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## ADT686/673Commands set

### 1 Commands instruction

(1) each command includes two parts: **mnemonic** and **parameter**. The **mnemonic** and **parameter** are separated by a space;

For example pressure:filter 0|1, <numeric>[,<numeric>], 0|1 refers to the parameter description specific optional option, <numeric> is the parameter to be input, [<numeric>] refers to the additional parameter when the parameter is set to 1. if set the pressure filter function by this command, enter pressure:filter 1, 50,5

(2) about the parameter

Each parameter in the instruction set is marked with  (do not enter angle brackets when converting to actual instructions) and separated by commas.

(3) terminator

The scpi command must include a command terminator, which can be one of the follows (excluding double quotation marks): "\r\n", "\r", "\n" or "\0".

### 1.1 IEEE 488.2 common commands

| No | Commands | Description                                                                                                                                               | Parameter | Returned value                         |
|----|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|----------------------------------------|
| 1  | *cls     | Clear the following registers:<br>Standard event register;<br>Query event register;<br>Operation event register;<br>Status byte register;<br>Error queue. | -         | -                                      |
| 2  | *idn?    | Instrument identification query, return 2 parts of data:<br>A. Product serial number;<br>B. Software version;                                             | -         | Product serial number,software version |
| 3  | *rst     | Program reset                                                                                                                                             | -         | -                                      |

### 1.2 Pressure commands

| No | Commands                          | Description                 | Parameter                               | Returned value                                                                                               |
|----|-----------------------------------|-----------------------------|-----------------------------------------|--------------------------------------------------------------------------------------------------------------|
| 1. | Pressure? [all]                   | Read current pressure value | Option all: reading barometric pressure | Pressure value, pressure unit, pressure type[barometric pressure, barometric unit, barometric pressure type] |
| 2. | Pressure:unit?                    | Read current pressure unit  | None                                    | Unit name                                                                                                    |
| 3. | Pressure:unit<numeric> <unquostr> | Set current pressure unit   | Unit id or unquoted unit name           | None                                                                                                         |
| 4. | Pressure:ptype?                   | Read current pressure type  | None                                    | G: gauge pressure<br>A: absolute pressure<br>D: differential pressure                                        |

|     |                                           |                                        |                                                                                                                                                |                                                                                                                                                |
|-----|-------------------------------------------|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|
| 5.  | Pressure:ptyp[ga d]                       | Set current pressure type              | G: gauge pressure<br>A: absolute pressure<br>D: differential pressure                                                                          | None                                                                                                                                           |
| 6.  | Pressure:online?                          | Whether the pressure module is online? | None                                                                                                                                           | 0: offline<br>1: online                                                                                                                        |
| 7.  | Pressure:range? [<unquostr>]              | Read pressure module's range           | None, 0 or 1                                                                                                                                   | None or 0: lower limit, upper limit, unit id, pressure type(g/a/d);<br>1: lower limit, upper limit, unit name, pressure type(g/a/d)            |
| 8.  | Pressure:zero                             | Pressure module zero                   | None                                                                                                                                           | None                                                                                                                                           |
| 9.  | Pressure:resolution?                      | Read pressure resolution               | None                                                                                                                                           | 4 5 6                                                                                                                                          |
| 10. | Pressure:resolution<numeric>              | Set pressure resolution                | 4 5 6                                                                                                                                          | None                                                                                                                                           |
| 11. | Pressure:filter:enable?                   | Read filter status                     | None                                                                                                                                           | 0: disable<br>1: enable                                                                                                                        |
| 12. | Pressure:filter:enable0 1                 | Set filter type                        | 0: disable<br>1: enable                                                                                                                        | None                                                                                                                                           |
| 13. | Pressure:filter?                          | Read filter parameter                  | None                                                                                                                                           | Two returns format:<br>First-order filter: 0, first-order filter coefficient<br>Average filter: 1, de-extreme value pairs, filter window size. |
| 14. | pressure:filter 0 1,<numeric>[,<numeric>] | Set filter type                        | Two returns format:<br>First-order filter: 0, first-order filter coefficient<br>Average filter: 1, de-extreme value pairs, filter window size. | None                                                                                                                                           |

|     |                                              |                                                                     |                                        |                                                                                  |
|-----|----------------------------------------------|---------------------------------------------------------------------|----------------------------------------|----------------------------------------------------------------------------------|
| 15. | Pressure:stable?                             | Read pressure stable status                                         | None                                   | 0: not stable<br>1: stable                                                       |
| 16. | Pressure:stable:enable?                      | Read the status of the stable time                                  | None                                   | 0: disable<br>1: enable                                                          |
| 17. | Pressure:stable:enable0 1                    | Set the status of the stable time                                   | 0: disable<br>1: enable                | None                                                                             |
| 18. | Pressure:stable:configure?                   | Read pressure stable status parameter                               | None                                   | Separated by comma:<br>Stability, stable time                                    |
| 19. | Pressure:stable:configure<numeric>,<numeric> | Set pressure stable status parameter                                | Stability(0.005-1), stable time(1-60s) | None                                                                             |
| 20. | Pressure:peak:enable?                        | Read pressure peak status                                           | None                                   | 0: disable<br>1: enable                                                          |
| 21. | Pressure:peak:enable0 1                      | Set pressure peak status                                            | 0: disable<br>1: enable                | None                                                                             |
| 22. | Pressure:tare:enable?                        | Read pressure tare function status                                  | None                                   | 0: disable<br>1: enable                                                          |
| 23. | Pressure:tare:enable0 1                      | Set pressure tare function status                                   | 0: disable<br>1: enable                | None                                                                             |
| 24. | Pressure:tare:configure?                     | Read pressure tare value                                            | None                                   | Pressure tare value                                                              |
| 25. | Pressure:tare:configure<numeric>             | Set pressure tare value                                             | Tare value                             | None                                                                             |
| 26. | Pressure:cldangp                             | Clear overpressure record                                           | None                                   | None                                                                             |
| 27. | Pressure:dangp?                              | Read overpressure record                                            | None                                   | Overpressure record                                                              |
| 28. | Atm? [all]                                   | Read barometric pressure value all and read process treatment value | None                                   | Final barometric value<br>All with the original value, linear value, tare value, |

|     |          |                       |      |                                                                                                                                                                                                           |
|-----|----------|-----------------------|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|     |          |                       |      | filter value and final value. (with pressure type when switch pressure is supported)                                                                                                                      |
| 29. | Measure? | Read the measure data | None | Type 1+ pressure value+ pressure unit id+ pressure type+ type 2+ barometric pressure+ barometric unit id+ type 3+ temperature+ temperature unit id+ type 4+ electric measurement+ electric measurement id |

### 1.3 Electric measure commands

| No | Commands                                  | Description                 | Parameter                                      | Returned value                                                                                                                                                                                                                                |
|----|-------------------------------------------|-----------------------------|------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. | Electricity:measure? [cal]                | Read current measured value | None or cal                                    | 1. none<br>Item no,measuredvalue,unit name<br>2. cal<br>Item no,final measured value,unitname,single-point fixed value,multi-point fixed value,linar fixed value,origin value<br>Note:<br>Item no:<br>1. current 2. voltage 3. switch 4. hart |
| 2. | Electricity:function?                     | Read current measured item  | None                                           | Item no[, item description]<br>Item no:<br>1. current 2. voltage 3. switch 4. hart<br>Switch:<br>0.mechanical switch 1.npn switch 2.pnp switch                                                                                                |
| 3. | Electricity:function<numeric>[,<numeric>] | Set current measured item   | Item no:<br>1. current 2. voltage 3. switch 4. | None                                                                                                                                                                                                                                          |

|     |                                              |                              |                                                                                                                         |                                                                                                                         |
|-----|----------------------------------------------|------------------------------|-------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
|     |                                              |                              | hart<br>Switch:<br>0.mechanical switch 1.npn switch<br>2.pnp switch                                                     |                                                                                                                         |
| 4.  | Electricity:24venable?                       | Read 24v status              | None                                                                                                                    | 0: disable<br>1: enable                                                                                                 |
| 5.  | Electricity:24venable 0 1                    | Set 24v status               | 0: disable<br>1: enable                                                                                                 | None                                                                                                                    |
| 6.  | Electricity:zero                             | Electric measure zero        | None                                                                                                                    | None                                                                                                                    |
| 7.  | Electricity:czero                            | Electric measure cancel zero | None                                                                                                                    | None                                                                                                                    |
| 8.  | Electricity:switch:actions?                  | Read switch test act value   | None                                                                                                                    | Separated by space:<br>Act valueunit name                                                                               |
| 9.  | Electricity:filter:enable?                   | Read filter status           | None                                                                                                                    | 0: disable<br>1: enable                                                                                                 |
| 10. | Electricity:filter:enable 0 1                | Set filter status            | 0: disable<br>1: enable                                                                                                 | None                                                                                                                    |
| 11. | Electricity:filter?                          | Read filter parameter        | None                                                                                                                    | First-order filter: 0, first-order filter coefficient<br>Average filter: 1, de-extreme value pairs, filter window size. |
| 12. | Electricity:filter 0 1,<numeric>[,<numeric>] | Set filter parameter         | First-order filter: 0, first-order filter coefficient<br>Average filter: 1, de-extreme value pairs, filter window size. | None                                                                                                                    |
| 13. | Electricity:scale:enable?                    | Read scaling status          | None                                                                                                                    | 0: disable<br>1: enable                                                                                                 |

|     |                                                                                         |                              |                                                                                                                                                        |                                                                                                           |
|-----|-----------------------------------------------------------------------------------------|------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|
| 14. | Electricity:scale:enable 0 1                                                            | Set scaling status           | 0: disable<br>1: enable                                                                                                                                | None                                                                                                      |
| 15. | Electricity:scale?                                                                      | Read scaling configuration   | None                                                                                                                                                   | Transfer function: 0linear 1 square root<br>Input range<br>Output range<br>Decimal digits of output range |
| 16. | Electricity:scale<br>0 1 2,<numeric>,<numeric>,<numeric>,<numeric>,<unquostr>,<numeric> | Set scaling configuration    | Transfer function, input lower limit,<br>input upper limit, output lower limit,<br>output upper limit, output units,<br>decimal digits of output range | None                                                                                                      |
| 17. | Electricity:minmax:enable?                                                              | Read min/max function status | None                                                                                                                                                   | 0: disable<br>1: enable                                                                                   |
| 18. | Electricity:minmax:enable 0 1                                                           | Set min/max function status  | 0: disable<br>1: enable                                                                                                                                | None                                                                                                      |

#### 1.4 System commands

| No | Commands                                                                                                          | Description                        | Parameter                                                                                                   | Returned value                                                                                |
|----|-------------------------------------------------------------------------------------------------------------------|------------------------------------|-------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|
| 1. | System:error?                                                                                                     | Read the execute error information | None                                                                                                        | A message at the stack top of the error                                                       |
| 2. | System:lock?                                                                                                      | Read the screen lock status        | None                                                                                                        | 0= unlock<br>1= lock                                                                          |
| 3. | System:lock0 1 on off                                                                                             | Set the screen lock status         | 0= unlock<br>1= lock                                                                                        | None                                                                                          |
| 4. | System:version?<br>[/"application"/]"os:firmware"/]"os:hardware"<br>  /"wifi:firmware"/]"bt:firmware"/]"hart:dd"] | Read the device version            | "application" = host version,<br>"os:firmware" system firmware<br>version,<br>"os:hardware" system hardware | Default:<br>No parameter= return host version<br>With parameter= return corresponding version |

|     |                                          |                                 |                                                                                                              |                                                                     |
|-----|------------------------------------------|---------------------------------|--------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|
|     |                                          |                                 | version,<br>"wifi:firmware" wifi version<br>"bt:firmware" bluetooth version<br>"hart:dd" hartdd file version |                                                                     |
| 5.  | System:date?                             | Read system date                | None                                                                                                         | Date (yyyy,mm,dd)                                                   |
| 6.  | System:date<numeric>,<numeric>,<numeric> | Set system date                 | Year, month, day                                                                                             | None                                                                |
| 7.  | System:time?                             | Read system time                | None                                                                                                         | Time (hh,mm,ss)                                                     |
| 8.  | System:time<numeric>,<numeric>,<numeric> | Set system time                 | Hour, minute, second                                                                                         | None                                                                |
| 9.  | System:time:format?                      | Read system time format         | None                                                                                                         | Two values, separated by comma,<br>24/12 hours<br>Current time zone |
| 10. | System:time:format<boolean>,<numeric>    | Set system time format          | Two parameters, separated by<br>comma,<br>24/12 hours<br>Current utc time zone                               | None                                                                |
| 11. | System:tbeep?                            | Read the touch beep status      | None                                                                                                         | 0 disable<br>1 enable                                               |
| 12. | System:tbeep<boolean> on off             | Set the touch beep status       | 0 off disable<br>1 on enable                                                                                 | None                                                                |
| 13. | System:pbeep?                            | Read the prompt beep status     | None                                                                                                         | 0 disable<br>1 enable                                               |
| 14. | System:pbeep<boolean> on off             | Set the prompt beep status      | 0 off disable<br>1 on enable                                                                                 | None                                                                |
| 15. | System:orbeep?                           | Read the over range beep status | None                                                                                                         | 0 disable<br>1 enable                                               |

|     |                                             |                                                       |                                                                           |                       |
|-----|---------------------------------------------|-------------------------------------------------------|---------------------------------------------------------------------------|-----------------------|
| 16. | System:orbeep<boolean> on off               | Set the over range beep status                        | 0 off disable<br>1 on enable                                              | None                  |
| 17. | System:stbeep?                              | Read the stable beep status                           | None                                                                      | 0 disable<br>1 enable |
| 18. | System:stbeep<boolean> on off               | Set the stable beep status                            | 0 off disable<br>1 on enable                                              | None                  |
| 19. | System:shbeep?                              | Read the snapshot beep status                         | None                                                                      | 0 disable<br>1 enable |
| 20. | System: shbeep<boolean> on off              | Set the snapshot beep status                          | 0 off disable<br>1 on enable                                              | None                  |
| 21. | System:volume?                              | Read system volume percentage                         | None                                                                      | Volume percentage     |
| 22. | System:volume<numeric>                      | Set system volume                                     | Volume percentage                                                         | None                  |
| 23. | System:language?                            | Read current language                                 | None                                                                      | Current language      |
| 24. | System:language<unquostr>[,<boolean>]       | Set current language                                  | Parameter: language zh-cn<br>Optional: restart or not, restart by default | None                  |
| 25. | System:language:config?                     | Read the list of supported languages                  | None                                                                      | Lamguage list         |
| 26. | System:language:config<quotestr>            | Set the list of supported languages                   | Language list, separated by comma                                         | None                  |
| 27. | System:brightness? Percentage value         | Read the screen brightness                            | Percentage or value                                                       | Screen brightness     |
| 28. | System:brightnesspercentage value,<numeric> | Set the screen brightness<br>Range:<br>Value 200-4096 | 1: percentage or value<br>2: brightness                                   | None                  |

|     |                                                   |                                                                                                                                                                                                      |                                                                                                                  |                                                                                                                  |
|-----|---------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|
|     |                                                   | Percentage 0-100<br>When the set value is greater than 4096 or 100%, it will be set to the greatest brightness, when the set value is lower than 200 or 0%, it will be set to the lowest brightness. |                                                                                                                  |                                                                                                                  |
| 29. | System:battery:online?                            | Read the battery online status                                                                                                                                                                       | None                                                                                                             | 1 : battery online<br>0 : battery offline                                                                        |
| 30. | System:battery:status?                            | Read the battery status                                                                                                                                                                              | None                                                                                                             | 0: battery communication abnormal<br>1: battery communication ok                                                 |
| 31. | System:battery:infomation?                        | Read the current battery level, voltage, current                                                                                                                                                     | None                                                                                                             | Current battery level, total level (mah), voltage (v), current (>0 indicates charging, <0 indicates discharging) |
| 32. | Display:acloud:capcha<br>0 1,<unquostr>,<numeric> | Show or close acloud service verify code                                                                                                                                                             | 1:<br>0-close the verify code, 1-show the verify code<br>2: string, verify code text<br>3: number, time-out time | None                                                                                                             |
| 33. | System:ble<boolean> on off                        | Bluetooth on/off                                                                                                                                                                                     | 1 or on: on<br>0 or off: off                                                                                     | No return                                                                                                        |
| 34. | System:ble:status?                                | Read bluetooth status                                                                                                                                                                                | None                                                                                                             | 0: unkown;<br>1: booted;<br>2: initialized<br>3: sleep<br>4: broadcasting                                        |

|     |                             |                            |                                                                                                                               |                   |
|-----|-----------------------------|----------------------------|-------------------------------------------------------------------------------------------------------------------------------|-------------------|
|     |                             |                            |                                                                                                                               | 5: connected      |
| 35. | System:ble:info? <unquostr> | Read bluetooth information | Name: return bluetooth version information<br>Mac: return bluetooth mac address<br>Version: return bluetooth firmware version | See the parameter |

### 1.5Data management commands

| No | Commands                                                                      | Description                   | Parameter                                                                                                                                                    | Returned value |
|----|-------------------------------------------------------------------------------|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|
| 1. | Datamanager:count?<br>Leaktest[snapshot[datalogger]psvtest                    | Read data amount              | Leaktest: leak test<br>Snapshot: snapshot<br>Datalogger: data log<br>Psvtest:psv test                                                                        | Data amount    |
| 2. | Datamanager:info?<br>Leaktest[snapshot[datalogger]psvtest,<numeric>,<numeric> | Read data related information | 1: leaktest: leak test<br>Snapshot: snapshot<br>Datalogger: data log<br>Psvtest: psv test<br>2: start, start point<br>3: count , length                      | Information    |
| 3. | Datamanager:delleaktest[snapshot[datalogger]psvtest,<unquostr>                | Delete test result            | 1: leaktest: leak test<br>Snapshot: snapshot<br>Datalogger: data log<br>Psvtest: psv test<br>2: the file path that perform the deletion (without quote mark) | None           |
| 4. | Datamanager:length?<br>Leaktest[snapshot[datalogger]psvtest,data im           | Read data length              | 1: leaktest: leak test<br>Snapshot: snapshot                                                                                                                 | Data length    |

|    |                                                                                                     |                                  |                                                                                                           |               |
|----|-----------------------------------------------------------------------------------------------------|----------------------------------|-----------------------------------------------------------------------------------------------------------|---------------|
|    | age,<unquostr>                                                                                      |                                  | Datalogger: data log<br>Psvtest: psv test<br>2: read data file or image<br>File name (without quote mark) |               |
| 5. | Datamanager:data?<br>Leaktest[snapshot[datalogger]psvtest,data]image,<unquostr>,<numeric>,<numeric> | Read data in designated location | File name (without quote mark),<br>start point, read data length                                          | String format |

### 1.6 calibration commands

| No | Commands                                                                                                               | Description                                    | Parameter                                                                                                                                                                                                | Returned value                                                                                                              |
|----|------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|
| 1. | Calibration:electricity:data<br>123456,<numeric>,<numeric>,<quotes<br>tr>,<quotestr>,<numeric>,<numeric>,<<br>numeric> | Write electric calibration data                | 1: 0-linar<br>1-multi-point<br>2: 0-ma measure<br>1-30v measure<br>Calibration point (quoted string,<br>separated by comma)<br>Standard point (quoted string,<br>separated by comma)<br>Year, month, day | None                                                                                                                        |
| 2. | Calibration:electricity:data?<br>123456,<numeric>,<numeric>                                                            | Write electric calibration value               | 1: 0-linar<br>1-multi-point<br>2: 0-ma measure<br>1-30v measure                                                                                                                                          | Multi-point: calibration point list, actual value list,<br>year, month, day<br>Single point: offset value, year, month, day |
| 3. | Calibration:electricity:reset<br>123456,<numeric>,<numeric>                                                            | Reset electric multi-point calibration<br>data | 1: 0-linar<br>1-multi-point<br>2: 0-ma measure                                                                                                                                                           | None                                                                                                                        |

|    |                                                                                                     |                                          | 1-30v measure                                                                                                                                                                 |                                                                                                                                                     |
|----|-----------------------------------------------------------------------------------------------------|------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| 4. | Calibration:barosensor:data?<br>123456,<numeric>                                                    | Read barometric sensor calibration data  | 0-two points<br>1-offset<br>2-demarcate                                                                                                                                       | With calibration data: standard value 1, measure value 1, standard value 2, measure value 2, year, month, day<br>Without calibration data: no data! |
| 5. | Calibration:barosensor:data<br>123456,<numeric>,<quotestr>,<quotestr>,<numeric>,<numeric>,<numeric> | Write barometric sensor calibration data | 1: 0-two points<br>1-offset<br>2-demarcate<br>2: standard value(quoted string, separated by comma)<br>3: measure value(quoted string, separated by comma)<br>Year, month, day | None                                                                                                                                                |
| 6. | Calibration:barosensor:preset<br>123456,<numeric>                                                   | Reset barometric sensor calibration data | 0- Multi-point (reset both two-point and single-point calibration data)<br>1- Single-point ( reset both two-point and single-point calibration data)                          | None                                                                                                                                                |

### 1.7 HART

| No | Commands         | Description                | Parameter | Returned value                                                                                   |
|----|------------------|----------------------------|-----------|--------------------------------------------------------------------------------------------------|
| 1. | Hart:supplymode? | Read the power supply mode |           | 0-ipir internal power and internal resistance;<br>1-eper external power and external resistance; |

|    |                                                    |                            |                                                                                                                                                                                                     |                                                                                                                                                                          |
|----|----------------------------------------------------|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|    |                                                    |                            |                                                                                                                                                                                                     | 2-epir external power and internal resistance;<br>3-iper internal power and external resistance                                                                          |
| 2. | Hart:supplymode ipir eper epir iper 0 1 2 3        | Set the power supply mode  | 0-ipir internal power and internal resistance;<br>1-eper external power and external resistance;<br>2-epir external power and internal resistance;<br>3-iper internal power and external resistance | -                                                                                                                                                                        |
| 3. | Hart:searchstart stop zero[,<numeric>][,<numeric>] | Hart search;               | Start: start searching;<br>Stop: stop searching;<br>Zero: search only zero<br>Note: the start and stop can be added later in the address range parameter, such as",0,15"                            | -                                                                                                                                                                        |
| 4. | Hart:devices?                                      | Search device              | -                                                                                                                                                                                                   | List of devices searched (address and device type)                                                                                                                       |
| 5. | Hart:connect<address>                              | Connect to searched device | Address                                                                                                                                                                                             | -                                                                                                                                                                        |
| 6. | Hart:on device:process?                            | Get process option         | -                                                                                                                                                                                                   | Pv: process variable;<br>Ao: analog current;<br>%: scale percentage;<br>Sv: second variable;<br>Tv: third variable;<br>Fv: fourth variable;<br>Loopcurrent: loop current |

|     |                                                              |                              |                                                                                                                                                                          |                                                                                                                                                   |
|-----|--------------------------------------------------------------|------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| 7.  | Hart:ondevice:process:value?<br>[pv ao sv tv fv loopcurrent] | Get process value            | Pv: process variable;<br>Ao: analog current;<br>%: scale percentage;<br>Sv: second viriable;<br>Tv: third viriable;<br>Fv: fourth viriable;<br>Loopcurrent: loop current | Null: current variable<br>Or designated value                                                                                                     |
| 8.  | Hart:ondevice:processpv ao sv tv fv loopcurrent              | Switch process value         | Pv: process variable;<br>Ao: analog current;<br>%: scale percentage;<br>Sv: second viriable;<br>Tv: third viriable;<br>Fv: fourth viriable;<br>Loopcurrent: loop current | -                                                                                                                                                 |
| 9.  | Hart:ondevice:parameter? <name>                              | Read the parameter           | Name: parameter name (quoted string)                                                                                                                                     | Corresponding value                                                                                                                               |
| 10. | Hart:ondevice:parameter<name>,<"value">                      | Set the parameter            | Name: parameter name (quoted string)<br>Value: value (quoted string)                                                                                                     | -                                                                                                                                                 |
| 11. | Hart:ondevice:info?                                          | Read hart device information | None or <parameter name><br>Name list:<br>Tag<br>Manufacturer<br>Devicetype<br>Deviceid<br>Writeprotect<br>Date                                                          | Return all parameter values of the device when there are no parameters;<br>Return the corresponding parameter value for designated parameter name |

|     |                          |                                                                                                                              |                                                                                                                |                                                                                                                                                        |
|-----|--------------------------|------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
|     |                          |                                                                                                                              | Message<br>Descriptor<br>Finalassemble<br>Preambles<br>Universalrev<br>Hardwarerev<br>Softwarerev<br>Devicerev |                                                                                                                                                        |
| 12. | Hart:ondevice:sensor?    | Return all parameter values for the sensor or return the corresponding values based on the name of the designated parameters | None or <parameter name><br>Name list:<br>Sn<br>Unit<br>Lrl<br>Url<br>Minspan                                  | Return all parameter values of the sensor when there are no parameters;<br>Return the corresponding parameter value for designated parameter name      |
| 13. | Hart:ondevice:output?    | Return all parameter values of hart output or return the corresponding values based on the name of the designated parameters | None or <parameter name><br>Name list:<br>Unit<br>Lrv<br>Urv<br>Damping<br>Transferfunction                    | Return all parameter values of the hart output when there are no parameters;<br>Return the corresponding parameter value for designated parameter name |
| 14. | Hart:ondevice:connected? | Get the hart device connect condition                                                                                        | None                                                                                                           | 1 value<br>1=connected, 0=unconnected                                                                                                                  |

#### Appendix 1:scpiunit id list

| Unit id | Unit               |
|---------|--------------------|
| 2000    | Text unit          |
| 32767   | Blank unit         |
|         |                    |
| 1211    | Ma                 |
| 1212    | Ma                 |
| 1209    | A                  |
| 1240    | V                  |
| 1241    | Mv                 |
| 1281    | $\Omega$           |
| 1284    | K $\omega$         |
| 1283    | M $\omega$         |
| 1000    | K                  |
| 1001    | $^{\circ}\text{C}$ |
| 1002    | $^{\circ}\text{F}$ |
| 1003    | $^{\circ}\text{r}$ |

|      |      |
|------|------|
| 999  | °re  |
| 1005 | °    |
| 1342 | %    |
|      |      |
| 1133 | Kpa  |
| 1130 | Pa   |
| 1131 | Gpa  |
| 1132 | Mpa  |
| 1134 | Mpa  |
| 1135 | Mpa  |
| 1136 | Hpa  |
| 1137 | Bar  |
| 1138 | Mbar |
| 1139 | Torr |
| 1140 | Atm  |
| 1141 | Psi  |

|      |                     |
|------|---------------------|
| 1142 | Psia                |
| 1143 | Psig                |
| 1144 | Gf/cm <sup>2</sup>  |
| 1145 | Kgf/cm <sup>2</sup> |
| 1147 | Inh2o@4°c           |
| 1148 | Inh2o@68°f          |
| 1150 | Mmh2o@4°c           |
| 1151 | Mmh2o@20°c          |
| 1153 | Fth2o@4°c           |
| 1154 | Fth2o@68°f          |
| 1156 | Inhg@0°c            |
| 1158 | Mmhg@0°c            |
| 2001 | Mtorr               |
| 2002 | Lb/ft <sup>2</sup>  |
| 2003 | Tsi                 |
| 2004 | Psf                 |

|      |                    |
|------|--------------------|
| 2005 | Inh2o@60°f         |
| 2006 | Fth2o@60°f         |
| 2007 | Cmh2o@4°c          |
| 2008 | Mh2o@4°c           |
| 2009 | Cmhg@0°c           |
| 2010 | Mhg@0°c            |
| 2011 | Kgf/m <sup>2</sup> |

## Appendix 2: error definition

| No                     | Error code | Error description          | Definition                                                                    |
|------------------------|------------|----------------------------|-------------------------------------------------------------------------------|
|                        | 0          | No error                   | No error                                                                      |
| <b>Command error</b>   |            |                            |                                                                               |
| 2                      | 120        | Commandparameter error     | Command parameter error                                                       |
| 3                      | -108       | Parameter not allowed      | Too many parameters, or the command without parameters contains parameters    |
| 4                      | -109       | Missing parameter          | Parameter missed                                                              |
| 5                      | -110       | Command header error       | Command header error                                                          |
| 6                      | -114       | Header suffix out of range | Command header suffix is out of range                                         |
| 7                      | -123       | Numeric overflow           | Number overflow, the absolute value of the number exponent is greater than 43 |
| 8                      | -151       | Invalid string data        | Invalid string, such as mismatched quotes                                     |
| 9                      | -171       | Invalid expression         | Invalid expressions, such as mismatched parentheses                           |
| <b>Execution error</b> |            |                            |                                                                               |
| 10                     | -200       | Execution error            | Execution error                                                               |
| 11                     | -221       | Settings conflict          | Settings conflict                                                             |
| 12                     | -222       | Data out of range          | Parameter out of the command's range                                          |
| 13                     | -223       | Too much data              | Too much data beyond processing capacity                                      |
| 14                     | -224       | Illegal parameter value    | Illegal parameter value                                                       |
| 15                     | -230       | Data corrupt or stale      | Invalid data, or the data is being read, and no valid data has been obtained  |
| 16                     | -240       | Hardware error             | Hardware error                                                                |
| 17                     | -256       | File name not found        | File name not found                                                           |
| 18                     | -282       | Illegal program name       | Illegal program name                                                          |
| 19                     | 220        | Measure error              | Measure error                                                                 |

| No | Error code | Error description                  | Definition                                                                                                                      |
|----|------------|------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| 20 | 221        | Failed to set measure function     | Failed to set measure function                                                                                                  |
| 21 | 222        | Failed to read measure value       | Failed to read measure value                                                                                                    |
| 22 | 223        |                                    |                                                                                                                                 |
| 23 | 224        |                                    |                                                                                                                                 |
| 24 | 240        | Control error                      | Control error                                                                                                                   |
| 25 | 241        |                                    |                                                                                                                                 |
| 26 | 242        |                                    |                                                                                                                                 |
| 27 | 243        |                                    |                                                                                                                                 |
| 28 | 260        | Calibration error                  | Calibration error                                                                                                               |
| 29 | 261        | Calibration secured                | Calibration secured, can not perform calibration                                                                                |
| 30 | 262        | Invalid calibration secure code    | Invalid calibration secure code                                                                                                 |
| 31 | 263        | Missing calibration value          | During current/voltage calibration, this error will occur if the calibration value is set without setting the calibration point |
| 32 | 264        | Missing calibration data           | This error occurs when the calibration point is set continuously, but the calibration value is not set                          |
| 33 | 265        | Failed to set calibration function | Failed to set calibration function                                                                                              |
| 34 | 266        | Calibration data is not enough     | When saving the calibration data, if the calibration data does not reach 3 points, this error will occur                        |
| 35 | 271        | Setion_name_not_found              | Setion name not found                                                                                                           |
| 36 | 272        | Key_name_not_found                 | Key name not found                                                                                                              |
| 37 | 291        | Update secured                     | Update secured                                                                                                                  |
| 38 | 292        | Invalid update secure code         | Invalid update secure code                                                                                                      |
| 39 | 293        | Not found the service pack         | Not found the service pack                                                                                                      |
| 40 | 294        | The service pack unavailable       | The service pack unavailable                                                                                                    |

| No                          | Error code | Error description                             | Definition                                    |
|-----------------------------|------------|-----------------------------------------------|-----------------------------------------------|
| 41                          | 295        | Appupdate not found                           | Appupdate.exe not found                       |
| <b>Device related error</b> |            |                                               |                                               |
| 42                          | -310       | System error                                  | System error                                  |
| 43                          | -311       | Memory error                                  | Memory error                                  |
| 44                          | -350       | Queue overflow                                | Queue overflow                                |
| 45                          | -360       | Communication error                           | Communication error                           |
| 46                          | 301        | Internal module is not connected              | Internal module is not connected              |
| 47                          | 302        | External module is not connected              | External module is not connected              |
| 48                          | 303        | Supply module is not connected                | Supply module is not connected                |
| 49                          | 304        | Vacuum module is not connected                | Vacuum module is not connected                |
| 50                          | 361        | Open wlan failed                              | Open wlan failed                              |
| 51                          | 362        | Set wlan address mode failed                  | Set wlan address mode failed                  |
| 52                          | 363        | Set wlan address failed                       | Set wlan address failed                       |
| 53                          | 364        | Communication port to wifi module is not open | Communication port to wifi module is not open |
| 54                          | 365        | Wlanisnotconnected                            | Wlan is not connected                         |