy	Ratio: 1-30000 accuracy: 0.2	
Phase displacement: Resolution Accuracy	0.01 min 3 min (typical) / 5 min (guaranteed)	
Minimum Knee Point	0.5V	
Maximum Knee Point	4500V	
"Winding Resistance Resolution Accuracy"	1 mΩ 0.05 % (typical) / 0.1 % + 1 mΩ (guaranteed)	
Current Input Range(CT Secondary Side)	1mA - 500mA	
Minimum Knee Current	1mA	
Maximum Knee Voltage	1.5A Up to 4KV	

Protocol AMT203		
IEC 61850	GOOSE Publish	128
	Goose Subscribe	128
	Virtual Binary I/O	360 IN / 360 OUT
	SV Publish Streams	10
	SV Subscribe Streams	10
	SV Sample Rates	80-256 samples/cycle
	Ethernet Ports	3x RJ45 100Base , 1x External Fiber 100Base (Optional)
	Time Sync	PTP (IEEE-1588), IRIG-B, PPS, SNTP
	Time Accuracy	±1 µs (PTP), ±80 ns (PPS)
Combination Cable AMT203		
3Voltage, 3 Current	Yes	
6Current	No	
PC Connection AMT203		
Wifi	Yes	
LAN	3 Port	
Programming USB Port	Yes	
Physical Characteristic AMT203		
Weight	14kg	
Dimension	35cm-35cm-15cm	
Operating Temperature	-10 to 55° C	
Storage Temperature	-20 to 85° C	
Humidity	70%	
Transformer Test Specification AMT203		
HV & LV outputs-power	Frequency	
	Power	
HV & LV outputs-Voltage	3-phase AC (RMS)	0-600 V(LN)....1.2 A peak
	1-phase AC (RMS)	0-1200V(LN)....1.2 A peak
	3-phase DC	0-850V(LN)....1.2 A
	1-phase DC	0-1700V(LN)....1.2 A peak
HV & LV outputs-Current	3-phase AC (RMS)	0-32A....22V
	1-phase AC (RMS)	
	3-phase DC	0-10A....22V
	1-phase DC	0-10A....60V
HV & LV input-Voltage	0 ... 10 mV 0.05 % range 0 ... 50 mV 0.05 % range 0 ... 120m V 0.05 % range 0 ... 400m V 0.05 % range 0 ... 4.5 V 0.05 % range 0 ... 30V 0.05 % range 0 ... 188V 0.05 % range 0 ... 520 V 0.05 % range	
HV & LV input-Current	0 ...82 uA 0.05 % range 0 ... 35 mA 0.05 % range 0 ... 800 mA 0.05 % range 0 ... 10 A 0.05 % range	
CT Test SPECIFICATION AMT203		
Test Standard	IEC61869 / 60044	
Voltage Output Range	0-1200V	
Current Output Range	0-128A	
Output Frequency Range	DC & 5-2500HZ	
CT Ratio Measurement Accuracy	Ratio: 1-30000 accuracy: 0.1	
Phase displacement: Resolution Accuracy	0.01 min 3 min (typical) / 5 min (guaranteed)	
Minimum Knee Point	0.01V	
Maximum Knee Point	10KV	
"Winding Resistance Resolution Accuracy"	1 mΩ 0.05 % (typical) / 0.1 % + 1 mΩ (guaranteed)	
Current Input Range(CT Secondary Side)	1 mA - 7 A	
Minimum Knee Current	100 uA	
Maximum Knee Voltage	10A up to 50V 2.5A Up to 10KV	

PT Test SPECIFICATION AMT103	
Test Standard	IEC61869 / 60044
Voltage Output Range	0-450V AC
Current Output Range	0-128A
Ratio Measurement Voltage Level Typical accuracy	Ratio: 1-500KV accuracy: 0.2
Phase displacement measurement Voltage level Typical accuracy	0.01 min 3 min (typical) / 5 min (guaranteed)
Winding Resistance: Resolution Guaranteed Accuracy Typical accuracy	1 mΩ 0.1% + 1 mΩ 0.05 %
Circuit Breaker Test Specification AMT203	
Commands for control of trip or close coils	2.5 A DC or 1.5A AC for 200 ms
Resistance measurements(100A)	4 μΩ ... 400 μΩ 0.1 % rd + 4 μΩ
	45 μΩ ... 4.5Ω 0.1 % rd + 45 μΩ
Maximum Sampling rate	2.5 KHz
Minimum resolution	400 μs
Voltage measurements	0 ... 400 mV 0.05 % range
	0 ... 4.5 V 0.05 % range
	0 ... 30 V 0.05 % range
	0 ... 188 V 0.05 % range
Current measurements	0 ... 800 mA 0.05 % range

PT Test SPECIFICATION AMT203		
Test Standard	IEC61869 / 60044	
Voltage Output Range	0-1200 V AC	
Current Output Range	0-128A	
Ratio Measurement Voltage Level Typical accuracy	Ratio: 1-500KV accuracy: 0.1	
Phase displacement measurement Voltage level Typical accuracy	0.01 min 3 min (typical) / 5 min (guaranteed)	
Winding Resistance: Resolution Guaranteed Accuracy Typical accuracy	1 mΩ 0.1% + 1 mΩ 0.05 %	
Circuit Breaker Test Specification AMT203		
Commands for control of trip or close coils	6A DC or3.5 A AC for 200ms	
Resistance measurements(100A)	0.1 μΩ ... 10 μΩ	0.1 % rd + 0.1 μΩ
	0.5 μΩ ... 50 μΩ	0.1 % rd + 0.5 μΩ
	1.2 μΩ ... 120 μΩ	0.1 % rd + 1.2 μΩ
	4 μΩ ... 400 μΩ	0.1 % rd + 4 μΩ
	45 μΩ ... 4.5 Ω	0.1 % rd + 45 μΩ
Maximum Sampling rate	80 KHz	
Minimum resolution	12.5 μs	
Voltage measurements	0... 10 mV	0.05 % range
	0 ... 50 mV	0.05 % range
	0... 120 mV	0.05 % range
	0 ... 400 mV	0.05 % range
	0 ... 4.5 V	0.05 % range
	0 ... 30 V	0.05 % range
	0 ... 188 V	0.05 % range
	0 ... 520 V	0.05 % range
Current measurements	0 0...82 uA	0.05 % range
	0 ... 35 mA	0.05 % range
	0 ... 800 mA	0.05 % range
	0 ... 10 A	0.05 % range