		Temp or time firstline	P/V/F/T secondline	PressData	WindData	FlowData	Tempe data	WidthOrDia	Height;	ThirdLine	WD_DigitNum;	H_DigitNum	Infor1	Infor2	Infor3	Infor4
uchar	uchar	Signed int	float	float	float	float	Signed int	float	float	uchar	uchar	uchar	uchar	uChar	uchar	uchar
1	1	2	4	4	4	4	2	4	4	1	1	1	1	1	1	1

Infor5	Infor6	Infor7	Infor8	ShowState	Pressunit	VEL /Flow unit	crc	
uChar	uchar	uChar	uchar	uchar	uchar	uchar	Signed int	
1	1	1	1	1	1	1	2	

46 bytes, identifier 2 bytes, data 42 bytes, crc 2 bytes
Checksum is the sum of the previous 44 bytes.

The data format in the program as below:

```
#define    txdwordlenth    23
#define    txdbytelenth     46
struct
 {
    uchar IDone;
    uchar IDone;
    signed int FirstLine;                //temperature / time/    //2 Bytes[2],Bytes[3]
    float          SecondLine;          //pressure value/wind speed value/flow value/temperature value
     float          PressData;           //the measured pressure value
    float          WindData             // wind speed value    m/.s
    float          FlowData              //flow
    signed int TempData;                //room temperature
```

```
    float          WidthOrDia;         // width or diameter
    float          Height;             // height
   signed char ThirdLine;             // display the record number
    uchar        WD_DigitNum;
    uchar        H_DigitNum;
    uchar           Infor1;
    uchar           Infor2;
    uchar           Infor3;
    uchar           Infor4;
    uchar           Infor5;
    uchar           Infor6;
    uchar           Infor7;
    uchar           Infor8;
    uchar           SowState;
    uchar           PressUnit;
    uchar           velorflowunit;        //8
    signed int    crc;                    //2
  }Data;
  uint    Words[TxdWordLenth];
  uchar Bytes[TxdByteLenth];     //44
};
```

Checksum is the sum of the previous 44 bytes.

```
   for(i=0;i<(TxdByteLenth-2);i++) Txd.Data.crc=Txd.Data.crc+Txd.Bytes[i];
   for(i=0;i<TxdByteLenth;i++)TxdSend.Bytes[i]=Txd.Bytes[i];
```

at common mode ShowState=0x00；

Firstline ：the first line number displayed, signed int variable display the temperature value (or, display time under MAX/MIN mode). 10 times the value of the temperature

（if the data transferred back is 100, therefore, the temperature is 10.0）

Secondline： the second line number displayed, float variable display the pressure value, wind speed value, flow value or temperature value.

Thirdline： the third line number displayed, signed char variable Shows the number of cells stored.

when ShowState=0x01；

Firstline ：the first line number displayed, signed int variable display the temperature value (or, display time under MAX/MIN mode). 10 times the value of the temperature

（if the data transferred back is 100, therefore, the temperature is 10.0）

Secondline： the second line number displayed, float variable wind speed

Thirdline： the third line number displayed, signed char variable Shows the number of cells stored.

when ShowState=0x02；

Firstline ：the first line number displayed, signed int variable display the temperature value (or, display time under MAX/MIN mode). 10 times the value of the temperature

（if the data transferred back is 100, therefore, the temperature is 10.0）

Secondline：the second line number displayed, float variable the area set by pitot tube, when set into a rectangle, it’s the length of H. When set into a circle, it’s the length of D.

Thirdline：the third line number displayed, signed char variable　　Shows the number of cells stored.

when ShowState=0x03；

Firstline　：the first line number displayed,　signed int variable　　display the temperature value (or, display time under MAX/MIN mode).　10 times the value of the temperature

（if the data transferred back is 100, therefore, the temperature is 10.0）

Secondline：　the second line number displayed, float variable　　the area set by pitot tube, when it’s set into a rectangle, it’s the length of W.

Thirdline：　the third line number displayed, signed char variable　　Shows the number of cells stored.

when ShowState=0x03；

Firstline　：the first line number displayed,　signed int variable　　display the temperature value (or, display time under MAX/MIN mode).　10 times the value of the temperature

（if the data transferred back is 100, therefore, the temperature is 10.0）

Secondline：　the second line number displayed, float variable　　Flow values

Thirdline：　the third line number displayed, signed char variable　　Shows the number of cells stored.

At MAX/MIN mode

Firstline　：display the first line data, display time, the front byte is hour/minute, the following byte is minute/second. ie bytes[1], bytes[2] mentioned above.

Secondline : display the second line number and MAX/MIN/AVG related measurement variables. eg: 12345 will be displayed as 1.2-4, means 1.2×10^4.

Thirdline：the third line number displayed, signed char variable　　Shows the number of cells stored.

First of all,　Firstline　Secondline　Thirdline: no matter it display what number at what mode, the data will be shown as what it upload.

****

PressData　　record the pressure value, unit Pa

WindData　　record the wind speed value, unit m/s

FlowData　　flow value, unit m3/s

Tempe data　　record the temperature value　signed　int　10 times of the temperature value, unit Celsius

WD_DigitNum;　when the flow area which pitot tube calculate is set into a rectangle, when it display W= , the decimal point position. eg: Secondline=1.0, WD_DigitNum=1, therefore, the second line display data 1.0.　If Secondline=1.0, WD_DigitNum=0, thence, the second line data is 1.　When it's set into a circle, it display D=.　WD_DigitNum means the decimal point position of the D data, eg: Secondline=123.000, WD_DigitNum=2, therefore, the second line data is 123.00. If　Secondline=123.000, WD_DigitNum=0, therefore, the second　line data is 123.

H_DigitNum;　　when the flow area which pitot tube calculate is set into a rectangle, when it display H= ,　the decimal point position. eg: Secondline=1.0, H_DigitNum=1, therefore, the second line data displayed 1.0. If　Secondline=1.0,　H_DigitNum =0, therefore, the second line data display 1.

Press unit　:

0、doesn't display pressure unit　　1 、Pa　　2、PSI　　3、mbar　　4、inH2O　　5、mmH2O

VEL/Flow uint　　xxxx xxxx

VEL/Flow uint　　wind speed number 0 to number 4

Value of “VEL/Flow uint&0x0F” means the wind speed unit displayed

0 x00 doesn’t display pressure unit　　0x01display m/s　　0x02display ft/min　　0x03display MPH　　0x04 display Knots　　0x05 display km/h

VEL/Flow uint　wind speed number 4 to number 8 is the flow unit and display location

Value of　“VEL/Flow uint&0xf0” means flow unit displayed　　0x00 doesn’t display pressure unit,　0x10 display CFM ,　0x20 display CMM

Infor1	7	6	5	4	3	2	1	0
byte	Hour:min	min:Sec	**--:--(COL)**	TempUint	F(A)	C(A)	F(B)	C(B)
	1	1	1	1	1	1	1	1

Hour:min　：　1 display Hour:min character ,　0 doesn’t display Hour:min character

min:Sec　：1 display min:Sec character ,　0 doesn’t display min:Sec character

COL：　1 display : character　　0 display : character

TempUint　：　1 device using temperature unit C　　0 the device using temperature unit F

COL：　1 display : character　　0 display : character

F（A）:　1 display first line F character ,　0 doesn’t display the first line F character

C（A）:　1 display first line C character,　0 doesn’t display the first line C character

F（B）:　1 display second line F character ,　0 doesn’t display the second line F character

C（B）: 1 display second line C character , 0 doesn’t display the second line C character

Infor2	7	6	5	4	3	2	1	0
byte	AUTO	BAT	blacklight		TEMP	FLOW	VEL	PRESS
	1	0	1	1	1	1	1	1

AUTO： 1 display AUTO POWER OFF icon, 0doesn’t display AUTO POWER OFF icon

BAT： 1 display BAT, 0 doesn’t display BAT (low battery voltage)

blacklight：1 display blacklight（backlight ON）, 0 doesn’t blacklight（backlight off ）

TEMP ：1 displayTEMP , 0 doesn’t display TEMP

FLOW： 1 display FLOW, 0 doesn’t display FLOW

VEL：1 display VEL , 0 doesn’t display VEL

PRESS ：1 display low battery ico, 0 doesn’t display low battery icon

Infor3	7	6	5	4	3	2	1	0
byte	REC	MAX	MIN	AVG		firstline	firstline	firstline
	1	1	1	1		Character	REC	----

number 4 to number 7 of Infor3
when at MAX/MIN mode, REC character always display

REC： 1 display REC , 0 doesn’t display REC

MAX： 1 display MAX 0 doesn’t display MAX

MIN： 1 display MIN 0 doesn’t display MIN

AVG : 1 display AVG 0 doesn’t display AVG

Number 0 to number 2 of Infor3

character： 1 first line of LCD doesn’t display content 0 first line of LCD display content

-----： 1 first line of LCD display ----- 0 first line of LCD doesn’t display -----

REC： 1 first line of LCD doesn’t display REC 0 first line of LCD doesn’t display REC (when it display REC, means enter Recall mode)

Infor4	7	6	5	4	3	2	1	0
byte	secondline	secondline	secondline	secondline	secondline	thirdline	thirdline	thirdline
	character	OL	-OL	ERR	-----	character	------	FU

Number 4 to number 7 of Infor4

character： 1 second line of LCD doesn’t display content 0 second line of LCD display content

OL： 1 second line of LCD display OL 0 second line of LCD doesn’t display OL

-OL： 1 second line of LCD display -OL 0 second line of LCD display -OL

----- ： 1 second line of LCD display ----- 0 second line of LCD doesn’t display ----

Number 0 to number 2 of Infor4

character： 1 third line of LCD doesn’t display content 0 third line of LCD display content

----- ： 1 third line of LCD display ----- 0 third line of LCD doesn’t display -----

FU： 1 third line of LCD display FU 0 third line of LCD doesn’t display FU

Infor5	7	6	5	4	3	2	1	0
byte	HOLD	SETUP	MEM	Clear	PC	H=	W=	D=
	1	1	1	1	1	1	1	1

HOLD： 1 show HOLD icon， 0 doesn’t show HOLD icon

SETUP： 1 show SETUP icon， 0 doesn’t show HOLD icon

MEM： 1 show MEM icon， 0 doesn’t show MEM icon

Clear： 1 show Clear icon， 0 doesn’t show Clear icon

PC： 1 show PC icon， 0 doesn’t show PC icon

H=： 1 show H= icon， 0 doesn’t show H= icon

W= ： 1 show W= icon， 0 doesn’t show W= icon

D= ： 1 show D= icon， 0 doesn’t show D= icon

Infor6	7	6	5	4	3	2	1	0
byte		unit	in	cm	Duct shape	□	○	shape
	1	1	1	1	1	1	1	1

unit 1 length unit which the meter selects, 0 cm is the length unit which the meter selects
in 1 show unit in 0 doesn’t show the unit in

cm： 1 show unit cm 0 doesn’t show the unit cm

Duct shape： 1 show Duct shape icon 0 doesn’t show Duct shape icon

□ : 1 show the square icon , 0 doesn’t show the square icon

○ : 1 show the round icon , 0 doesn’t show the round icon

Shape： 1 shape which pitot tube selected is square □ 0 shape which pitot tube selected is round ○

Infor7	7	6	5	4	3	2	1	0
byte								ZeroState

ZeroState： 1 the meter is becoming ZERO state 0 the meter is not at ZERO state

Note:

When flow is display: the calculation fomular for the flow displayed:

CMM: SecondLine =FlowData*60

CFM: SecondLine =FlowData* *6.4516/10000;

Pressure unit conversion factor

```
const float    PressUnitQuotiety[6]=      //pressure parameter array
                    {
                          1.0,                        //    Pa
                          0.00014505367,              //1psi
                          0.01,                       // mbar
                          0.004014678,                //nH2O
                          0.010197282,                //    mmH2O       };
Wind speed unit conversion factor
const float    AnemometerQuotiety[5]=    //wind speed parameter array
                    {
                         1.0,      //m/s

                         196.85,//    ft/min = 196.85*m/s                80 - 5900

                         3.6 ,// km/h    =      3.6* m/s                  1.4 - 108.0

                         2.23693632,//      MPH =      2.23693632* m/s          0.9 - 67.0

                         1.94384466 // Knots    =    1.94384466 *m/s          0.8 - 58.0

                    };
```

communication protocols for computer controlling instrument

Identify code		Command word	Function	
uchar	uchar	uchar		
0xaa0xbb		0x01	Connect the instrument, request to send data	
0xaa0xbb		0x02	Dis-connect the instrument, prohibits receiving data	
0xaa0xbb		0x03	Save/Delect button	
0xaa0xbb		0x04	Hold button	
0xaa0xbb		0x05	P/V/F button	
0xaa0xbb		0x06	Max/min/avg button	
0xaa0xbb		0x07	Exit Max/min/avg state	
0xaa0xbb		0x08	Press Setup backlight button to trun on/off backlight	
0xaa0xbb		0x09	Up button	
0xaa0xbb		0x0a	Down button	
0xaa0xbb		0x0b	Rec/Avg button	
0xaa0xbb		0x0c	Send handshake information (send command after receiving 5 groups)	
0xaa0xbb		0x0d	Power off	
0xaa0xbb		0x0e	Keep pressing Hold button for 2 seconds to ZERO pressure	
0xaa0xbb		0x0f	Keep pressing Rec/Avg button for 2 seconds to enter or exit Recall mode	
0xaa0xbb		0x10	Keep pressing Setup button for 2 seconds to enter or exit Setup mode	

Note:

1. Need to send the handshake information with Red color in above.