

ADT878 Commands Set

1. Commands Instruction

- (1) Each function command is divided into two parts: mnemonic and parameter, and the mnemonic and parameter are separated by spaces;

For example, the MEASure[:SCALar]:CH? <value> command, MEASure[:SCALar]:CH? is a mnemonic, and <value> indicates the parameter to be input, which needs to be separated by spaces. If users use this command to get the current measurement value, they can input MEASure:CH? PV

- (2) About mnemonic

- [] in mnemonic means optional, not input is ok

For example, MEASure[:SCALar]:AElectricity? There are two kinds of actual input: MEASure:SCALar:AElectricity? or MEASure:AElectricity?

- (num1:num2) in the mnemonic indicates the range of serial numbers, which need to be replaced with real numbers during actual input For example, SENSE:ELECtricity:TCCHannel(1:4)? If users need to get the configuration of the first TC channel, need to enter SENSE:ELECtricity:TCCHannel1?

- (3) About parameters

Each parameter in the commands set is identified by <> (do not enter angle brackets when converting to actual instructions), and separated by commas.

- (4) End character

The SCPI command must be accompanied by a command end character, which can be one of the end characters (excluding double quotes): "\r\n", "\r", "\n" or "\0".

1.1 IEEE488.2 Common commands

No.	Commands	Explanation	Parameters	Returned values
1	*CLS	This command eliminates the following registers: Register of standard event Register of searching event Register of operating event Register of status byte Error queue	-	-
2	*IDN?	To search instrument identifies, the returned data is divided into 2 parts a. product serial number b. firmware version number	-	product serial number and firmware version number
3	*RST	main program reset	-	-

1.2 Measurement and configuration commands

No.	Commands	Explanation	Parameters	Returned values
1	MEASure[:SCALar]:AElectricity?	Reading all electrical signals (Returned values 7 and 8, 14 and 15, 21 and 22 are separated by semicolons)	None	31 values, separated by comma Channel 1 Measured unit Id, Channel 1 measured value, Channel 1 electrical signal Id, Channel 1 electrical signal value, Channel 1 electrical signal original value, Channel 1 extra parameter 1, extra parameter 2 Channel 2 Measured unit Id, Channel 2 measured value, Channel 2 electrical signal

No.	Commands	Explanation	Parameters	Returned values
				<p>Id, Channel 2 electrical signal value, Channel 2 electrical signal original value, Channel 2 extra parameter 1, extra parameter 2</p> <p>Channel EXT connection is on-line or not, External sensor types (1=Smart, 2= user defined), Channel EXTmeasured unit Id, Channel EXT measured value, Channel EXT measured electrical value (unit is Ohm), Channel EXT measured electrical original value,clock, abnormal code</p> <p>24V voltage values</p> <p>AD temperature values (unit is degree Celsius)</p> <p>24V voltage values of CH1</p> <p>24V voltage values of CH2</p> <p>Positive 2.5V voltage values</p> <p>Negative 2.5V voltage values</p> <p>Positive 5V voltage values</p> <p>Negative 2.5V voltage values</p> <p>5.8V voltage values</p> <p>If the electrical measurement is TC, the extra parameter 1 is cold-junction value(unit is degree Celsius) and the extra parameter 2 is</p>

No.	Commands	Explanation	Parameters	Returned values
				<p>not used.</p> <p>If the electrical measurement is resistance /RTD, the extra parameter 1 is the Ra value measured by three-wire resistance, and the extra parameter 2 is the Rb value. And this two values are meaningless if use other wires type</p> <p>If the electrical measurement is switch, the extra parameter 1 is the temperature value of last time switching and the extra parameter 2 is the temperature value of the one before last switching. The unit is fixed to Celsius, and the temperature value comes from the temperature controlling standard.</p>
2	MEASure[:SCALar]:AEINfo?	To acquire the values of all electrical signals	none	<p>21 values, separated by comma</p> <p>Channel 1 electrical signal values, Channel 1 electrical signal original value, Channel 1 cold-junction electrical signal value, Channel 1 cold-junction electrical signal original value , Channel 2 electrical signal values, Channel 2 electrical signal original value,</p>

No.	Commands	Explanation	Parameters	Returned values
				Channel 2 cold-junction electrical signal value, Channel 2 cold-junction electrical signal original value , Channel EXT resistance value, Channel EXT resistance original value, the time stamp.abnormal code Total 24V, AD temperature The 24V of channel 1, The 24 V. 2.5V, -2.5V, 5V, -5V, 5.8V of channel 2
3	MEASure[:SCALar]:CH?<value>	To acquire the values of chanel 1and 2	one value: Specific value PV SV TV FV PV=current value(temperature sensor is the temperature value, electrical signal channel is the electrical measurement value, switch 1= switch on , 0=switch off) SV= electrical measurement value TV= electrical measurement original value FV=cold-junction value(only the TC chanel)	4 values, separated by comma. The unit Id of CH1, The value of CH1, The unit Id of CH2, The value of CH2
4	SENSe:ELECTricity:TCCHannel1 2 <"SensorName">,<CJCType>,<FixedValue>	To set the TCconfigurations for channel 1 2	3 values, separated by comma. <"SensorName">: Sensor Name <CJCType>: Auto or Fixed	None

No.	Commands	Explanation	Parameters	Returned values
			<FixedValue>: FixedValue	
5	SENSe:ELECtricity:TCCHannel1 2?	To acquire TC configurations of channel 1 2	none	7 parameters, separated by comma. Channel types, Unit: Id, Measurement Lower limit, Measurement Upper limit, SensorName, CJCType, Cold-junction FixedValue
6	SENSe:ELECtricity:RTDChannel1 2 <"SensorName">,<"SensorSN">,<2 3 4>	To set RTD configurations for channel 1 2	3 values, separated by comma <"SensorName">: SensorName <"SensorSN">: SensorSN. If it's the basic sensor, this can be zero, <2 3 4>: Wires type	none
7	SENSe:ELECtricity:RTDChannel:LRTD# (1,2) <"SensorName">,<r0>,<2 3 4>	To quickly set the RTD configurations for channel 1 2	3 values, separated by comma <"SensorName">: "basic sensor name", <r0>: New r0 value, <2 3 4>: Wires type	none
8	SENSe:ELECtricity:RTDChannel1 2?	To acquire the RTD configurations of channel 1 2	none	6 parameters, separated by comma; Channel types, Unit id, Measurement Lower limit, Measurement Upper limit,

No.	Commands	Explanation	Parameters	Returned values
				SensorName, Wires type
9	SENSe:ELECtricity:CHITem1 2 <Item>	To set the electrical measurement types for channel1 2	one value Types of electrical measurements <Item>:Current/Switch/RTD/TC/Voltage/ HART None	none
10	SENSe:ELECtricity:CHANsItem <Item>	To set electrical measurement channels AB at the same time	one value Electrical channels type <Item>: Current Switch RTD TC Volt None	none
11	SENSe:ELECtricity:CHITem?	To acquire the measurement type of electrical channel	none	2 parameters, separated by comma; Type of channel A, Type of channel B mA,mV(TC),Switch,R400,R4k,TC,RTD,None
12	MEASure[:SCALar]:ELECtricity1 2 3?	To acquire the current electrical measurement data from channel 1 2 3	none	7 values, separated by comma; The unit id of Measurement value, measurement value, electrical signal unit id. Measured electrical value,original electrical value,extra parameter1, extra parameter 2 If the electrical measurement project is TC, the extra parameter 1 is cold-junction value(unit is degree Celsius) and the extra parameter 2 is not used.

No.	Commands	Explanation	Parameters	Returned values
				<p>If the electrical measurement is resistance /RTD, the extra parameter 1 is the Ra value measured by three-wire resistance, and the extra parameter 2 is the Rb value. And this two values are meaningless if use other wires type</p> <p>If the electrical measurement is switch, the extra parameter 1 is the temperature value of last time switching and the extra parameter 2 is the temperature value of the one before last switching. The unit is fixed to Celsius, and the temperature value comes from the temperature controlling standard.</p>
13	SENSe:EIECTricity:CHINfo1 2?	To acquire the brief information of current channels1/2	none	<p>4 values, separated by comma.</p> <p>channel types,</p> <p>unit id,</p> <p>Measurement Lower limit,</p> <p>Measurement upper limit</p>
14	SENSe:EIECTricity:RANGe1 2? <Item>	To acquire the ranges of one of the test items for channels 1 2	<p>one value</p> <p>Channel types <item>:</p> <p>Current Switch RTD TC Volt HART</p>	<p>3 values, separated by comma.</p> <p>Measurement Lower limit,</p> <p>Measurement upper limit,</p> <p>Current unit id</p>
15	SENSe:EIECTricity:VOLTchannel1 2<VoltType>	To set voltage configuration for channels 1 2	<p>one value</p> <p>Channel configuration</p>	none

No.	Commands	Explanation	Parameters	Returned values
			<VoltType>:Volt12 Volt30	
16	SENSe:ELECtricity:VOLTchannel1 2?	To read voltage configuration of channel 1/2	none	one value Channel configuration: Volt12 Volt30
17	SENSe:ELECtricity:SWITChchannel1 2 <SwitchType>	To set the switch configuration for channel 1/2	one value: <SwitchType>: Dry Contact WetContact PNP NPN	none
18	SENSe:ELECtricity:SWITChchannel1 2?	To read the switch configuration of channel 1 2	none	One value, comma separated Switch types DryContact WetContact PNP NPN
19	SENSe:ELECtricity:ZERo1 2 <enable>	To set the zeroing or cancel zeroing for channel 1 2	one value <enable>: 1 0 ON OFF, ON=1= zeroing OFF=0= cancel zeroing	none
20	SENSe:ELECtricity:CJC:R0_?	To read the R0 value of cold-junction channel	none	4 values, separated by comma: Channel 1 cold-junction R0 manufacturer, Channel 2 cold-junction R0 manufacturer, Channel 1 cold-junction R0 user Channel 2 cold-junction R0 user
21	SENSe:ELECtricity:CJC:R0_1 2 Manufacturer User,<password>,<r0>	To set R0 value for cold-junction channel 1 2	three values Manufacturer,User <password>: The password of manufacturer and users.	none

No.	Commands	Explanation	Parameters	Returned values
			<r0>: R0 value	
22	SENSe:ELECtricity:CHATtached?	To read if the channel 1 and channel2 are linked or not	none	one value 1=linkd 0= not linked
23	SENSe:ELECtricity:CHATtached <attached>	To set to link the channel 1 and channel 2 or not	one value <attached>: 1/0 1= linked, 0= not linked	none

1.3Output commands

No.	Commands	Explanation	Parameters	Returned values
1	MEASure[:SCALar][:TEMPerature]?	To acquire the current conditions and data of control board	none	18 values, separated by comma.(the default values of temperature unit is Celsius): The first 8 valuesare in numbers: Current temperature(according to temperature control types, equal to the internal/external temperature), Internal temperature, External temperature, External difference temperature (used in temperature field calibration) , Original values of internal temperature(before temperature field calibration), Original resistance value(default unit is Ohm),

No.	Commands	Explanation	Parameters	Returned values
				<p>Internal difference temperature, voltage values of Internal difference (default unit is mV),</p> <p>The following 9 values are status values: the current control state, stable or not, reached target value or not, High level, (-1~1), Low level, (-1~1), Fan output, (0~1), Inlet air temperature(room temperature), electric current, voltage, The last one is the abnormal information</p>
2	MEASure[:SCALar]:CONTrol?	Acquire the current control data	none	<p>8 values, separated by comma:</p> <p>The current temperature unit id, the current temperature, Difference temperature(used in the temperature field calibration), current control state, Heating power (-1~1) Fan power (0~1) Stable or not"1 0" Reach target value or not "1 0"</p>

No.	Commands	Explanation	Parameters	Returned values
3	[SOURce:]TEMPerature:STATus:MEASure	Switch to measurement state	none	none
4	[SOURce:]TEMPerature:STATus:CONTROL<TargetTemperature>,<unitId>[,<slewType>,<SlewRate>]	Switch to controlling state	4 values <TargetTemperature>: TargetTemperature <unitId>: Temperature UnitId <slewType>: 0 or 1 . 0 means percentage (0~100) , 1 means the actual speed value(unit temperature per minute) <SlewRate>: The temperature controlling speed . The characters in [] can be omitted. If it's omitted, the current temperature controlling speed will be the default value.	none
5	[SOURce:]TEMPerature:STATus?	To read the temperature controlling status	none	one value Measure=0 (automated)Control=1 SemiAutoControl=2 Manual control=3 Maintenance mode=4
6	[SOURce:]TEMPerature:TARGET<target_Temperature>,<unitId>	To set target temperature(automated control)	2 values <target_Temperature>:target value <unitId>: temperature unitId	none
7	[SOURce:]TEMPerature:TARGET?	To read target temperature	none	2 values, separated by comma

No.	Commands	Explanation	Parameters	Returned values
				Current target temperature, Current temperature unit id
8	[SOURce:]TEMPerature:OPTions?	To read controlling configuration	none	11 values, separated by comma: Current temperature unit id, fluctuation rate, Stable residence time(1-600)minutes, Allowable deviation of target value, Temperature controlling slew rate in percentage. Temperature controlling slew rate in value, Whether to enable the set point limit or not, 1 or 0 Lower limit of set point, Upper limit of set point, Temperature control configuration, Windproof mode (Not available yet) About temperature control configuration: Internal temperature control =0 External temperature control=1 External temperature control+external connection difference=2(temperature filed calibration)
9	[SOURce:]TEMPerature:OPTions<unit Id>,<stability>,<DwellMinutes>,<Targe	To settemperature controlling configuration	10/11values <unitId>: Temperature unitId,	无none

No.	Commands	Explanation	Parameters	Returned values
	<Tolerance>,<slewType>,<SlewRate>, <IsEnableLimits>,<LimitsLower>,<LimitsUpper>,<ControlConfig>,<AirValueState>		<stability>: Fluctuation ratio, <DwellMinutes>: dwell time in stable, <TargetTolerance>: allowable tolerance of target value <slewType>: 0 or 1 . 0 means percentage (0~100) , 1 means the actual speed value(unit temperature per minute) <SlewRate>: temperature controlling slew rate, <IsEnableLimits>: Whether to enable the set points limit or not <LimitsLower>: set points Lower limit <LimitsUpper>: set points Upper limit <ControlConfig>: Temperature controlling types(0=internal temperature control,1=external temperature control,2= external temperature control +external connection CH1 temperature difference), Air Value state(0= close,1=open up, only for high temperature furnace) Windproof mode (High temperature furnace only, Not available yet)	
10	[SOURce:]TEMPerature:STAbility	To set the fluctuation rate of temperature	2 values	none

No.	Commands	Explanation	Parameters	Returned values
	<sta>,<unitId>	control	fluction rate of temperature control, temperature unit Id	
11	[SOURce:]TEMPerature:STABility?	To acquire fluction rate of temperature control	none	2 values, separated by comma fluction rate of temperature control, temperature unit id
12	[SOURce:]TEMPerature:STABility:LIMit?	To read fluction rate range of temperature control	none	Three values, separated by comma: fluctuation rate lower limit, fluctuation rate upper limit, Temperature unit id, unit is Celsius
13	[SOURce:]TEMPerature:TARToleranc e?	To read allowable deviation of target value	none	2 values, comma separated allowable deviation of target value, Temperature unit id
14	[SOURce:]TEMPerature:TARToleranc e <ttolerance>,< unitId >	To set allowable deviation of target value	2 values allowable deviation of target value, Temperature unit id	none
15	[SOURce:]TEMPerature:TARToleranc e:LIMit?	To read allowable deviation range of target value	none	3values, comma separated Lower limits of allowable deviation of target value, Upper limits of allowable deviation of target value Temperature unit id, fixed in Celsius
16	[SOURce:]TEMPerature:SLEW <slew>,< unitId >	To set slew rate of temperature control	2 values <slew>: slew rate of Temperatute control	none

No.	Commands	Explanation	Parameters	Returned values
			(temperature per minute), < unitId >: temperature unit id	
17	[SOURce:]TEMPerature:SLEW?	To read slew rate of temperature control	none	2 values, comma separated slew rate of Temperature control (temperature per minute), Temperature unit id, fixed in Celsius
18	[SOURce:]TEMPerature:PERSlew<slew>	To setslew rate of temperature control in percentage	one value <slew>: temperature control slew rate(percentage 0~100)	none
19	[SOURce:]TEMPerature:PERSlew?	To read slew rate of temperature control in percentage	none	one value Temperature control slew rate(percentage 0~100)
20	[SOURce:]TEMPerature:SLEW:LIMit?	To read the upper and lower limits of temperature control slew rate (value, °C /minute)	none	3values, comma separated Lower limits of slew rate of temperature control, Upper limits of slew rate of temperature control Temperature unit id, fixed inCelsius
21	[SOURce:]TEMPerature:SLEW:PERLi mit?	To read the upper and lower limits of temperature control slew rate in percentage	none	2 values , comma separated, Lower limit of temperature control slewrte in percentage, fixed in 0, Upper limit of temperature control slew rate

No.	Commands	Explanation	Parameters	Returned values
				in percentage, fixed in 100
22	[SOURce:]TEMPerature:SETPoints:LI Mit?	To read the settable lower and upper limits of temperature control	none	3 values, comma separated set points lower limits of temperature control, set points upper limits of temperature control, Id current unit id
23	[SOURce:]TEMPerature:CLIMit?	To read the lower and upper limits of temperature controlling capability	none	3 values, comma separated: Lower limits of temperature controlling capability, Upper limits of temperature controlling capability, Current unit id
24	[SOURce:]TEMPerature:SLIMit?	To read Lower and upper limits of temperature control setup	none	4 values, comma separated Whether to enable the lower and upper limits control or not, Lower limits of temperature control, Upper limits of temperature control, Current unit id
25	[SOURce:]TEMPerature:SLIMit <IsEnable>,<lower>,<upper>	To set the setup of temperature controlling lower and upper limits	3values, unit is fixed inCelsius <IsEnable>: Whether to enable thelow and upper limits or not: 0=disable, 1=enable <lower>: Lower limit	none

No.	Commands	Explanation	Parameters	Returned values
			<upper>: Upper limit	
26	[SOURce:]TEMPerature:CONFig?	To acquire operation status of temperature controlling	none	one value 0= internal temperature control 1= external control 2= double external temperature control, used in temperature field calibration
27	[SOURce:]TEMPerature:CONFig <config>	To set operation status of temperature control	one value <config>: 0,1 or 2 0= internal temperature control 1= external temperature control 2= double external temperature control, used in temperature field calibration	none
28	[SOURce:]TEMPerature: WINDenabled?	To acquire operation status of wind resistance mode (High temperature furnace only.)	none	one value 1=True=on 0=False=off
29	[SOURce:]TEMPerature: WINDenabled <enable>	To set the status for wind resistance mode (High temperature furnace only.)	<enable>: 0 or 1 0=OFF 1=ON	none
30	[SOURce:]TEMPerature:CONParams?	To read controlling parameters	none	6 values, comma separated: damping ratio, time constant, KKp, KTi, KTd,

No.	Commands	Explanation	Parameters	Returned values
				KTf
31	[SOURce:]TEMPerature:CONParams <damping>,<timeConst>,<kkp>,<kti>,<ktd>,<ktf>,	To set control parameters	6 values, comma separated damping ratio, timeConstant, KKp, KTi, KTd, KTf	none
32	OUTPut:24V[:STATe] <enable>	To set 24V state	one value: <enable>: 0 or 1 0=OFF 1=ON	none
33	OUTPut:24V[:STATe]?	To read 24V state	none	one value: 0 or 1 0= OFF 1= ON
34	[SOURce:]TEMPerature:OPTions:EXT Ra?	To read extra control parameters	none	3values, comma separated Steady-state damper opens :0-close 1-open(Open by default, High temperature furnace only) Replenishing wind when Control:0-close, 1-open(Open by default, High temperature furnace only) Fast mode :0-close ,1-open(closeby default)

No.	Commands	Explanation	Parameters	Returned values
35	[SOURce:]TEMPerature:OPTions:EXTRa <windEnable>,<airEnable>,<fastEnable>	To set extra control parameters	3values, comma separated <windEnable>: Steady-state damper opens :0-close 1-open(High temperature furnace only) <airEnable>: Replenishing wind when Control:0-close, 1-open (High temperature furnace only) <fastEnable>: Fast mode :0-close , 1-open	none

1.4 Calibration commands

No.	Commands	Explanation	Parameters	Returned values
1	CALibration:EIECTricity:DATA Manufacturer User,<password>,<item>,<unitID>,<count>,<"points">,<"values">,<year>,<month>,<day>	Write in calibration data for electrical functions	10values Manufacturer: Manufacturer calibration; User :User calibration <password>: The calibration password , corresponding to the Manufacturer or User <item>: Measurement items: 0-A channel mA measurements; 1-B channel mA measurements; 2-A channel TC mV measurements; 3-B channel TC mV measurement; 4-A channel TC cold-junction measurement; 5-Bchannel TC cold-junction measurement;	none

No.	Commands	Explanation	Parameters	Returned values
			6-Achannel400Ω two- wire resistance measurement; 7-Bchannel 400Ω two- wire resistance measurement; 8-A channel 400Ω three- wire resistance measurement; 9-B channel 400Ω three- wire resistance measurement; 10-A channel 400Ω four- wire resistance measurement; 11-B channel 400Ω four- wire resistance measurement; 12-A channel 4kΩ two- wire resistance measurement; 13-Bchannel 4kΩ two- wire resistance measurement; 14-A channel 4kΩ three- wire resistance measurement; 15-B channel 4kΩ three- wire resistance measurement; 16-A channel 4kΩ four- wire resistance measurement; 17-B channel 4kΩ four- wire resistance measurement;	

No.	Commands	Explanation	Parameters	Returned values
			18-standard resistance measurement channel; 19-A channel dry contact switch; 20-Bchannel dry contact switch; 21-Achannel HART; 22-Bchannel HART; 23-Achannel -12V~12Vmeasurement; 24-B channel -12V~12V measurement; 25-Achannel -30V~30V measurement; 26-Bchannel -30V~30V measurement; 27-Achannel NPN switch; 28-Bchannel NPNswitch; 29-Achannel PNP switch; 30-Bchannel PNP switch; 31-Achannel wet connection switch; 32-Bchannel wet connection switch; <unitID>: unit id, <count>:points number, <"points">: calibrated points (character string with quotation mark, comma separated), <"values">: standard value (character string with quotation mark, comma separated),	

No.	Commands	Explanation	Parameters	Returned values
			<year>: year, <month>: month <day>: day	
2	CALibration:ELECTricity:DATA?Manuf actor User,<password>,<ItemID>	To acquire electrical calibration data	3 values Manufactor: Manufactor calibration User: User calibration <password>: calibration password, corresponding to Manufactor or User <ItemID>: Item ID, ditto	N*2+5 values, comma separated: Unit id, The number of calibrated points, Standard value list, N, Calibration points list, N, Year, Month, Day,
3	CALibration:ELECTricity:PRESet <Item>	Restore factory valuefor electrical calibration	one value <Item>: electrical items, ditto	none
4	CALibration:CONTRoller:DATA:INDicat ion? Manufactor User,<password>	To acquire revised data of temperature indicating values	2 values, comma separated: Manufactor: Manufactor calibration User: User calibration <password>: calibration password, corresponding to Manufactor or User	N*2+5values, comma separated: Unit id, The number of calibrated points, List of indicating values after N correction, List of resistance values of N internal sensors, Year, Month, Day
5	CALibration:CONTRoller:DATA:INDicat ion:INCRement	To set the revised data's increment of temperature indicating values	9 values, comma separated: User: User calibration,	none

No.	Commands	Explanation	Parameters	Returned values
	User,<password>.<unitid>,<calCount> ,<"ExtValue">,<"IntValue">,<year>,<m onth>,<day>		<password>:user password <unitid>:unit Id, <calCount>:the number of calibrated points <"ExtValue">: List of revised indicating values, comma separated <"IntValue">:List of indicating values before correction, comma separated, Year, Month, Day	
6	CALibration:CONTRoller:DATA:INDicat ion:ABSolute Manufactor User,<password>.<unitid>, <calCount>,<"ExtValue">,<"IntValue"> ,<year>,<month>,<day>	To set absolute type of temperature indicating values's revised data	9 values, comma separated: User: User calibration, <password>:user password <unitid>:unit Id, <calCount>:the number of calibrated points <"ExtValue">: List of revised indicating values, comma separated <"IntValue">:List of indicating values before correction, comma separated, Year,	none

No.	Commands	Explanation	Parameters	Returned values
			Month, Day	
7	CALibration:CONTRoller:DATA:FACTo rsecondorder:INDication:ABSolute <password>.<unitid>,<calCount>,<"Ext tValue">,<"IntResistance">,<year>,<m onth>,<day>	Write in revised data of maunfactor indicating values based on the correction of indicating values on manufactor dry well self -calibration	8 values, comma separated: <password>: Password , corresponding to manufactor ot users <unitid>: unitid <calCount>: The number of calibrated points <"ExtValue">: List of revised indicating values, comma separated <"IntValue">:List of indicating values before correction, comma separated, Year, Month, Day	none
8	CALibration:CONTRoller:DATA:FIELD? Manufactor User,<password>	To acquire calibration data of temperature field	2 values, comma separated Manufactor : Manufactor calibration User : User calibration <password>: Password , corresponding to manufactor ot users	N*4+7 values, comma separated: unit id, optimize height, environment temperature, The number of calibrated points N, List of N temperature points, List of N internal control temperature difference,

No.	Commands	Explanation	Parameters	Returned values
				List of N temperature difference factor Kh, List of N temperature difference factor Kl. Year, Month, Day
9	CALibration:CONTroller:DATA:FIELD:INCRement User,<password>,<unitid>,<environmentTemp>,<calCount>,<"setpoints">,<"difftemps">,<year>,<month>,<day>	Write in calibration data and increment of temperature	10 values, comma separated User: User calibration <password>: User's password , <unitid>:unit Id <environmentTemp>: environmentTemperature, <calCount>: The number of calibration points, <"setpoints">:List of setting points, comma separated <"difftemps">: List of temperatureTmH-Tml, comma separated. Year, Month, Day,	none
10	CALibration:CONTroller:DATA:FIELD:ABSolute Manufactor User,<password>,<unitid>,<	Write in calibration data of temperature, absolute type	13 values, comma separated Manufactor : Manufactor calibration User: User calibration	none

No.	Commands	Explanation	Parameters	Returned values
	<optHeight>,<environmentTemp>,<calCount>,<"setpoints">,<"dts">,<"khs">,<"kls">,<year>,<month>,<day>		<p><password>: Password , corresponding to manufactor or user</p> <p><unitid>: unit Id,</p> <p><optHeight>: optimize height, temporarily fixedas62.5mm</p> <p><environmentTemp>: environmentTemperature,</p> <p><calCount>: the number of calibrated points</p> <p><"setpoints">: Lsit of setting points, comma separated,</p> <p><"dts">: List of internal control temperature difference, comma separated,</p> <p><"khs">: List of temperature difference factor Kh comma separated,</p> <p><"kls">: List of temperature difference factor Kl,</p> <p>Year,</p> <p>Month,</p> <p>Day,</p>	
11	CALibration:CONTRoller:FRESet 1 2 3	Reset factory settings of control panel's calibration data	<p>1 parameters, denotes restoration project,</p> <p>2=indicating value correction</p> <p>3=vertical temperature field</p>	none

No.	Commands	Explanation	Parameters	Returned values
			1=AC voltage calibration	
12	CALibration:CONTRoller:PERiod:COU Nt?	To acquire the total number of temperature calibration data	none	One value The total number of data
13	CALibration:CONTRoller:PERiod:HEA Der?	To acquire data head information of temperature calibration	none	N terms of calibration data, semicolon separated. Every item of cailibration has 6 values, comma separated. Id, Name, calibrated date, operator, remark, Data source: 0=axial temperature field, 1 =indicating values calibration, 2=dry well self-calibration
14	CALibration:CONTRoller:PERiod:INFO? <id>	To acquire detailed data of temperature calibration	one value Id	Two sets of calibration data, Semicolon separated, Revised data of temperature indicating values, N*2+5 parameters, comma separated, unit id, the number of calibrated points, N calibrated points,

No.	Commands	Explanation	Parameters	Returned values
				N actual values, Year, Month, Day, Calibration data of Axial temperature field. , N*4+7 values, comma separated. unit id, optimize height (mm) , environment temperature , the number of calibrated points, M calibrated points, M control temperature difference, M kh, M Kl, Year, Month, Day,

1.5System Commands

No.	Commands	Explanation	Parameters	Returned values
1	SYSTem:VERSion? [<module>]	According to parameters, to search version NO. of different modules, to overlook this parameter,returning back to SCIP version NO followed by system	"APPLication": Main program firmware version "CONTroller:FIRMware": ": Controller firmware version "CONTroller:HARDware": Controller	version No.

No.	Commands	Explanation	Parameters	Returned values
			hardware version number; "EIECTricity:FIRMware": The version number of the electric test board "EIECTricity:HARDware": Electric test board hardware version	
2	SYSTem:ERRor[:NEXT]?	Query the next error item in the error queue, and delete the item from the queue. The error queue can store 50 error messages. If there are more than 50 error messages, the last one is replaced by -350, "Queue overflow". System power off or *CLS instruction can clear the error queue	none	wrong information
3	SYSTem:DATE<year>,<month>,<day>	To set the date of system	year: month: day :	none
4	SYSTem:DATE?	To search the date of system	-	Year ,month day
5	SYSTem:TIME<hour>,<minute>,<second>	To set the time of system	hour: minute: second:	none
6	SYSTem:TIME?	To acquire system time	none	3 values , comma separated Hour, Minute, Second,
7	SYSTem:TIME:FORMat?	To acquire system time format	none	2 values , comma separated

No.	Commands	Explanation	Parameters	Returned values
				24-hour clock or not, Current time zone,
8	SYSTem:TIME:FORMat <Boolean>,<Numeric>	To set system time format	2 values , comma separated <Boolean>: 24-hour clock or not, <Numeric>: Current time zone value	none
9	SYSTem:KLOCK <Boolean> ON OFF	To set local lock-out state of system, only to lock out the functional operation of pannel	1 ON: system is locked –out 0 OFF: syatem is unlock	none
10	SYSTem:KLOCK?	To search local lock-out state of system,	none	1: lock-out 0: unlock
11	SYSTem:BEEPer:ALARm <Boolean> ON OFF	To set warning tone state	ON or OFF	none
12	SYSTem:BEEPer:TOUCH <Boolean> ON OFF	To set keypad tone state	ON or OFF	none
13	SYSTem:COMMunicate:SOCKet:WLAN:STATe] <Boolean> ON OFF	To set WIFI state Attention: if the wifi is opened, the serial port of controller will be closed. During the time of opening wifi and connecting wifi, the communication with controller is only done through ethernet	1 , ON:Open WIFI; 0 , OFF:Close WIFI	none
14	SYSTem:COMMunicate:SOCKet:WLAN:STATe]?	To search wifi state	none	1: WIFI open 0: WIFI close
15	SYSTem:COMMunicate:SOCKet:WLAN:ADDRess<IP address>	To set the IP address of WIFI Befeor designing the DHCP、 IP subset mask and gatway of WIFI, please confirm	IP address: character string without quotation, format is <NR1>.<NR1>.<NR1>.<NR1>	none

No.	Commands	Explanation	Parameters	Returned values
		that the wifi module has been opened and doesn't connect with any hot spots.		
16	SYSTem:COMMunicate:SOCKet:WLAN:ADDRess?	To search the IP address of WIFI	none	IP address
17	SYSTem:COMMunicate:SOCKet:WLAN:MASK <IP address>	To set subnet mask of wifi Before designing the DHCP, IP subnet mask and gateway of WIFI, please confirm that the wifi module has been opened and doesn't connect with any hot spots.	IP address: character string without quotation, format is <NR1>.<NR1>.<NR1>.<NR1>	none
18	SYSTem:COMMunicate:SOCKet:WLAN:MASK?	To search subnet mask of WIFI	none	IP address
19	SYSTem:COMMunicate:SOCKet:WLAN:GATeway <IP address>	To design gateway of wifi Before designing the DHCP, IP subnet mask and gateway of WIFI, please confirm that the wifi module has been opened and doesn't connect with any hot spots.	IP address: character string without quotation, format is <NR1>.<NR1>.<NR1>.<NR1>	none
20	SYSTem:COMMunicate:SOCKet:WLAN:GATeway?	To search gateway of wifi	none	IP address
21	SYSTem:COMMunicate:SOCKet:WLAN:MAC?	To search physical address of wifi	none	Physical address
22	SYSTem:COMMunicate:SOCKet:WLAN:DHCP[:STATe] <Boolean> OFF ON	To design WIFIDHCP state, Before designing the DHCP, IP subnet mask and gateway of WIFI, please confirm that the wifi module has been opened and	1=ON: open DHCP; 0=OFF: close DHCP	none

No.	Commands	Explanation	Parameters	Returned values
		doesn't connect with any hot spots.		
23	SYSTem:COMMunicate:SOCKet:WLAN:DHCP[:STATe]?	To search WIFIDHCP state	none	1: DHCP open; 0: DHCP closed
24	SYSTem:COMMunicate:SOCKet:WLAN:SSID? [ALL]	If the parameter is all, the search will be done and all the searched SSID names and the ways of encryption will be returned. If the parameter is overlooked, the result will return back to the current connected SSID name and the ways of encryption, if there is no connections or no searched hot spots, please return	none	{["ssid: way of encryption"]}
25	SYSTem:COMMunicate:SOCKet:WLAN:CONNect <"ssid">,<"encryptionMode">[,<"password">]	To make the wifi connect with the appointed hot spot	1) "ssid" hot spot name, the character string with quotation 2) "encryption Mode WEP_OFF, WEP_ON, WEP_AUTO, WPA_PSK, WPA_TKIP, WPA2_PSK, WPA2_AES, CCKM_TKIP, WEP_CKIP, WEP_AUTO_CKIP, CCKM_AES, WPA_PSK_AES, WPA_AES, WPA2_PSK_TKIP, WPA2_TKIP, WAPI_PSK, WAPI_CERT; 3) password"the character string with quotation	none
26	SYSTem:COMMunicate:SOCKet:WLAN:	To serch the connection state of wifi	none	Successfully,

No.	Commands	Explanation	Parameters	Returned values
	CONNect?			Initialization, SSIDNotFound SSIDNotConfigured, JoinFaile ScanningConfiguredSSID WaitingIPConfiguration ModuleJoinedListeningSockets
27	SYSTem:COMMunicate:SOCKet:WLAN:DISConnect	To Break off the wifi connection	none	none
28	SYSTem:COMMunicate:SOCKet:WLAN:DBM?	To search signal strength and dBm value of WIFI	none	DBM Value unit is dBm
29	SYSTem:COMMunicate:SOCKet:ETHern et:DHCP?	To acquire DHCP state of ethernet	none	1=DHCP, 0=static
30	SYSTem:COMMunicate:SOCKet:ETHern et:DHCP <enable>	To design DHCP state of ethernet	<enable>: 1=ON, 0=OFF	none
31	SYSTem:COMMunicate:SOCKet:ETHern et:ADDRess?	To acquire IP address of ethernet	none	IP address
32	SYSTem:COMMunicate:SOCKet:ETHern et:ADDRess <ip>	To set the IP address of Ethernet under the static state	<ip>: IP address	none
33	SYSTem:COMMunicate:SOCKet:ETHern et:MASK?	To acquire subnet mask of Ethernet	none	subnet mask of Ethernet
34	SYSTem:COMMunicate:SOCKet:ETHern et:MASK <mask>	To design subnet mask of Ethernet under the static state	<mask>: subnet mask of Ethernet	none
35	SYSTem:COMMunicate:SOCKet:ETHern et:GATeway?	To acquire gateway of Ethernet	none	gateway

No.	Commands	Explanation	Parameters	Returned values
36	SYSTem:COMMunicate:SOCKEt:ETHer et:GATeway <gateway>	To set gateway of Ethernet under the static state	gateway	none
37	SYSTem:COMMunicate:SOCKEt:ETHer et:PHYSicaladdress?	To read physical Address of Ethernet	none	physical Address
38	SYSTem:PASSword:EDIT <oldPassword>,<newPassword>,<newP asswordRepeat>	To editor the user password	3 values, comma separated, password is only consist of numbers. Old Password/super administrative password, New Password, New and old Passwords Repeat	none
39	SYSTem:PASSword:ENABLE:TASK?	To search that the protection of tasks password is opened or not	none	one value Open or not 1=open, 0=close
40	SYSTem:PASSword:ENABLE:TASK <enable>	To design the protection of tasks password	one value: enable,0= close 1= open	none
41	SYSTem:PASSword:ENABLE:SENSor?	To search that the protection of sensor bank password is opened or not	none	one value Open or not 1=open 0=close
42	SYSTem:PASSword:ENABLE:SENSor <enable>	To design the protection of sensor bank password	one value enable: 0=close, 1= open	none
43	SYSTem:VOLume?	To read system volume	none	one value The percentage of system volume (0~100)
44	SYSTem:VOLume <per>	To design system volume	one volume per: The percentage of system volume (0~100)	none
45	SYSTem:COMMunicate:BLUetooth[:STA	To read Bluetooth status	none	one value

No.	Commands	Explanation	Parameters	Returned values
	Te]?			Open status :1-open, 0-close
46	SYSTem:COMMunicate:BLUetooth[:STA Te] <Boolean> ON OFF	To design Bluetooth status	one value Open status :1-open 0-close	none
47	SYSTem:COMMunicate:BLUetooth:NAM e?	To read Bluetooth name	none	string:bluetooth name
48	SYSTem:COMMunicate:BLUetooth:NAM e <UnquoStr>	To design Bluetooth name	string:bluetooth name	none
49	SYSTem:COMMunicate:BLUetooth:SEA Rch <Boolean>	Search for Bluetooth devices	One value 0- search again 1- to read search status	2 parts: 0- searching 1- search success ,then devices name and MAC address Example: 0 1: name:mac address, name: mac address
50	SYSTem:SCReensaver <timeout>	To design screensaver time	One value , Screensaver time , 1 5 10 30 60 -1 minute,-1 is close	none
51	SYSTem:SCReensaver?	To read screensaver time	none	One value , Screensaver time , 1 5 10 30 60 -1 minute,-1 is close
52	SYSTem:BEEPer:ORANge <Boolean> ON OFF	To design overrange beeper enable	1/ON 0/OFF	none
53	SYSTem:ERSource:Auto <Boolean> ON OFF	To design Whether the temperature control standard automatically selects Ext standard	1/ON 0/OFF	none

No.	Commands	Explanation	Parameters	Returned values
		temperature to control		
54	SYSTem:STABility:TIME <Numeric>	To design stability time(1-120 s)	stability time	none
55	SYSTem:STABility:TOLerance <Numeric>	To design stability tolerance(>0.005°C)	stability tolerance	none

1.6 Display Commands

No.	Commands	Explanation	Parameters	Returned values
1.	DISPlay:BRIGhtness<type>,<level>	To design brightness	2 values, comma separated Type: Percentage=percentage value=concrete value Level: brightness	
2.	DISPlay:BRIGhtness?<type>	To search brightness	Type: Percentage, Value	brightness
3.	DISPlay:DECimals:CONTRol?	To acquire indicating decimal digits of control temperature	none	one value: decimal digits
4.	DISPlay:DECimals:CONTRol <decimal>	To design indicating decimal digits of control temperature	one value decimal: decimal digits(0,3)	none
5.	DISPlay:DECimals:REF?	To acquire indicating decimal digits of external temperature	none	one value: decimal digits
6.	DISPlay:DECimals:REF <decimal>	To design indicating decimal digits of external temperature	one value decimal: decimal digits (0,3)	none
7.	DISPlay:DECimals:CHTemp?	To read indicating decimal digits of temperature measurement	none	one value: decimal digits
8.	DISPlay:DECimals:CHTemp <decimal>	To design indicating decimal digits of	one value:	none

No.	Commands	Explanation	Parameters	Returned values
		temperature measurement	decimal (0,3)	
9.	DISPlay:DECimals:ELECtric?	To read indicating decimal digits of measuring current,voltage,resistance	none	one value : Decimal digits
10.	DISPlay:DECimals:ELECtric <decimal>	To design indicating decimal digits of measuring current,voltage,resistance	one value : <decimal>: ecimal digits(0,4)	none
11.	DISPlay:HOME?	To search on the main interface or not	none	0 not on the main interface, 1 on the main interface
12.	DISPlay:HOME	To return back to the main interface from current interface (temporarily only support the return of system designing interface)	none	none
13.	DISPlay:THEMe?	To acquire current theme mode	none	one value: topic name
14.	DISPlay:THEMe:ALLNames?	To acquite names of all current supporting themes	none	Numerical Values, comma separated: Theme name 1, theme name 2
15.	DISPlay:THEMe <themeName>[,<isReboot>]	To design system theme(after reset, it will work)	2 values. Comma separated: Supporting Theme Name, Reset or not, can be omitted, if omitted, the default value is reset.	none
16.	DISPlay:LANGuage?	To search current system language	none	one value: Standard character string of current language, For example: zh-CN
17.	DISPlay:LANGuage	To design current system language	LanguageName:	none

No.	Commands	Explanation	Parameters	Returned values
	languageName[,isReboot]		Character string without quotation, for example: zh-CN isReboot: Optional parameters, Boolean value, after finish, to restart instruments or not , default value is to restart instruments.	

1.7 Unit Commands

No.	Commands	Explanation	Parameters	Returned values
1	UNIT:TEMPerature<unit_ID> <"unit_name">	To design temperature unit of current system	one value: Unit: unit name or unit ID unit_name is the character string with quotation unit_ID is figure	none
2	UNIT:TEMPerature?	To acquire temperature unit of current system	none	2values, comma separated: Name of temperature unit, temperature unit id

1.8Tasks Commands

No.	Commands	Explanation	Parameters	Returned values
1	TASK:INSTrument:COUNt?	To search the number of instrumentss		The number of instrumentss
2	TASK:INSTrument:RESult:COUNt? <Guid>	To search the result number under instrumentss	Guid: Instrumentss's Guid	the result number under instrumentss
3	TASK:INSTrument:CATalog? < index >,< count >	To read information of instruments's list	Index:initial position Count: quantity (0-10)	ClassName, character data of Base64, CRC16 check code

No.	Commands	Explanation	Parameters	Returned values
4	TASK:INSTrument:RESult:CATalog? <Guid>,< index >,< count >	To read result information list under instruments	Guid:instruments ID Index:initial position Count: quantity (0-10)	ClassName, character data of Base64, CRC16 check code
5	TASK:INSTrument:INFo? <Guid>	To read detailed information of instruments	Guid:instruments ID	ClassName, character data of Base64, CRC16 check code
6	TASK:INSTrument:RESult:CLEAr <Guid>	To delete all results under instrumentss	Guid:instruments ID	
7	TASK:INSTrument:SEARch:COUNt? <"condition">	According to searching conditions, to find the number of instruments	Search conditions" condition": JSon character string , JSon character string can not have line break	The number of Instrumentss
8	TASK:INSTrument:SEARch:CATalog? <"condition">,< index >,< count >	According to searching conditions, to read information of instruments list	Search conditions" condition": JSon character string , JSon character string can not have line break Index:initial position Count: quantity (0-10)	ClassName, character data of Base64, CRC16 check code
9	TASK:TEST:COUNt?	To search the number of tasks	none	the number of tasks
10	TASK:TEST:RESult:COUNt? <Guid>	To search result umnber under instruments	Guid:tasks Guid	result umnber under tasks
11	TASK:TEST:CATalog? < index >,< count >	To read information of tasks list	Index:initial position Count: quantity (0-10)	ClassName, character data of Base64, CRC16 check code
12	TASK:TEST:RESult:CATalog? < Guid >,< index >,< count >	To read information of result list under instruments	Guid:tasks ID Index:initial position Count: quantity (0-10)	ClassName, character data of Base64, CRC16 check code
13	TASK:TEST:INFo? <Guid>	To read the detailed information of tasks	Guid:tasks ID	ClassName, character data of Base64, CRC16 check code

No.	Commands	Explanation	Parameters	Returned values
14	TASK:TEST:RESult:CLEAr <Guid>	To delete all results under tasks	Guid:tasks ID	None
15	TASK:TEST:SEARch:COUNt? <"condition">	According to conditions, to find the number of tasks	Search conditions" condition": JSon character string , JSon character string can not have line break	The number of tasks matching conditions
16	TASK:TEST:SEARch:CATalog? <"condition">,< index >,< count >	According to conditions, to read the information of tasks list	Search conditions" condition": JSon character string , JSon character string can not have line break Index:initial position Count: quantity (0-10)	ClassName, character data of Base64, CRC16 check code
17	TASK:RESult:COUNt?	To search result number		The result number
18	TASK:RESult:CATalog? <index>,<count>	To read information of result list	Index:initial position Count: quantity (0-10)	ClassName, character data of Base64, CRC16 check code
19	TASK:RESult:INFo? <Guid>	To read detailed information of result I	Guid: result ID	ClassName, character data of Base64, CRC16 check code
20	TASK:RESult:SEARch:COUNt? <"condition">	According to conditions, to search result number	Search conditions" condition": JSon character string , JSon character string can not have line break	The result number with matching conditions
21	TASK:RESult:SEARch:CATalog? <"condition">,<index>,<count>	According to conditions, to read the information of result list	Search conditions" condition": JSon character string , JSon character string can not have line break Index:initial position Count: quantity (0-10)	ClassName, character data of Base64, CRC16 check code
22	TASK:DELeTe TASK RESult INSTrument,	To delete tasks\results\instrument	TASK : To operate the task data	

No.	Commands	Explanation	Parameters	Returned values
	<Operation>		RESult : To operate the result data INSTRument : To operate the instrument data Operation: ALL: To operate the all data Guid: According to ID, directly write in Guide "Guids": The character string is consist of Guid, comma separated.	
23	TASK:ADD:TEST <data>	To add tasks	data: data(base64 encoding characters)	
24	TASK:ADD:INSTRument <calssname>,<data>	To add instruments	Classname:Instrument class data:data(Base encoding characters)	
25	TASK:ADD:RESult < data >	To add results	data:data(Base64 character string)	

1.9 Sensor Commands

No.	Commands	Explanation	Parameters	Returned values
1	SENSor:COUNT? <SenorType>	To acquire the number of sensor	one value sensor type SenorType:RTD SPRT CVD NTC NTC_SH 2 SMART UUT RTD=10, SPRT=3, CVD=2, NTC=1,	one value: To custom the number of sensor

No.	Commands	Explanation	Parameters	Returned values
			NTC_SH2=12	
2	SENSor:CATalog? <SensorType>,<offset>,<count>	To acquire the information of sensor head	3 values sensor type, SensorType:UUT SPRT RTD CVD NTC NTC_SH2 SMART, RTD=10, SPRT=3, CVD=2, NTC=1, NTC_SH2=12 Initial position offset, Number count UUT denotes all sensors	3values, comma separated ClassName,the real thing is List<SensorHeader> Base64 character data CRC16 check code
3	SENSor:INFormations? <id>	To acquire the information of single sensor	one value: id: sensor id	3values, comma separated ClassName,the real thing is TemperatureSensorInfo Base64 character data CRC16 check code
4	SENSor:SETSensorinfo:ADD<SensorType>,<"Info">	new constructed sensor	2values SensorType:RTD SPRT CVD NTC NTC_SH2, RTD=10, SPRT=3, CVD=2, NTC=1, NTC_SH2=12 "Info" is the character data of Base64	none
5	SENSor:SETSensorinfo:UPDate<SensorType>,<"Info">	To modify sensor	2 values, sensor types SensorType:RTD SPRT CVD NTC NTC_SH2, RTD=10, SPRT=3, CVD=2, NTC=1, NTC_SH2=12 "Info" is the character data of Base64	none

No.	Commands	Explanation	Parameters	Returned values
6	SENSor:Delete <"ids">	To delete sensor	one value Sensor ids, comma separated in the quotation mark.	none
7	SENSor:SEARCh? <"condition">	To search sensor	One value,comma separated Searching condition of sensor,Base64 character data	3 values, comma separated ClassName, the real things is List< SensorHeader > Base64 character data CRC16 check code
8	SENSor:REF:AVailable?	To acquire online state of external connected sensor	none	3values, comma separated. External connected sensor is online or not, 1=online 0=offline External connected sensor is smart or not, 1=smart 0=not smart Available, 1=available 0= not available
9	SENSor:REF[:SENSorinfo]?	To acquire information of external connected sensor	none	7 values,comma separated. Class name of sensor data, Id, sensor id sensor name, SN: sensor SN, smart or not, Character data of Base64, CRC16 check code
10	SENSor:REF[:SENSorinfo]:ORDinary<SensorType >,<"Info">	To design information of ORDinary external connected sensor, write in sensor bank and	two values Sensor type SensorType:SPRT CVD	none

No.	Commands	Explanation	Parameters	Returned values
		the external connected sensor works, the not-smart external connected sensor must be online	Info" is the character data of Base64	
11	SENSor:REF[:SENSorinfo]:SMART <SensorType>,<"Info">	To design information of Smart external connected sensor, the smart external connected sensor must be online	2 values Sensor type SensorType:SPRT CVD Info" is the character data of Base64	none

1.10 Application Commands

No.	Commands	Explanation	Parameters	Returned values
1	APPLication:DATas:COUNT? <App>	To acquire information of applicable data	One value, applicable type POWER= power grid quality STEP=phase step test SWITCh=switch test SNAPshot=sanpshoot CONTrolcurve=control curve	one value: the number of data
2	APPLication:DATas:DATA? <App>,<Index>	To acquire the configuration of applicable data and specific data (except control curve)	2 values, comma separated Applicable type App Serial NO. of data index	1 value: Character string of data Json (Snapshot is the character data of Base64, control curve only control configuration, and has no data)
3	APPLication:DATas:DELeTe <App>,<Index>	To delete applicable data	2 values, comma separated Applications type App	none

No.	Commands	Explanation	Parameters	Returned values
			Data serial NO. index	
4	APPLication:DATas:DIAGnosis:RESult:LENGth? <"path">	To read applicable data length of control curve	One value , file path	1 value the length of data
5	APPLication:DATas:DIAGnosis:RESult:DATA? <"path">,<Index>,<Count>	To read applicable data of control curve	3 values, comma separated: file path Offset Address of initiation Length count	2 values, comma separated: Real data, Base64 character data CRC16 check code

1.11 HART Commands

No.	Commands	Explanation	Parameters	Returned values
1.	HART:SEARCHStart Stop Zero[,<Numeric>][,<Numeric>]	HARTsearch	Start: Start searching Stop: Stop searching Zero: only searching 0 address Notes: to add address to the parameters of start and stop Range parameters, for example ,0,15"	
2.	HART:DEVICES?	To return back to the searched instrument list(Address and instrument type)		
3.	HART:CONnect<address>	To connect with the researched instruments	Address	
4.	HART:ONLDEvice:PROcess?		-	PV: master variable AO: simulated current value %: range percentage SV: second master variable TV: third master variable FV: fourth master variable

No.	Commands	Explanation	Parameters	Returned values
				LoopCurrent:
5.	HART:ONLDEvice:PROcEss PV AO % SV TV FV LoopCurrent	Hand off process quantity	PV: master variable AO: simulated current value %: range percentage SV: second master variable TV: third master variable FV: fourth master variable LoopCurrent:	-
6.	HART:ONLDEvice:PROcEss:VALue?	To read the value of process quantity		the value of process quantity
7.	HART:ONLDEvice:PARAmeter? <"name">	To search parameters	"name"Parameters' names	
8.	HART:ONLDEvice:PARAmeter[:ECHO] <"name">,<"value"> <value>	To design parameters	"name"Parameters' names value"value(with character string or figure of quotation mark)	
9.	HART:ONLDEvice:INFO?	To search HART instruments' information	None or <parameters. Names> Name list of parameters is as follows : Tag Manufacturer Devicetype Deviceid writeprotect date	If no parameters, to return back to information values of all instruments; If designing paramters'name, to return back to corresponding parameters' value

No.	Commands	Explanation	Parameters	Returned values
			message descriptor finalassemble preambles universalrev hardwarerev softwarerev devicerev	
10.	HART:ONLDEvice:SENSor?	To return back to all parameters' values of sensor, Or according to designing parameters's name, to return back to corresponding values	No parameters or<parameters'name) Name list of parameters is as follows: sn unit lrl url minspan	If no parameters, to return back to all parameters' values of sensor: If designing paramters'name, to return back to corresponding parameters' value
11.	HART:ONLDEvice:OUTput?	to return back to all numerical values output by HART; Or according to designing paramters'name, to return back to corresponding parameters' value	No parameters or<parameters'name); Name list of parameters is as follows: unit lrv urv damping transferFunction	If no parameters, to return back to all numerical values output by HART; If designing paramters'name, to return back to corresponding parameters' value
12.	HART:ONLDEvice:CONNected?	To acquire HART instrument device is connected or not.	none	one value 1=connected 0=disconnected

Appendix 1: unit id list of SCPI

UNIT Id	UNIT
2000	text unit
32767	the empty unit
1211	mA
1212	μ A
1209	A
1240	V
1241	mV
1281	Ω
1284	k Ω
1283	M Ω
1000	K
1001	$^{\circ}$ C
1002	$^{\circ}$ F
1003	$^{\circ}$ R
999	$^{\circ}$ Re
1005	$^{\circ}$
1342	%
1133	kPa
1130	Pa
1131	GPa
1132	MPa
1134	mPa

1135	μPa
1136	hPa
1137	bar
1138	mbar
1139	torr
1140	atm
1141	psi
1142	psia
1143	psig
1144	gf/cm ²
1145	kgf/cm ²
1147	inH ₂ O@4°C
1148	inH ₂ O@68°F
1150	mmH ₂ O@4°C
1151	mmH ₂ O@20°C
1153	ftH ₂ O@4°C
1154	ftH ₂ O@68°F
1156	inHg@0°C
1158	mmHg@0°C
2001	mtorr
2002	lb/ft ²
2003	tsi
2004	psf
2005	inH ₂ O@60°F
2006	ftH ₂ O@60°F

2007	cmH ₂ O@4°C
2008	mH ₂ O@4°C
2009	cmHg@0°C
2010	mHg@0°C
2011	kgf/m ²

Appendix 2: default industrial sensor

Sensor types	Sensor name(used in orders)
R400	400Ω/R400
R4k	4kΩ/R4k
Pt100-385	Pt100(385)
Pt10-385	Pt10(385)
Pt50-385	Pt50(385)
Pt200-385	Pt200(385)
Pt400-385	Pt400(385)
Pt1000-385	Pt1000(385)
Pt25-385	Pt25(385)
Pt100-3916	Pt100(3916)
Pt100-3926	Pt100(3926)
Pt100-391	Pt100(391)
Cu100-428	Cu100(428)
Cu50-428	Cu50(428)
Cu10-427	Cu10(427)
Ni100-617	Ni100(617)

Ni100-617	Ni100(618)
Ni120-672	Ni120(672)
Ni1000	Ni1000
TC-S	S
TC-R	R
TC-B	B
TC-K	K
TC-N	N
TC-E	E
TC-J	J
TC-T	T
TC-C	C
TC-D	D
TC-G	G
TC-L	L
TC-U	U
TC-LR	LR
TC-A	A
mV	mV

2Error Defination

No.	Error code	Description of error	Explanation
1	0	No error	No errors (all good!)
Instruction related errors			
2	120	Commandparameter error	One of the paramaters has an error.
3	-108	Too muchParameters or the orders which is not allowedto have parameters with parameters	There are too many or too few paramaters.
4	-109	Missing parameter	A paramater is missing.
5	-110	Command header error	Commnand has a header error.
6	-114	Header suffix out of range	Command has a header suffix that is out of range.
7	-123	Numeric overflow	Number is greater than the max value of numbers on the device (number has an exponent greater than 43)
8	-151	Invalid string data	Part of the command is not a valid string (for example, quotation marks do not match)
9	-171	Invalid expression	Part of the command is not patterned correctly (for example, parentheseses do not match)
Exeuction related errors			
10	-200	Execution error	Execution error.
11	-221	Settings conflict	Settings Conflict
12	-222	Data out of range	Paramater value exceeds the range fo the command.
13	-223	Too much data	Too much data (beyond what the unit is capable of processing)
14	-224	Illegal parameter value	Incorrect paramater value.
15	-230	Data corrupt or stale	The data is invalid or does not exist.
16	-240	Hardware error	Hardware error.
17	-256	File name not found	File name was not found.
18	-282	Illegal program name	Illegal program name.

No.	Error code	Description of error	Explanation
19	220	Measure error	Measure error.
20	221	Failed to set measure function	Failed to switch the measurement item
21	222	Failed to read measure value	Failed to read the measurement.
22	240	Control error	Control error
23	260	Calibration error	Calibration error
24	261	Calibration secured	This device is in a state that protects it from being calibrated.
25	262	Invalid calibration secure code	The calibration password is invalid.
26	263	Missing calibration value	This error occurs if the calibration value is set without setting the calibration point (during current/voltage calibration).
27	264	Missing calibration data	This error occurs if the calibration point is set without setting the calibration data.
28	265	Failed to set calibration function	Failed to set calibration item
29	266	Calibration data is not enough	This error occurs when calibration data is saved with less than 3 points.
30	271	Setion_name_not_found	No segment name found.
31	272	Key_name_not_found	No key name found.
32	291	Update secured	The device is in a state that protects it from upgrades.
33	292	Invalid update secure code	Upgrade password is not valid.
34	293	Not found the service pack	Not found the service pack
35	294	The service pack unavailable	Upgrade package is not available.
36	295	AppUpdate not found	AppUpdate.exe not found.
Device related errors			
37	-310	System error	System error
38	-311	Memory error	Memory error
39	-350	Queue overflow	Error queue overflow
40	-360	Communication error	Communication error.

No.	Error code	Description of error	Explanation
41	301	Internal module is not connected	No internal module connected.
42	302	External module is not connected	No external module connected.
43	303	Supply module is not connected	No positive pressure module connected.
44	304	Vacuum module is not connected	No negative pressure module connected.
45	361	Open WLAN Failed	Failed to open the Wifi.
46	362	Set WLAN address mode failed	Failed to set the Wifi address mode.
47	363	Set WLAN address failed	Failed to set the Wifi address.
48	364	Communication port to WIFI module is not open	The communication port with the Wifi module is not open.
49	365	WLANisnotconnected	Wifi is not connected.

3 State Report

3.1 Register of state bytes

Register of state bytes shows the information of other states' registers. Its value is unlocked, so if an event register is done with zero clearing, the corresponding places of Register of state bytes will also be done with zero clearing.

Table 3-1 definition of register places of state byte

Bytes	Decimalism value	Definition	Explanation
0	1	unused	always 0
1	2	unused	always 0
2	4	Error queue	non-empty error queue
3	8	Question data	Many Bits set 1 or one of question data register (corresponding places of enabling register must work)
4	16	unused	always 0

5	32	Standard event	Many Bits set 1 or one of Standard event register(corresponding places of enabling register must work)
6	64	Service request	Many Bits set 1 or 1 bit except this bit (corresponding places of enabling register must work)
7	128	Operation state	Many Bits set 1 or one of Standard event register(corresponding places of enabling register must work)

3.2 Standard event register

Standard event register shows the following events:power on, grammatical error of orders, the error of self-testing or calibration,or a *OPC orders have been executed. The places are defined as follows:

Table 3-2 the definition of standard event registers

Bytes	Decimalism value	Definition	Explanation
0	1	Finished operation	Before *OPC orders, the oher orders are all executed
1	2	unused	always 0
2	4	unused	always 0
3	8	Instrument error	The error of self-testing , calibration or overloading
4	16	Execution error	To Happen Execution error
5	32	Order erroe	To Happen order grammatical error
6	64	unused	
7	128	Power on	To Happen power on and off operation

3.3 Question data register

Question data register shows the information of testing results, for example:outrang and so on. The place definition is as follows:

Table 3-3 the definition of Question data register

Bytes	Decimalism value	Definition	Explanation
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0	1	Voltage overload	Voltage overrange
1	2	Current overload	Current overrange
2	4	unused	always 0
3	8	unused	always 0
4	16	unused	always 0
5	32	unused	always 0
6	64	unused	always 0
7	128	unused	always 0
8	256	unused	always 0
9	512	Over pressure	Exceed pressure range
10	1024	unused	always 0
11	2048	unused	always 0
12	4096	unused	always 0
13	8192	unused	always 0
14	16384	unused	always 0
15	32768	unused	always 0

3.4 Operation Status Register

Operation status register provide the normal operation information of the instrument. The place definitions as below.

Table 3-4 the register place definition of operation state

Bytes	Decimalism value	Definition	Explanation
0	1	unused	always 0
1	2	unused	always 0
2	4	unused	always 0
3	8	unused	always 0

4	16	In measurement state	Instrument is initiative to make pressure measurement
5	32	unused	always 0
6	64	unused	always 0
7	128	Over pressure	always 0
8	256	unused	always 0
9	512	unused	always 0
10	1024	unused	always 0
11	2048	unused	always 0
12	4096	unused	always 0
13	8192	unused	always 0
14	16384	unused	always 0
15	32768	unused	always 0