AMELEC SIGNAL CONDITIONING

APM489-5 Process Panel Meter / Controller

■ DESCRIPTION

- 5 Digit Red LED high-brightness Display.
- Standard input 0~10V 0(4)~20mA. Other ranges on request.
- Square Root function option available.
- 4 relays can be programmed individually to be Hi / Lo / Hi Latch / Lo Latch / Go energised with Start Delay / Hysteresis / Energised & De-energised Delay functions, or to be remote control.
- Analogue output fitted as standard with optional 1 RS485 (Modbus RTU Mode) interface with versatile functions such as control, alarm, re-transmission and communication for a wide range of industrial applications.
- 3 external control inputs can be programmed individually to be Relative PV (Tare) / PV Hold / Maximum or Minimum Hold / DI (remote monitoring) / Reset for Relay Energised Latch….
- Standard 115 / 230Vac supply
- (24V or 48Vdc supply options available on request)

■ TECHNICAL SPECIFICATION

Input

Input Range		Input Impedance	Input Range		Input Impedance
Voltage	0 ~ 10 V	≥ 1M ohm	**Current**	0(4)~20 mA	250 ohm

➢ **Input 0~10V or 0~20mA can be selected by termination. (11 or 12)**
➢ **Other customer special ranges available on request**

Calibration: Digital calibration by front key
A/D converter: **16 bits resolution**
Accuracy: ≤± 0.04% of FS ± 1C;
Sampling rate: 15 cycles/sec
Response time: ≤100 msec.(when the AvG = "1") in standard
Input type: **0~10V / 0~5V / 1~5V / 0-10mA / 0~20mA / 4~20mA**
Input range High and Low programmable
Ai.Hi: Settable range: 0.00~100.00% of input range
Ai.Lo: Settable range: 0.00~100.00% of input range

Display & Functions

LED: **Numeric:** 5 digits, 0.8"(20.0mm)H red high-brightness LED
Relay output indication: 4 square red LED
RS 485 communication: 1 square orange LED
E.C.I. function indication: 3 square green LED
Max/Mini Hold indication: 2 square orange LED
Display range: -19999~29999;
Scaling function: **Lo.SC:** Low Scale; Settable range: -19999~+29999
Hi.SC: High Scale; Settable range: -19999~+29999
Decimal point: Programmable from 0 / 0.0 / 0.00 / 0.000 / 0.0000
Square root function: Option on Request-for differential pressure transducers
Over range indication: **ovFL,** when input is over 120% of input range Hi
Under range indication: **-ovFL,** when input is under -20% of input range Lo
Max / Mini recording: Maximum and Minimum value storage during power on.
Display functions: ***PV / Max(Mini) Hold / RS 485 Programmable***
Front key functions: ***Up and down key can be set to be a function as ECI.***
Low cut: Settable range: -19999~29999 counts
Digital fine adjust: **Pv.Zro:** Settable range: -19999~+29999
Pv.SPn: Settable range: -19999~+29999

Reading Stable Function

Average: Settable range: 1~99 times
Moving average: Settable range: None / 1~10 times
Digital filter: Settable range: None /1~99 times

Control Functions(option)

Set-points: Four set-points

Control relay: Four relays
Relay 2 & Relay 3: SPCO, 5A/230Vac, 10A/115V
Relay 1 & Relay 4: SPST, 1A/230Vac, 3A/115V
Relay energised mode: Energised levels compare with set-points:
Hi / Lo / Go.12 / Go.23 / ***Hi.HLd*** */* ***Lo.HLd****; programmable*
DO function: Energised by RS485 command of master.
Energising functions: Start delay / Energised & De-energised delay / Hysteresis / Energised Latch
Start band(Minimum level for Energising): 0~9999counts
Start delay time: *0:00.0~9(Minutes):59.9(Second)*
Energised delay time: *0.00.0~9(Minutes):59.9(Second)*
De-energised delay time: *0.00.0~9(Minutes):59.9(Second)*
Hysteresis: 0~5000 counts

External Control Inputs(ECI)

Input mode: 3 ECI points, Contact or open collect input, Level trigger
Functions: *Relative PV(Tare) / PV Hold / Reset for Max or Mini. Hold /* ***DI*** */ Reset for Relay Energised latch*
Debouncing time: Settable range 5 ~255 x (8m seconds)

Analogue output(option)

Accuracy: ***≤± 0.1% of F.S.; 16 bits DA converter***
Ripple: ≤± 0.1% of F.S.
Response time: ≤100 msec. (10~90% of input)
Isolation: AC 2.0 KV between input and output
Output range: Specify either Voltage or Current output in ordering
Voltage: 0~5V / 0~10V / 1~5V programmable
Current: 0~10mA / 0~20mA / 4~20mA programmable
Output capability: **Voltage: 0~10V: ≥ 1000Ω;**
Current: 4(0)~20mA: ≤ 600Ω max

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Functions: *Ao.HS(output range high): Settable range: -19999~29999*
Ao.LS(output range Low): Settable range: -19999~29999
Ao.LMt(output High Limit): 0.00~110.00% of output High

Digital fine adjust: **Ao.Zro:** Settable range: -38011~+27524
Ao.SPn: Settable range: -38011~+27524

RS 485 Communication(option)

Protocol:	Modbus RTU mode
Baud rate:	1200/2400/4800/9600/19200/38400 programmable
Data bits:	8 bits
Parity:	Even, odd or none (with 1 or 2 stop bit) programmable
Address:	1 ~ 255 programmable
Remote display:	*to show the value from RS485 command of master*
Distance:	1200M
Terminate resistor:	150Ω at last unit.

Electrical Safety

Dielectric strength:	AC 2.0 KV for 1 min, Between Power / Input / Output / Case
Insulation resistance:	≥100M ohm at 500Vdc, Between Power / Input / Output
Isolation:	Between Power / Input / Relay / Analogue / RS485 / E.C.I.
EMC:	EN 55011:2002; EN 61326:2003
Safety(LVD):	EN 61010-1:2001

Environmental

Operating temp.:	0~60 ˚C
Operating humidity:	20~95 %RH, Non-condensing
Temp. coefficient:	≤100 PPM/˚C
Storage temp.:	-10~70 ˚C
Enclosure:	Front panel: IEC 549 (IP54); Housing: IP20

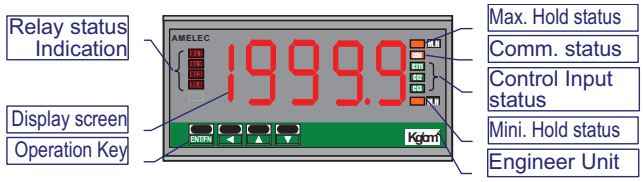
Mechanical

Dimensions:	96mm(W) x 48mm(H) x 120mm(D)
Panel cutout:	92mm(W) x 44mm(H)
Case materiel:	ABS fire-resistance (UL 94V-0)
Mounting:	Panel flush mounting
Terminal block:	Plastic NYLON 66 (UL 94V-0)
	10A 300Vac, M2.6, 1.3~2.0mm²(16~12AWG)
Weight:	550g / 350g(Aux. Power Code: ADH or ADL)

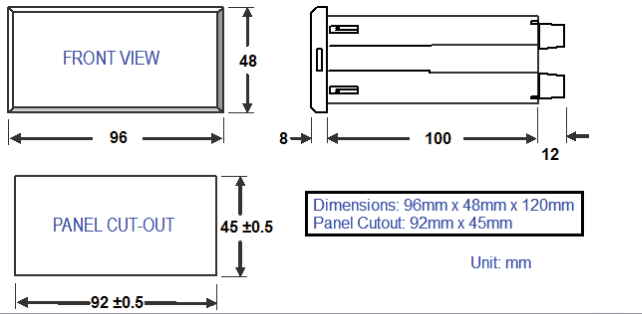
Power

Power supply:	AC115/230V,50/60Hz;
	Optional: AC/DC 85~264V or 20~90V(RoHS version)
Excitation supply:	DC24V/30mA maximum in standard
Power consumption:	5.0VA maximum
Back up memory:	By EEPROM

■ FRONT PANEL

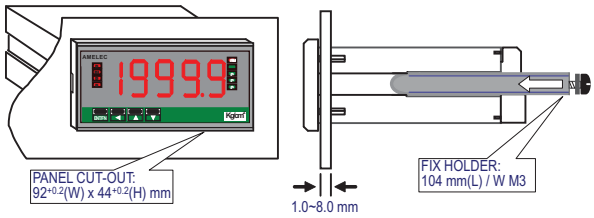


■ DIMENSIONS

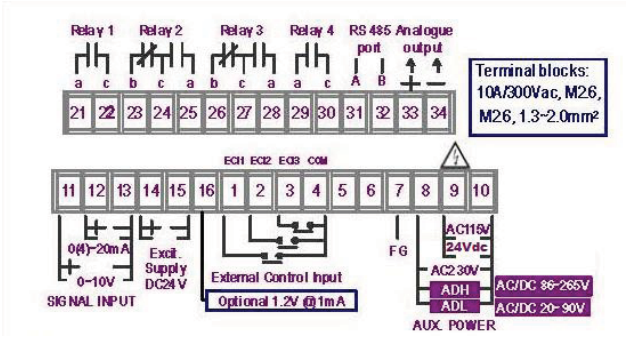


■ INSTALLATION

The meter should be installed in a location that does not exceed the maximum operating temperature and provides good air circulation.

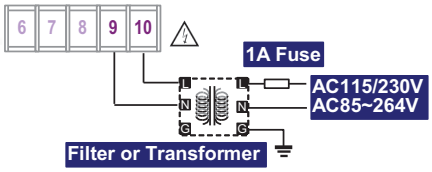


■ CONNECTION DIAGRAM

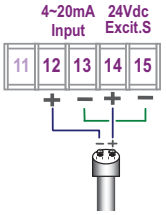


Please check the power supply voltage first, and then connect to the specified terminals. It is recommended that power supplied to the meter be protected by a fuse or circuit breaker.

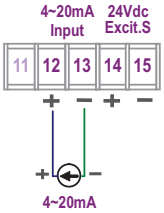
Power Supply



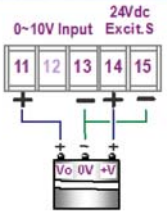
2 wire Transmitter connection



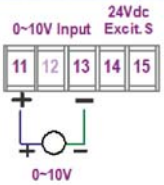
4(0)~20mA Input connection



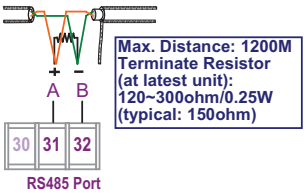
3 Wire Transmitter



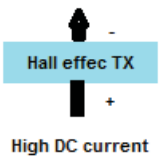
0~10V Source Input connection



RS485 Communication Port



High DC Current Input



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■ RS485 MODBUS RTU MODE

■ Modbus RTU Mode protocol

1. Function 03H (Read Holding Registers)

Request Data Frame; EX: Read the data of display value(0000H starts from 1 Word)

SLAVE Address	FUNCTION	Starting Address Hi	Starting Address Lo	No. of Word Hi	No. of Word Lo	CRC Lo	CRC Hi
01H	03H	00H	00H	00H	01H	84H	0AH

Response Data Frame; EX: The response value is ”0”

SLAVE Address	FUNCTION	Byte count	Data Hi	Data Lo	CRC Lo	CRC Hi
01H	03H	02H	00H	00H	B8H	44H

Request Data Frame (EX: Continue to request the data of 10 points)

SLAVE Address	FUNCTION	Starting Address Hi	Starting Address Lo	No. of Word Hi	No. of Word Lo	CRC Lo	CRC Hi
01H	03H	00H	00H	00H	0AH	C5H	CDH

Response Data Frame

SLAVE Address	FUNCTION	Byte count	Data(1) Hi	Data(1) Lo	…	…	Data(10) Hi	Data(10) Lo	CRC Lo	CRC Hi
01H	03H	14H	00H	00H	…	…	01H	00H	--	--

2. Writing Command by Function 06H (Preset Single Register)

Request Data Frame

SLAVE Address	FUNCTION Code	Starting Address Hi	Starting Address Lo	Preset DATA Hi	Preset DATA Lo	CRC Lo	CRC Hi
01H	06H	00H	00H	00H	02H	08H	0BH

Response Data Frame

SLAVE Address	FUNCTION Code	Starting Address Hi	Starting Address Lo	Preset DATA Hi	Preset DATA Lo	CRC Lo	CRC Hi
01H	06H	00H	00H	00H	02H	08H	0BH

■ ADDRESS TABLE **Address number are Hexadecimal

■ User level

Name	Address	Range	Explain	Initial	Write/Read	Note
PV	0000h	-19999~29999	Present Value		R	
r1SP	0001h	-19999~29999	Relay1 Set Point	10000	R/W	
r2SP	0002h	-19999~29999	Relay2 Set Point	10000	R/W	
r3SP	0003h	-19999~29999	Relay3 Set Point	10000	R/W	
r4SP	0004h	-19999~29999	Relay4 Set Point	10000	R/W	
RELAY STATUS	0005h	0~1	RELAY STATUS **bit0~bit3:**relay1~relay4; **0**=Relay off **1**=Relay on		R/W	
ECI STATUS	0006h	0~1	ECI STATUS **bit0~bit2:**ECI.1~ECI.3; **0**=untriged **1**:triged		R	
PvHLd	0007h	-19999~29999	PV Hold		R	
Min	0008h	-19999~29999	The Minimum of PV	0	R	
MAX	0009h	-19999~29999	The Maximum of PV	0	R	
SYSTEM STATUS	000Ah		SYSTEM STATUS **bit0**=1 EEP fail; **bit1**=1 Input calibration fail; **bit2**=1 Input calibration NG; **bit3**=1 Analogue Output calibration fail; **bit4**=1 Analogue Output calibration NG		R	
MrSt	000Bh	0~1	Reset Maximum & Minimum Value **0:**No **1:**Yes	0	R/W	
r5485	000Ch	-19999~29999	PV showing from RS485 command(data)	0.00%	R/W	