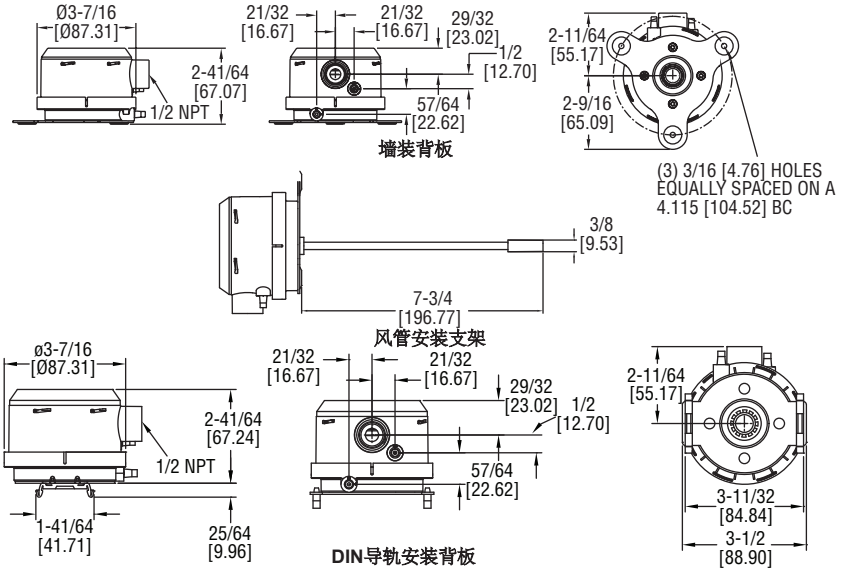
MS2系列Magnesense® II 差压变送器

技术指标 - 安装和操作说明书



MS2系列Magnesense® II微差压变送器和我们已经有的MS系列一样采用霍尔效应测量原理，并增加了多种功能，不仅节省安装时间和费用，而且订购方便简单。我们在这个第二代的微差压变送器上增设了现场选择四种量程范围，包括四种正负组合量程。当配有自带数显或使用分体式数显配件时，可以通过线路板上的拨动开关选择英制或公制的工程单位。输出信号可以电流或电压输出，或电流电压同时输出，这样用户可以在现场很方便连接控制装置或进行现场测试。电压输出可选0-5VDC或0-10VDC，电流输出为4-20mA。电流输出和电压输出都可以反相输出。MS2系列可选择带有BACnet®或 MODBUS®通讯协议输出方式，多个传感器可以采用链式拓扑结构连接在一起。

和我们已经有的MS系列一样，这个第二代变送器不仅能线性输出差压信号，还可通过自带的开方的功能得到风速的线性输出。并可设置参数用于风量的线性输出。

BACnet®和Modbus®通讯协议建议每段不超过32个节点。因此，收发器能接受全位负载。也可以接受分负载。MS2在多数据传输平台MSTP中作为第八位负载。

安装

表面安装

变送器应该在垂直的表面安装，连接头指向下方，以防止水汽进入压力接口或电气接口。隔膜必须垂直是为了尽量减少重力的影响。自带的法兰式安装板可采用三颗平头自攻螺钉直接安装在面板上。上螺丝不要上太紧。

风管安装：

安装变送器时，安装位置尽量远离风机，拐角，冷凝盘管或其它会影响压力测量的设备。

1。安装变送器时，在风管上钻0.562“（12.70毫米）直径的孔。
2。将变送器探头插入。
3。在风管上用法兰式安装板比对着标注三个安装孔的位置，然后钻孔。
4。用三颗#8x1/2”平头自攻螺钉上紧法兰式安装板。不要过分紧固螺钉。

技术指标

兼容波特率：9600, 19200, 38400, 57600, 76800, 115200.
数据位： 8.
奇偶校验: None.
停止位：1.
介质：空气或其它不可燃气体。
材质：咨询工厂。
精度：当量程为0.25″ (50 Pa), 0.5″ (100 Pa), 2″ (500 Pa), 5″ (1250Pa), 10″ (2 kPa), 15″ (3 kPa), 25″ (5kPa)时，精度为± 1%；当量程为 0.1″ (25 Pa)以及所有正负组合量程，精度为± 2% FS 。
稳定性：± 1% / 年 FSO。
温度限制：0 to 150°F (-18to 66°C)。**耐压：**最大1 psi。
泄放压力：10psi。
电源：10 – 35VDC（两线），
17 – 36VDC或隔离21.6 – 33 VAC（三线）。
输出信号：
4 – 20mA（两线）；
0-5VDC，0-10VDC（三线）。
响应时间：0.5到15秒时间常数可调。1.5到45秒达到9 5%的响应。
零点和量程调整：数字按键。
回路电阻：
电流输出：最大0 – 1250 Ω；
电压输出：最小1 kΩ。
电流消耗：最大40mA。
显示方式（可选）：4位LCD数显。**电气连接：**
4 – 20mA：两线连接的（16 – 26AWG）可移除接线端排；
0 – 5（10）V：三线连接的（16 – 26AWG）可移除接线端排。
电线穿管：1/2”NPS螺纹。
配件及附件（A-151）：电缆密封套，用于电缆直径5 – 10mm。
过程连接：3/16”内径管（5mm内径）；
最大外径9 mm。
外壳防护等级：NEMA 4X（IP65）。
安装方位：隔膜垂直于地面的方向。
重量：8.0 oz (230 g)。
机构认证：BTL，CE。

电气连接：

MS2系列的变送器同时输出两线制的4-20mA电流信号和三线制的0-5V或0-10V电压信号，采用欧式可移除的三点接线端子排。可选择任一种输出方式接线，或者是电流信号，或者是电压信号。电压输出信号范围可以采用拨动开关来选取，见这个安装使用说明书上的描述。

供电：
见以下表格的电源要求。

输出方式	电源要求
两线制电流输出	10 to 40 VDC (40 mA min)
三线制电压输出	17 to 40 VDC or 21.6 to 33 VAC (40 mA min)
电流电压同时输出	17 to 40 VDC (40 mA min)

按照我们的对于电流和电压技术要求选择电源。如果没有稳压的电源，请确保电压在一定的范围内波动，最大波动不超过100mV。

交流/直流跳线开关选择

NOTICE **注意：**跳线开关在工厂被设置为交流。在设置为交流的情况下使用直流电源，不会对产品造成损害，但是它的精度可能会临时受到影响。

CAUTION **警告：**如果跳线开关设置为直流时，采用交流电供电会损害变送器。

参考图1中的的交流/直流跳线开关的位置。将跳线插片根据需要的交流或直流插入相应位置。

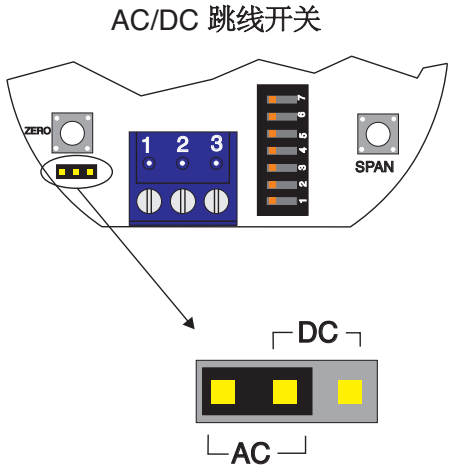
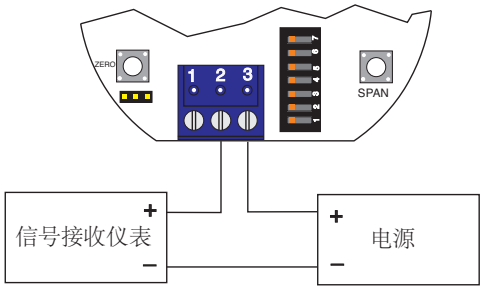


图 1

两线制4 - 20mA电流输出

CAUTION **警告：**不要超过电源电压额定值。永久性的损坏不在保修范围内。所有输出都不能用于交流系统。

见图2，与变送器的连接都是通过端子排上的端子2和3。接线排是可移除的，在电路板上标记出了对应接线端子编号。正极负极采用+IOUT 和-IOUT标出。交流/直流选择的跳线开关应该设置为直流。



电流输出信号接线

图 2

下面的公式列出了在供电电压范围内如何计算回路负载电阻。推荐采用2线屏蔽电缆连接控制信号回路，在电源端将屏蔽接地。

NOTICE 信号接收仪表可以根据现场方便任意连接在回路的正端或者负端。如果变送器和信号接收仪表连接反相了，不会损坏变送器，但是回路不会正常工作。

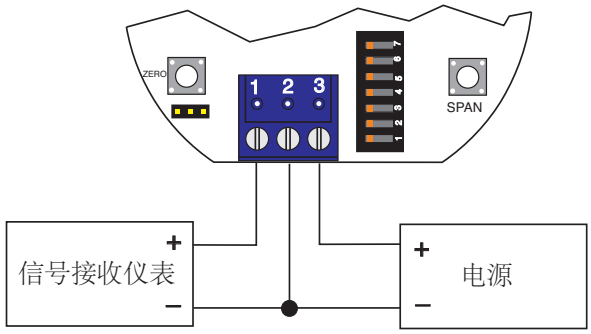
$$R_L = \frac{V_{ps} - 10.0}{20\ mA\ DC}$$

变送器和信号接受仪表之间最大连线距离与导线的粗细以及接收仪表的电阻有关。导线回路的电阻不应该超过接收仪表的电阻的10%。对于非常远的距离（超过1000英尺），可选择低阻抗的接收仪表，以便节省连接导线的费用。在安装中，如果连线少于100英尺，导线可采用小至22号的线。

三线制0 - 10 V 和 0 - 5V电压输出

CAUTION **警告：**不要超过电源电压额定值。永久性的损坏不在保修范围内。

见图3，与变送器的连接都是通过端子排上的端子1，2 和3。接线排是可移除的，在电路板上标记出了对应接线端子编号。正极负极和电源采用PWR，COM，和 +VOUT标出。如果采用直流电源，检查交流/直流跳线开关是否设置为直流。如果变送器的极性接反相了，不会损坏变送器，但是不能正常使用。当连接交流电源时，确保交流/直流的跳线开关设置为交流。电源的两端任意接PWR和COM，不会影响变送器的正常工作，也不会对变送器造成损坏。



电压输出信号接线

图 3

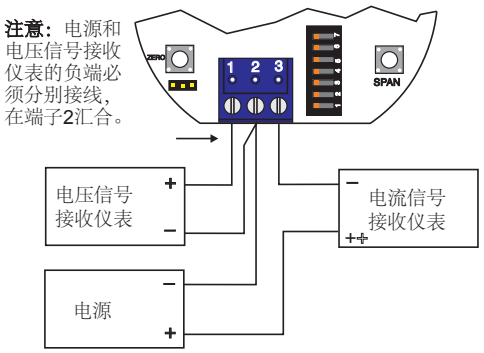
信号接收仪表的最小阻抗为1KΩ。连接导线的电阻应该大大小于接收仪表阻抗。当两端的电压保持不变时，如果有10mA的电流流过，连接导线的电压损耗会使得接收仪表收到的信号产生误差。对于精度为1%的仪表，连接导线电阻应该小于接收仪表阻抗的0.1%。这样能保证信号传输误差在0.1%之内。

+VOUT和COM两端的输出可能是0-5V或0-10V，或者是反相输出，这些都是采用拨动开关来设置。见拨动开关的设置选择表。

电流电压信号同时输出

CAUTION **警告：**不要超过电源电压额定值。永久性的损坏不在保修范围内。所有输出都不能用于交流系统。

见图4，与变送器的连接都是通过端子排上的端子1，2 和3。接线排是可移除的，在电路板上标记出了对应接线端子编号。正极负极和电源采用PWR, COM, 和 +VOUT标出。交流/直流跳线开关应该选择直流。电压输出和电源分开接两套线，负端都在变送器的端子2汇集到一起。如果电源和接收仪表的负端用单线串到一起可能带来额外的误差。



电流电压同时输出接线图

Figure 4

电流输出回路中，最大容许回路电阻（导线电阻 + 接受仪表阻抗）和供电电压有关系。最大回路电压在损失后不能低于变送器的电压17V。可采用下面的公式计算最大回路电阻：

R_{MAX} = (VPS – 17.0) / 0.02 ，VPS为供电电压

公式中的17.0代替过去电流回路公式中的10.0，是因为电流电压同时输出的最小电源电压要求较高。

控制回路信号线建议采用4芯屏蔽电缆。屏蔽接地在电源端。如果变送器和接受仪表的连接反相了，不会损坏变送器，但是不能正常工作。

信号接收仪表的最小阻抗为1KΩ。连接导线的电阻应该大大小于接收仪表阻抗。当两端的电压保持不变时，如果有10mA的电流流过，连接导线的电压损耗会使得接收仪表收到的信号产生误差。对于精度为1%的仪表，连接导线电阻应该小于接收仪表阻抗的0.1%。这样能保证信号传输误差在0.1%之内。

+VOUT和COM两端的输出可能是0-5V或0-10V，或者是反相输出，这些都是采用拨动开关来设置。见拨动开关的设置选择表。

拨动开关设置

见图5，拨动开关在接线端子排的边上。采用微小螺丝刀或笔来改变开关的位置。

WARNING 在改变拨动开关位置时，请确定所有的电源都关闭以避免触电。

拨动开关设置

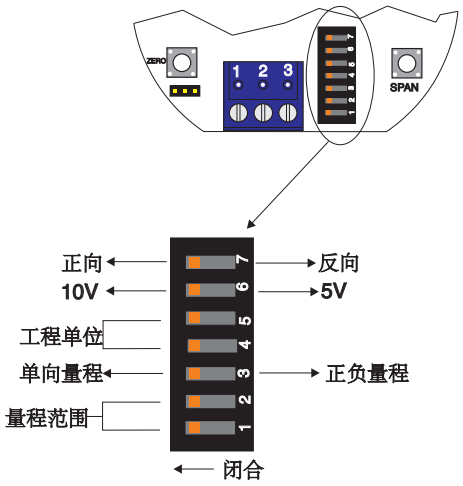


图 5

工厂设定
量程方向：单向（除MS2-XX1X型外）
量程范围：最高的范围 （0.5，5，或28英寸水柱）
工程单位：英寸水柱
电压输出：10V
正向/反相输出：正向

差压量程范围设定

根据以下设置选择表，选择拨动开关的位置1和2可以设置需要的量程范围。量程范围和工程单位（见工程单位设置）以及单向/正负方向量程（见量程方向设置）有关系。下面的表列出的是最大满量程值。单向量程是以零为起始点，正负方向量程是表中的±满量程的值。

拨动开关		MS2-X101的满量程			
1	2	in w.c.	Pa	mm w.c.	kPa
OFF	OFF	0.1	25	2.5	0.025
OFF	ON	0.15	40	4	0.040
ON	OFF	0.25	50	6	0.050
ON	ON	0.5	125	10	0.125

拨动开关		MS2-X102的满量程			
1	2	in w.c.	Pa	mm w.c.	kPa
OFF	OFF	1	250	25	0.250
OFF	ON	2	500	50	0.500
ON	OFF	3	750	75	0.750
ON	ON	5	1250	125	1.25

拨动开关		MS2-X103的满量程			
1	2	in w.c.	Pa	mm w.c.	kPa
OFF	OFF	10	2500	250	2.50
OFF	ON	15	3500	350	3.50
ON	OFF	25	5000	500	5.00
ON	ON	28	6975	700	6.98

单向量程或正负量程设置
MS2-X101，MS2-X102和MS2-X103都只是单向量程，双向量程型MS2-X111和MS2-X112可以被拨动开关设置为单向量程，但会影响精度。

•开关闭合时，变送器被设置为单向量程，零点为起始点（例如：0 - 5英寸水柱）。
•开关断开时，变送器被设置为正负量程，±最大的选择量程（例如：±5英寸水柱）。
•对于只能单向量程的变送器，开关不起作用。

设置工程单位

Magnesense® II可以选择4种工程单位（in w.c., Pa, mm w.c., 或 kPa），可是设置拨动开关4和5来选取，选择的工程单位会显示在LCD显示屏上。

拨动开关		工程单位		
4	5	差压	风速	风量
OFF	OFF	kPa	m/s	m^3/h
OFF	ON	mm w.c.	m/s	m^3/h
ON	OFF	Pa	m/s	m^3/h
ON	ON	in w.c.	FPM	cfm

设置电压输出信号范围：

可设置拨动开关6来选取0-10V或0-5V电压信号输出。

•当拨动开关闭合时，输出是0-10V

•当拨动开关断开时，输出是0-5V

设置输入/输出方向

可配置拨动开关7来选择是输入输出是同方向或是反方向输出。

•当拨动开关闭合时，输出和输出是同方向（例如：输入信号上升时，输出也往上升）

•当拨动开关断开时，输出和输出是反方向（例如：输入信号上升时，输出下降）

校准

注意 在零点或量程校准按钮按下放开后有5秒钟的延时进行校准。这个延时可以保护低量程的变送器在校准是受到按钮按下时的应力引起的误差。

注意 校准功能可以在可编程菜单中设置安全级别，用户可自行设置。

零点校准

压力接口的两端都不加压为零时按下较零按钮3秒钟。如果带显示器或连接了分体显示器，可以看到显示变为ZEro，然后回到正常显示。

量程校准

请在零点校准之后校准量程。并且必须在零点校准后五分钟之内完成。在变送器的相应接口加压，使之达到相应满量程输出的压力（根据变送器的型号，有20mA，5V或10V）。按下并且保持量程按钮3秒钟。如果带显示器或连接了分体显示器，可以看到显示变为SPAn，然后回到正常显示。如果在较准零之前试图校准量程，显示器上会闪显FAIL出错信息。正负组合量程型中，要在正和负两边进行量程校准。

LCD显示

在订购Magnesense® II时可选择带LCD显示。如果不需要带显示的应用场合，可选择不带LCD显示的变送器。我们提供A-MS2-LCD现场升级显示屏，带配套的前盖，可随时现场升级现场的变送器为带显示的变送器。见图6.

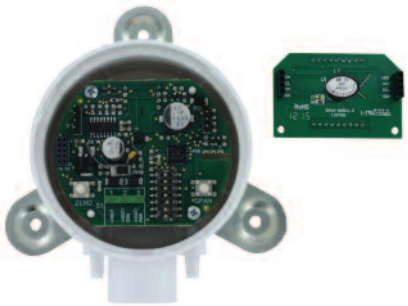


图 6

对于不带显示的变送器还有另外一个选项：A-435-A分体显示器，它可以直接插拔连接，见图7。这个分体显示器还配有两个按键，按键的功能和变送器电路板上的按键一样。

图 7

错误信息显示

ovEr= 超出最大量程。

UndEr= 低于最小量程。

FAiL= 当按下零点或量程按钮时，所加压力超出设定范围。这个可能加压超出范围或者是传感器出了问题。

Err1= 传感器损坏。

编程菜单

主菜单

正常情况下都显示主菜单，并且显示现行测量值和工程单位。

进入安全设置菜单

在显示主菜单时，同时按下Zero和Span按钮直到SECUr出现，这样可以设置安全级别，当放开按钮时会显示出现行安全级别。

如果当前的安全级别是你所需要的安全级别，按住Span建三秒钟进入差压，风速后风量设置菜单。

如果当前的安全级别不是你所需要的安全级别，你可以临时改变当前的安全级别到较低的安全级别，或者按住Zero件来提升安全级别。显示出来的安全级别代码可以更改为下面表格中列出的任何一个代码。Span键选择数位，Zero键增减数值。按住Span键可以储存这个安全级别值。

安全级别	设置	安全限制			
		查看菜单	编辑菜单	量程	零点
0	000	Yes	Yes	Yes	Yes
1	111	Yes	No	No	Yes
2	222	No	No	No	Yes
3	333	No	No	No	No

以上表格中详细列出进入菜单的安全级别，根据安全级别不同进入编程菜单配置或校准的功能会受到不同程度的限制。

模式选择/数字阻尼菜单

在主菜单下，同时按住Span和Zero键三秒钟进入安全级别菜单，如果安全级别为0或1，按住Span键三秒钟进入功能选择菜单。第一次加电时，默认选项为差压模式，按Zeor键循环显示到风速模式和风量模式。

当显示出需要的模式时，按住Span键三秒钟保存所需要的模式，并且显示出数字阻尼或平均参数。这个参数是为了稳定输出而采用平均值的方式来显示。用户可选择多少秒的读数平均值来显示，最大可选到240秒，如果选择2.5读数/秒，输出和显示将会连续每秒2.5次的平均速度来更新，采用的是平均移动值。

差压模式
如果选择了差压模式，在调整了数字阻尼后按住Span键会进入差压模式。在这个菜单中，最大输出差压（POH）可以采用拨动开关在最低和最高值之间任意设置测量范围。如果你希望自己定义测量范围，可以将POH参数设置为Off（关闭）。

风速模式
K系数调整
风速模式下，在调整数字阻尼后按住Span键将会进入风速模式，变送器将会显示出已经由拨动开关选择了的工程单位。按住Span键三秒钟后进行K系数调整。K系数可以在0.001 to 9.999之间选择。需要调整时，按住Span键选择数位然后按下Zero键增加数值。按住Span键三秒钟进行最大输出参数调整。

最大输出参数调整
最大输出参数可以选择和比对风速或比对差压。在调整完K系数后，会显示出对比风速或对比差压来调整最大输出参数，按下Zero键选择其中之一。按住Span键三秒钟后进行最大输出参数调整。按下Span键选择数位，按下Zero键选择数值。按住Span键三秒钟保存选择的值，然后界面回到安全设置菜单。

风量模式
K系数调整
风量模式下，在调整数字阻尼后按住Span键将会进入风量模式，变送器将会显示出已经由拨动开关选择了的工程单位。按住Span键三秒钟后进行K系数调整。K系数可以在0.001 to 9.999之间选择。需要调整时，按住Span键选择数位然后按下Zero键增加数值。按住Span键三秒钟后进行风管面积参数调整。

面积参数调整
在测量风量时，采用风速乘以面积可得出风量。根据拨动开关的设置，面积单位可以是英尺也可以是米。在调整时工程单位会被显示。调整面积参数时，按Span键选择数位，按Zero键循环增加数值，按住Span键三秒钟后进入最大输出调整菜单。

最大输出参数调整
最大输出参数可以选择和比对风量或比对差压。在调整完面积参数后，会显示出对比风量或对比差压来调整最大输出参数，按下Zero键可选择其中之一。按住Span键三秒钟后进行最大输出参数调整。按下Span键选择数位，按下Zero键选择数值。按住Span键三秒钟保存选择的值，然后界面回到安全设置菜单。

安全级别调整菜单/保存调整参数
安全级别调整菜单可以更改当前的安全级别更高或更低。这个安全级别将会在下次从主菜单进入到安全级别菜单时显示出来。按Zero键循环显示不同安全级别，按住Span键三秒钟后保存新的安全级别，然后可以选择是否保存所有的菜单更改。按Zero键切换Yes（是）和No（否），Yes将会保存所有菜单的更改，No将会放弃所有菜单的更改。在显示Yes时，按住Span键将会保存所有菜单设置然后返回到主菜单。

恢复原厂设置
为了方便将所有的菜单设定恢复为原厂设置，同时按住Span和Zero键10秒直到FACtis显示出现。当松开按钮时，变送器将会还原为工厂的默认设定。因为重设了所有已经改变了的参数，所以在使用变送器前请校准零点（和校准量程）。

维护/维修
在MS2系列Magnesense®II差压变送器安装好之后，不需要额为的维护保养，偶尔校准零点就好。除了定期校准和LCD的安装以外，请勿在现场对MS2进行维修，这可能会使您失去保修权利。

保修/退换
见我们产品样本中和网站中的销售条款。请联系我们的客户服务，在送货品返修之前先取得货品退换授权号码。请同时描述问题和应用场合的大致情况。

附录 I
风速/风量计算

采用下列等式计算风速：

风速(fpm) = K-系数 x 4004.4 x √(差压 (in of w.c.)

当风速为m/s时采用下列等式：

风速(m/s) = 风速(fpm) x 0.00508

采用下列等式计算风量：

风量(cfm) = 面积(Ft^2) x K-系数 x 4004.4 x √(差压 (in of w.c.)

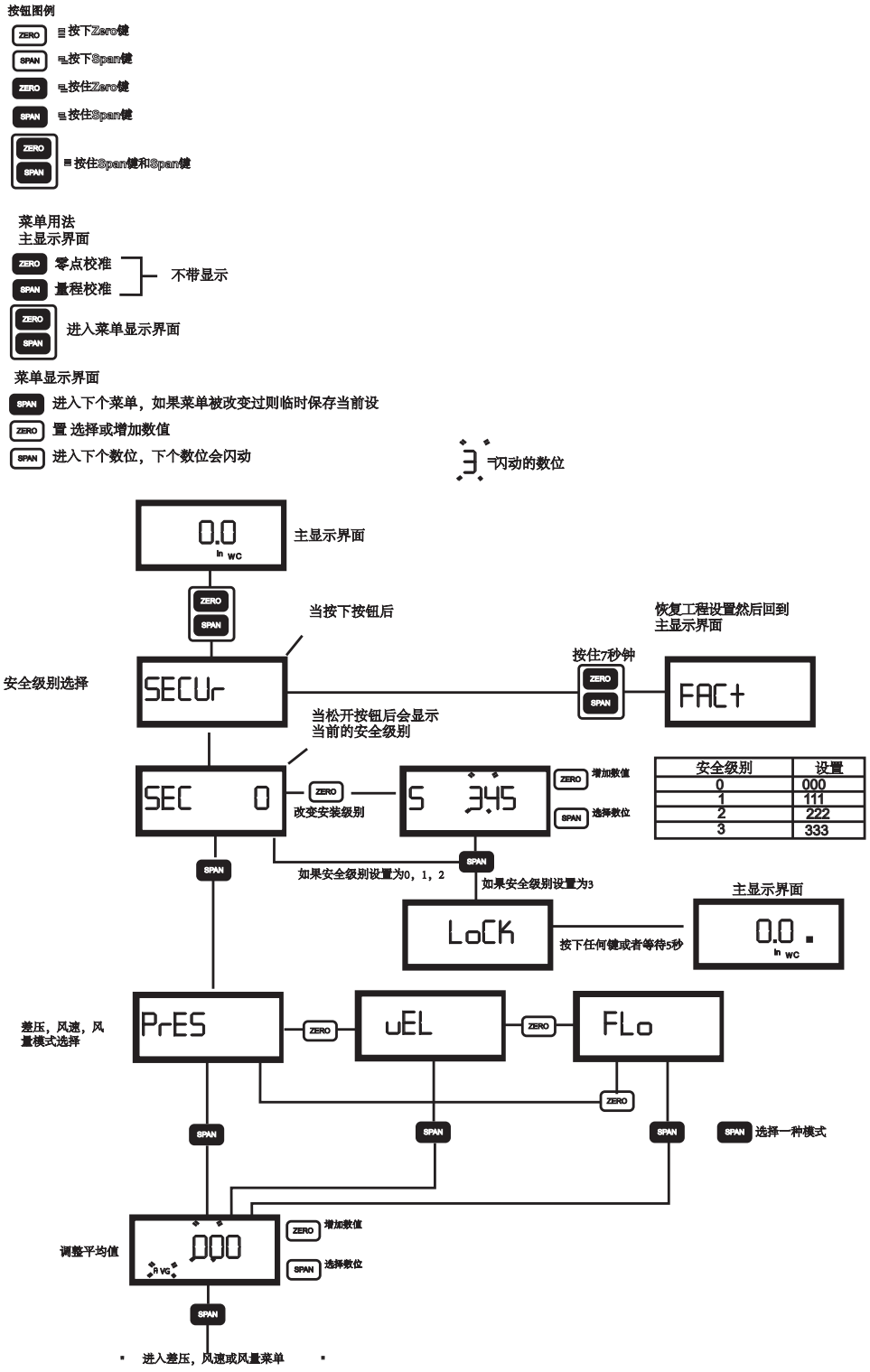
风量(m^3/h) = 风量 (cfm) x 1.6992

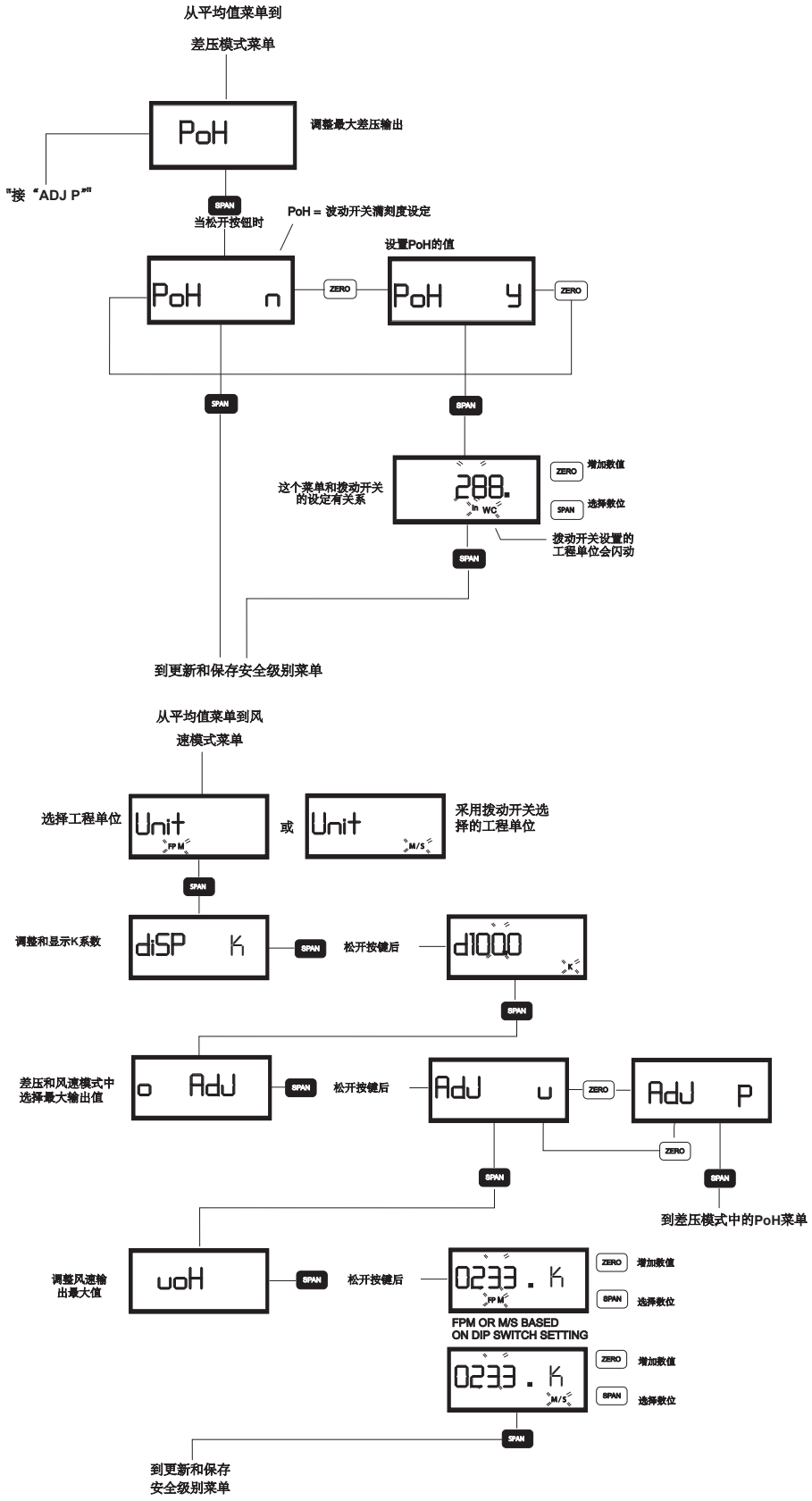
附录 II
最大风量

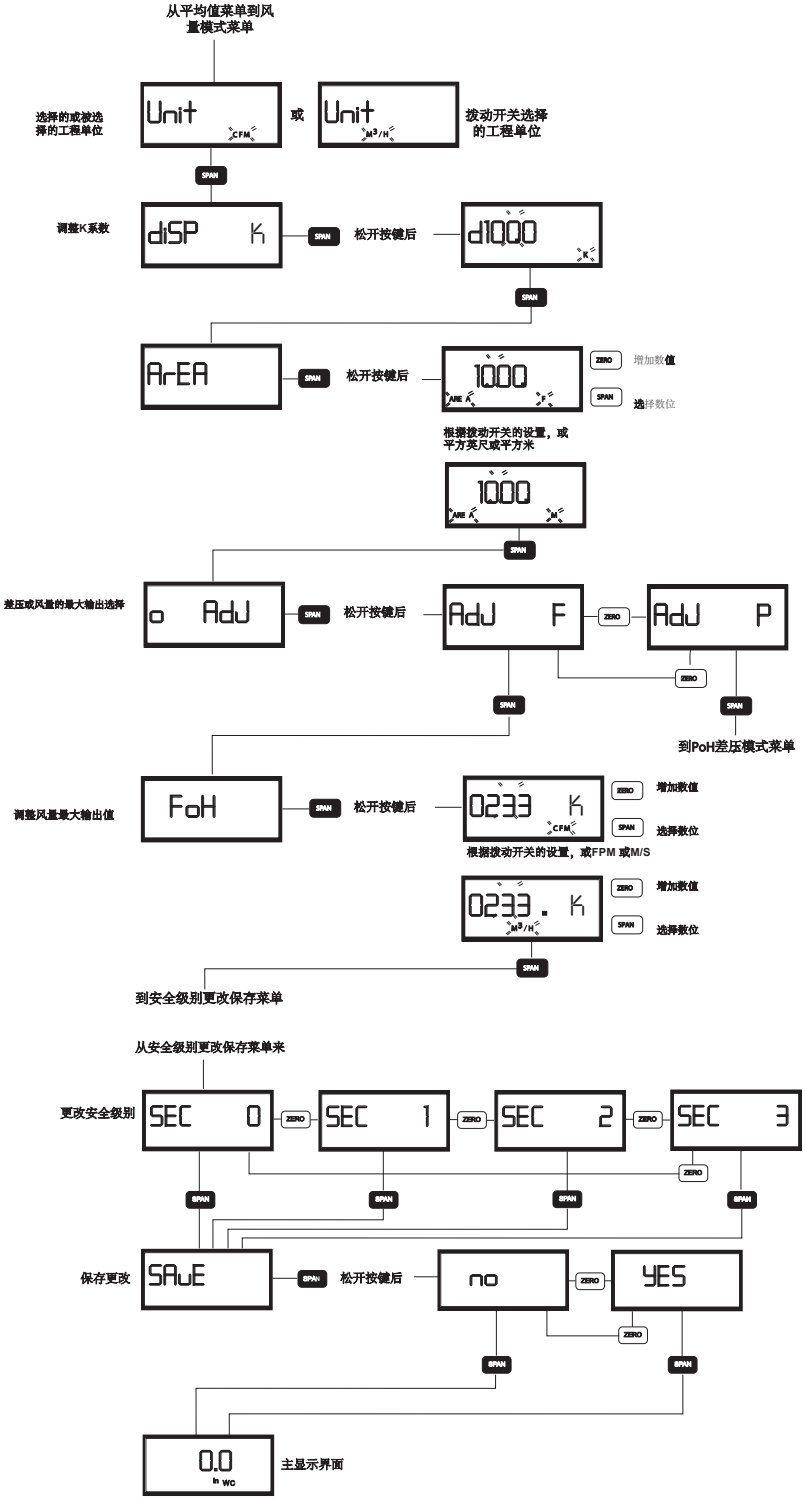
量程	最大显示流量		最大(K 系数 x 面积)	
in w.c.	CFM	M^3/H	CFM 模式	M^3/H 模式
0.5	5885000	9999000	2037.2	154.5
5	5885000	9999000	644.2	59.9
28	5885000	9999000	272.2	25.3

附录 III
快速上手说明

菜单操作流程图

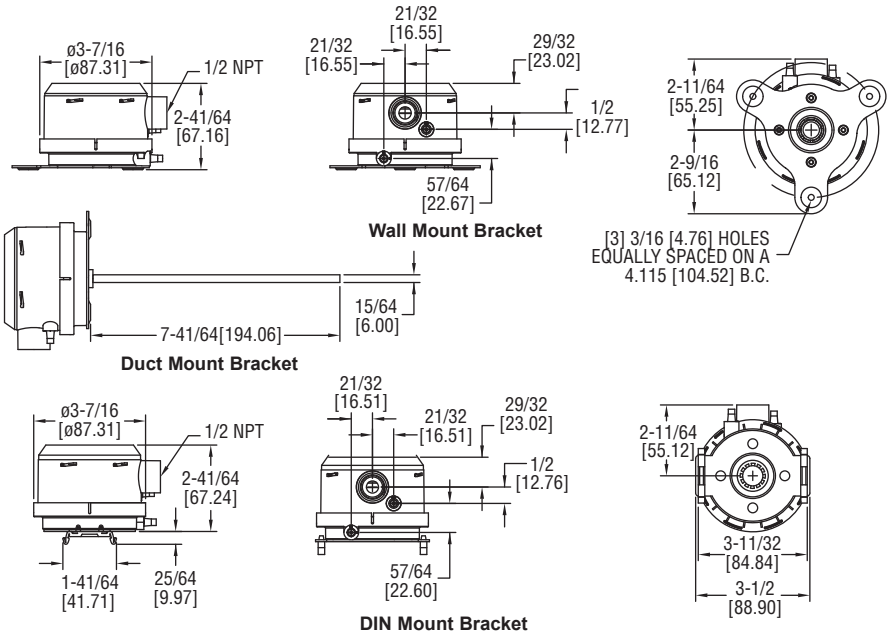



从平均值菜单到
差压模式菜单
PoH
调整最大差压输出
"接“ADJ P”"
SPAN
当松开按钮时
PoH = 波动开关满刻度设定
设置PoH的值
PoH n
ZERO
PoH y
ZERO
SPAN
SPAN
这个菜单和拨动开关
的设定有关系
288.
in WC
ZERO
增加数值
SPAN
选择数位
拨动开关设置的
工程单位会闪动
SPAN
到更新和保存安全级别菜单
从平均值菜单到风
速模式菜单
选择工程单位
Unit
FPM
或
Unit
M/S
采用拨动开关选
择的工程单位
SPAN
调整和显示K系数
diSP K
SPAN
松开按键后
d1000
K
SPAN
差压和风速模式中
选择最大输出值
o AdJ
SPAN
松开按键后
AdJ u
ZERO
AdJ P
ZERO
SPAN
SPAN
到差压模式中的PoH菜单
调整风速输
出最大值
uoH
SPAN
松开按键后
0233 . K
FPM
ZERO
增加数值
SPAN
选择数位
FPM OR M/S BASED
ON DIP SWITCH SETTING
0233 . K
M/S
ZERO
增加数值
SPAN
选择数位
SPAN
到更新和保存
安全级别菜单


从平均值菜单到风量模式菜单
选择的或被选择的工程单位
Unit
CFM
或
Unit
M3/H
拨动开关选择的工程单位
SPAN
调整K系数
diSP K
SPAN
松开按键后
d1000
K
SPAN
ArEA
SPAN
松开按键后
1000
ARE K F
ZERO
增加数值
SPAN
选择数位
根据拨动开关的设置，或平方英尺或平方米
1000
ARE K M
SPAN
差压或风量的最大输出选择
o AdJ
SPAN
松开按键后
AdJ F
ZERO
AdJ P
ZERO
SPAN
SPAN
到PoH差压模式菜单
调整风量最大输出值
FoH
SPAN
松开按键后
0233 K
CFM
ZERO
增加数值
SPAN
选择数位
根据拨动开关的设置，或FPM 或M/S
0233. K
M3/H
ZERO
增加数值
SPAN
选择数位
SPAN
到安全级别更改保存菜单
从安全级别更改保存菜单来
更改安全级别
SEC 0
ZERO
SEC 1
ZERO
SEC 2
ZERO
SEC 3
ZERO
SPAN
SPAN
SPAN
SPAN
保存更改
SAuE
SPAN
松开按键后
no
ZERO
YES
ZERO
SPAN
SPAN
0.0
in WC
主显示界面

Series MS2 Magnesense® II Differential Pressure Transmitter

Specifications - Installation and Operating Instructions



The Series MS2 Magnesense® II Differential Pressure Transmitter combines the proven stable Hall Effect sensing technology of our original Series MS with additional features to reduce installation time and simplify ordering. In this second generation transmitter, we have added additional field selectable pressure ranges so that each model can have four selectable ranges along with four additional bidirectional ranges. When using the pluggable integral display or the portable remote display tool, both Metric and English engineering units can be selected via on board dip switches. Dual current and voltage outputs allow users to simultaneously take either a current or voltage output to their building controller and have a local test circuit for verification of the output reading. The voltage output can be selected to be either 0 to 5 VDC or 0 to 10 VDC, while the current is always 4 to 20 mA. Both the current and voltage output can also be inverted. Alternatively, the MS2 can be ordered with either a BACnet or MODBUS® Communications protocol that will allow the transmitters to be daisy-chained together.

Like the original Series MS, the second generation transmitter can be used as a linear pressure output or a linear velocity output with the square root extraction done in the transmitter. Additional parameters have been included to expand the square root capability to include flow measurements.

BACnet® and Modbus® Communications protocol recommend limiting the number of nodes in any segment to 32. Therefore, the transceiver may be rated at one unit load. Fractional loads are also acceptable. The MS2 accounts as an eighth of a load on the MSTP network.

INSTALLATION

Surface Mount:

The transmitter should be mounted on a vertical surface with the connections directed down to prevent moisture from entering either the pressure ports or the electrical cable entry. The diaphragm must be vertical to minimize gravity effects on the diaphragm. Attach the mounting flange to a flat surface using three #8 x 1/2″ pan head sheet metal screws. Do not over tighten.

Duct Mount:

The transmitter should be mounted away from fans, corners, heating and cooling coils and other equipment that will effect the measurement of the pressure.

1. To mount the transmitter, drill a .562″ (12.70 mm) diameter hold into the duct.
2. Insert transmitter probe into the duct.
3. Mark location of three mounting holes on duct using mounting flange as template. Drill holes.
4. Attach mounting flange to duct with three #8 x 1/2″ pan head sheet metal screws. Do not over tighten screws.

SPECIFICATIONS

Supported Baud Rates: 9600, 19200, 38400, 57600, 76800, 115200.
Data Size: 8.
Parity: None.
Stop Bits: 1.
Service: Air and non-combustible, compatible gases.
Wetted Materials: Consult factory.
Accuracy: ±1% FS for 0.25″ (50 Pa), 0.5″ (100 Pa), 2″ (500 Pa), 5″ (1250 Pa), 10″ (2 kPa), 15″ (3 kPa), 25″ (5 kPa); ±2% FS for 0.1″ (25 Pa), 1″ (250 Pa), ±0.1″ (±25 Pa), ±1″ (±250 Pa) and all bi-directional ranges.
Stability: ±1% / year FSO.
Temperature Limits: 0 to 150°F (-18 to 66°C).
Pressure Limits: 1 psi max., operation; 10 psi burst.
Power Requirements: 10 to 35 VDC (2 wire), 17 to 36 VDC or isolated 21.6 to 33 VAC (3 wire).
Output Signals: 4 to 20 mA (2-wire), 0 to 5 VDC, 0 to 10 VDC (3-wire).
Response Time: Averaging 0 to 240 sec, 2.5 Hz sample rate, 1.5 to 228 sec for 95% step change.
Zero & Span Adjustments: Digital push buttons.
Loop Resistance: Current Output: 0 to 1250Ω max; Voltage Output: Min. load resistance 1kΩ.
Current Consumption: 40 mA max.
Display (optional): 5-digit LCD.
Electrical Connections: 3-wire removable European style terminal block for 16 to 26 AWG.
Electrical Entry: 1/2″ NPS thread; Accessory (A-151): Cable gland for 5 to 10 mm diameter cable.
Process Connection: 3/16″ ID tubing (5 mm ID); Max. OD 9 mm.
Enclosure Rating: IP66.
Mounting Orientation: Diaphragm in vertical position.
Weight: 8.0 oz (230 g).
Agency Approvals: CE.

Electrical Connection:

The Series MS2 simultaneously transmits a 2-wire 4 to 20 mA current output and a 3-wire 0 to 5 V / 0 to 10 V voltage output via a removable European-style three conductor terminal block. The transmitter can be wired in one of the following three ways to utilize the current and / or voltage output. The range of the voltage output can be selected using the on board dip switches as described in the Dip Switch Settings section of this manual.

Power Supply

Refer to the below table for the required supply rating.

Output Type	Power Supply Rating
2-Wire Current	10 to 40 VDC (40 mA min)
3-Wire Voltage	17 to 40 VDC or 21.6 to 33 VAC (40 mA min)
Simultaneous Current and Voltage	17 to 40 VDC (40 mA min)

Choose a power supply with a voltage and current rating sufficient to meet the power specifications under all operating conditions. If the supply is unregulated, make sure that the output voltage remains within the required voltage range under all power line conditions. Ripple on the supply should not exceed 100 mV.

AC/DC Jumper Selection

NOTICE The jumper is factory set to AC. If DC power is applied while the jumper is set to AC, no damage will occur. However, the accuracy of the unit may temporarily be affected.

CAUTION Powering the unit with AC power while the jumper is set to DC may permanently damage the transmitter.

Refer to Figure 1 for the location of the AC / DC jumper. Place the shorting jumper across either the two pins marked AC or the two pins marked DC.

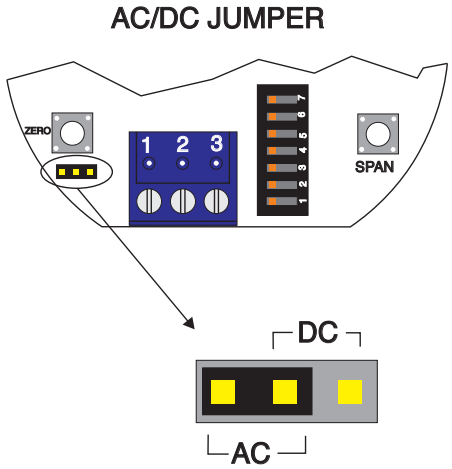
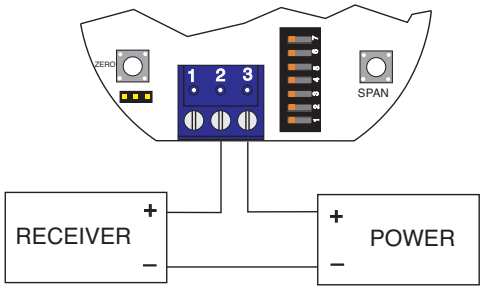


Figure 1

2-Wire 4 to 20 mA Current Operation

CAUTION DO NOT EXCEED SPECIFIED SUPPLY VOLTAGE RATINGS. PERMANENT DAMAGE NOT COVERED BY WARRANTY WILL RESULT. SIMULTANEOUS OUTPUTS ARE NOT DESIGNED FOR AC VOLTAGE OPERATION.

The connections to the transmitter are made through terminals 2 and 3 on the terminal block as shown in Figure 2. The terminal block is removable and each of the terminals are labeled underneath the terminal block on the circuit board. Polarity is indicated by +IOUT and -IOUT. The AC/DC selection jumper should be set for DC operation.



CURRENT OUTPUT WIRING

Figure 2

The range of appropriate receiver load resistances (RL) for the power supply voltage available is given by the formula listed below. Shielded 2-wire cable is recommended for control loop wiring. Ground the shield at the power supply end only.

NOTICE The receiver may be connected to either the negative or positive side of the loop, whichever is most convenient. Should polarity of the transmitter or receiver be inadvertently reversed, the loop will not function properly but no damage will be done to the transmitter.

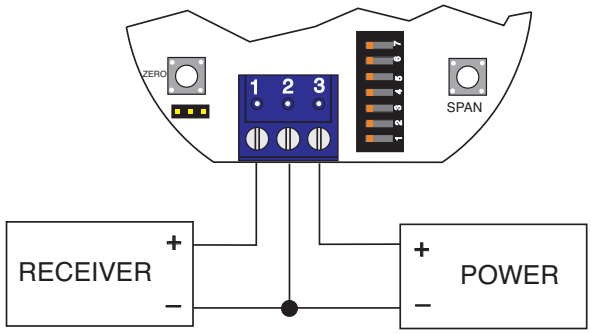
$$R_L = \frac{V_{ps} - 10.0}{20 \text{ mA DC}}$$

The maximum length of connecting wire between the transmitter and the receiver is a function of wire size and receiver resistance. That portion of the total current loop resistance represented by the resistance of the connecting wires themselves should not exceed 10% of the receiver resistance. For extremely long runs (over 1,000 feet), it is desirable to select receivers with lower resistances in order to keep the size and cost of the connecting leads as low as possible. In installations where the connecting run is no more than 100 feet, connecting lead wire as small as No. 22 ga. can be used.

3-Wire 0 to 10 V and 0 to 5V Voltage Operation

CAUTION DO NOT EXCEED SPECIFIED SUPPLY VOLTAGE RATINGS. PERMANENT DAMAGE NOT COVERED BY WARRANTY WILL RESULT.

The connection to the transmitter are made to Terminals 1, 2, and 3 on the terminal block as shown in Figure 3. The terminal block is removable and each of the terminals are labeled underneath the terminal block on the circuit board. Polarity is indicated by PWR, COM, and +VOUT. When connecting using a DC power source, make sure the AC/DC selection jumper is set for DC. If the polarity of the transmitter is inadvertently reversed, the unit will not function properly, but no damage will be done to the transmitter. When connecting to an AC power source, make sure the AC/DC selection jumper is set for AC. Either lead of the supply power may be connected to PWR and COM without affecting the operation of the transmitter or damage to the transmitter.



VOLTAGE OUTPUT WIRING

Figure 3

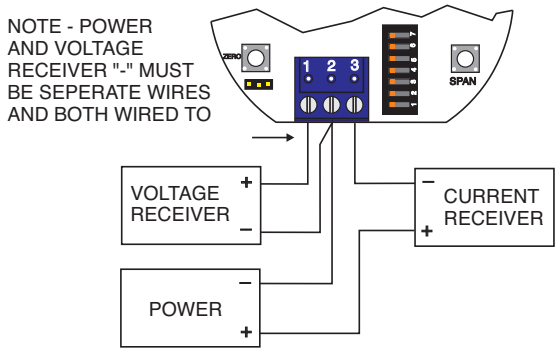
The minimum receiver load is 1K Ω. The resistance due to the wire should be low compared to the receiver load resistance. While the voltage at the terminal block remains unchanged with a 10 mA current flow, resistive losses in the wiring do cause errors in the voltage delivered to the receiver. For a 1% accurate gauge, the resistance of the wires should be less than 0.1% of the value of the receiver load resistance. This will keep the error caused by the current flow below 0.1%.

The output across +VOUT and COM will be either 0 to 5 V, 0 to 10 V, or the inverse depending on the dip switch setting. See Dip Switch Setting Section for more information.

Simultaneous Current and Voltage Operation

CAUTION DO NOT EXCEED SPECIFIED SUPPLY VOLTAGE RATINGS. PERMANENT DAMAGE NOT COVERED BY WARRANTY WILL RESULT. SIMULTANEOUS OUTPUTS ARE NOT DESIGNED FOR AC VOLTAGE OPERATION.

The connection to the transmitter are made to Terminals 1, 2, and 3 on the terminal block as shown in Figure 4. The terminal block is removable and each of the terminals are labeled underneath the terminal block on the circuit board. Polarity is indicated by PWR, COM, and +VOUT. The AC/DC selection jumper should be set for DC operation. The voltage output and the power supply must have separate wire leads that are only joined at terminal 2 of the transmitter. Additional error may occur for the voltage output if a single wire is used or if the wires are joined at the power supply or receiver.



SIMULTANEOUS CURRENT AND VOLTAGE OUTPUT WIRING

Figure 4

For the current output, the maximum allowable loop resistance (wiring + receiver resistance) is dependent on the power supply. The maximum loop voltage drop must not reduce the transmitter voltage below 17 V. The maximum loop resistance can be calculated using the following equation:

R_{MAX} = (VPS – 17.0) / 0.02 Where VPS is the power supply voltage

The equation uses 17.0 instead of 10.0 used in current only equation. This represents the minimum voltage supply which is higher on the simultaneous output configuration due to the requirements of the voltage outputs.

Shielded 4-wire cable is recommended for control loop wiring. Ground the shield at the power supply end only. Should the polarity of the transmitter or receiver be inadvertently reversed, the unit will not function properly, but no damage will be done to the transmitter.

For voltage outputs, the minimum receiver load is 1K Ω. The resistance due to the wire should be low compared to the receiver load resistance. While the voltage at the terminal block remains unchanged with a 10 mA current flow, resistive losses in the wiring do cause errors in the voltage delivered to the receiver. For a 1% accurate gauge, the resistance of the wires should be less than 0.1% of the value of the receiver load resistance. This will keep the error caused by the current flow below 0.1%.

The output across +VOUT and COM will be either 0 to 5 V, 0 to 10 V, or the inverse depending on the dip switch setting. See Dip Switch Setting Section for more information.

DIP SWITCH SETTINGS

DIP Switches can be located next to the terminal block as shown in Figure 5. A small screw driver or pen can be used to change the position of the switches.

⚠ WARNING All power should be turned off to the transmitter before adjusting the dip switch settings to avoid electrical shock.

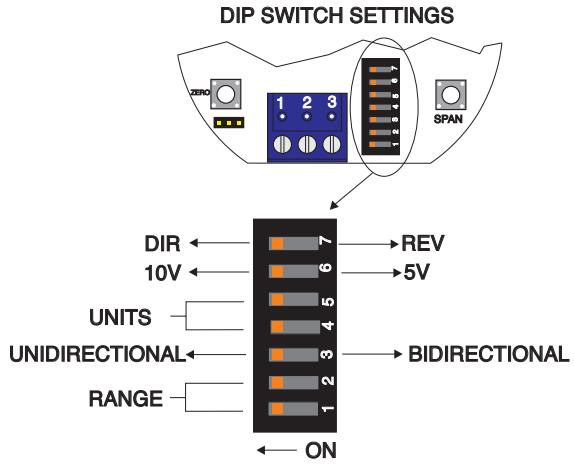


Figure 5

Factory Settings

Mode = Unidirectional (except on MS2-XX1X models)
Range = Highest Range Setting (0.5, 5, or 28 in w.c.)
Units = Inches W.C.
Voltage Output Range = 10 V
Direct / Reverse Output Action = Direct

Setting the Pressure Range

Ranges are selected by adjusting DIP Switch Positions 1 and 2 according to the below tables. The range also depends on the units selected (Refer to Setting the Engineering Units Section) and if the input is set for unidirectional or bidirectional (Refer to the Setting for Unidirectional or Bidirectional Section). The tables below show the maximum full scale value for the selected range and selected units. If the unit is set to unidirectional, the ranges are all zero based. If the unit is set for bidirectional, the ranges will be ± the maximum full scale value shown in the tables below.

DIP Switch		Full Scale Range for MS2-X101			
1	2	in w.c.	Pa	mm w.c.	kPa
OFF	OFF	0.1	25	2.5	0.025
OFF	ON	0.15	40	4	0.040
ON	OFF	0.25	50	6	0.050
ON	ON	0.5	125	10	0.125

DIP Switch		Full Scale Range for MS2-X102			
1	2	in w.c.	Pa	mm w.c.	kPa
OFF	OFF	1	250	25	0.250
OFF	ON	2	500	50	0.500
ON	OFF	3	750	75	0.750
ON	ON	5	1250	125	1.25

DIP Switch		Full Scale Range for MS2-X103			
1	2	in w.c.	Pa	mm w.c.	kPa
OFF	OFF	10	2500	250	2.50
OFF	ON	15	3500	350	3.50
ON	OFF	25	5000	500	5.00
ON	ON	28	6975	700	6.98

Setting for Unidirectional or Bidirectional

The Models MS2-X101, MS2-X102, and MS2-X103 models are unidirectional only. The Bidirectional models MS2-X111 and MS2-X112 can be changed to measure pressure in one direction at a reduced accuracy by changing the setting of DIP Switch 3.

- When the switch is in the ON direction, the transmitter will be set for Unidirectional and will be 0 based (i.e. 0 to 5 in w.c.).
- When the switch is in the OFF position, the transmitter will be set for Bidirectional and will be ± the maximum of the selected range (i.e. ±5 in w.c.).
- For unidirectional units only, switch has no effect and unit will remain in unidirectional mode.

Setting the Engineering Units
Magnesense® II comes with the selection of four engineering units (in w.c., Pa, mm w.c., or kPa). The engineering units are selected using DIP Switch 4 and 5. The units will be displayed on the optional LCD display.

DIP Switch		Units		
4	5	Pressure	Velocity	Air Flow
OFF	OFF	kPa	m/s	m^3/h
OFF	ON	mm w.c.	m/s	m^3/h
ON	OFF	Pa	m/s	m^3/h
ON	ON	in w.c.	FPM	cfm

Setting the Output Voltage Range
Voltage output can be either 0 to 10 V or 0 to 5 V depending on the position of DIP Switch 6.

- When the switch is in the ON position, the output will be 0 to 10 V
- When the switch is in the OFF position, the output will be 0 to 5 V

Setting the Input / Output Action
The output will either directly or indirectly follow the input based on the position of DIP Switch 7.

- When the switch is in the ON position, the output directly follows the input (i.e output increases as the input increases)
- When the switch is in the OFF position, the output acts in reverse of the input (i.e. output decreases as the input increases)

CALIBRATION

NOTICE There is a 5 second delay from the time the zero or span calibration buttons is released until the time that the change in calibration takes place. This delay is used to prevent stress related offsets on the lower ranges.

NOTICE The security level that is set in the Programming Menu Section of the manual will determine which calibrations, if any, may be adjusted by the user.

Zero Calibration
The zero calibration can be set by applying zero pressure to both the pressure ports and pressing the zero button for 3 seconds. If either the remote or local LCD is present, the display will read ZEro and then sequence back to the home display.

SPAN Calibration
The span calibration can be adjusted only after setting the zero adjustment. It must be completed within 5 minutes of the last zero calibration. The span calibration button will be ignored until the zero calibration is completed. Apply pressure to the ports of the transmitter that is associated with the maximum output of the transmitter (20 mA, 5 V, or 10 V depending on output being used). Press and hold the span button for 3 seconds. If either the remote or local LCD is present, the display will read SPAn and then sequence back to the home display. If the span calibration is attempted before adjusting the zero calibration, the FAIL error message will flash on the display. On bi-directional models, separate spans can be performed on the positive and negative sides of the range.

LCD DISPLAY
The Magnesense® II can be ordered with an optional, integral LCD. If the display is not needed for normal operation, the transmitter can be ordered without the LCD. An A-MS2-LCD field upgradeable display is available. It comes with a housing cover with the overlay cut out for the display. The display will plug into the pins as shown in Figure 6.

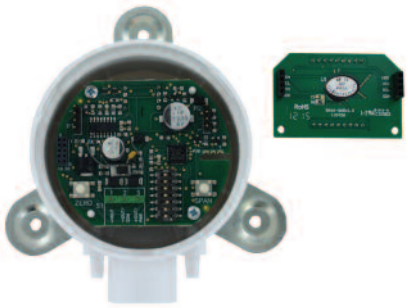


Figure 6

Another option for models that do not have a display would be to use a Model A-435-A remote display tool which can plug into the connector shown in Figure 7. The remote display tool has two buttons that function identically to the buttons on the PCB.

Figure 7

Display Error Messages
ovEr = The applied pressure is greater than the maximum span value causing an Over Range Error.
UndEr = The applied pressure is less than the minimum span value causing an Under Range Error.
FAIL = When the span or zero buttons are pressed, the pressure value is out of the range to allow a correct setting. This may be due to a sensor failure or incorrect pressure being applied.
Err! = The sensor is damaged.

PROGRAMMING MENUS

Home Menu
During normal operation, the display will be in the Home Menu and will display the current measured pressure and the engineering units.

Menu Access Security
While in the Home Menu, press and hold the Zero and Span buttons simultaneously until SECUr appears on the display in order to access the other programming menus. Upon releasing the buttons, the display will indicate the current security level.

If the current security level is the security level desired (i.e. Security Level 0), press and hold the span button for three seconds to enter the Pressure, Velocity, or Air Flow Menu.

If the security level is not the desired level, the security level can be changed temporarily to a lower security level or permanently to a higher level of security by pressing the zero button. A security code will be shown on the display and it can be changed to one of the codes listed in the below table. The span button chooses which digit and the zero button increments the value of that digit. Pressing and holding the span button will store the value.

Security Level	Setting	Access			
		View Menu	Edit Menu	Span	Zero
0	000	Yes	Yes	Yes	Yes
1	111	Yes	No	No	Yes
2	222	No	No	No	Yes
3	333	No	No	No	No

The level of access to the programming menus and the calibration is limited based on the security level. The above table details the level of access for each security level.

Mode Selection / Digital Dampening Menu
From the home display, pressing the span and zero button simultaneously for 3 seconds will access the Menu Security Level. If the level is set to 0 or 1, pressing and holding the span button for 3 seconds a second time will access the Mode Selection Menu. The display will default to Pressure when first powered up. Pressing the zero button will cycle to Velocity and Flow.

Once the desired Mode is displayed, pressing and holding the span button for three seconds will save the selected mode and display the digital dampening or averaging parameter. This parameter stabilizes the output and the display by averaging the readings. There are 2.5 readings taken each second and the user can select the number of seconds that they would like to average up to 240 seconds. The display and the output will continue to update at a rate of 2.5 updates per second, but the moving average is used for these updates.

PRESSURE MODE
Maximum Output Adjustment
If the Pressure Mode was selected, pressing and holding the span after adjusting the digital dampening will enter the Pressure Mode. In this menu, the maximum output pressure (POH) can be adjusted to any pressure between the lowest dip switch range to the highest dip switch range. If the dip switch settings are preferred over manually setting the range, the POH parameter can be set to off.

VELOCITY MODE
K-Factor Adjustment
If the Velocity Mode was selected, pressing and holding the span after adjusting the digital dampening will enter the Velocity Mode and the transmitter will display the engineering unit that has been selected by the dip switch. Pressing and holding the span button for three seconds will enter the K – Factor adjustment. The K – Factor can be adjusted between 0.001 to 9.999. The K-Factor can be adjusted by pressing the span button to select the digit and pressing the zero button to increment the value of the digit. Pressing and holding the span button for three seconds will enter the Maximum Output Adjustment parameter.

Maximum Output Adjustment
The maximum output can be equivalent to a velocity or a pressure. After adjusting the K-Factor, the display will indicate if the adjustment is set for pressure or velocity. Pressing the zero button will toggle between the selections. Pressing and holding the span button for three seconds will enter the maximum output adjustment. The maximum output can be adjusted by pressing the span button to select the digit and pressing the zero button to increment the value of the digit. Pressing and holding the span button for three seconds will save this value and go to the Security Update Menu.

FLOW MODE
K-Factor Adjustment
If the Flow Mode was selected, pressing and holding the span after adjusting the digital dampening will enter the Flow Mode and the transmitter will display the engineering unit that has been selected by the dip switch. Pressing and holding the span button for three seconds will enter the K – Factor adjustment. The K – Factor can be adjusted between 0.001 to 9.999. The K-Factor can be adjusted by pressing the span button to select the digit and pressing the zero button to increment the value of the digit. Pressing and holding the span button for three seconds will enter the Area Adjustment parameter.

Area Adjustment
For Flow applications, the area is multiplied by the velocity to determine the volumetric air flow. The area will be listed in either feet or meters depending on the dip switch settings. The units will be indicated on the display at the time of adjustment.The area can be adjusted by pressing the span button to select the digit and pressing the zero button to increment the value of the digit. Pressing and holding the span button for three seconds will enter the Maximum Output Adjustment parameter.

Maximum Output Adjustment
The maximum output can be equivalent to a flow or a pressure. After adjusting the Area parameter, the display will indicate if the adjustment is set for pressure or flow. Pressing the zero button will toggle between the selections. Pressing and holding the span button for three seconds will enter the maximum output adjustment. The maximum output can be adjusted by pressing the span button to select the digit and pressing the zero button to increment the value of the digit. Pressing and holding the span button for three seconds will save this value and go to the Security Update Menu.

Security Update / Save Changes Menu
The Security Update Menu allows the security level to be set either higher or lower than the current security level setting. This security level will be displayed the next time the Menus are accessed from the home screen. Pressing the zero button cycles through the security levels. Pressing and holding the span button for three seconds accepts the new security level and gives the option to save all the menu changes. Pressing the zero button will toggle between yes and no. Yes will save the changes made to all menu items and no will discard all the changes made to all menu items. If the display is set to yes, pressing and holding the span will save the menu items and return the display to the Home Position.

FACTORY DEFAULT PROCEDURE
In order to reset all of the menu settings back to their factory programmed values, press and hold both the span and zero buttons simultaneously for 10 seconds until FAC+ is displayed on the LCD. Upon releasing the buttons, the unit will be factory defaulted. Since resetting the transmitter will wipe out all changes, it is necessary to zero (and possibly span) the transmitter before taking measurements.

MAINTENANCE/REPAIR
Upon final installation of the Series MS2 Magnesense®II Differential Pressure Transmitter, no routine maintenance is required besides zeroing the transmitter occasionally. Besides routine calibration and installation of the LCD, the Series MS2 is not field serviceable and it is not possible to repair the unit. Field repair should not be attempted and may void warranty.

WARRANTY/RETURN
Refer to “Terms and Conditions of Sales” in our catalog and on our website. Contact customer service to receive a Return Goods Authorization number before shipping the product back for repair. Be sure to include a brief description of the problem plus any additional application notes.

APPENDIX I
Air Velocity / Air Flow Calculations

Velocity is calculated using the below equation:

$$\text{Velocity(fpm)} = \text{K-Factor} \times 4004.4 \times \sqrt{(\text{Diff. Press. (in of w.c.)}}$$

Velocity in m/s is then calculated from the equation:

$$\text{Velocity(m/s)} = \text{Velocity(fpm)} \times 0.00508$$

Flow is calculated using the below equation:

$$\text{Flow(cfm)} = \text{Area(Ft}^2\text{)} \times \text{K-Factor} \times 4004.4 \times \sqrt{(\text{Diff. Press. (in of w.c.)}}$$

$$\text{Flow (m}^3\text{/h)} = \text{Flow (cfm)} \times 1.6992$$

APPENDIX II
Maximum Flow

Range	Max Displayed Flow		Max (K Factor x Area)	
in w.c.	CFM	M^3/H	CFM Mode	M^3/H Mode
0.5	5885000	9999000	2037.2	154.5
5	5885000	9999000	644.2	59.9
28	5885000	9999000	272.2	25.3

APPENDIX III
Quick Start Guide

MENU FLOW CHART

BUTTON PRESS LEGEND

ZERO = PRESS ZERO BUTTON

SPAN = PRESS SPAN BUTTON

ZERO = PRESS AND HOLD ZERO BUTTON

SPAN = PRESS AND HOLD SPAN BUTTON

ZERO + SPAN = PRESS AND HOLD ZERO AND SPAN BUTTONS

MENU CONVENTIONS

IN HOME POSITION:

ZERO CALIBRATE UNIT TO ZERO PRESSURE.

SPAN CALIBRATE UNIT TO SPAN PRESSURE.

DISPLAY IS NOT NECESSARY

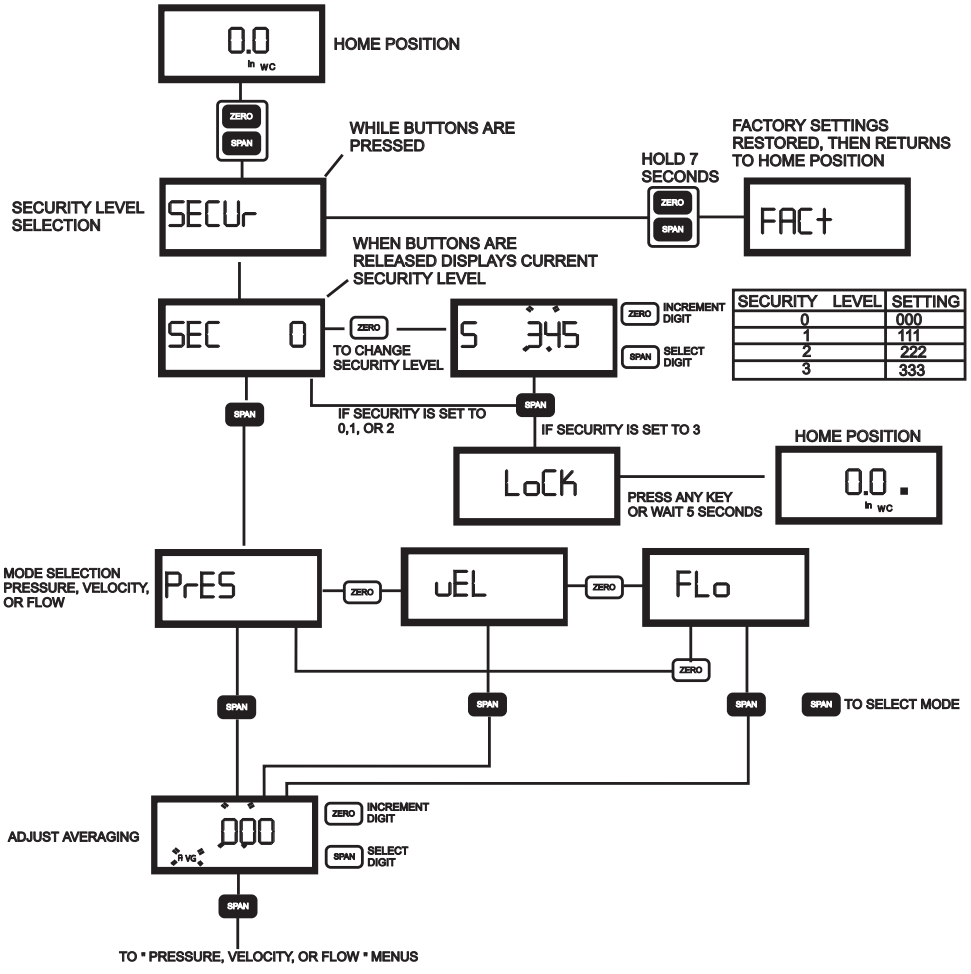
ZERO + SPAN ENTER MENU DISPLAY

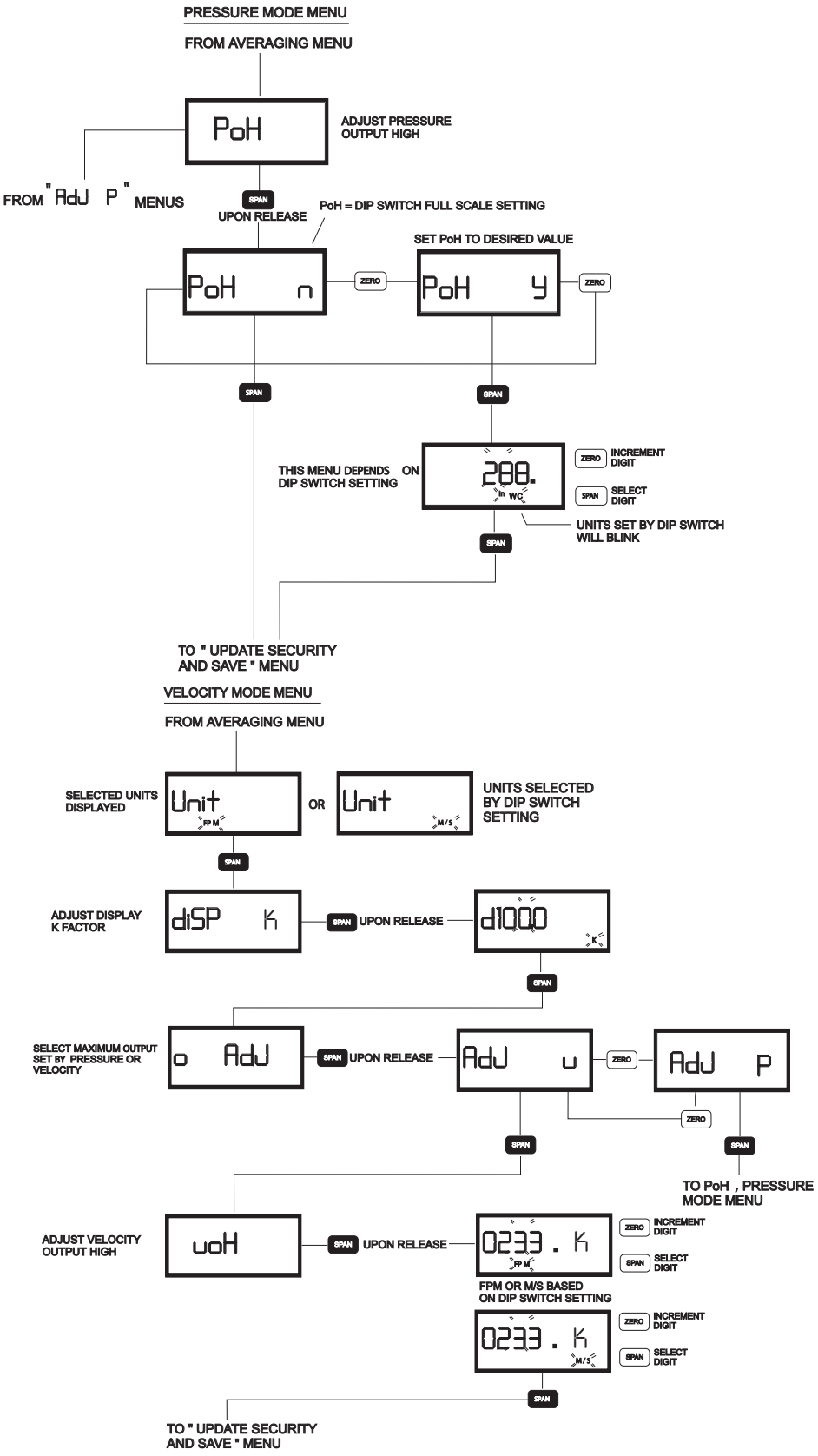
IN MENU DISPLAY:

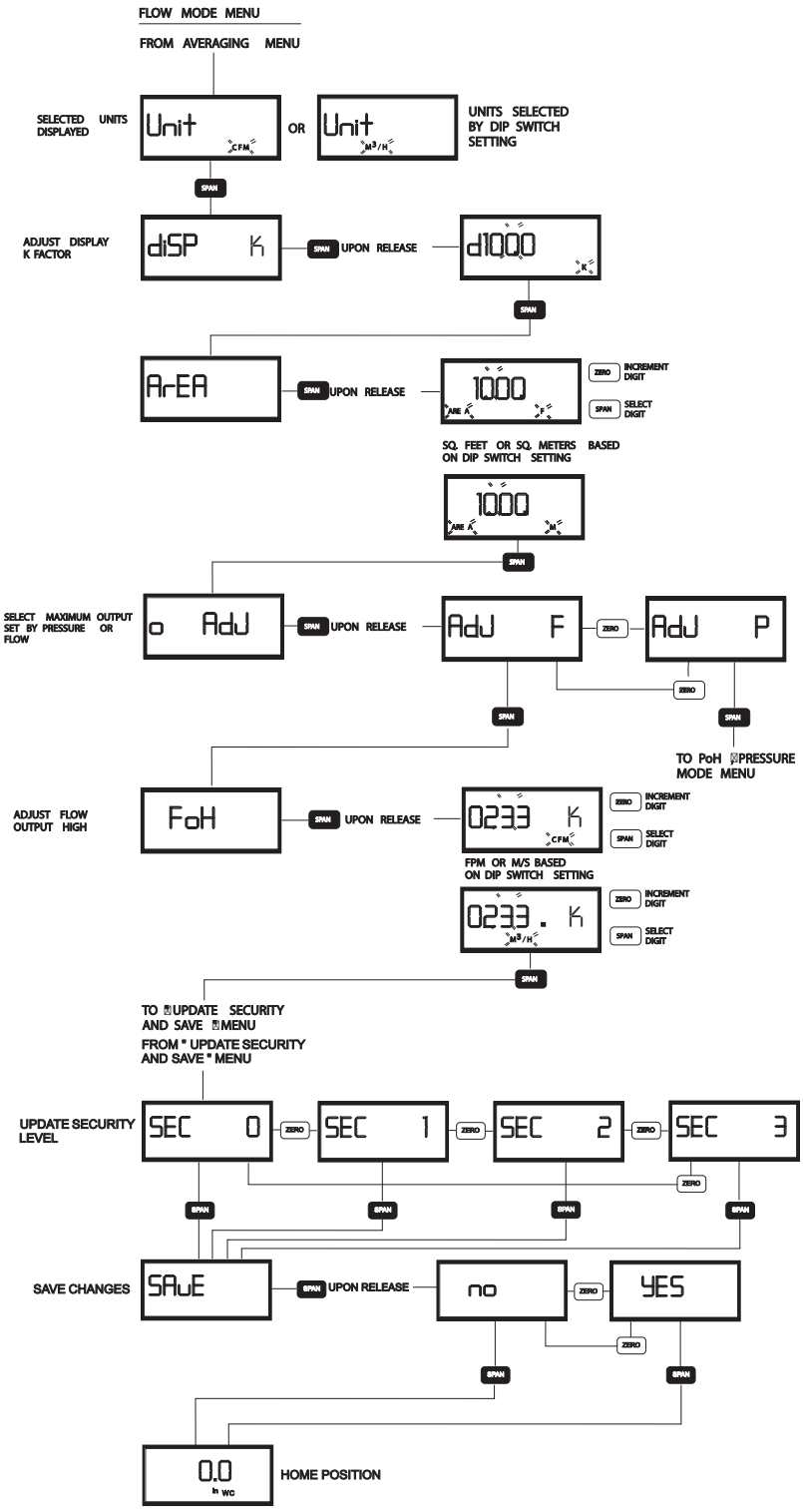
SPAN SEQUENCES TO NEXT MAIN MENU ITEM, AND IF A MENU ITEM IS CHANGED TEMPORARILY SAVES THE SELECTION

ZERO SEQUENCES THROUGH SUB MENU SELECTIONS OR INCREMENTS DIGITS

SPAN SEQUENCE TO NEXT DIGIT. ACTIVE DIGIT WILL BLINK. 3 = BLINKING DIGIT




PRESSURE MODE MENU
FROM AVERAGING MENU
PoH
ADJUST PRESSURE OUTPUT HIGH
FROM " AdJ P " MENUS
SPAN
UPON RELEASE
PoH = DIP SWITCH FULL SCALE SETTING
SET PoH TO DESIRED VALUE
PoH n
ZERO
PoH y
ZERO
SPAN
SPAN
THIS MENU DEPENDS ON DIP SWITCH SETTING
288.
IN WC
ZERO INCREMENT DIGIT
SPAN SELECT DIGIT
UNITS SET BY DIP SWITCH WILL BLINK
SPAN
TO " UPDATE SECURITY AND SAVE " MENU
VELOCITY MODE MENU
FROM AVERAGING MENU
SELECTED UNITS DISPLAYED
Unit
FP M
OR
Unit
M/S
UNITS SELECTED BY DIP SWITCH SETTING
SPAN
ADJUST DISPLAY K FACTOR
diSP K
SPAN
UPON RELEASE
d1000
K
SPAN
SELECT MAXIMUM OUTPUT SET BY PRESSURE OR VELOCITY
o AdJ
SPAN
UPON RELEASE
AdJ u
ZERO
AdJ P
ZERO
SPAN
SPAN
TO PoH , PRESSURE MODE MENU
ADJUST VELOCITY OUTPUT HIGH
uoH
SPAN
UPON RELEASE
0233 . K
FP M
ZERO INCREMENT DIGIT
SPAN SELECT DIGIT
FPM OR M/S BASED ON DIP SWITCH SETTING
0233 . K
M/S
ZERO INCREMENT DIGIT
SPAN SELECT DIGIT
SPAN
TO " UPDATE SECURITY AND SAVE " MENU


FLOW MODE MENU
FROM AVERAGING MENU
SELECTED UNITS DISPLAYED
Unit
CFM
OR
Unit
M3/H
UNITS SELECTED BY DIP SWITCH SETTING
SPAN
ADJUST DISPLAY K FACTOR
diSP K
SPAN UPON RELEASE
d1000
K
SPAN
ArEA
SPAN UPON RELEASE
1000
ARE
F
ZERO INCREMENT DIGIT
SPAN SELECT DIGIT
SQ. FEET OR SQ. METERS BASED ON DIP SWITCH SETTING
1000
ARE
M
SPAN
SELECT MAXIMUM OUTPUT SET BY PRESSURE OR FLOW
o AdJ
SPAN UPON RELEASE
AdJ F
ZERO
AdJ P
ZERO
SPAN
SPAN
TO PoH PRESSURE MODE MENU
ADJUST FLOW OUTPUT HIGH
FoH
SPAN UPON RELEASE
0233 K
CFM
ZERO INCREMENT DIGIT
SPAN SELECT DIGIT
FPM OR M/S BASED ON DIP SWITCH SETTING
0233 . K
M3/H
ZERO INCREMENT DIGIT
SPAN SELECT DIGIT
SPAN
TO UPDATE SECURITY AND SAVE MENU
FROM " UPDATE SECURITY AND SAVE " MENU
UPDATE SECURITY LEVEL
SEC 0
ZERO
SEC 1
ZERO
SEC 2
ZERO
SEC 3
ZERO
SPAN
SPAN
SPAN
SPAN
SAVE CHANGES
SAuE
SPAN UPON RELEASE
no
ZERO
YES
ZERO
SPAN
SPAN
0.0
In WC
HOME POSITION