

Measuring class parameter [Floating point format data]

Input Register Parameter [Function code : 04H]				Register Address [Hex]	
Description	Length (bytes)	Data Format	Units	High Byte	Low Byte
Phase 1 line to neutral volts.	4	Float	V	00	00
Phase 2 line to neutral volts.	4	Float	V	00	02
Phase 3 line to neutral volts.	4	Float	V	00	04
Phase 1 current.	4	Float	A	00	06
Phase 2 current.	4	Float	A	00	08
Phase 3 current.	4	Float	A	00	0A
Phase 1 active power.	4	Float	W	00	0C
Phase 2 active power.	4	Float	W	00	0E
Phase 3 active power.	4	Float	W	00	10
Phase 1 reactive power.	4	Float	var	00	12
Phase 2 reactive power.	4	Float	var	00	14
Phase 3 reactive power.	4	Float	var	00	16
Phase 1 apparent power.	4	Float	VA	00	18
Phase 2 apparent power.	4	Float	VA	00	1A
Phase 3 apparent power.	4	Float	VA	00	1C
Phase 1 power factor (1).	4	Float	None	00	1E
Phase 2 power factor (1).	4	Float	None	00	20
Phase 3 power factor (1).	4	Float	None	00	22
Phase 1 phase angle.	4	Float	Degrees	00	24
Phase 2 phase angle.	4	Float	Degrees	00	26
Phase 3 phase angle.	4	Float	Degrees	00	28
Line 1 to Line 2 volts.	4	Float	V	00	2A
Line 2 to Line 3 volts.	4	Float	V	00	2C
Line 3 to Line 1 volts.	4	Float	V	00	2E
Frequency of supply voltages.	4	Float	Hz	00	30
Total system active power.	4	Float	W	00	32
Total system reactive power.	4	Float	var	00	34
Total system apparent power.	4	Float	VA	00	36
Total system power factor (1).	4	Float	None	00	38
Total system phase angle.	4	Float	Degrees	00	3A
Sum of line currents.	4	Float	A	00	3C
Average line to neutral volts.	4	Float	V	00	3E
Average line to line volts.	4	Float	V	00	40
Average line current.	4	Float	A	00	42
Neutral current.	4	Float	A	00	44
Nature of L1 load (Resistive=1, inductive=2, capacitive =3)	4	Float	None	00	4E
Nature of L2 load (Resistive =1, inductive=2, capacitive =3)	4	Float	None	00	50
Nature of L3 load (Resistive =1, inductive=2, capacitive =3)	4	Float	None	00	52
Nature of the system load	4	Float	None	00	54

(Resistive =1、inductive =2、capacitive =3)					
Voltage phase sequence (normal=1、reverse=2、phase missing =3)	4	Float	None	00	56
Current phase sequence (normal=1、reverse=2、phase missing =3)	4	Float	None	00	58
Phase 1 voltage THD (2).	4	Float	%	00	7C
Phase 2 voltage THD (2).	4	Float	%	00	7E
Phase 3 voltage THD (2).	4	Float	%	00	80
Phase 1 current THD	4	Float	%	00	82
Phase 2 current THD	4	Float	%	00	84
Phase 3 current THD	4	Float	%	00	86
Average voltage THD (2).	4	Float	%	00	88
Average line current THD.	4	Float	%	00	8A
Total system active power demand (3).	4	Float	W	00	8C
Total system reactive power demand (3).	4	Float	var	00	8E
Total system apparent power demand.	4	Float	VA	00	90
Phase 1 current demand.	4	Float	A	00	92
Phase 2 current demand.	4	Float	A	00	94
Phase 3 current demand.	4	Float	A	00	96
Neutral current demand.	4	Float	A	00	98
Import active power demand	4	Float	W	00	9A
Export active power demand	4	Float	W	00	9C
Maximum total system active power demand (3).	4	Float	W	00	A2
Maximum total system reactive power demand (3).	4	Float	var	00	A4
Maximum total system apparent power demand.	4	Float	VA	00	A6
Maximum phase 1 current demand.	4	Float	A	00	A8
Maximum phase 2 current demand.	4	Float	A	00	AA
Maximum phase 3 current demand.	4	Float	A	00	AC
Maximum neutral current demand.	4	Float	A	00	AE
Maximum import active power demand	4	Float	W	00	B0
Maximum export active power demand	4	Float	W	00	B2
Voltage 2st~31st Harmonic L1 (2).	120	Float	%	00	B8
Voltage 2st~31st Harmonic L2 (2).	120	Float	%	01	34
Voltage 2st~31st Harmonic L3 (2).	120	Float	%	01	B0
Current 2st~31st Harmonic L1	120	Float	%	02	2C
Current 2st~31st Harmonic L2	120	Float	%	02	A8
Current 2st~31st Harmonic L3	120	Float	%	03	24
Maximum value of total active power	4	Float	W	04	3C
Maximum value of total reactive power	4	Float	var	04	3E
Maximum value of total apparent power	4	Float	VA	04	40
Maximum of the total power factor	4	Float	None	04	42
Maximum value of L1 active power	4	Float	W	04	44
Maximum value of L2 active power	4	Float	W	04	46
Maximum value of L3 active power	4	Float	W	04	48

Maximum value of L1 reactive power	4	Float	var	04	4A
Maximum value of L2 reactive power	4	Float	var	04	4C
Maximum value of L3 reactive power	4	Float	var	04	4E
Maximum value of L1 apparent power	4	Float	VA	04	50
Maximum value of L2 apparent power	4	Float	VA	04	52
Maximum value of L3 apparent power	4	Float	VA	04	54
Maximum of the L1 power factor	4	Float	None	04	56
Maximum of the L2 power factor	4	Float	None	04	58
Maximum of the L3 power factor	4	Float	None	04	5A
Maximum value of L1 current	4	Float	A	04	5C
Maximum value of L2 current	4	Float	A	04	5E
Maximum value of L3 current	4	Float	A	04	60
Maximum value of neutral current	4	Float	A	04	62
Maximum value of total current	4	Float	A	04	64
Maximum value of L1 voltage	4	Float	V	04	66
Maximum value of L2 voltage	4	Float	V	04	68
Maximum value of L3 voltage	4	Float	V	04	6A
Maximum value of L1-2 voltage	4	Float	V	04	6C
Maximum value of L2-3 voltage	4	Float	V	04	6E
Maximum value of L3-1 voltage	4	Float	V	04	70
Maximum value of L1 voltage total harmonic (2).	4	Float	%	04	72
Maximum value of L2 voltage total harmonic (2).	4	Float	%	04	74
Maximum value of L3 voltage total harmonic (2).	4	Float	%	04	76
Maximum value of L1 current total harmonic	4	Float	%	04	78
Maximum value of L2 current total harmonic	4	Float	%	04	7A
Maximum value of L3 current total harmonic	4	Float	%	04	7C
Minimum value of total active power	4	Float	W	04	7E
Minimum value of total reactive power	4	Float	var	04	80
Minimum value of total apparent power	4	Float	VA	04	82
Minimum of the total power factor	4	Float	None	04	84
Minimum value of L1 active power	4	Float	W	04	86
Minimum value of L2 active power	4	Float	W	04	88
Minimum value of L3 active power	4	Float	W	04	8A
Minimum value of L1 reactive power	4	Float	var	04	8C
Minimum value of L2 reactive power	4	Float	var	04	8E
Minimum value of L3 reactive power	4	Float	var	04	90
Minimum value of L1 apparent power	4	Float	VA	04	92
Minimum value of L2 apparent power	4	Float	VA	04	94
Minimum value of L3 apparent power	4	Float	VA	04	96
Minimum of the L1 power factor	4	Float	None	04	98
Minimum of the L2 power factor	4	Float	None	04	9A
Minimum of the L3 power factor	4	Float	None	04	9C
Minimum value of L1 current	4	Float	A	04	9E
Minimum value of L2 current	4	Float	A	04	A0

Minimum value of L3 current	4	Float	A	04	A2
Minimum value of neutral current	4	Float	A	04	A4
Minimum value of total current	4	Float	A	04	A6
Minimum value of L1 voltage	4	Float	V	04	A8
Minimum value of L2 voltage	4	Float	V	04	AA
Minimum value of L3 voltage	4	Float	V	04	AC
Minimum value of L1-2 voltage	4	Float	V	04	AE
Minimum value of L2-3 voltage	4	Float	V	04	B0
Minimum value of L3-1 voltage	4	Float	V	04	B2
Minimum value of L1 voltage total harmonic (2).	4	Float	%	04	B4
Minimum value of L2 voltage total harmonic (2).	4	Float	%	04	B6
Minimum value of L3 voltage total harmonic (2).	4	Float	%	04	B8
Minimum value of L1 current total harmonic	4	Float	%	04	BA
Minimum value of L2 current total harmonic	4	Float	%	04	BC
Minimum value of L3 current total harmonic	4	Float	%	04	BE
Total import active energy.	4	Float	kWh	05	00
Total export active energy.	4	Float	kWh	05	02
Total active Energy (Import + Export).	4	Float	kWh	05	04
Net active Energy (Import - Export).	4	Float	kWh	05	06
Total import reactive energy.	4	Float	kvarh	05	08
Total export reactive energy.	4	Float	kvarh	05	0A
Total reactive energy (Import + Export).	4	Float	kvarh	05	0C
Net reactive energy (Import - Export).	4	Float	kvarh	05	0E
Total apparent energy.	4	Float	kVAh	05	10
The Ah of the system current	4	Float	Ah	05	12
L1 import active Energy	4	Float	kWh	05	14
L2 import active Energy	4	Float	kWh	05	16
L3 import active Energy	4	Float	kWh	05	18
L1 export active Energy	4	Float	kWh	05	1A
L2 export active Energy	4	Float	kWh	05	1C
L3 export active Energy	4	Float	kWh	05	1E
L1 total active Energy	4	Float	kWh	05	20
L2 total active Energy	4	Float	kWh	05	22
L3 total active Energy	4	Float	kWh	05	24
L1 import reactive energy	4	Float	kvarh	05	26
L2 import reactive energy	4	Float	kvarh	05	28
L3 import reactive energy	4	Float	kvarh	05	2A
L1 export reactive energy	4	Float	kvarh	05	2C
L2 export reactive energy	4	Float	kvarh	05	2E
L3 export reactive energy	4	Float	kvarh	05	30
L1 total reactive energy	4	Float	kvarh	05	32
L2 total reactive energy	4	Float	kvarh	05	34
L3 total reactive energy	4	Float	kvarh	05	36
Reactive energy in the I quadrant	4	Float	kvarh	06	28

Reactive energy in the II quadrant	4	Float	kvarh	06	2A
Reactive energy in the III quadrant	4	Float	kvarh	06	2C
Reactive energy in the IV quadrant	4	Float	kvarh	06	2E

Notes:

1. The power factor has its sign adjusted to indicate the direction of the current. Positive refers to forward current, negative refers to reverse current.
2. In 3P3W mode, L1 represents the line voltage THD of L1-2, L2 represents the line voltage harmonic content of L2-3, and L3 represents the Line voltage THD of L3-1. In 3P4W, 1P2W, 1P3W and other modes, L1, L2 and L3 respectively represent the corresponding phase voltage harmonic content
3. The power sum demand calculation is for import – export.

Measuring class parameter [Integer format data]

Holding Register Parameter [Read : Function code : 03H]				Register Address [Hex]		
Description	Length (bytes)	Data Format	Units	High Byte	Low Byte	Mode
Total import active energy.	8	INT64	Wh	1D	00	R
Total export active energy.	8	INT64	Wh	1D	04	R
Total active Energy (Import + Export).	8	INT64	Wh	1D	08	R
Net active Energy (Import - Export).	8	INT64	Wh	1D	0C	R
Total import reactive energy.	8	INT64	varh	1D	10	R
Total export reactive energy.	8	INT64	varh	1D	14	R
Total reactive energy (Import + Export).	8	INT64	varh	1D	18	R
Net reactive energy (Import - Export).	8	INT64	varh	1D	1C	R
Total apparent energy.	8	INT64	VAh	1D	20	R
L1 import active Energy	8	INT64	Wh	1D	24	R
L2 import active Energy	8	INT64	Wh	1D	28	R
L3 import active Energy	8	INT64	Wh	1D	2C	R
L1 export active Energy	8	INT64	Wh	1D	30	R
L2 export active Energy	8	INT64	Wh	1D	34	R
L3 export active Energy	8	INT64	Wh	1D	38	R
L1 total active Energy	8	INT64	Wh	1D	3C	R
L2 total active Energy	8	INT64	Wh	1D	40	R
L3 total active Energy	8	INT64	Wh	1D	44	R
L1 import reactive energy	8	INT64	varh	1D	48	R
L2 import reactive energy	8	INT64	varh	1D	4C	R
L3 import reactive energy	8	INT64	varh	1D	50	R
L1 export reactive energy	8	INT64	varh	1D	54	R
L2 export reactive energy	8	INT64	varh	1D	58	R
L3 export reactive energy	8	INT64	varh	1D	5C	R
L1 total reactive energy	8	INT64	varh	1D	60	R
L2 total reactive energy	8	INT64	varh	1D	64	R
L3 total reactive energy	8	INT64	varh	1D	68	R
Reactive energy in the I quadrant	8	INT64	varh	1F	4C	R
Reactive energy in the II quadrant	8	INT64	varh	1F	50	R
Reactive energy in the III quadrant	8	INT64	varh	1F	54	R
Reactive energy in the IV quadrant	8	INT64	varh	1F	58	R

Set class parameters

Holding Register Parameter [Read : Function code : 03H ; Write : Function code : 10H]				Register Address [Hex]		
Parameter	Description	Length (bytes)	Data Format	High Byte	Low Byte	Mode
Key Parameter Programming Authorization (KPPA)	Read: to get the status of the KPPA 0 = not authorized; 1 = authorized Write the correct password to get KPPA, enable to program key parameters.	2	UINT	50	00	R/W
System Type	Write system type: 1 = 1P2W; 2 = 3P3W 2CT; 3 = 3P4W,(default); 4 = 1P3W; 5 = 3P3W 3CT; (KPPA is asked)	2	UINT	50	01	R/W
Demand Period	Write demand period: 0~60 minutes, Default 60. Range: 0~60, 0 means function update every second.	2	UINT	50	02	R/W
Slide time	Default 1, min. Range: 1 ~ (Demand Period -1).	2	UINT	50	03	R/W
Demand calculation method	Default 0, 0 = sliding block 1 = fixed block	2	UINT	50	04	R/W
Modbus address	Write the modbus address Range: 1 to 247 for MODBUS Protocol, default 1.	2	UINT	50	05	R/W
Network Baud Rate	Write the network port baud rate for MODBUS Protocol, where: 0 = 1200 baud. 1 = 2400 baud. 2 = 4800 baud. 3 = 9600 baud, default. 4 = 19200 baud. 5 = 38400 baud.	2	UINT	50	06	R/W
Parity and stop bit	Write the network port parity/stop bits for MODBUS Protocol, where: 0 = One stop bit and no parity, default. 1 = One stop bit and even parity. 2 = One stop bit and odd parity. 3 = Two stop bits and no parity.	2	UINT	50	07	R/W
Password	Read: to get the password of the meter Write: to program the new password of the	2	UINT	50	08	R/W

	meter Default : 0000 (KPPA is asked)					
Pulse 1 Energy Type	Write MODBUS Protocol input parameter for pulse output 1: 1: import active energy 2: total active energy 4: export active energy 5: import reactive energy 6: total reactive energy, default 8: export reactive energy	2	UINT	50	09	R/W
Pulse 1 Rate	Write pulse rate index: n = 0 to 6 0 : 0.001 kwh/imp 1 : 0.01kwh/imp, default 2 : 0.1kwh/imp 3 : 1kwh/imp 4 : 10kwh/imp 5 : 100kwh/imp 6 : 1000kwh/imp	2	UINT	50	0A	R/W
Pulse 1 Width	Write pulse on period in milliseconds: 60, 100 or 200, default 200.	2	UINT	50	0B	R/W
Current Direction correction (when the external CT is connected reversely)	0 = L1 Frd, L2 Frd, L3 Frd 1 = L1 Rev, L2 Frd, L3 Frd 2 = L1 Frd, L2 Rev, L3 Frd 3 = L1 Rev, L2 Rev, L3 Frd 4 = L1 Frd, L2 Frd, L3 Rev 5 = L1 Rev, L2 Frd, L3 Rev 6 = L1 Frd, L2 Rev, L3 Rev 7 = L1 Rev, L2 Rev, L3 Rev Default 0 (KPPA is asked)	2	UINT	50	0F	R/W
PT1	PT1 Range 30 - 600000V, Default 230 (KPPA is asked)	4	ULONG	50	12	R/W
PT2	PT2 Range 30- 600V, Default 230 (KPPA is asked)	2	UINT	50	14	R/W
CT1	CT1 Range 1-9999A, Default 5, (KPPA is asked)	2	UINT	50	15	R/W
CT2	CT2 Range: 1A or 5A , Default 5A (KPPA is asked)	2	UINT	50	16	R/W
Automatic Scroll Display Time	Automatic scroll display time, unit : second Range 0~255, default : 0 Note: 0 mean stop automatic scroll display	2	UINT	50	18	R/W
Backlit time	Backlit time, unit : minute.	2	UINT	50	19	R/W

	Default 60. Range 0~120 or 255, 0 means backlit always on, 255 means backlit always off.					
Running time	Running time. Data definition: Day-hour-minute, day=2byte; hour=1byte; minute=1byte Explane: 04 23 21 57 mean : Running time=423 day + 21 hour + 57 min Write 0 to reset the running time. No response if write other value. Note: The meter starts timing when it's powered on	4	BCD	50	2D	R/W
Running time with load	Running time with load. Data definition: Day-hour-minute, day=2byte; hour=1byte; minute=1byte Explane: 04 23 21 57代表 Running time=423 day + 21 hour + 57 min Write 0 to reset the running time with load. No response if write other value. Note: The meter starts timing when power greater than 0 detected	4	BCD	50	2F	R/W
Running time (Data in units of minutes)	Running time. Unit : minute. Write 0 to reset the running time with load. No response if write other value. Note: The meter starts timing when it's powered on	4	ULONG	50	3C	R/W
Running time with load (Data in units of minutes)	Running time with load. Unit : minute. Write 0 to reset the running time with load. No response if write other value. Note: The meter starts timing when power greater than 0 detected	4	ULONG	50	3E	R/W
Reset historical data	0 = reset max. demand 1 = reset active energy 2 = reset reactive energy 3 = reset all energy 4 = reset max. and min. data (KPPA is asked)	2	UINT	56	00	W
Meter code	The code of the meter PAC5000 = 00 01 PAC5100 = 00 02 PAC5010 = 00 81	2	HEX	56	01	R

	PAC5110 = 00 82					
Serial number	The serial number of the meter	4	ULONG	56	02	R
Software version number	Software version number : XX.YY Data definition : The first byte represents XX, and the second byte represents YY	2	HEX	56	04	R
Hardware version number	Hardware version number : XX.YY Data definition : The first byte represents XX, and the second byte represents YY	2	HEX	56	05	R
version number of displayed	version number of displayed : XX.YY Data definition : The first byte represents XX, and the second byte represents YY	2	HEX	56	06	R
The automatic exit time of the Extends display	The automatic exit time of the Extends display, unit : second. Range : 0 - 255, default 60. Note: 0 means will not automatically quit, only manually operated exit.	2	UINT	56	0B	R/W
Rated voltage of the system	Rated voltage of the system, default:230V。 Represents the voltage that is connected to the voltage measuring interface. If a voltage transformer is used, it represents the voltage on the secondary side of the voltage transformer.	4	ULONG	56	0C	R/W
Rated current of the system	Rated current of the system, default:5A。 Represents the current that is connected to the current measuring interface. If a current transformer is used, it represents the current on the secondary side of the current transformer.	4	ULONG	56	0E	R/W

Example:

1, Read Input Registers

Example: Read "Phase 1 line to neutral volts"

Request: 01 04 00 00 00 02 71 CB

Where, 01 = Meter address

04 = Function code

00 = High byte of registers starting address

00 = Low byte of registers starting address

00 = High byte of registers number

02 = Low byte of registers number

71 = CRC Low

CB = CRC High

Response: 01 04 04 43 66 33 34 1B 38

Where, 01 = Meter address

04 = Function code

04 = Byte count

43 = Data, (High Word, High Byte)

66 = Data, (High Word, Low Byte)

33 = Data, (Low Word, High Byte)

34 = Data, (Low Word, Low Byte)

1B = CRC Low

38 = CRC High

Note: 43 66 33 34(Hex) = 230.2 (Floating point)

Example: Read "Phase 1 line to neutral volts" (ULONG Format)

Request: 01 03 00 00 00 02 C4 B0

Where, 01 = Meter address

03 = Function code

00 = High byte of registers starting address

00 = Low byte of registers starting address

00 = High byte of registers number

02 = Low byte of registers number

C4 = CRC Low

B0 = CRC High

Response: 01 03 04 00 00 61 AA 53 DC

Where, 01 = Meter address

04 = Function code

04 = Byte count

00 = Data, (High Word, High Byte)

00 = Data, (High Word, Low Byte)

61 = Data, (Low Word, High Byte)

AA = Data, (Low Word, Low Byte)

53 = CRC Low

DC = CRC High

Note: 00 00 61 AA(Hex) = 25002(ULONG) * 0.01V = 250.02V

2, Read Holding Registers

Example: Read "Slide time"

Request: 01 03 50 03 00 01 65 0A

Where, 01 = Meter address

03 = Function code

50 = High byte of registers starting address

03 = Low byte of registers starting address

00 = High byte of registers number

01 = Low byte of registers number

65 = CRC Low

0A = CRC High

Response: 01 03 02 00 05 78 47

Where, 01 = Meter address

03 = Function code

04 = Byte Count

00 = Data, (High Byte)

05 = Data, (Low Byte)

78 = CRC Low

47 = CRC High

Note: 00 05 (Hex) = 5 (UINT)

3, Write Holding Registers

Example: Write "Demand Period" = 30

Request: 01 10 50 02 00 01 02 00 1E 77 BF

Where, 01 = Meter address

10 = Function code

50 = High byte of registers starting address

02 = Low byte of registers starting address

00 = High byte of registers number

01 = Low byte of registers number

02 = Byte Count

00 = Data, (High Byte)

1E = Data, (Low Byte)

77 = CRC Low

BF = CRC High

Note: 00 1E (Hex) = 30(UINT)

Response: 01 10 50 02 00 01 B1 09

Where, 01 = Meter address

10 = Function code

50 = High byte of registers starting address

02 = Low byte of registers starting address

00 = High byte of registers number

01 = Low byte of registers number

B1 = CRC Low

09 = CRC High

4, Read Input Status

Example: Read DI1~4 status

Request: 01 02 00 00 00 04 79 C9

Where, 01 = Meter address

02 = Function code

00 = High byte of registers starting address

00 = Low byte of registers starting address

00 = High byte of read DI number

04 = Low byte of read DI number

79 = CRC Low

C9 = CRC High

Response: 01 02 01 03 E1 89

Where, 01 = Meter address

02 = Function code

01 = Byte Count

03 = Data, (DI status)

E1 = CRC Low

89 = CRC High

Note: Data=0x03 = 0000 0011 (Binary Value).

Bit 0 refers to the status of DI-1. The value is 1, which means DI-1 is on.

Bit 1 refers to the status of DI-2. The value is 1, which means DI-2 is on

Bit 2 refers to the status of DI-3. The value is 0, which means DI-3 is off

Bit 3 refers to the status of DI-4. The value is 0, which means DI-4 is off

5, Read Coil Status

Example: Read DO1~2 status

Request: 01 01 00 00 00 02 BD CB

Where, 01 = Meter address

01 = Function code

00 = High byte of registers starting address

00 = Low byte of registers starting address

00 = High byte of read DO number

02 = Low byte of read DO number

BD = CRC Low

CB = CRC High

Response: 01 01 01 02 D0 49

Where, 01 = Meter address

01 = Function code

01 = Byte Count

02 = Data, (DO status)

D0 = CRC Low

49 = CRC High

Note: Data=0x02 = 0000 0010 (Binary Value).

Bit 0 refers to DO-1 status. The value is 0, which means DO-1 is open

Bit 1 refers to DO-2 status. The value is 1, which means DO-1 is close

6, Force Single Coil

Example: Control DO1=ON

Request: 01 05 00 00 FF 00 8C 3A

Where, 01 = Meter address

05 = Function code

00 = High byte of registers starting address

00 = Low byte of registers starting address

FF = High byte of DO control data

00 = Low byte of DO control data

8C = CRC Low

3A = CRC High

Response: 01 05 00 00 FF 00 8C 3A

Where, 01 = Meter address

05 = Function code

00 = High byte of registers starting address

00 = Low byte of registers starting address

FF = High byte of DO control data

00 = Low byte of DO control data

8C = CRC Low

3A = CRC High