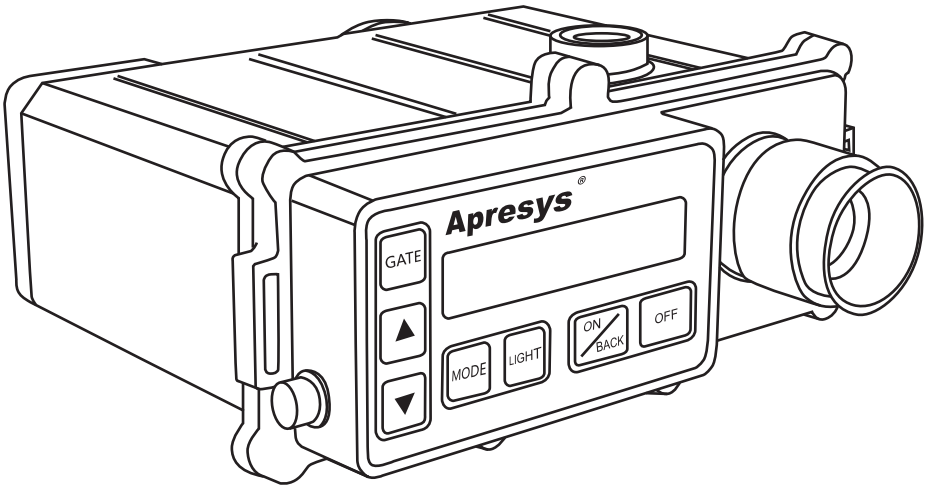
Apresys®

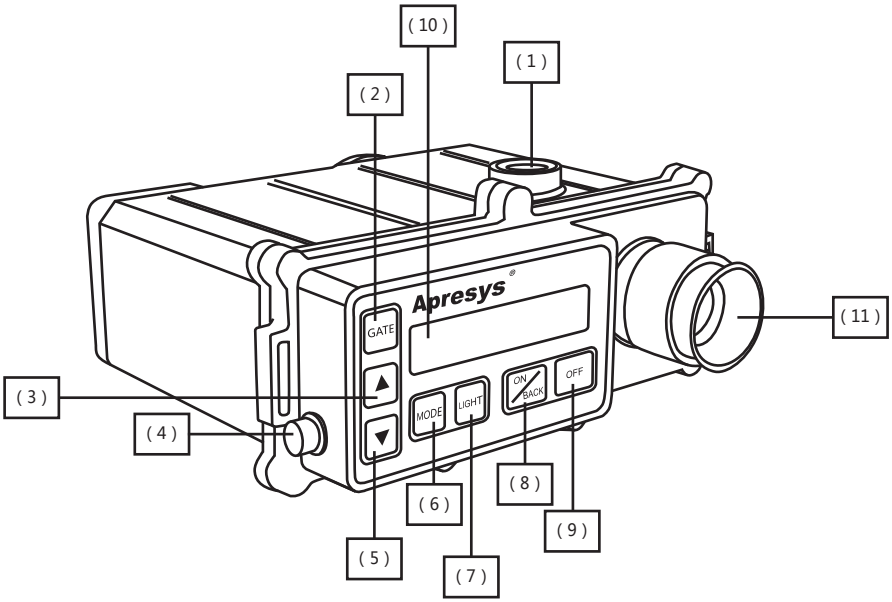


USER MANUAL

产品使用说明书

--在使用本仪器之前，我们建议您务必仔细阅读操作说明书。避免仪器的损伤和操作失误--

结构和操作功能



功能简述

⑴ 测距键：在开机状态下，使仪器进行单次测距或平均测距。

⑵ 选通键：设定仪器的最小距离门。

⑶ 上键：数值向正方向修正或菜单向左方向选择。

⑷ 连接插座：用于仪器和外围设备的连接。

⑸ 下键：数值向负方向修正或菜单向右方向选择。

⑹ 模式键：特殊使用功能菜单启动键，特殊使用功能由该键选择。

⑺ 照明键：用于夜间或低照度环境条件下液晶显示器和分划板照明。

⑻ 开机/复位：在关机状态下，开启仪器；在开机状态下，退出当前功能状态。

⑼ 关机键：切断仪器电源。

⑽ 显示窗口：显示被测目标的距离值和操作功能字符。

⑾ 瞄准目镜：操作者由此观察并瞄准目标。

技术参数

测距参数	有效测程	20~4000m/5000m/6000m/10000m/20000m
	测距误差	±1m
	距离选通	20~4000m/5000m/6000m/10000m/20000m
	准测率	＞98%
	重复频率	1/6~1/3Hz（10~20 次/分）
光学参数	接收孔径	Φ30mm
	瞄准镜视场	6.5°
	瞄准镜放大倍率	8×
激光器参数	光　　源	Nd:YAG
	波　　长	1.064μm
	输出能量	≥5mJ
	工作寿命	≥20000次
工作温度		-20℃~+60℃
环境适应性		防尘，防水，抗震
外型尺寸		115mm×152mm×54mm
重　　量		1Kg（含电池组）
电源		专用镍氢电池组（12伏、1200毫安时）， 在常温下， 每个充足的电池组可测距1500次以上。
测距功能		⑴ 计算测量数据平均值 ⑵ 测量数据存储（四个存储区， 每个存储区250个数据,共1000个数据） ⑶ 测量数据发送（输出接口： RS232、2400、8、N、2） ⑷ 液晶显示屏和分划板照明及亮度调整， 20秒无任何操作时自动关闭液晶显示屏照明 ⑸ 仪器工作次数统计 ⑹ 存储区数据查阅 ⑺ 最近十次测距值查询 ⑻ 电池电压查看 ⑼ 序列号查询 ⑽ 存储区数据查询

一般使用

1. 打开仪器物镜上的防尘罩，按仪器红色按钮“开机 / 复位”。液晶显示窗显示“APRESYS”，这表明仪器初始化通过，可以进行测距。

2. 通过观察目镜瞄准目标，并将观察目镜中的十字分划线中心对准目标，调节视度调节圈，使所瞄准的目标图象最清晰。

3. 按一下“测距键”，仪器开始测距，并显示如下结果之一：

Ⅰ 显示所瞄准目标的距离数。如“S-1234.5m▽”。其中“▽”表示本次测距有双目标,按“下键”即可显示第二目标，如“S-2345.0m△”；再按“上键”又可显示第一目标距离值。如无双目标，则不显示符号“▽”或“△”。

Ⅱ“AAAA.Am”表示没有测到目标或目标在测程之外。

Ⅲ“0000.0m”表示没有激光输出。

Ⅳ 如果在液晶显示窗中显示出符号“▯”，则表示电池能量不足，需对专用电池组进行充电或更换专用电池组。如果继续使用，当电池能量接近耗尽时，仪器将执行保护性关机，此时按“开机 / 复位”不能打开仪器。

①在每次正常测距结束,即得到有效的测距值后,将自动以 ASCII 格式通过串行口发送当前测距值。（串行通信格式见附录）

②显示测距值时，第一个字母表示测距类型，“S”代表普通单次测距；“A”代表平均测距；“C”代表连续测距。

特殊使用

在本测距仪中，除了最常用的测距功能外，还有强大的辅助功能，作为特殊使用。包括：选通、平均、数据存储、数据发送、角度测量、数据检索、照明设置、数据删除及背光开关。

在特殊使用中，无论进入了何种功能状态，按“复位键”可退出此功能状态。按住“复位键”1 秒以上退到初始状态，显示“ *-<APRESYS>-*”（选通值，存储区设置，照明设置仍能保留）。

“选通键”、“模式键”、“照明键”、“复位键”四键为功能键，相互之间无任何优先级分布，可任意切换。“上键”和“下键”可进行菜单选择和数值修正。

1. 选通功能：如果瞄准光路中有多重目标，可以通过选通功能进行有选择地测距（选通范围为 20~4000m/5000m/6000m/10000m）。

① 开机后按“选通键”,仪器显示“MGR 0020m”,表示最小距离为 20m。此时可用“上键”或“下键”进行选通值修正。

② 在进行选通值调正时,每按一次“上键”或“下键”,则选通距离增或减 20m; 若按住“上键”或“下键”1 秒钟以上，则选通距离每隔约 0.3 秒增或减 100m。

③ 修正完选通值后再按一下“测距键”，即可测得选通值之后目标的距离。

④ 如在一次正常测距后未进行“模式键”、“照明键”、“复位键”或“关机键”操作即按“选通键”，则将当前屏幕显示的测距值加 20m 后自动置为当前选通值。（注：当有双目标时，如果在屏幕显示第二目标的距离值时按“选通键”，则将第二目标的距离值加 20m 后自动置为当前选通值）

⑤ 在选通状态下，按住“选通键”1 秒以上，则将选通值恢复为 20m。

2.平均功能（AVG）：如需精确测量目标距离值，可进行平均测距，有效的平均次数为 1~100 次。当测距次数设为大于 100 次，即认为是连续测量。在连续测量状态，可按“复位键”停止测距。

① 开机后按“模式键”,仪器显示模式菜单,其中闪烁的为当前待选的功能名称,按“上键”或“下键”选择到“AVG”。

② 按“模式键”予以确认，则进入平均次数设置状态。此时显示“NUM=001”，表示仪器处于单次测距状态。

③ 按“上键”或“下键”修正平均次数,每按一次“上键”或“下键”则平均次数加 / 减 1 次；按住“上键”或“下键”1 秒以上则平均次数每隔约 0.3 秒增或减 10 次。

④ 调整好平均次数后，再按一次“模式键”，确认平均次数，此时显示“Average Ready!”，表示可以进行平均测距（小于等于 100 次）或连续测距（大于 100 次）。

⑤ 按一般操作规程瞄准目标，按一下“测距键”，仪器将按程序自动测距，并显示每次测距结果。测距结束后,将显示出平均数值,如“X (100):1234.5m”,表示平均测距 100 次,距离平均值为 1234.5m。

⑥ 在步骤 ① ~ ⑤ 中，若设定错误，可以按“复位键”退向上一操作步骤。

⑦ 在进行自动平均测距的过程中，如累计测到五次“AAAA.A”或“0000.0”，则自动退出平均测距，并显示“Average Error!”，并且不发送数据；如在平均测距或连续测距过程中按“复位键”，则退出平均测距或连续测距状态，如在平均测距状态则显示有效测距次数及平均值，并发送有效测距次数及平均值。

⑧ 在进行正常平均测距的过程中，并不向外发送测距信息，但在平均测距完毕后，会向外界发送平均测距次数及平均值（数据格式见附录）。

注：正常平均测距频率为 1/3 Hz（20 次 / 分）；

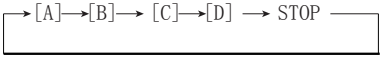
处于平均测距或连续测距状态时，除“复位键”外，其它键都不能操作；

在计算平均值时，将自动剔除无效的距离值（包括“0000.0”、“AAAA.A”以及明显偏离平均值的数据）及测距次数；如果开始三次的距离值相互之间有明显偏差，则认为是测距出错，并显示“Average Error!”，并且不发送数据。

3. 存储功能（SAV）：如果现场记录数据有困难或想用计算机对数据进行集中处理，可用存储功能。如选择了存储区域，则以后的每次测距值都将记录进所选的存储区。

① 开机后按“模式键”,仪器显示模式菜单,其中闪烁的为当前待选中的功能名称,按“上键”或“下键”选择到“SAV”。

② 按“模式键”予以确认，则进入存储功能。此时显示“STOP［A］［B］”，其中“［A］”在闪烁，表示当前存储区［A］为待选存储区，可用“上键”或“下键”对［A］、［B］、［C］、［D］四个存储区进行选择。“STOP”表示停止存储功能。



③ 按“模式键”对所选存储区予以确认，如此时显示“SD-A010”，则表示当前处于存储区 A，其中已存有 10 个有效数据。

④ 此时再按“复位”键,则又回复到步骤②状态,可重新选择存储区,但步骤③所选的存储区仍有效。

⑤ 在步骤②中，选择菜单“STOP”，然后按“模式键”确认，即可取消存储功能。

⑥ 按“复位键”可退出当前状态。

注：Ⅰ开机默认为不存储数据。

Ⅱ 本仪器内共分 A、B、C、D 四个存储区，每个存储区可存储 250 个数据，共可存储 1000 个数据。切断仪器的电源不会影响存储区内存储的数据。

Ⅲ 当存储区 A 存满数据后，将显示”A Data Full!”，同时发出两声提示音。如不选择其他可用存储区或停止存储，则每次测距时都将显示”A Data Full!”，约一秒后再显示距离数。B、C、D 区情况也如此。

4. 发送功能（TXD)：如需将 A、B、C、D 四个存储区中的数据发送到外围设备进行处理，可用发送功能。

① 在测距仪及外围设置均处于关机状态下，通过专用电缆将仪器与外围设备正常连接。仪器插座排脚如下表所示：

脚　　号	功　　能
1	信号地
2	保留，禁止使用
3	保留，禁止使用
4	TXD
5	RXD
6	信号地

② 开机后按“模式键”,仪器显示模式菜单,其中闪烁的为当前待选的功能名称,按“上键”或“下键”选择到“TXD”，使之处于闪烁状态。

③ 按“模式键”予以确认，则进入发送区选择状态。此时显示“[A] [B] [C]”，其中 [B] 在闪烁，表示当前待选发送区为 B 区。可用“上键”或“下键”对 A、B、C、D 四个发送区域进行选择。

④ 在选择了正确的发送区后再按“模式键”，如此时显示“TXD-B Running”，表示正在发送 B 区中的数据；之后显示“TXD-B End!”，表示数据发送完毕。如所选发送区 B 中没有数据，则显示“(B) -No Data!”，不执行发送操作。(注：在数据发送过程中，对任何操作都不响应)

⑤ 再次“模式键”，则将所选发送区中的数据重新发送一次。

⑥ 按“复位键”可依次退出步骤⑤、④、③、②。

注：在单次测距状态下，每测距一次，则发送一次距离值；在平均测距状态下，仅在平均测距结束后才发送一次平均值和测距次数；在连续测距状态下，每测距一次，发送一次距离值。

注意：仪器插座的引脚“2”和“3”仅供工厂测试时使用,错误的连接有可能导致仪器或外围设备损坏。

5. 测角功能（ANG）：显示测距机当前的俯仰角。

① 开机后按“模式键”,仪器显示模式菜单,其中闪烁的为当前待选的功能名称,按“上键”或“下键”选择到“ANG”，使之处于闪烁状态。

② 按“模式键”予以确认，则进入测角功能。此时显示当前测距机的俯仰角。有两种角度显示方式，一种显示单位为角度，另一种显示单位为密位。此时按“模式键”可在角度与密位显示之间切换。

③ 在测角状态下，每次测距除发送距离值外，还发送当前角度值。（数据格式参见附录）

④ 按“复位键”可退出当前状态。

⑤ 在仪器处于存储状态时，如果进入了测角功能，并进行单次测距操作，仪器将同时记录距离值和角度值（注：在平均测距和连续测距状态时不能使用测角功能）。

⑥在仪器中执行测角操作时将显示“No Function”，表示没有此项功能。

6. 数据检索功能（IND）：查看存储区中的数据和一些与仪器有关的数据。包括：最近十次数据检索(LTD),区域数据检索(SEI),产品序列号显示(S/N),电池电压显示(BAT)及测距仪工作次数检索(LIF)。

6.1 最近十次数据检索：显示开机后的最近十次测距值，可用“上键”或“下键”翻阅查看。

① 在数据检索功能菜单下，用“上键”或“下键”选择到“LTD”，再按“模式键”予以确认，则进入最近十次数据检索状态。

② 刚进入最近十次数据检索状态时,显示的是当前的测距值,按“上键”一次,即显示前一次的测距值。按“下键”一次，则显示后一次的测距值。

③ 最近十次数据不能保存，关机后即丢失。

④ 当存储数据包含角度值时，将以 0.5 秒的间隔轮流显示距离值和角度值。

6.2 区域数据检索：显示[A]、[B]、[C] 、[D] 四个数据存储区中的距离值。

① 在数据检索功能菜单下，用“上键”或“下键”选择到“SEI”，再按“模式键”予以确认，则进入区域数据检索状态。

② 在区域数据检索状态下，先用“上键”和“下键”选择存储区域，按“模式键”予以确认，即可看到存储在该区域中的测距值,按“上键”和“下键”可翻阅所选区域中的距离值,每按一次“上键”或“下键”，则显示前一个或后一个数据，如果按住“上键”或“下键”超过一秒，则每隔约 0.3 秒显示向前或向后的第十个数据。如所选的存储区中没有数据，则显示“No Data”。

③ 当存储数据包含角度值时，将以 0.5 秒的间隔轮流显示距离值和角度值。

6.3 电池寿命显示：直接显示当前电池电压值。

在数据检索状态下，选中“BAT”，然后按模式键，即显示当前电池电压值。以后每按一次模式键，则重新检测一次当前电池电压值。按复位键退出此功能。

6.4 测距次数显示：检查仪器累计测距次数，即从购买之日起，测距机发射激光的次数。

在数据检索功能菜单下，用“上键”或“下键”选择到“LIF”，再按“模式键”予以确认，则进入测距次数显示状态。

7. 亮度调整功能：在照明打开的状态下，此功能用于分别调整液晶“LCD”及分划板“LED”的亮度。

①开机后按“模式键”，仪器显示一模式菜单，按“上键”或“下键”选择到“ADJ”。

②按“模式键”予以确认，则进入亮度调整功能。此时菜单显示“LED LCD”，而“LCD”在闪烁，表示当前选中液晶照明亮度调整。按“上键”或“下键”可选择对液晶“LCD”还是分划板“LED”进行亮度调整。

③ 按“模式键”予以确认，此时显示当前存储的照明亮度等级。如“LCD：  ”，则表示当前存储的液晶照明亮度等级为四级。

④ 按“复位键”可依次退出以上状态。

注：Ⅰ 液晶及分划板的亮度调整等级各有 4 级，1 级亮度最低，4 级最高，每次开机时默认的亮度等级都为 1 级。

Ⅱ 按住“照明键”1 秒以上，可快速进入亮度调整功能。

8. 数据删除：如需将仪器存储区内的数据清除，可用清除功能。

① 开机后按“模式键”,仪器显示一模式菜单,其中闪烁的为当前待选的功能名称,按“上键”或“下键”选择到“DEL”。

② 按“模式键”予以确认，则进入数据清除功能。此时显示“[A] [B] [C]”，其中“[B]”，表示当前选中 B 区，可用“上键”或“下键”对 A、B、C、D 区进行选择。

③按“模式键”对所选的存储区予以确认。如显示“B-Deleted！”，则表示 B 区内的数据被清除。

④按“复位键”可依次退出以上状态。

注：数据一旦被删除，就无法恢复。

9. 照明：建议在低照度或夜间环境条件下，使用照明功能：

① 开机后按“照明键”,仪器显示“Light On?”。如再次按“照明键”,则打开液晶及分划板照明; 如按“复位键”，则退出打开照明询问状态。

② 在照明打开的状态下，再按“照明键”，仪器显示“Light Off ?”。如再次按“照明键”，则关闭液晶及分划板照明；如按“复位键”，则退出关闭照明询问状态。

注：在照明打开后，如连续 20 秒无任何操作，则自动关闭液晶的背光照明，但分划板照明仍打开；在自动关闭照明后，任一操作均能激活照明。

架设使用/电池/充电器使用

架设使用

如果需稳定、可靠地测量远距离目标，可以通过仪器底部连接板 1/4”螺孔固定在照相机架上使用，或通过连接板的燕尾槽经专用转接机构与各种经纬仪相连使用，并可以通过外触发电缆进行遥控测距操作。

电池

① 本仪器使用的是 12V、1200mAh 专用镍氢电池组。

② 电池组首次使用前请先充电 12 小时。

③ 当仪器显示电池欠压时请及时充电或更换专用电池组。

④ 为防止受伤或起火，不要让金属物接触电池电极。

⑤ 为防止损坏电池，请勿打开电池组封装，并保持电池组干燥。

⑥ 切勿将电池投入火中（投入火中有爆炸的危险）。

⑦ 建议使用配套充电器对电池组充电，使用劣质充电器可能对电池组造成损害。

⑧ 电池充电时请保持环境温度为 10℃到 30℃之间，相对湿度≤80％，不合适的使用环境可能对电池性能造成损害。

（注意：长期不使用时，请将专用电池组存放于包装箱内，不要存放于测距仪内或充电器内）

充电器使用

当仪器显示电池欠压时应及时充电，充电时将充电适配器的输出插头插入充电器的电源插座中，然后将充电适配器的插头插入交流 220V 电源，打开充电器的上盖，将专用电池组电极对准充电器电池仓内弹簧装入，然后关上上盖，此时红色指示灯点亮，表示正在对电池组进行充电。电池充满后红色指示灯熄灭，绿色指示灯点亮。充电结束后先将充电适配器的插头从交流电源拔下，再拔下充电适配器的输出插头，然后取出专用电池组。

维护与保养/保修说明/装箱单

维护与保养

1. 仪器维护

①经常检查仪器外观及时清除表面的灰尘脏污、油脂、霉斑等。

②清洁目镜、物镜或激光发射窗时应使用柔软的干布。严禁用硬物刻划，以免损坏光学性能。

③本机为光、机、电一体化高精密仪器，使用中应小心轻放，严禁挤压或从高处跌落，以免损坏仪器。

2. 故障处理

使用人员排除故障仅限于装卸和更换电池组以及一些不需要打开仪器的校验。发现故障应及时与本公司联系。严禁私自打开仪器，以防机内高压伤人或进一步扩大故障。

保修说明

本仪器自售出之日起，保修壹年，凡因制造或元器件引起的质量问题，由本公司免费更换零件和维修。如属于用户使用不慎或贮存和运输不当造成的事故损坏，不属于保修范围。

本产品实行终身维修，超过保修期，本公司只收取部分检修费和维修成本费。

装箱单

序号	名称	数量	备注
1	仪器防潮箱	1	
2	测距仪	1	
3	充电器	1	
4	充电适配器	1	
5	电池	1	
6	拭镜布	1	
7	保修卡	1	
8	说明书	1	

附录

1. 操作功能检索表

- 测距 —— 测量距离
- 选通 —— 设置最小距离
- 照明 —— 打开液晶及分划板照明
- 模式 —— 功能模块
  - 平均（AVG） —— 平均测距功能
  - 存储（SAV） —— 区域数据存储功能
  - 发送（TXD） —— 测量数据串行发送
  - 测角（ANG） —— 仰角测量
  - 检索（IND） —— 数据检索
    - （LTD） —— 最近十次测量数据查询
    - （SEI） —— 区域数据查询
    - （S/N） —— 序列号查询
    - （BAT） —— 电池寿命查询
    - （LIF） —— 测距寿命查询
  - 调整（ADJ） —— 照明亮度调整
    - （LED） —— 分划板亮度调整
    - （LCD） —— 液晶亮度调整
  - 删除（DEL） —— 区域数据删除

2. 按键长按功能（按键时间超过 1 秒）

1. 选通 —— 最小测距为 20m
2. 照明 —— 快速进入亮度调整
3. 模式 —— 显示仪器序列号
4. 复位 —— 退出所有菜单设置功能

3. 数据发送格式

数据以 ASCII 码发送，距离值以字符“L”开头，以回车符结束；角度值以字符“A”开头，以回车符结束。

1. 距离值数据格式：

L	*	*	*	*	.	*	m	↙
代表距离	距离值最大 9999.5m						距离单位	结束标记

2. 角度值数据格式：

A	*	*	*	.	*	°	↙
代表角度	角度值，最大 359.9°					角度单位	结束标记

3. 当距离值和角度值一起发送时，首先发送距离值，再发送角度值，最后以回车符结束。

L	*	*	*	*	.	*	m	↙	A	*	*	*	.	*	°	↙	↙
距离	距离值，最大 9999.5m							结束标记	角度	角度值，最大 359.9°						结束标记	整组数据结束

4. 发送平均测距数据时，首先发送距离值，再发送测距次数，最后以回车符结束。

L	*	*	*	*	.	*	m	↙	N	*	*	*	↙	↙
距离	距离值，最大 9999.5m							结束标记	次数	次数值，最大 100			结束标记	整组数据结束

4. 仪器与 Pc 机串口通讯的连接方法

RS232C 信号线和 DB-9 引脚定义

符号	名称	引脚
DCD	接收信号载波检测	1
RXD	接收数据线	2
TXD	数据发送线	3
DTR	DTE 装置数据就绪	4
GND	公共地	5
DSR	DCE 装置就绪	6
RTS	请求发送	7
CTS	清除发送	8
RI	振铃指示	9

连线方法　　仪器输出插座引脚定义

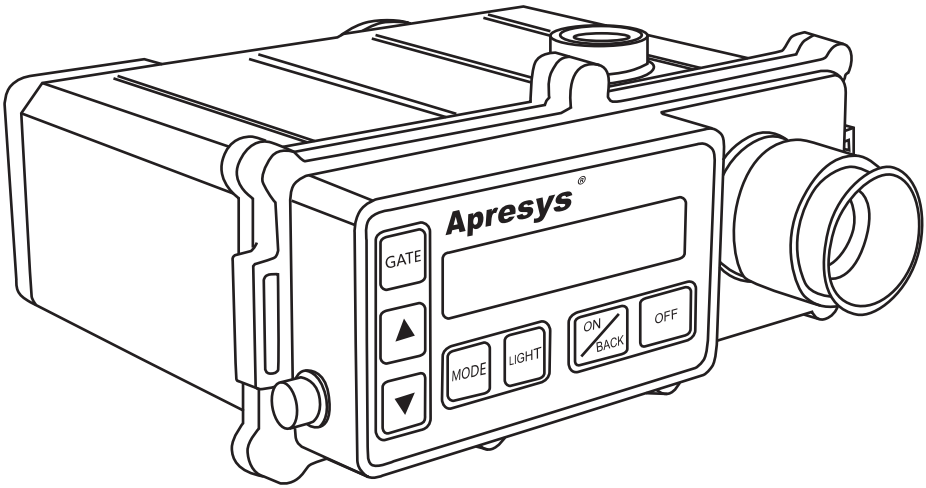
脚　　号	功　　能
1	信号地
2	保留，禁止使用
3	保留，禁止使用
4	TXD
5	RXD
6	信号地

注意事项：激光测距仪不能对准人眼直接测量，防止对人体造成伤害。

Apresys®

Apresys International Inc.
Add: 2410 Camino Ramon, Suite 170,
San Ramon, CA 94583, USA
Tel: +1-925-272-7788

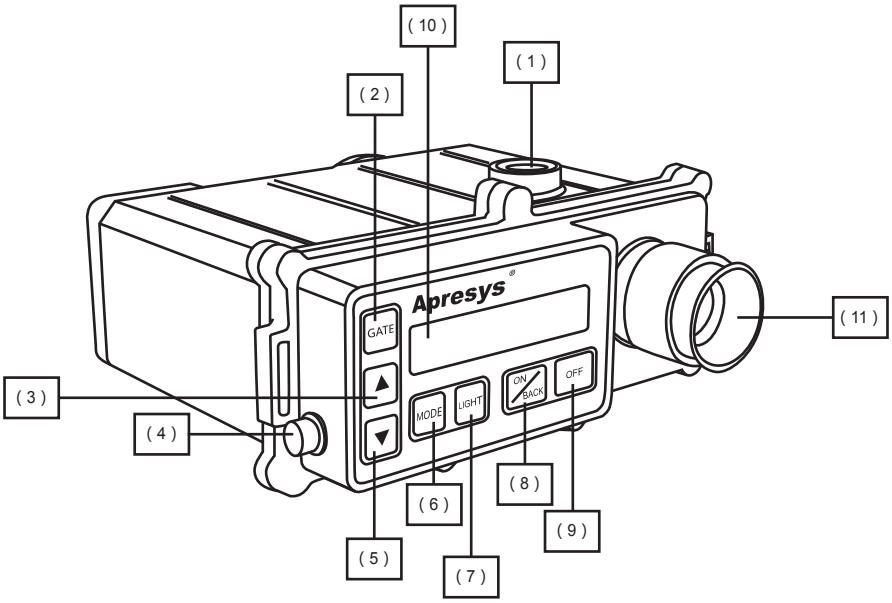
Apresys®



USER MANUAL

Laser Rangefinders

— — To ensure optimal performance and longevity, please read instructions before using — —



(1) Fire Key:
Make the instrument perform the operation of one time or average under the “ON” condition.
(2) Gate Key:
Set the minimum range gate of the instrument
(3) Up Key:
Make the value increased or the menu changed towards left direction.
(4) Socket Connector:
Connect the instrument with external equipment
(5) Down Key:
Make the value decreased or the menu changed towards right direction.
(6) Mode Key:
Start the special function, which can be activated by pressing this key.
(7) Light Key:
Illuminate the LCD and reticle when the instrument works at night or in low light condition
(8) On/Back Key:
Power on the instrument when it is on “OFF” condition or exit the current function when it is on “ON” condition.
(9) Off Key: Power off the instrument.
(10)LCD: Display the measured distance and the character of operation function.
(11)Collimating Eyepiece: The objective can be aimed at and observed.

Technical Specifications

Ranging Parameters	
Ranging Range	20~4000m/5000m/6000m/10000m/20000m
Ranging Error	±1m
Optional Distance	20~4000m/5000m/6000m/10000m/20000m
Correct Ranging Probability	98%
Repeatability Ratio	1/6~1/3 Hz (10~20times/min)
Optical Parameters	
Receiving Aperture Diameter	ф30mm
Collimator Visual Field	6.5°
Collimator Magnification	8X
Laser Projector Parameters	
Laser Source	Nd : YAG
Wavelength	1.064mm
Output Power	≥5mj
Lifetime	≥20000 times
Mechanical Parameters	
Dimension	115X152X54mm
Weight	1kg (including battery package)
Working temperature	-20℃~+60℃
Environment Adaptability	Waterproof; dustproof; shockproof
Power supply	
The instrument uses special NiCd battery package (12V,1200mA) , which can power the operation of more than 1500 times in normal temperature.	
Ranging Functions	
Calculate the mean value of the measured data Save the measured data (1000 data can be saved in 4 save areas, each having the capacity of 250 data) Transmit the measured data (output interface: RS232, 2400 , 8 , N , 2) LCD & reticle illumination and lightness adjustment Automatically shut off LCD illumination if nooperation is available for about 20 seconds. Working time statistic Data consultation in save area Save the latest ten measured data Check battery voltage Sequence number query Data query in save area	

3.1 Open the dustproof cover on the objective lens, push the red On/R key, and the LCD will display "APRESYS". This means the instrument has been initialized and is ready to work.
3.2Aim the instrument at the objective through the collimating-eyepiece. Make the center of the reticle up against the target, and adjust the diopter-adjusting-ring to obtain the clearest image of the aimed objective.
3.3 Push the FIRE key to perform the measurement, and the following results will be obtained.

3.3.1 Display the distance to the aimed objective, like "S-1234.5m▽". The sign ▽ means two targets measured in this time. If the DOWN key is pressed, the second distance, like "S-2345.0m△" will be shown. If the UP key is pressed, the first distance will be displayed again. The symbols ▽ or △ will not be displayed if there is not two targets.

3.3.2 "AAAA.Am" means that no objective is measured or the objective is out of the ranging range.

3.3.3 "0000.0m" means no laser is emitted.

3.3.4 The sign "▯" on the LCD means weak battery, and recharge the special battery package or replace it. If the operator chooses to use the instrument until the battery is almost used up, the instrument will be automatically off for protection. Herein, to press "On/BACK" key is not available for powering on the instrument.

Remark:

(1) After finishing the normal measurement, i.e. the effective value is obtained, the instrument will automatically transmit the measured value in ASCII format through the serial port. Please refer to the appendix for serial communication format.

(2) When the measured value is displayed, the first letter means the ranging type, "S" for general measurement of one time, "A" for average measurement, "C" for continuous measurement.

Special Usage

In addition to ranging functions in common use, the instrument also owns strong assistant functions for special application, including minimum range gating, average, data save, data transmission, angle measurement, data search, illumination setup, data deletion and poor light switch.
In case of the special usage, to press On/BACK key can make the instrument exit any ongoing function state. To push the On/BACK key for over one second will make the instrument return to original state and display "APRESYS", but the minimum range gating, save area setup and illumination setup can still be reserved.

The four keys, such as GATE key, MODE key, LIGHT key, On/BACK key are functional ones, and there is no priority among them and can be switched at random. Use of UP and DOWN key is for menu selections and value modifications.

4.1 Minimum Range Gating Function:
If there are multiple objectives in the aiming optical path, the optional ranging can be performed by the function of minimum range gating. The minimum range is from 20m to 4000m/ 5000m/ 6000m/ 10000m.

4.1.1 Push the GATE key after powering the instrument on so that the instrument shows "MGR: 0020m", which means the minimum range is 20m. You can change the range by pushing the UP or down key.

4.1.2 In the case of the range adjustment, the gated range will increase or decrease by 20m for each press of UP or DOWN key. If the UP or DOWN key is given a continuous press for one second or more, the gated range will increase or decrease by 100m every other 0.3s or so.

4.1.3 When the range adjustment is finished, give FIRE key a press so that the range to the objective can be obtained.

4.1.4 After a normal measurement, directly give a press to the GATE key without operations to the MODE, LIGHT, On/BACK and OFF keys, and then the current ranging value in the LCD, with the increase by 20m, will be automatically set as the current gating value.

Remark:
In the case of two objectives, if you give a press to the GATE key after the second value is displayed, the second value increased by 20m will result in the current gated range.

4.1.5 In the GATE condition, give a continuous press to the key for one second or more and the gated range will return to 20m.

4.2 Average Function

The average functional operation can be carried out on the request of accurately measured the distance. The effective average times are from 1 to 100. If the times are more than 100, the operation will be regarded as continuous measuring. In the continuous mode, press the On/R key to stop the operation.

4.2.1 The instrument will display the mode menu with the press to the MODE key after powering on the instrument. wherein the flashing item is the names of function ready to be selected currently. You can select the "AVG" item by press of UP or DOWN key.

4.2.2 After the press of the MODE key for confirmation, the instrument enters the average times setup state. Now, the LCD displays "NUM=001", which means the instrument is in the range state of single time.

4.2.3 The change of times can be made by the press of UP or DOWN key. The average times will change one by pushing UP or DOWN key once. If the continuous press is given for one second or more, the average times will increase or decrease by 10 every other 0.3 second.

4.2.4 After finishing the setting of average number, press the MODE key for confirmation of times. Now, the LCD displays "AVERAGE READY", which means the instrument is ready for average ranging with the number equal to or smaller than 100 or continuous ranging with the number beyond 100.

4.2.5 Aim at the objective according to general rules, and push the FIRE key so that the instrument performs the ranging function and display the measured results. After the measurement, the instrument will give the average value, like "X (100):1234.5m", which means it carries out the measurement 100 times with the average value of 1234.5m.

4.2.6 In the above steps from one to five, if there is something wrong with the setting in any step, the instrument can return to the previous step with the press of On/R key.

4.2.7 During the automatic average measurement, if "AAAA.A" or "0000.0" is obtained for five times, the instrument will automatically exit the average ranging and display "AVERAGE ERROR" without data output. In the case of pushing the On/BACK key in the average or continuous measurement state, the instrument will exit this state. If the instrument is on the average ranging state now, it will give the effective ranging times and the average value, and transmit the times and value.

4.2.8 During the normal average measurement, the instrument does not transmit the ranging information; But the instrument will give the average ranging times and the value after the measurement is over. The data format refers to the appendix.

Remark:

The frequency of normal average measurement is 1/3Hz (20 times per min);

During the average or continuous measurement, all keys but On/R key can not be operated.

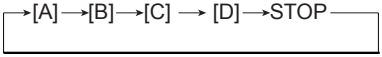
During the calculation of the mean value, the invalid values and average times will be automatically removed, such as "0000.0", "AAAA.A" and the values with obvious deflection from the mean value. If there is obvious difference among the first three values, you can come to the conclusion that the ranging is wrong and the instrument displays "AVERAGE ERROR" without data output.

4.3 Save Function (SAV)

If it is difficult for operator to write down the data in the surveying field or if it is desired to process the data collectively by computer, you can select the SAV function. If the SAV function is selected, each measured value is saved in the selected save area.

4.3.1 After switching on the instrument, press the MODE key so that the mode menu is displayed. The flashing item is ready to be selected. You can select "SAV" by the press of UP or DOWN key.

4.3.2 After the selection of SAV function, push the MODE key for confirmation so that the instrument performs the SAV function. The LCD will show "STOP[A] [B]". Wherein [A] is flashing, which means the [A] save area is ready to save data. The selection among [A]、[B]、[C]、[D] can be performed by the press of UP or DOWN key. "STOP" means the termination of SAV function.



4.3.3 Push the MODE key to confirm the selection of the save area. The LCD will display "SD-A010", which means [A] is the present save area with ten effective data saved herein.

4.3.4 If you push the On/R key, the instrument will return to the second step, and the operator can select the desired save area once more. Wherein the selection in step three is still effective.

4.3.5 In step two, the instrument will cancel the SAV function if the STOP item is selected and then MODE key is pressed for confirmation.

4.3.6 The instrument will quit the present state with the press of On/R key.

Remark: a) No data save is default state after switching on the instrument.

b) This instrument divides the saving area into four parts, each for saving 250 data and totaling 1000 data. The data saved in the area will not be influenced by switching off the power.

c) When the [A] area is full of data, "A DATA FULL" will be shown in the screen with two alarm sounds for hint. If no other area is selected or SAV function is not stopped, "A DATA FULL" will be shown for each ranging, and the distance will be shown after one second or so. B、C、D areas share the same function.

4.4 Transmission Function (TXD)

The TXD function will be used when the data saved in the A、B、C、D four areas are necessary to be transmitted to the peripheral equipment for processing.

4.4.1 Make the instrument connected with the peripheral equipment by special rangefinder cable when both the instrument and the peripheral equipment are powered off. The functions of the pin on the jack connector refer to the following table.

No.	Functions
1	GND
2	Nc
3	Nc
4	TXD
5	RXD
6	GND

4.4.2 After switching on the instrument, press the MODE key to display the mode menu. The flashing item is ready to be selected. You can select "TXD" and make it flashing by the press of UP or DOWN key.

4.4.3 After the selection of TXD function, push the MOD key for confirmation so that the instrument enters the TXD state. The LCD will show "[A] [B] [C]", and wherein [B] flashing means [B] is ready to transmit data. The selection among A, B, C and D can be performed by the press of UP or DOWN key.

4.4.4 Press the MODE key after the correct selection of transmitting area. The LCD will display "TXD- B Running", which means the data in [B] area are in transmission. After a while, the LCD shows "TXD-B End!", which means the transmission is over. If there is no data in the selected B area, the LCD will display "(B)-No Data!" with no operation made.

Remark: During the transmission of data, any operation is of no effect.

4.4.5 One more press on the MODE key will result in transmitting the data in the selected area once more.

4.4.6 Press the On/BACK key to quit the above steps in turn.

Remark:

In the single ranging, the instrument transmits a value for every ranging; In the average ranging, the instrument transmits the average value and the ranging times only after the average ranging is finished. In the continuous ranging, the instrument transmits a value for every ranging.

Note:

"2" and "3" pin on the jack connector is only used for test in the works. Wrong connection will cause the damage of the instrument and the peripheral equipment.

4.5 Angle Function (ANG)

Display the present elevation angle of depression.

4.5.1 After switching on the instrument, press the MODE key so that the mode menu is displayed. The flashing item is ready to be selected. You can select "ANG" and make it flashing by the press of UP or DOWN key.

4.5.2 Push the MODE key for confirmation so that the instrument enters the ANG state. The LCD will show the elevation angle of depression of the rangefinder. There are two angle display modes, one using "degree" as unit and the other "mil" as unit. Herein the display mode can switch between "degree" and "mil" by the press of the MODE key.

4.5.3 In the ANG state, the instrument transmits not only the distance value but also the angle value. The data format refers to the appendix.

4.5.4 You can quit the present state by the press of the On/Back key.

4.5.5 While in the SAV state, if the ANG function is selected and meanwhile single ranging is performed, the instrument will record the distance and the angle simultaneously.

Remark: The ANG function can not be used together with the average and continuous ranging.

4.5.6 When the ANG function is operated on device, the LCD will display "NO FUNCTION", which means the function is not available herein.

4.6 Index Function (IND)

This function is for browsing the data in save area and some data relating to the instrument, which includes the latest ten data inquiry (LTD), sector data inquiry(SEI), series number indication(S/N), battery voltage indication(BAT), working life inquiry(LIF).

4.6.1 Latest Ten Data Inquiry (LTD)

This function is used for displaying the latest ten data. You can browse the data by the press of UP or DOWN key.

4.6.1.1 Under the IND menu, the "LTD" is selected by the press of UP or DOWN key, then press the MODE key for confirmation to enter the LTD state.

4.6.1.2 When the instrument just enters the LTD state, what is displayed is the present distance value. The UP key is for previous distance value and the Down key for next one.

4.6.1.3 The lasted ten data can not be saved, and will be lost after switching off the instrument.

4.6.1.4 If the saved data include angle value, the instrument will display the distance and angle value in turn at interval of 0.5 second.

4.6.2 Sector Data Inquiry (SEI)

This function is used for displaying the distance values saved in [A], [B], [C], [D] four save areas.

4.6.2.1 Under the SEI menu, the "SEI" is selected by the press of UP or DOWN key. Then press the MODE key for confirmation to enter the SEI state.

4.6.2.2 In the SEI state, the save area can be selected by the press of UP or DOWN key, then press the MODE key for confirmation to find the data saved in the areas. You can browse the data saved in the areas by the press of UP or DOWN key. The previous or next datum can be found by one press of UP or DOWN key. If the press of UP or DOWN key lasts for one second beyond, the instrument will display the previous or next tenth value at interval of 0.3 second. If there is no data in the save areas, "NO DATA" will be displayed.

4.6.2.3 When the saved data include the angle value, the instrument will display the distance or angle value in turn at interval of 0.5 second.

4.6.3 Battery Voltage Indication (BAT)

This function is used for the indication of the battery voltage.

In the IND state, select the BAT function and press the MODE key so as to display the present battery voltage. Afterwards, the instrument will recheck the voltage with every press of the MODE key. This function will be quitted by the press of the On/BACK key.

4.6.4 Battery Life Indication (LIF)

This function is used for looking over the accumulated measurement times, i.e. the times of laser projection as from the date when the instrument is purchased.

Under the IND menu, LIF can be selected by the press of UP or DOWN key. Then give the MODE key a press for confirmation to enter the LIF state.

4.7 Lightness Adjustment Function (ADJ)

This function is used for adjusting the lightness of LCD and reticle LED.

4.7.1 The instrument will display the MODE menu with the press of the MODE key after the switching on the instrument. “ADJ” can be selected by the press of UP or DOWN key.

4.7.2 Press the MODE key for confirmation to enter the ADJ state. Now "LED LCD" will be displayed. "LCD" flashing means liquid crystal illumination lightness adjustment is selected. The lightness adjustment selection between LCD and reticle LED can be made by the press of UP or DOWN key.

4.7.3 Press the MODE key for confirmation, and the presently-saved illumination grade will be displayed. For example, "LCD: " means that the presently-saved illumination grade is the fourth class.

4.7.4 Press the On/BACK key to quit the above state.

Remark: a) The lightness of LCD and LED is divided into four grades. The first one is the weak est and the fourth one is strongest. The default lightness grade is the first one after switching on the instrument.

b) Press the LIGHT key for one second or more so as to enter the lightness adjustment function quickly.

4.8 Data Deletion (DEL)

If the data saved in saving areas need deleting, data deletion function can be used.

4.8.1 After switching on the instrument, press the MODE key so that the mode menu is displayed. The flashing item is ready to be selected. You can select "DEL" by the press of UP or DOWN key.

4.8.2 Press the MODE key for confirmation to enter the DEL function. The LCD displays "[A] [B] [C]", and wherein "[B]" flashing means "[B]" area is selected. You can make selection among [A], [B], [C] and [D] areas by the press of UP or DOWN key.

4.8.3 Press the MODE key to confirm the selection of [B] area, If "B-Deleted!" is shown, the data saved in [B] area are deleted.

4.8.4 Press On/BACK key to quit the above steps in turn.

Remark: Once the data are deleted, they can not be recovered.

4.9 Illumination

It is suggested that the LIGHT function should be used when the instrument is operated in low light conditions or at night.

4.9.1 Press the LIGHT key after the switching on the instrument, and the instrument display "Light On?". If the LIGHT key is pushed again, the illumination for LCD and LED is turned on. Press the On/BACK key to quit the inquiry for "Light On" state.

4.9.2 In the case the illumination is turned on, press the LIGHT key to display "Light Off ?". If the key is pressed again, the illumination for LCD and LED is turned off. Press the On/BACK key to quit the inquiry for "Light Off " state.

Remark: In the case the illumination is turned on, if there is no operation for 20-plus seconds, the instrument will automatically turn off the illumination for LCD, but the illumination for LED is still on. After the illumination is automatically turned off, any operation can actuate the illumination.

Mounting Usage/Battery/Charger Usage

Mounting Usage

If you want to measure the target of long distance stably and reliably, you can fix the instrument with camera tripod through 1/4 screw on the bottom connecting plate of instrument, or connect the instrument with various theodolites through the coattail-slot on the connecting plate cooperating with special switch mechanism. Also the instrument can be remotely operated by outer trigger cable.

Battery

6.1 This instrument uses the special Ni-MH rechargeable battery package of 12V and 1200mAh.

6.2 Charge the battery package for 12 hours before the first use.

6.3 When the instrument indicates weak batteries, please charge the battery package or replace them as soon as possible.

6.4 Don't make metal close to the electrode to escape damage or fire.

6.5 Keep the battery package sealed and dry to protect them from damage.

6.6 Don't throw the batteries into fire, because it is possible for them to blast in fire.

6.7 Propose to use the matched charger to charge the batteries. It is possible to do harm to the batteries owing to the charger of low quality.

6.8 The ambient temperature for the charging should be from 10℃ to 30℃, and the relative humidity should be less than 80%. Improper working environment is possible to do harm to battery performance.

Note: If the batteries are not used for a long term, they should be stored in packed box, not in the box of the instrument or the charger.

Charger Usage

When the instrument indicates that the batteries become weak, they should be recharged immediately. In the case of recharge, insert the output connector of the adapter in the jack of the charger, and then connect the charger with the 220V power. The following step is to open the cover of the charger and insert the batteries with their indicated polarity against the correspondent spring, then close the cover. Right now the red indicator lamp is on, which means the charger is charging the batteries. After the power of the batteries is enough, the red lamp is off, but the green one is on. When the charging is over, first pull out the jack of the adapter, then pull out the output connector of the adapter, and at last take out the special batteries.

Maintenance

8.1 Instrument Maintenance

8.1.1 Make regular checks of the appearance of the instrument and remove dust, dirt, grease, mould, etc.

8.1.2 Soft and dry cotton cloth should be used when you clean the eyepiece, objective lens or the laser emitting window. Cutting or scratching with a rigid thing is strictly prohibited to protect optical performance from damage.

8.1.3 This is a highly-precise instrument combined with optics, mechanics and electronics. During the use, handle with care and strictly prohibit squeezing or falling from a high place to protect the instrument from damage.

8.2 Malfunction Treatment

The malfunction that the operator can remove is only limited to load, unload and replace the batteries or make a few calibrations without opening the instrument. Please connect with our company at once if something wrong is found. Opening the instrument without permission is strictly prohibited to avoid injury caused by high voltage of the laser instrument or to avoid further expansion of malfunctions.

Guarantee

The instrument is guaranteed for one year from the purchasing date. As for the quality problem caused by manufacturing or components, our company is responsible for repairs and the replacement of parts free of charge. If the trouble or damage is caused by the operator's incorrect operation or improper transportation and storage, it is beyond the guarantee range.

The instrument enjoys lifelong maintenance. If the instrument is out of the guarantee period, our company will only charge the check or repair fee to some extent and the cost for maintenance.

Packing list

No.	Description	QTY	Remarks
1	Instrument case	1	
2	Rangefinder	1	
3	Charger	1	
4	Charging Adapter	1	
5	Special Battery Package	1	
6	Flannelette	1	
7	Quality Certificate	1	
8	Instruction Manual	1	

Appendix

1. Operation Function Index

FIRE----------Fire laser ranging pulse to perform normal ranging operation

MRG----------Set the minimum range gate

LIGHT----------Turn on the illumination for the reticle and LCD

MODE----------Function mode

- AVG----------Average measurement function
- SAV----------Sector data save function
- TXD----------Measure data serial transmission
- ANG----------Elevation angle measurement
- IND----------Data index
  - （LTD） ----------The latest ten measured data search
  - （SEI） ----------Sector data search
  - （S/N） ----------Serial number inquiry
  - （BAT） ----------Battery life inquiry
  - （LIF） ----------Working life inquiry
- ADJ----------Illumination lightness adjustment
  - LED----------Reticle lightness adjustment
  - LCD----------LCD lightness adjustment
- DEL----------Sector data deletion

2. Long-time Press Function (Beyond one second)

MRG----------20m for minimum range gate

ADJ----------Enter the light adjustment quickly

Mode----------Display the series number

On/R----------Quit the setup function in any menu

3. Data Transmission Format

Data is transmitted in ASCII code. The distance value begins with the letter of L, and ends with the character of ENTER. Whereas the angle value begins with the letter of A, and end with the character of ENTER.

3.1 Distance Data Format

L	*	*	*	*	.	*	m	↙
Distance	Value, Maximum: 9999.5m						Unit	End

3.2 Angle Data Format

A	*	*	*	.	*	°	↙
Angle	Value, Maximum: 359.9°					Unit	End

3.3 In the case of transmitting the distance together with the angle, the distance is transmitted followed by the angle, and the character of ENTER is the end.

L	*	*	*	*	.	*	m	↙	A	*	*	*	.	*	°	↙	↙
Distance	Value, maximum:9999.5m							End	Angle	Value, maximum:359.9°						End	Complete data end

3.4 In the case that the average distance is transmitted, the value is transmitted followed by the times. At last, end with the character “END”.

L	*	*	*	*	.	*	m	↙	N	*	*	*	↙	↙
Distance	Value, maximum:9999.5m							End	Times	Value, maximum:100			End	Complete data end

4. Connection Between Instrument and PC Series Port Communication

Definition of RS232C signal cable and DB-9 pin

Definition of instrument output jack pin

Connection methods

Sign	Description	Pin
DCD	Carrier detect for received signal	1
RXD	Received data line	2
TXD	Data transmission line	3
DTR	Data in DTE is ready	4
GND	Common ground	5
DSR	DCE device is ready	6
RTS	Request transmission	7
CTS	Delete transmission	8
RI	Ring indication	9

Pin No.	Functions
1	GND
2	Nc
3	Nc
4	TXD
5	RXD
6	GND

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