

HJ269 交互式无线（Lora）温振一体传感器规格书

（电池供电版本）

V1.5

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简介

HJ269 是我司新开发的一套**无线远程交互式**振动传感器。即传感器的采集时间，采集方式完全有主机通过命令实现。

其主要特点是：

- 传感器平时处在低功耗状态
- 传感器可以随时响应远程主机控制命令
- 传感器可采集特征值或者原始加速度数据
- 最新 lora 技术，提高了传输速率
- 多振动（或者配合电流电压等）传感器同步采集功能

这样的特点使得该传感器非常适合以下要求：

同时满足监测和诊断要求，按需采集波形文件。例如在设备开机过程中，需要监测特定的波形数据以及频谱分析。

在特定的时候进行数据采集。

多传感器同步采集：在某些诊断场合，可要求多个振动传感器同步采集。同步开始精度在 1ms 以内。

加速度 0Hz~1KHz；

速度 1Hz~1KHz；

位移 1Hz~1KHz；

采样速率 32Hz~4kHz 可设定；

采样分辨率 20bit，最高可达 3.9ug 分辨率

测量通道： 3 轴；

温度测量-40℃ ~ 85℃，测量精度±0.5℃；

LORA 433MHz 免费频段；

建筑物内传输有效距离>3000m（视距）；

三轴加速度值（±8G）；

三轴速度值(0-500mm/s)；

三轴位移值(0-10mm)；

三轴频谱最高频率以及幅度值

电池电压、低电压报警；

三轴重力矢量或倾斜度（可判断传感器位置是否有移动）；

加速度时间波形（根据云端命令发送）

电池容量：电池单节 1 号锂亚电池（电量 19000mA/H）。

也可以选择 12V~24V 供电版本。

电池寿命：按 30 分钟上报一次 > 3 年；

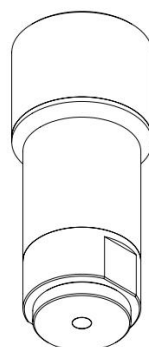
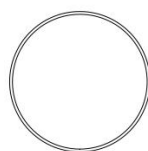
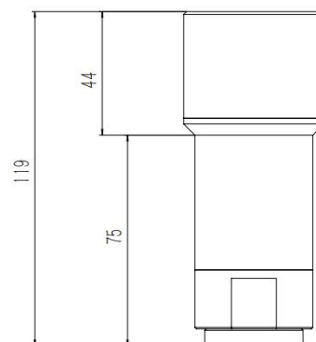
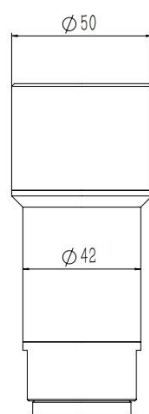
防护等级：IP67，表面耐腐蚀；

防爆等级：EXia II BT4；

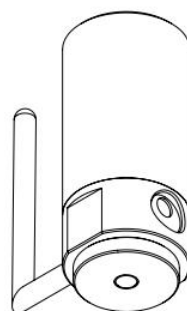
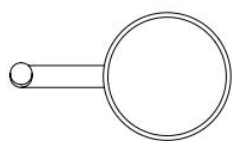
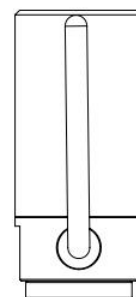
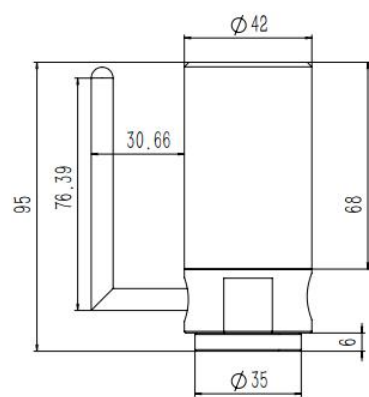
安装方式：磁吸座/M8 螺纹/胶粘安装可选；

结构尺寸

天线内置版本（单位 mm）



天线外置版本（单位 mm）



协议说明

HJ269 支持多传感器同步采集，多传感器数据缓存并分批发送功能。
HJ269 按照传感器分包进行数据传输。

传感器编号说明

每个传感器具有一个编号(SID)。编号由组号和组内号组成。每个传感器归入一个组别(GID)，例如传感器编号 101，表明传感器组号是 1，组内号为 01；传感器编号 112 表明组号是 1，组内号 12。即传感器通过编号计算组号公式为：

组号 = 编号/100 组内编号 = 编号%100

组内编号范围从 1 到 99。

传感器通讯协议

传感器跟我司网关通过私有 lora 协议通讯。网关通过网线接入 TCP/IP 网络。协议通过 mqtt 协议进行数据传输与命令控制。

下行命令

若需要发送一个控制命令到某个传感器，通过发送特定 JSON 格式字符串到主题：
hjvibra/1/tx

1 是网关的编号，不同的网关有不同的编号。不同编号网关使用不同频段，这样在同一个区域内可以多个网关同时部署互相不冲突。

下行命令基本格式：

```
{"adr":sensorid,"cmd":"command"}
```

命令有地址部分 adr 和 具体命令 cmd 两部分组成。

adr - 指明需要执行该命令的传感器

目前对外开放的几个命令如下：

唤醒命令

```
{"adr":202,"cmd":"wakeup"}
```

该命令将 202 号传感器唤醒。其他命令执行之前需要先执行该命令。一般命令顺序为：

1. {"adr":202,"cmd":"wakeup"}
2. 延时 500 毫秒
3. {"adr":202,"cmd":"start 2 1000 9"}

注意，下面的其他命令都需要先调用唤醒命令，之后才能执行对应命令。

在唤醒命令下达之后，传感器会等待 2 秒时间等待接收其他正式命令。如果在 2 秒内没有任何有效命令。则传感器重新进入低功耗等待状态。上位机就需要重新发送唤醒命令。为了降低功耗，推荐唤醒命令之后 500ms 内进行其他命令操作。

开始数据采集命令

命令格式为：

start groupid samples sid

groupid - 组号，这个组号必须同传感器配置的组号一致，传感器才会接受命令。

samples - 一个 16 进制数值，代表本次采样的数据量

sid - 本次采集的采集号，这个采集号在后续数据上传命令中会有用到。可以使用 1-9。

举例 1：

请求 202 号传感器开始采集 4096 个点数据，采集号为 9

```
{"adr":202,"cmd":"start 2 1000 9"}
```

2 为组号，必须一致。1000 为 16 进制，即 4096，9 为采集号

举例 2：

请求 1 组内的所有传感器同步开始采集，采集号为 3

```
{"adr":65535,"cmd":"start 1 27100 3"}
```

该命令要求所有组别为 1 的传感器开始采集数据，采集的数据量为 0x27100（即 10 进制的 4000x40=160000 采样点，对于一个 4000HZ 的采样率而言，刚好是 40 秒数据）

65535（0xffff）是个特殊的编号，代表这该命令是广播命令，发给所有的组内成员。

27100 是 16 进制数，也可以根据实际需要采样数目改成其他数值。

这里 3 为本次采集的采集号，数据上传时候该采集号会上传。

如果传感器配置有指示灯，采集命令过程中指示灯会常亮。

开始上传实时数据

举例

```
{"adr":101,"cmd":"upload 3 7"}
```

该命令为要求编号为 101 的传感器开始上传之前采集到的三轴实时数据，当时的采集编号为 3。

7 代表 x,y,z 轴数据。这里可以选择任意一轴或者两轴或者 3 轴数据上传。数字的 BIT0 代表 x 轴，BIT1 代表 y 轴，BIT2 代表 z 轴数据。即：

- 1-上传 x 轴数据
- 2-上传 y 轴数据
- 4-上传 z 轴数据
- 3- 上传 xy 轴数据
- 5- 上传 xz 轴数据
- 6- 上传 yz 轴数据
- 7- 上传 xyz 三轴数据
- 8- 只上传特征值包

在选择上传时候，需要一个一个的请求传感器上传，不能广播命令给所有传感器让数据上传，这会导致数据丢失，即 adr 值不能为 65535。

如果传感器配置有指示灯，上传过程中指示灯会闪烁。

上行数据说明

传感器上传给主机的主题格式为

hjvibra/GW/rx/SID

举例 101 号传感器上传的上行数据发送的主题为 hjvibra/1/rx/101，这里 101 是编号为 101 的传感器。即上位机需要接收该传感器的数据就需要订阅该主题下。

若在一个 MQTT 服务器上需要接收所有网关和传感器信息，则通过 MQTT TOPIC 的通配符来解决。订阅主题为：hjvibra+/rx/+

这样所有传感器的信息都能接收到。

传感器收到开始上传数据命令之后，就开始分包上传。

第 0 号编号包为参数包，不含具体加速度数据。举个例子如下：

```
{"id":101,"num":0,"samples":16,"status":0,"sum":4576,"data":[101,4096,69,1,314,3,-14,2,0,0,4,0,0,0,0,0]}
```

Id : 传感器编号

num: 该包序号为 0，代表这个包里面包含参数，不包含加速度值

samples: 说明 data 段后面的数据量

status: 数据状态, 若为 0, 则数据包正常。若为 1, 则数据包有错误, 需要丢掉重新选择单包上传

sum: data 字段内所有数据累加和

data 字段分别内容如下:

1. 传感器编号
2. 总数据量
3. Lora 传输数据包总数
4. 轴数即 upload 传递进去的参数, 目前即为 3
5. 温度*10
6. 此次采集号, 为 start 命令传递进去的采集编号
7. RSSI - 即信号强度, 绝对值越小表示信号越好。一般要求 RSSI 不能小于-100。要不然无法可靠传输数据。
8. 传感器量程 1 - 2g 2-4g 3-8g
9. 采样率

值与实际采样率对应如下:

- 0 - 4000Hz
- 1 - 2000Hz
- 2 - 1000Hz
- 3 - 500Hz
- 4 - 250Hz
- 5 - 125Hz
- 6 - 62.5Hz
- 7 - 31.25Hz
- 8 - 15.625Hz

10. 保留
11. 为 MQTT 包数目

其他未列的保留尚未使用。

从偏移 12 开始之后是振动特征值 (该部分内容为某些版本传感器具有, 单纯加速度数据该部分值均为 0 或者没有)

12. X 加速度特征值 x 1000 单位 m/s^2
13. Y 加速度特征值 x 1000 单位 m/s^2
14. Z 加速度特征值 x 1000 单位 m/s^2
15. X 速度特征值 x 1000 单位 mm/s
16. Y 速度特征值 x 1000 单位 mm/s
17. Z 速度特征值 x 1000 单位 mm/s

18. X 位移特征值 x 1000 单位 μm
19. Y 位移特征值 x 1000 单位 μm
20. Z 位移特征值 x 1000 单位 μm
21. X 加速度 重力方向分量 x 1000 单位 m/s^2
22. Y 加速度 重力方向分量 x 1000 单位 m/s^2

- 23. Z 加速度 重力方向分量 x 1000 单位 m/s^2
- 24. X 加速度 FFT 主频率 单位 Hz
- 25. Y 加速度 FFT 主频率 单位 Hz
- 26. Z 加速度 FFT 主频率 单位 Hz
- 27. X 加速度 FFT 幅值最大值 x 1000 单位 m/s^2
- 28. Y 加速度 FFT 幅值最大值 x 1000 单位 m/s^2
- 29. Z 加速度 FFT 幅值最大值 x 1000 单位 m/s^2

从序号为 1 开始的包为加速度数据包，举例如下：

下面例子是一个序号为 1 的包，1200 代表这个包里面的数据量。

data 字段里面数据按照根据上传数据的维数做排列，例如若 upload 参数为 3，即上传 xy 轴数据，则数据排列为[x1,y1,x2,y2...

status 若为 0，则改包正常。若为 1，则该 mqtt 包有丢包或者误码。

sum 为所有 data 里面的值的累加和。

实际例子：

```
{
  "id": 101,
  "num": 1,
  "samples": 1200,
  "status": 0,
  "sum": -12760478,
  "data": [
    -10757, -10709, -10654, -10540, -10539, -10636, -10618, -10628, -10698, -10600, -10592, -10846, -10756, -10685, -10775,
    -10775, -10753, -10757, -10637, -10719, -10836, -10809, -10721, -10719, -10716, -10595, -10543, -
    10591, -10607, -10703, -10577, -10465, -10447, -10485, -10456, -10517, -10605, -10600, -10563, -1
    0501, -10470, -10380, -10566, -10524, -10492, -10515, -10563, -10534, -10614, -10670, -10635, -10
    664, -10676, -10719, -10698, -10836, -10829, -10781, -10703, -10755, -10719, -10685, -10713, -106
    94, -10747, -10602, -10572, -10699, -10691, -10519, -10606, -10629, -10590, -10650, -10505, -1053
    1, -10623, -10514, -10438, -10542, -10620, -10598, -10467, -10515, -10582, -10667, -10681, -10703,
    -10812, -10755, -10775, -10706, -10709, -10770, -10847, -10781, -10696, -10790, -10716, -10690, -
    10740, -10792, -10813, -10730, -10657, -10593, -10714, -10701, -10664, -10542, -10660, -10656, -1
    0600, -10646, -10497, -10501, -10546, -10519, -10510, -10433, -10516, -10615, -10424, -10522, -10
    583, -10520, -10487, -10580, -10667, -10781, -10681, -10644, -10808, -10754, -10770, -10869, -108
    48, -10778, -10827, -10853, -10728, -10632, -10698, -10768, -10835, -10727, -10669, -10640, -1064
    7, -10707, -10611, -10591, -10645, -10565, -10591, -10601, -10633, -10488, -10483, -10545, -10542,
    -10627, -10545, -10559, -10449, -10496, -10538, -10610, -10721, -10761, -10733, -10779, -10707, -
    10732, -10714, -10597, -10709, -10686, -10670, -10702, -10789, -10749, -10637, -10572, -10785, -1
    0778, -10684, -10628, -10553, -10568, -10617, -10520, -10442, -10450, -10438, -10474, -10584, -10
    558, -10504, -10479, -10510, -10458, -10485, -10590, -10574, -10630, -10623, -10591, -10656, -106
    91, -10712, -10818, -10812, -10746, -10698, -10734, -10669, -10811, -10774, -10754, -10709, -1065
    9, -10659, -10679, -10618, -10546, -10685, -10632, -10471, -10505, -10477, -10545, -10505, -10582,
    -10514, -10613, -10604, -10636, -10561, -10484, -10666, -10614, -10484, -10550, -10528, -10633, -
    10726, -10614, -10566, -10574, -10693, -10752, -10799, -10781, -10741, -10790, -10706, -10712, -1
  ]
}
```

0762,-10766,-10606,-10673,-10556,-10640,-10654,-10655,-10655,-10555,-10539,-10561,-10571,-10559,-10502,-10561,-10467,-10510,-10519,-10403,-10537,-10473,-10446,-10407,-10524,-10506,-10556,-10581,-10552,-10596,-10606,-10696,-10623,-10641,-10723,-10709,-10734,-10809,-10747,-10722,-10717,-10806,-10822,-10774,-10637,-10649,-10764,-10658,-10497,-10587,-10705,-10541,-10353,-10485,-10615,-10674,-10565,-10586,-10488,-10474,-10617,-10585,-10719,-10608,-10563,-10590,-10785,-10687,-10703,-10615,-10647,-10713,-10723,-10790,-10725,-10808,-10703,-10714,-10798,-10832,-10691,-10695,-10776,-10829,-10722,-10595,-10626,-10606,-10657,-10631,-10582,-10561,-10538,-10682,-10596,-10510,-10509,-10499,-10532,-10525,-10570,-10537,-10469,-10556,-10668,-10595,-10608,-10597,-10681,-10739,-10688,-10713,-10656,-10683,-10694,-10696,-10743,-10765,-10833,-10883,-10732,-10752,-10848,-10688,-10651,-10651,-10632,-10596,-10486,-10594,-10726,-10623,-10561,-10587,-10548,-10439,-10517,-10537,-10419,-10420,-10529,-10566,-10609,-10581,-10563,-10734,-10843,-10794,-10623,-10670,-10760,-10651,-10708,-10785,-10668,-10655,-10733,-10602,-10781,-10794,-10754,-10665,-10696,-10737,-10692,-10762,-10800,-10707,-10627,-10671,-10605,-10684,-10581,-10514,-10547,-10394,-10472,-10475,-10494,-10501,-10547,-10573,-10434,-10512,-10470,-10518,-10439,-10471,-10505,-10492,-10605,-10654,-10768,-10744,-10733,-10766,-10729,-10749,-10714,-10826,-10748,-10731,-10772,-10842,-10832,-10748,-10608,-10650,-10659,-10588,-10625,-10687,-10644,-10518,-10655,-10665,-10494,-10486,-10515,-10506,-10460,-10499,-10608,-10663,-10677,-10590,-10609,-10583,-10651,-10591,-10698,-10799,-10695,-10710,-10807,-10740,-10731,-10814,-10743,-10804,-10682,-10775,-10793,-10699,-10705,-10757,-10807,-10668,-10584,-10572,-10561,-10463,-10493,-10601,-10615,-10592,-10539,-10429,-10397,-10392,-10458,-10542,-10521,-10492,-10523,-10556,-10597,-10596,-10643,-10762,-10751,-10768,-10695,-10741,-10721,-10680,-10719,-10720,-10808,-10784,-10781,-10771,-10746,-10755,-10641,-10670,-10726,-10620,-10629,-10605,-10482,-10530,-10572,-10532,-10565,-10553,-10541,-10539,-10431,-10521,-10506,-10456,-10651,-10684,-10631,-10573,-10706,-10745,-10734,-10729,-10708,-10705,-10671,-10738,-10844,-10743,-10741,-10745,-10660,-10725,-10680,-10696,-10701,-10682,-10610,-10619,-10698,-10681,-10585,-10410,-10532,-10696,-10633,-10509,-10605,-10472,-10374,-10358,-10524,-10500,-10554,-10610,-10577,-10472,-10459,-10548,-10636,-10626,-10631,-10481,-10504,-10728,-10713,-10634,-10660,-10883,-10807,-10629,-10633,-10595,-10692,-10817,-10703,-10757,-10785,-10671,-10674,-10614,-10560,-10566,-10641,-10493,-10585,-10547,-10515,-10443,-10381,-10437,-10363,-10533,-10632,-10568,-10539,-10665,-10573,-10583,-10611,-10594,-10605,-10661,-10582,-10578,-10649,-10727,-10854,-10776,-10849,-10756,-10775,-10614,-10692,-10731,-10635,-10622,-10719,-10665,-10623,-10560,-10603,-10609,-10502,-10574,-10492,-10586,-10507,-10660,-10644,-10409,-10350,-10497,-10367,-10478,-10502,-10537,-10471,-10577,-10628,-10539,-10716,-10676,-10610,-10534,-10605,-10567,-10601,-10814,-10920,-10696,-10681,-10680,-10694,-10838,-10825,-10789,-10813,-10654,-10691,-10714,-10541,-10583,-10462,-10597,-10593,-10618,-10406,-10513,-10614,-10491,-10498,-10561,-10533,-10584,-10570,-10491,-10566,-10714,-10682,-10614,-10700,-10696,-10762,-10713,-10795,-10805,-10763,-10896,-10906,-10908,-10731,-10758,-10837,-10823,-10804,-10750,-10750,-10795,-10713,-10560,-10707,-10740,-10597,-10483,-10499,-10578,-10509,-10557,-10383,-10488,-10645,-10678,-10581,-10579,-10540,-10504,-10548,-10493,-10542,-10505,-10497,-10703,-10704,-10631,-10685,-10703,-10753,-10815,-10796,-10830,-10941,-10925,-10939,-10814,-10700,-10676,-10700,-10790,-10714,-10744,-10592,-10586,-10632,-10533,-10599,-10596,-10675,-105

70,-10478,-10385,-10609,-10686,-10633,-10556,-10565,-10631,-10575,-10628,-10577,-10600,-10672,-10766,-10665,-10715,-10798,-10838,-10737,-10662,-10695,-10740,-10762,-10676,-10631,-10656,-10692,-10722,-10567,-10693,-10675,-10715,-10631,-10574,-10484,-10572,-10660,-10604,-10573,-10604,-10656,-10544,-10392,-10374,-10265,-10462,-10519,-10507,-10464,-10516,-10605,-10573,-10528,-10589,-10586,-10515,-10484,-10475,-10637,-10771,-10896,-10836,-10672,-10655,-10643,-10677,-10782,-10840,-10771,-10630,-10701,-10668,-10532,-10527,-10532,-10487,-10565,-10510,-10493,-10534,-10507,-10449,-10458,-10428,-10515,-10436,-10486,-10572,-10698,-10704,-10669,-10760,-10732,-10669,-10652,-10750,-10806,-10723,-10722,-10696,-10759,-10759,-10734,-10724,-10640,-10696,-10680,-10599,-10705,-10732,-10677,-10561,-10485,-10502,-10525,-10504,-10559,-10482,-10464,-10487,-10334,-10384,-10457,-10646,-10536,-10519,-10611,-10595,-10498,-10629,-10658,-10666,-10556,-10601,-10558,-10657,-10663,-10766,-10790,-10763,-10798,-10761,-10665,-10694,-10761,-10798,-10725,-10703,-10737,-10573,-10556,-10660,-10664,-10748,-10662,-10510,-10547,-10587,-10542,-10560,-10469,-10536,-10495,-10443,-10522,-10565,-10634,-10575,-10572,-10621,-10629,-10591,-10686,-10810,-10870,-10885,-10806,-10711,-10779,-10715,-10684,-10827,-10829,-10717,-10634,-10642,-10689,-10710,-10708,-10616,-10726,-10785,-10665,-10600,-10634,-10707,-10622,-10518,-10564,-10589,-10473,-10520,-10478,-10519,-10506,-10579,-10556,-10545,-10570,-10586,-10586,-10624,-10539,-10596,-10718,-10680,-10658,-10706,-10839,-10881,-10783,-10745,-10750,-10712,-10759,-10860,-10806,-10752,-10722,-10659,-10695,-10715,-10658,-10524,-10565,-10682,-10521,-10442,-10493,-10530,-10612,-10516,-10622,-10541,-10446,-10695,-10659,-10550,-10532,-10646,-10596,-10590,-10739,-10738,-10671,-10743,-10863,-10825,-10746,-10806,-10824,-10655,-10744,-10784,-10779,-10786,-10671,-10798,-10697,-10677,-10577,-10538,-10695,-10689,-10681,-10599,-10572,-10548,-10491,-10475,-10439,-10586,-10634,-10677,-10502,-10454,-10496,-10444,-10480,-10559,-10614,-10672,-10641,-10617,-10659,-10757,-10713,-10722,-10700,-10811,-10825,-10789,-10789,-10516,-10565,-10617,-10688,-10769,-10768,-10678,-10692,-10641,-10552,-10645,-10611,-10469,-10511,-10496,-10520,-10484,-10383,-10493,-10482,-10500,-10494,-10641,-10586,-10650,-10599,-10528,-10502,-10564,-10575,-10593,-10660,-10640,-10727,-10676,-10760,-10802,-10744,-10696,-10676,-10715,-10759,-10782,-10815,-10534,-10514,-10514,-10681,-10681,-10721,-10632,-10623,-10723,-10670,-10627,-10597,-10533,-10588,-10519,-10487,-10441,-10508,-10583,-10595,-10523,-10650,-10501,-10498,-10622,-10688,-10595,-10674,-10748,-10716,-10705,-10608,-10748,-10808,-10711,-10860,-10732,-10826,-10664,-10695,-10741,-10635,-10646,-10635,-10566,-10541,-10564,-10578,-10511,-10497,-10514,-10480,-10583,-10671,-10573,-10455,-10472,-10527,-10533}}

最后一个包内容

```
{ "id":101,"num":4,"samples":496,"status":0,"sum":-5272941,"data":[-10512,-10699,-10763,-10770,-10765,-10750,-10773,-10784,-10716,-10782,-10777,-10789,-10759,-10759,-10739,-10655,-10692,-10767,-10658,-10673,-10735,-10632,-10640,-10602,-10549,-10523,-10506,-10515,-10567,-10395,-10414,-10419,-10423,-10404,-10343,-10620,-10564,-10579,-10610,-10605,-10695,-10764,-10697,-10639,-10553,-10546,-10668,-10688,-10772,-10809,-10771,-10749,-10637,-10716,-10737,-10802,-10784,-10692,-10598,-10556,-10512,-10605,-10672,-10645,
```

-10527,-10379,-10415,-10541,-10511,-10461,-10430,-10503,-10549,-10390,-10619,-10695,-10619,-10554,-10651,-10574,-10614,-10684,-10694,-10550,-10700,-10755,-10832,-10798,-10711,-10752,-10694,-10644,-10669,-10568,-10596,-10685,-10733,-10586,-10591,-10525,-10628,-10459,-10460,-10492,-10444,-10435,-10429,-10551,-10546,-10457,-10533,-10610,-10576,-10524,-10524,-10487,-10511,-10483,-10492,-10438,-10603,-10600,-10690,-10703,-10767,-10777,-10631,-10777,-10765,-10845,-10683,-10751,-10659,-10656,-10688,-10623,-10616,-10642,-10626,-10626,-10613,-10598,-10722,-10641,-10487,-10436,-10503,-10635,-10637,-10448,-10368,-10527,-10573,-10665,-10516,-10479,-10534,-10596,-10657,-10677,-10673,-10704,-10691,-10669,-10713,-10769,-10830,-10797,-10848,-10738,-10667,-10700,-10664,-10685,-10708,-10640,-10660,-10698,-10667,-10601,-10479,-10539,-10560,-10533,-10570,-10523,-10611,-10570,-10433,-10480,-10455,-10466,-10487,-10496,-10394,-10440,-10523,-10664,-10655,-10578,-10667,-10605,-10628,-10541,-10832,-10877,-10713,-10740,-10755,-10633,-10761,-10825,-10772,-10473,-10591,-10681,-10643,-10581,-10628,-10588,-10636,-10544,-10556,-10572,-10519,-10622,-10563,-10543,-10507,-10501,-10609,-10482,-10547,-10555,-10597,-10487,-10588,-10689,-10681,-10789,-10712,-10645,-10749,-10709,-10673,-10757,-10788,-10848,-10729,-10672,-10779,-10797,-10669,-10665,-10670,-10717,-10659,-10590,-10584,-10688,-10707,-10516,-10528,-10517,-10439,-10453,-10532,-10484,-10415,-10527,-10518,-10547,-10572,-10489,-10419,-10484,-10515,-10434,-10597,-10803,-10721,-10679,-10712,-10610,-10833,-10875,-10809,-10752,-10722,-10762,-10863,-10822,-10700,-10723,-10677,-10545,-10641,-10650,-10592,-10497,-10397,-10447,-10479,-10507,-10535,-10514,-10517,-10501,-10504,-10495,-10551,-10438,-10500,-10587,-10752,-10657,-10555,-10619,-10679,-10728,-10620,-10800,-10618,-10735,-10741,-10784,-10775,-10768,-10756,-10769,-10668,-10813,-10734,-10818,-10689,-10722,-10699,-10635,-10652,-10715,-10615,-10655,-10597,-10550,-10465,-10484,-10570,-10576,-10581,-10493,-10498,-10536,-10467,-10464,-10489,-10641,-10609,-10600,-10554,-10601,-10731,-10695,-10620,-10673,-10667,-10771,-10730,-10791,-10856,-10899,-10906,-10766,-10775,-10874,-10791,-10518,-10516,-10714,-10680,-10668,-10598,-10614,-10669,-10547,-10579,-10603,-10615,-10601,-10577,-10678,-10623,-10586,-10516,-10534,-10555,-10560,-10829,-10649,-10601,-10775,-10780,-10745,-10821,-10880,-10786,-10792,-10684,-10823,-10803,-10772,-10719,-10816,-10818,-10783,-10830,-10880,-10723,-10597,-10493,-10624,-10617,-10608,-10469,-10414,-10527,-10615,-10454,-10485,-10672,-10538,-10370,-10487,-10564,-10597,-10643,-10515,-10590,-10636,-10714,-10727,-10709,-10644,-10604,-10674,-10729,-10763,-10816,-10702,-10799,-10778,-10678,-10718,-10768,-10722,-10582,-10701,-10766,-10793,-10654,-10574,-10424,-10511,-10653,-10429,-10448,-10359,-10516,-10662,-10628,-10535,-10401,-10502,-10590,-10579,-10695,-10667,-10530,-10506,-10590,-10755,-10699,-10683,-10653,-10858,-10816,-10788,-10662,-10678,-10740,-10675,-10630,-10667,-10615,-10569,-10554,-10689]]

量程 4g 情况下，得到的数值 x7.8ug 则得到 ug 单位

特定 MQTT 包上传

在 upload 命令之后，若有些包有错误，即包内 status 值为 1，或者有些 MQTT 丢包，则需要通过 mqttpack 命令请求传感器重新上传该包数据。

```
{"adr":101,"cmd":"mqttpack 6 3 8"}
```

6 - SID，即 start 命令中的采集号

3 - 选择轴数，这里要跟之前 upload 的参数一致。即 mqttpack 命令只能在 upload 命令之后使用。

8 - 这里是指定 num 为 8 的 MQTT 包上传。若在传输过程中监测到 num 为 8 的 MQTT 包 status 为 1，或者缺少该 MQTT 包，则需要重新上传该包。需要注意 mqttpack 的参数都是 16 进制表示，即例如 mqtt 包 num 为 10，则 mqttpack 后面参数为 a

修改采样频率

```
{"adr":101,"cmd":"setv 7 xx"}
```

xx 为下列值之一：

0 - 4000Hz

1 - 2000Hz

2 - 1000Hz

3 - 500Hz

4 - 250Hz

5 - 125Hz

6 - 62.5Hz

7 - 31.25Hz

8 - 15.625Hz

修改量程

设定 2g 量程：

```
{"adr":101,"cmd":"setv 8 c1"}
```

设定 4g 量程：

```
{"adr":101,"cmd":"setv 8 c2"}
```

设定 8g 量程：

```
{"adr":101,"cmd":"setv 8 c3"}
```

修改空中速率（正常情况下，不推荐）

如果丢包严重，可以试图降低空中速率来缓解丢包情况。空中速率需要传感器和网关都修改。缺省出厂空中速率为 3。 目前支持以下参数：

- 2 - 2.4k
- 3 - 4.8k
- 4 - 9.6k
- 5 - 19.2k
- 6 - 38.4k

要修改传感器空中速率为 4，按照以下两个命令

```
{"adr":65535,"cmd":"setv 1e 4"}
{"adr":65535,"cmd":"RESET"}
```

然后再修改网关

```
{"adr":1,"config":"setv lora_bps 4"}
{"adr":1,"config":"RESET"}
```

传感器的开机和关机

正常出厂状态传感器处于关机状态，即不会监听也不会收发数据。

对于有按钮的传感器，则长按按钮，看到灯亮一会儿，表示传感器已经进入开机状态。这个时候就进入监听状态，上位机可以发送命令进行操作。

若在开机状态想关闭传感器，则也是长按按钮，看到传感器灯快闪三下，则进入关机状态。

传感器缺省设置为上电即自动开机。即更换电池之后，传感器自动进入开机状态，而不需要长按按钮进行开机动作。

对于没有按钮的天线内置的传感器，则出厂的时候，电池与主板的连线的对接插头是分开的。需要按照要求接上接通电池才能进入开机状态。

传感器重启

```
{"adr":101,"cmd":"RESET"}
```

网关重启

```
{"adr":1,"config":"RESET"}
```

网关使用说明

通过网线接入到路由器或者电脑。

若选择电脑，则选择固定 ip 地址；若是接入路由器，则配置 ip 为 DHCP 动态获得方式。

电源供电为 9-24V 直流范围均可。缺省出厂自带 12V 电源。

配置说明

配置接口使用一条 microUSB 的线接入电脑，该接口会在电脑端生成一个串口。可通过串口工具对网关进行配置。

该串口需要下载驱动程序。下载链接请至官方驱动链接：

<http://www.wch.cn/products/CH340.html>

串口工具推荐可使用

SSCOM

本说明书中所使用的为 SSCOM V5.12

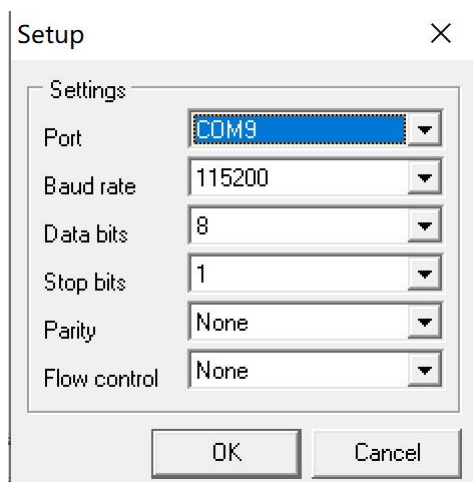
配置串口设置为

波特率 115200

数据位 8

停止位 1

无校验位以及流控制



显示当前配置信息命令（注意命令后面需要有回车或者勾上“加回车换行”）

dumpall

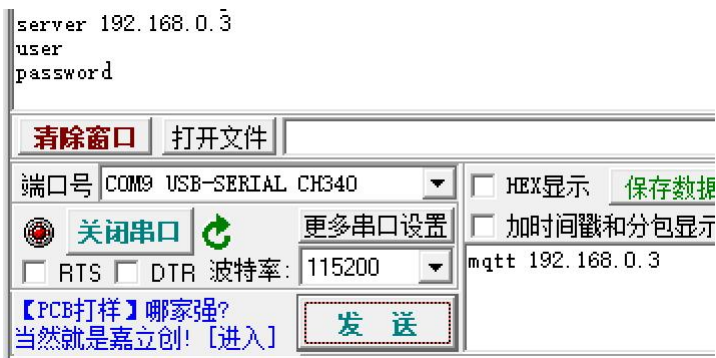
显示所有当前网关所有配置信息



设定 mqtt 设置:

mqtt

例子：设定 mqtt 服务器地址。这里的地址即 HJGW100 网关的 IP 地址。如果接入路由器，则需要通过路由器管理界面知道该地址。



RESET

```
.0:32mI (547) system_api: Base MAC address is not set [0m  
.0:32mI (547) system_api: read default base MAC address from EFUSE [0m  
.0:32mI (577) esp_eth.netif.glue: 7c:9e:bd:04:32:fb [0m  
.0:32mI (577) esp_eth.netif.glue: ethernet attached to netif [0m  
.0:32mI (587) eth_example: Ethernet Started [0m  
.0:32mI (587) IoTgw: MQTT init [0m  
.0:32mI (587) uart: queue free spaces: 20 [0m  
.0:32mI (587) SLAVE_TEST: Modbus slave stack initialized. [0m  
.0:32mI (587) SLAVE_TEST: Start modbus test... [0m  
.0:32mI (597) eth_example: Free memory: 216020 bytes [0m
```



恢复出厂设置：

FACTORY

staticip

设定固定 IP

staticip 192.168.0.5 255.255.255.0 192.168.0.1

三个参数分别是 IP 地址，netmask 和 gateway

恢复 DHCP 方式

dhcpi

附录：采集小工具

在购买了传感器之后，请向客服获取。

HJ269交互式温度振动采集测试软件

连接
IP地址:

端口:

订阅
订阅主题:

推送
推送主题:

接收mqtt消息
开始采集，请等待采集完成再执行上传命令...
上传开始...
id:203
num:0
samples:32
采集总数据量:12288
采集维数:7
RSSI:-17
采集号:9
MQTT 包数目:11
温度:23.3
xacc=0.007
yacc=0.008
zacc=0.01
xvel=0.019
yvel=0.019
zvel=0.019

功能区
网关号
传感器号
采集号
采样数量
上传维数

使用步骤：

输入 MQTT 地址

按连接

按订阅

输入正确的网关号

输入传感器号或输入 65535 则进行组内传感器同步采集

输入采集号，可以 1-9 范围内

采样点数

上传维数，参考 upload 命令里面的维数说明

点击**采集**按钮，如果有指示灯的传感器，则会看到灯亮起。注意，传感器本身不会应答。

根据采集数量和采样频率，**等待足够长时间**。

然后点击**上传**按钮，则能看到数据正常上传

最后采集的数据文件会保存在工具相同的目录下。文件名称包含传感器号，采集号以及维数。