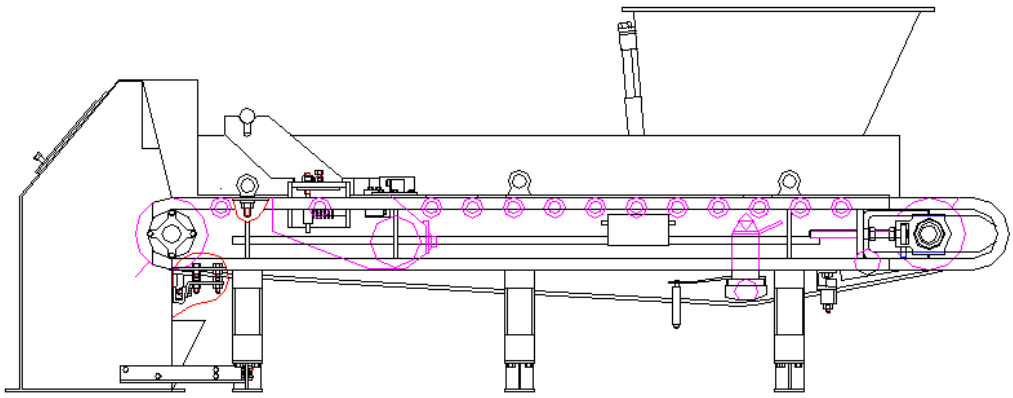
DEL/DEM 型定量给料机

DEL/DEM Type Weighing Feeder

使用、安装、维护手册

Operation, Installation & Maintenance Manual



深圳市科尔达电气设备有限公司

SHEN ZHEN KERTA ELECTRIC EQUIPMENT CO., LTD.

⚠注意事项
1、请在使用之前，仔细阅读本使用说明书，理解使用方法后正确使用。 2、本说明书已包含产品相对应控制仪表操作使用方法。

目 录

第一章、概述

1、定量给料机

DEL/DEM 型定量给料机是一种对散粒状和块状物料实施连续输送、动态称量和给料控制的设备，它适用于建材、冶金、矿山、化工等行业。

DEL/DEM 型定量给料机在控制方面，能够按照设定的给料率，通过调节皮带速度，自动调节物料流量，保证以设定的给料率连续不断地输送物料，并且能自动累积输送的物料总量；在操作上，可以通过仪表键盘实施操作，也可以通过上位机或过程管理系统 DCS，完成系统的自动控制。

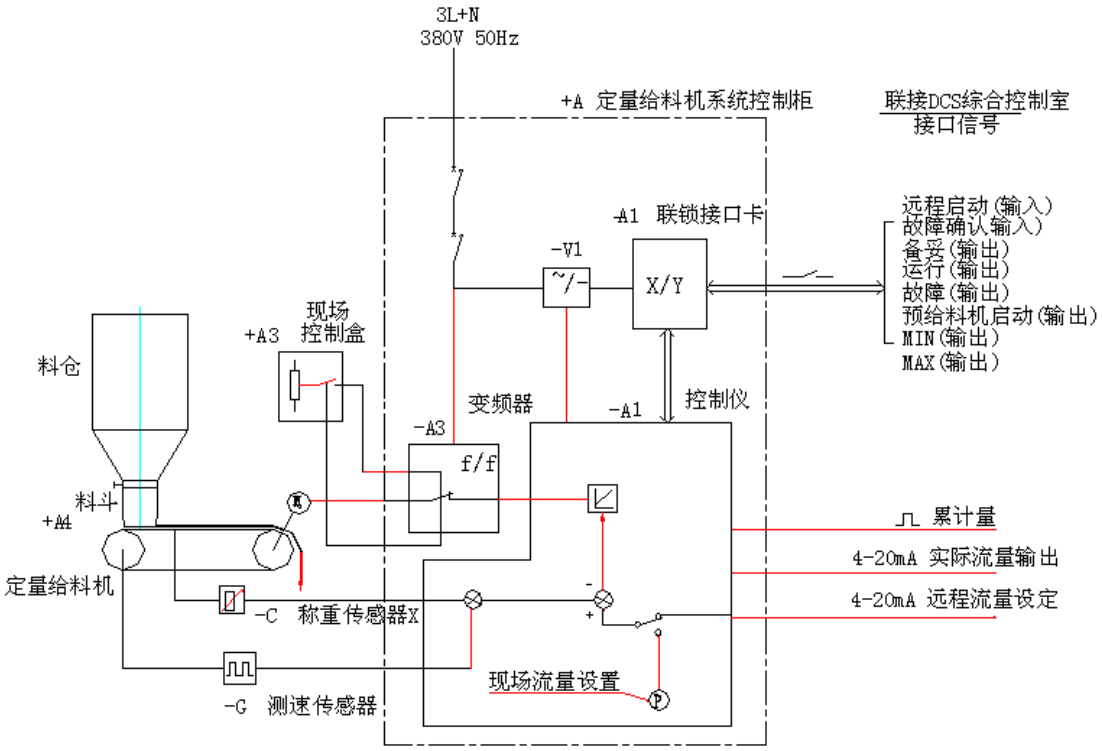
DEL/DEM 型定量给料机经过精湛的制造技术和严格的质量控制体系，保证了产品的质量。高精度和高稳定性的 DEL/DEM 型定量给料机，已成为工业上散粒状物料配料与计量的理想设备。

2、系统使用的部分字符说明

P	定义：设定的给料率	单位：kg/h；t/h
I	定义：实际给料率	单位：kg/h；t/h
Z	定义：给料量的累计值	单位：kg；t
V	定义：皮带速度	单位：m/s
Q	定义：皮带负荷	单位：kg/m
QB	定义：测量平台载荷	单位：kg
Y	定义：控制量	单位：mA
Ir	定义：给料率	单位：%
Qr	定义：皮带负载	单位：%
Xd	定义：偏差	单位：%
Pr	定义：外部百分比设定值	单位：%
Pe	定义：外部给定值	单位：kg/h

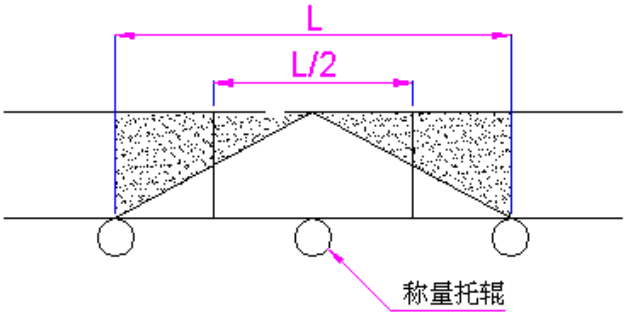
3、工作原理

a）工作原理图



b）测量原理

（1）皮带载荷



如图所示，定量给料机在工作过程中，料仓的物料经过料斗均布于机架的皮带上，在皮带称量段 L 上，物料载荷由机架上的称量框架传递给称量传感器，由上图可知，皮带有效称量段为 L/2，因此，皮带负荷为：

$$Q = QB/(L/2)$$

式中： QB－皮带称量段上物料的重量　　单位：kg

Q－皮带负荷值　　单位：kg/m

L－称量段长度　　单位：m

L/2－有效称量段　　单位：m

（2）带速信号

皮带速度信号一般是用变频器中输出的脉冲频率信号代替，或者将速度编码器装在从动滚筒轴端，或者取电机尾部测速脉冲信号，用间接测得的滚筒转速信号来代替。皮带速度脉冲频率信号送入控制仪表，进行变换，即可得到带速信号 V(m/s)。

（3）给料速率

在控制仪表内对皮带载荷信号和带速信号作乘法运算，即得到瞬时流量 I(kg/s)，I 也称作给料率。

即：

$$I = Q \times V = \frac{2QB}{L} \times V$$

（4）总累积量

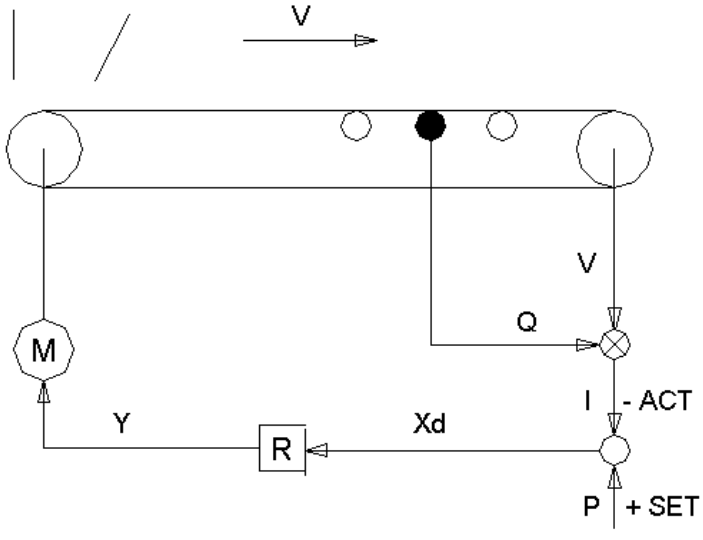
总累积量 $Z=\int Idt$，也就是给料率的积分。

从以上分析可知，给料率是由称量框架的载荷和皮带速度决定的。定量给料机在运行过程中，不断将流量的设定值 P 与 I 值比较，其偏差经控制仪表运算，输出偏差控制量，由变频器调节电机转速，即调整皮带速度，使给料速率 I 值接近给料速率的设定值，且保持不变。

4、控制

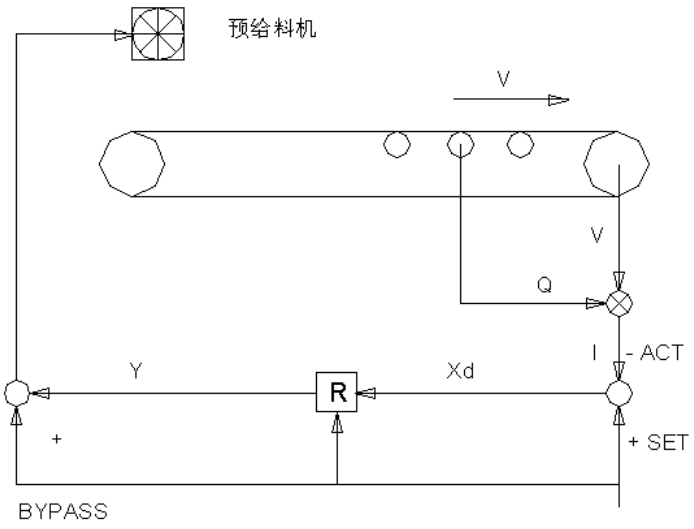
a）直接给料控制

直接由料仓通过料斗给料。测量实际给料率，并将其与设定给料率进行比较，用其差值控制定量给料机的电机旋转速度，从而达到给料控制。



b）带预给料机的控制

预给料机的速度跟随设定值，皮带以恒定转速工作。



5、控制模式

a）重力模式

控制模式，如以上所述。

b）体积模式

非控制模式，定量给料机或预给料机速度比例与设定值。

6、操作源

a）设定值

键盘或外部模拟量。

b）启动/停止

键盘或外部开关量。

第二章、技术参数及规格型号

1、技术参数

a）控制精度

称量精度：＜±1 %

给料控制精度：＜±0.5 %

b）控制柜

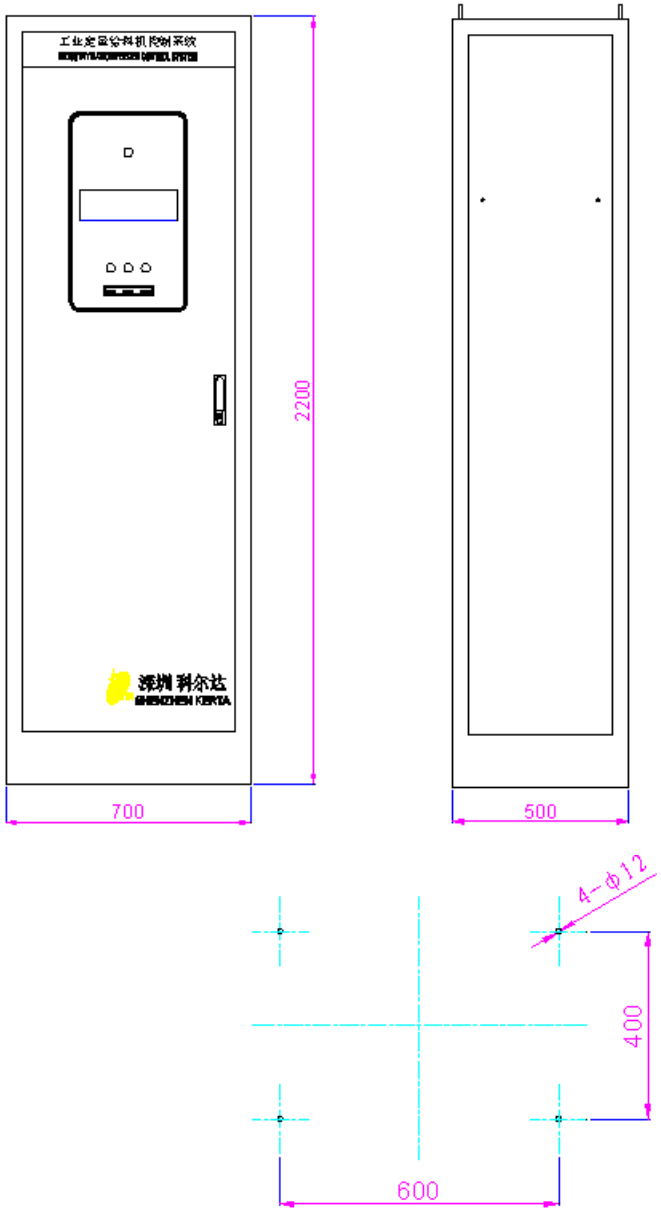
完成系统控制的所有功能。

1）控制柜规格

外型（宽×高×深）： 700×2200×500 mm

安装尺寸（宽×深）： 600×400 mm

4× φ12 mm



控制柜安装尺寸

（2）电源供应

仪表：220V AC 50Hz

秤体：380V AC 50Hz

（3）需求功率

<3KW(含传动装置)

（4）工作环境

秤体：　　-20～70℃

仪表：　　0～50℃

相对湿度：30～85%RH，无结露

（5）开关量输入

数量：2 个继电器输入接点

状态：远程启动/停止　　闭合/断开

故障确认　　常开

要求：外部无源触点

（6）开关量输出

数量：6 个继电器输出接点

状态：运行　　常开

备妥　　常开

故障　　常开

预给料机启动　　常开

极大值　　常开

极小值　　常开

负载：触点容量　AC 220V 3A　或 DC 35V 5A

（7）模拟量输入

数量：1 个

名称：给料率

标准：4～20 mA

（8）模拟量输出

数量：1 个

名称：实际给料率

标准：4～20 mA

（9）脉冲量输出

数量：1 个

名称：物料累计量

频率：　　<10 Hz

脉冲宽度：　　50～1000 ms

（10）速度输入

数量：1 个

名称：　　编码器、测速传感器

输入频率：　　0.05～2500 Hz

系统监控：　　编码器电缆开路、短路

电缆长度：　　≤500 m

（11）重力传感器

数量：　　1 个

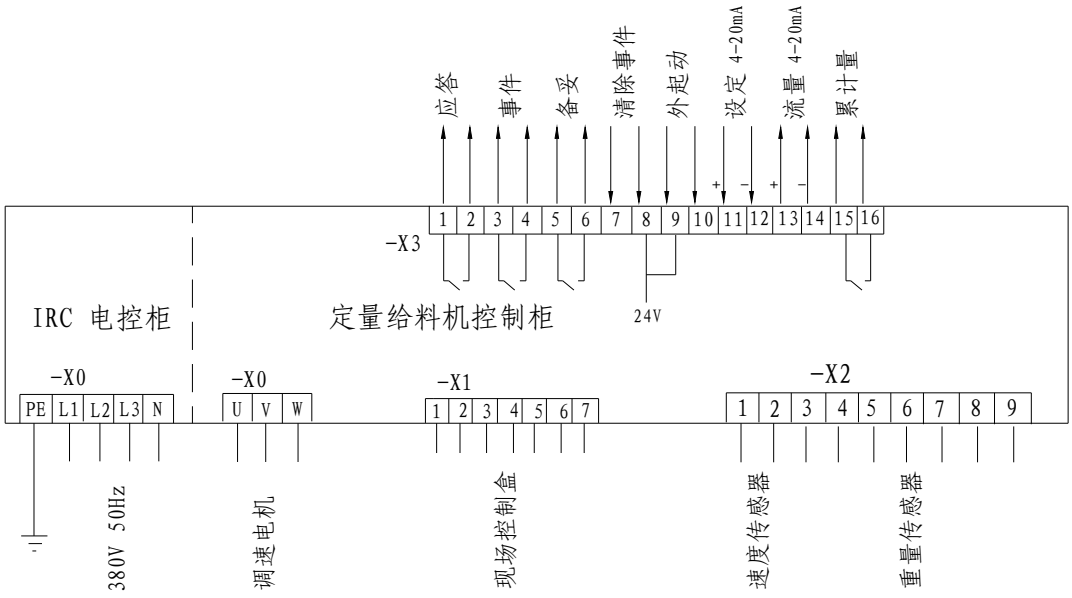
电源供应：　　5V DC

测量循环：　　80ms

电缆长度：≤500 m

测量范围：　　0～30 mV

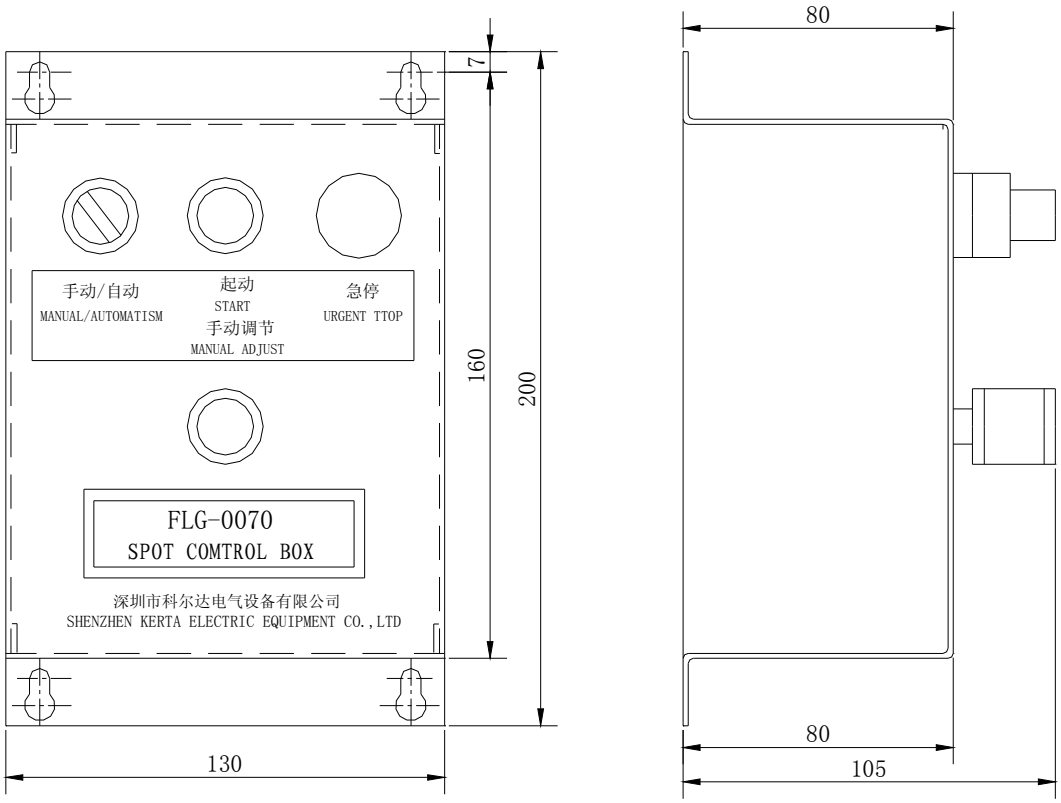
（12）外部接线图

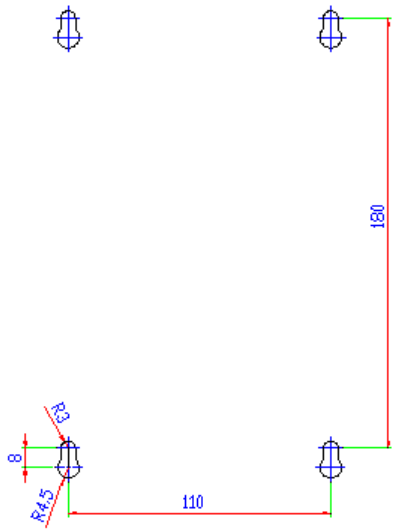


c）现场控制盒

外型（宽×高×深）：　130×200×105 mm

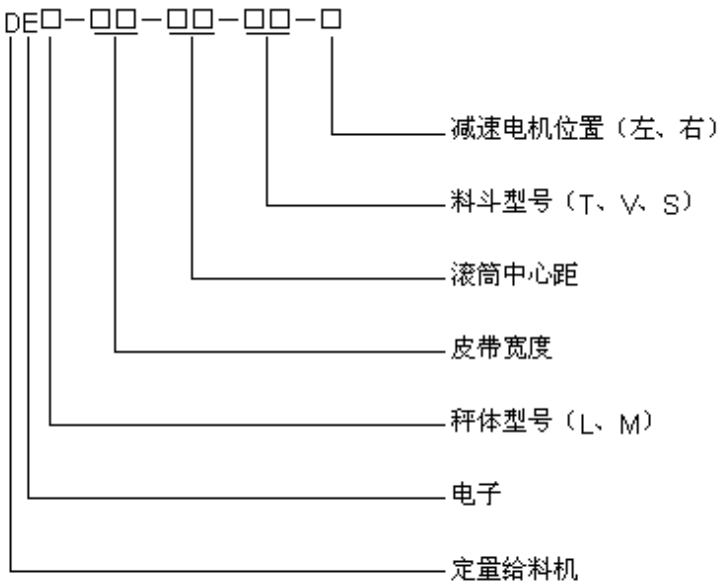
安装尺寸：　　如图所示





2、DEL/DEM 型定量给料机型号

a）型号



b）型号说明

（1）秤体型号

L 为轻型机，滚筒直径为 190mm

M 为重型机，滚筒直径为 320mm

（2）皮带宽度（用两位数字表示）

06 ——— 650mm　　08 ——— 800mm

10 ——— 1000mm　　12 ——— 1200mm

14 ——— 1400mm　　18 ——— 1800mm

（3）滚筒中心距（用两位数字表示）

13 ——— 1300mm　　15 ——— 1500mm

20 ——— 2000mm　　27 ——— 2700mm

35 ——— 3500mm　　40 ——— 4000mm

45 ——— 4500mm

（4）料斗型号

T4/T6　T20

V2　　V5

S1　　S2

（5）减速电机位置

左传动　　右传动

注：

左传动与右传动的区分方法：人的视线与物料输送方向一致时，若减速电机安装在秤体左侧即为左传动，若减速电机安装在秤体右侧即为右传动。

c）选型示例

DEL-08-20-T4-左表示：

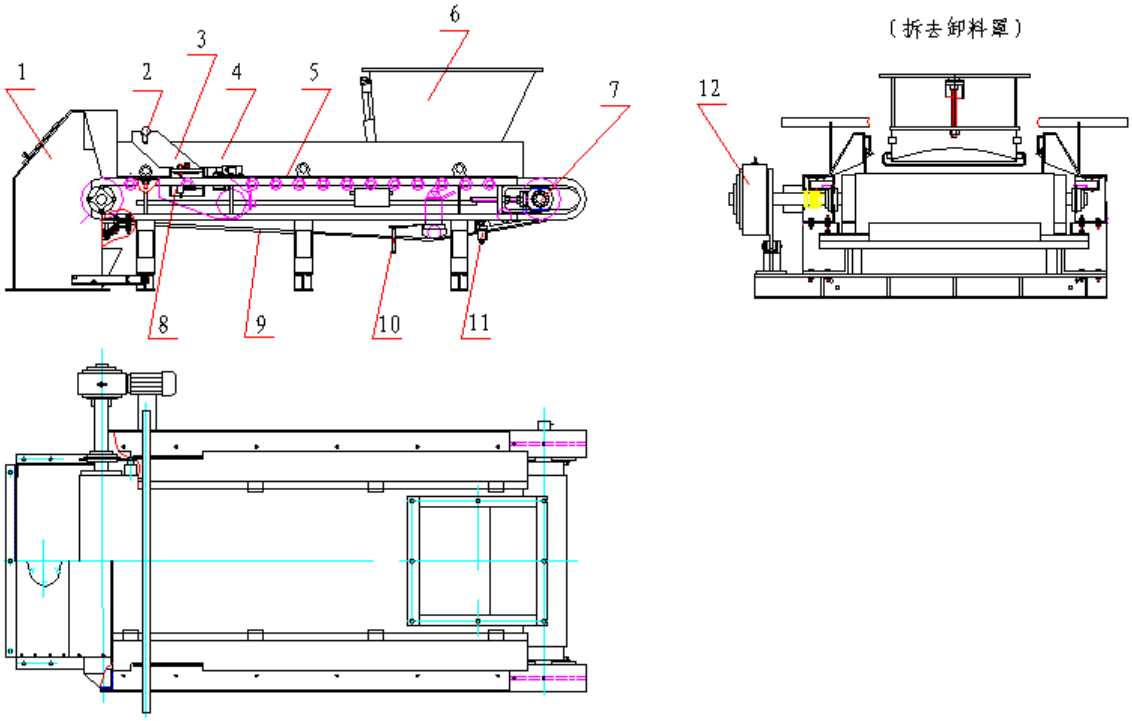
轻型定量给料机；滚筒直径为 190mm；皮带宽度为 800mm；滚筒中心距为 2000mm；料斗为 T4；传动为左传动。

第三章、定量给料机基本结构

DEL/DEM 型定量给料机由机械秤体和电气控制两大部分组成。

1、机械秤体

机械秤体主要包括：机架、料斗（或预给料机）、传动装置、称量传感器、卸料罩、自动张紧器等。



1-卸料罩　　2-标定棒　　3-称量框架　　4-挡料板　　5-秤体

6-料斗　　7-张紧装置　　8-称重传感器　　9-环型皮带　　10-纠偏装置

11-清扫装置　　12-传动装置

- 秤体是给料机的基础部件，它采用折弯成型的箱型结构，刚度大，稳定性好。
- 传动装置包括交流电机和减速机。减速机采用 SA 型斜齿轮蜗轮蜗杆减速机，体积小，速比大，通过空心轴与主动滚筒直接联接；交流电机采用交流变频调速控制。
- 称量装置由称量框架与称量托辊组成。称量框架由两组十字簧片支撑，皮带上的物料重量通过称量托辊作用到称量传感器上，框架上还设置有标定棒支架，整个装置已平衡好，无水平和侧向位移，无磨擦影响，不需维修。
- 称量传感器采用双连孔型金属波纹管密封传感器，由钢珠与传感器受力柱连接，具有抗侧向力，抗冲击，精度高，变形小等特点。
- 多压辊结构的皮带自动张紧和防跑偏装置能保持皮带张力恒定，稳定计量精度。
- 皮带内外清扫装置可防止皮带沾料，防止物料颗粒落入皮带里层。

- 装有皮带跑偏限位开关，当皮带运行跑偏超过允许值时，能自动报警或停机，防止生产和设备事故发生。
- 料斗有多种结构，可根据物料形状的不同特点，选配普通 T 型料斗；或用于物料流动不顺畅，带有振动器的 V 型振动料斗；或用于倾泻性物料的 S 型料斗。

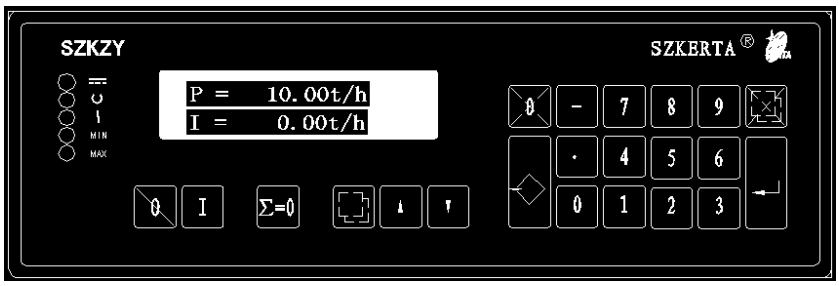
2、控制柜

定量给料机的控制部分均装在 IRC 型控制柜中，它包括 FP403 仪表，连锁接口板和交流变频器等。

- FP403 仪表内有三块基本功能卡，基本功能卡包括 CPU 与电源卡、A/D 与 I/O 卡，键盘显示卡；面板上有荧光显示屏、22 个触摸键和 5 个状态指示灯。
- 连锁接口板的作用主要有两个，一是输入信号的逻辑组合以及与其它设备实现信号连锁；二是将输入信号和输出信号实行隔离。
- 变频调速控制器是定量给料机传动装置的控制设备。
- 电控柜可与上位机或其它控制设备联机控制。
- 控制系统具有报警、故障编号显示、称量自动标定系统、自动去皮、动态零点调整、停电停机信息数据保护等功能。

第四章、使用与操作

1、控制仪表



a）信号灯

⎓	电源正常	（绿色）
◡	CPU 正常	（绿色）
⎍	报警灯	（红色）
MIN	灯	（红色）
MAX	灯	（红色）

b）按键

O I	停止/起动
Σ=0	计数器复位
	调用功能分配器或事件信息
	选择功能，选择上页或下页的显示内容
	确认事件信息或删除输入值
	中断功能，中止输入，退出功能分配器
	准备输入或变更设定值
	确认输入或确认显示的功能
0 ~ 9	数字键，输入参数值
- .	负号与小数点

c）显示窗口

5×7 点阵规格，字符高 6mm

窗口上部　　左侧：运行信息

右侧：设定的给料速率

窗口下部　　左侧：事件信息

右侧：选择显示参数

2、控制柜操作

（1） 接通电控柜内电源总开关和每路控制仪表的分路开关。控制仪表左上部两盏绿灯亮，表示给料机就绪待运行。

（2） 秤体传动电机由变频器控制，在自动状态下运行时，变频器应设置为“外部输入”（详见变频器使用说明）。

（3） 现场控制盒是安装在秤体旁，现场控制盒上选择开关为“手动”时，按一下“起动”按钮，才能通过控制盒上的电位器，调节皮带速度。在自动状态下运行时，现场控制盒上的选择开关应置于“自动”位置。急停按钮开关有安全隔离作用，现场有异常情况，可以按下按钮，开关断开，皮带秤体停止工作。正常工作时，按起按钮，开关闭合。

（4） 电控柜内的运行、停止和事件三个按钮是给料机运行时总控制按钮，事件按钮用于确认电控柜内仪表显示的事件信息。若分路单独操作，应按一下运行按钮之后，才可以在仪表面板上按停止/启动。控制仪表处于运行状态时，显示窗口上部左侧区域出现旋转的点。

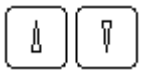
（5） 当控制仪表受外部驱动信号启动后，电控柜停止按钮失效，仪表面板上的停止/启动键仍然有效。

（6） 给料率设定

给料率的设定可在控制仪表上由键盘输入，也可由外部输入：

- 当参数 B07 选择键盘方式:按准备输入键,窗口下部显示 P= －－－kg/h 或 t/h；输入所需数值，按确认键确认输入值；若删除某一数字，按删除输入键；中止输入按中止输入键。
- 当参数 B07 选择串行或模拟方式时,参数 B08 选择外部输入有效(Yes)，给料率的设定值是由外部（例如上位机、DCS 系统）信号输入，仪表即时接收，由外部信号控制。

（7） 运行状态显示

 键可以选择系统运行时的状态显示：

- Z1:计数器 1　kg(t)
- I:给料速率(流量)　　kg/h 或 t/h
- Ir:给料速率(%)
- Q:皮带负载(kg/m)
- Qr:皮带负载(%)
- V:皮带速度 m/s

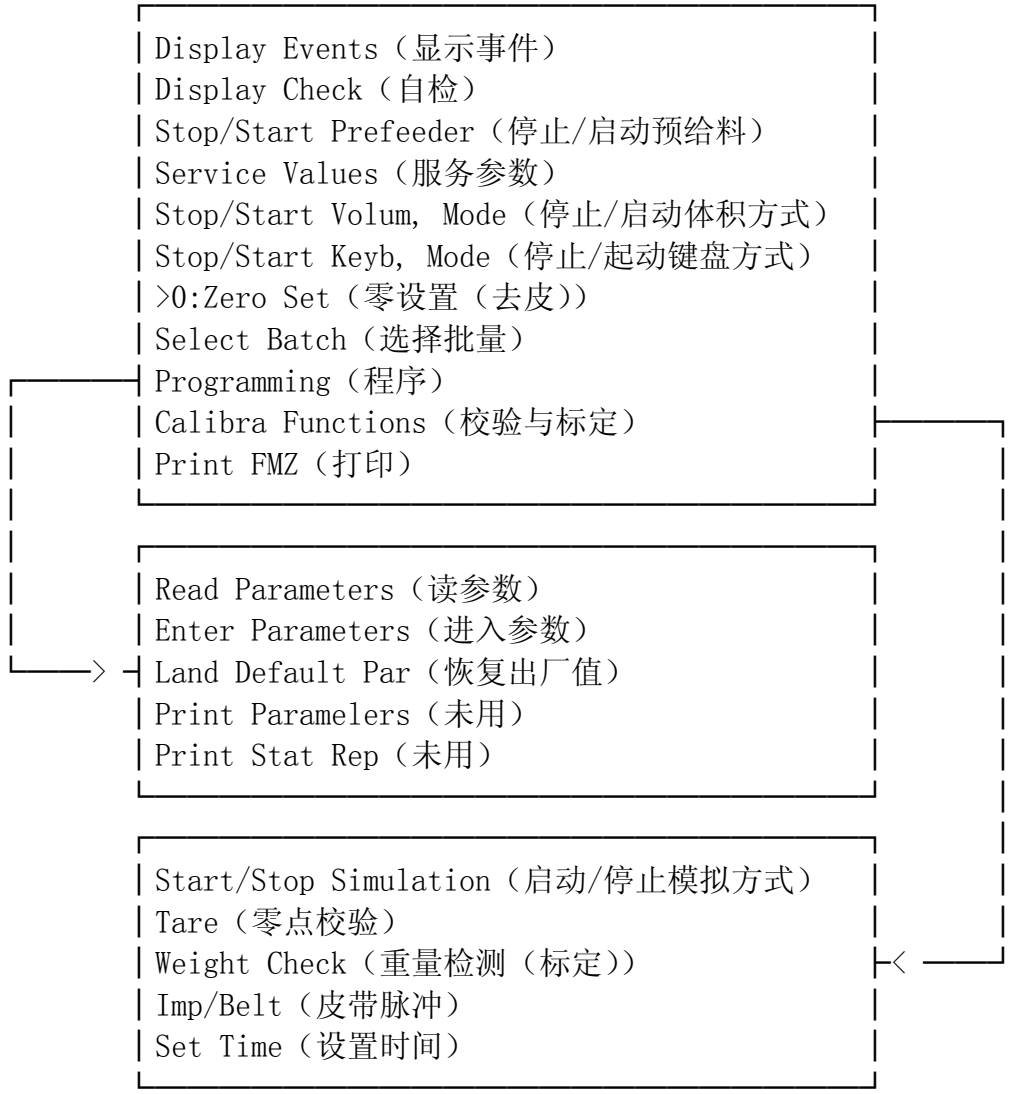
（8） 清除累积值，按  ；确认事件信息按  。

3、系统操作

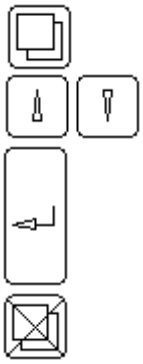
系统操作主要实在控制仪表上，通过调用功能分配器来完成。

d）功能分配器

仪表的参数整定、校验等功能都是通过调用功能分配器来选择，功能分配器如下：



e）调用方法



调用功能分配器

功能分配器中目录在显示区内滚动

确认调用的功能

退出恢复正常显示

第五章、校验与标定

定量给料机安装后，必须经过校验与标定才能投入正常使用。校验与标定要分别通过调用功能分配器中的校验及调零功能来完成。

1、校验前准备工作

1）定量给料机与电控柜必须安装就绪，并且已做好必要的调整工作，确保皮带张力恒定，皮带无跑偏，称重传感器置于正常工作状态。

2）控制仪表选择体积模式（Valume,Mode）， 校验时，皮带处于运转状态。

3）检查皮带速度，确定 B04 参数值，校正皮带速度显示。其方法：适当选择皮带运转周期 C02 参数值， 准确测量并计算皮带运转速度的平均值与称重器速度显示的值比较，若不相符，修改 B04 参数值：

$$B04(新值)=B04(原先值)\cdot(Vg/Va)$$

式中：Va：测量的速度值

Vg：称重器显示的速度值

4）根据随机提供的技术参数表内容，输入 B 组和 C 组参数值。其中，C03 参数为皮带周期时间，应尽量准确测量皮带运转一周的时间(s)，用实测值输入。

5）功能性检查：起动称重器，显示区的左上部有一旋转点出现，若显示区左下部出现任一事件信息，应排除故障。

2、脉冲数 / 皮带周期校验(LB)

1）调用功能分配器,选择校验(Calibra Function)

2）根据显示提示，输入口令 07734

3）选择“LB:IMP/Belt”

4）起动 LB 程序，程序运行后，窗口上部显示皮带速度平均值；下部显示皮带周期内总脉冲数。

5）确认运行结果（自动作为 D06 参数值）或中断运行不取结果数值。

注：在下列条件下，应调用 LB 程序

- 初始校准
- 更换皮带
- 参数 B04，B05 改变

3、自重（皮重）校验（TW）

1）调用功能分配器,选择校验(Calibra Function)

2）输入口令 07734

3）选择"TW:Tare"

4）起动 TW 程序，程序运行后，窗口上部显示自重值与上次自重值的偏差，以标称皮带负载的%表示，下部显示总自重平均值为标称皮带负载的%数。

5）确认运行结果（自动作 D04 参数值）或中断运行不取结果数值。

注：测自重时，皮带上必须没有任何负载，如果偏差大于 20%， 应检查给料机是否有机械故障。

4、零点校验

TW 程序仅取得基本自重数值，而零点校验可取得皮带在运转过程中产生的自重与基本自重之间的偏差，用以校正当前测量结果。

1）调用功能分配器

2）选择零校验功能（>0:Zero Set）

3）起动 Zero Set 程序，程序运行结果，窗口上部显示本次与上一次零校验的偏差，下部显示与基本自重零点偏差。

4）确认结果，称重器零点被校正。

5）或中止运行，不认其结果。

5、称量校验（标定：CW）

调用称量校验程序 CW，其目的是：将一已知的模拟检测重量置于称量框架（亦称称量平台）上，在一次或多次的完整地皮带循环运转中，仪表所检测的称量结果与设定值比较，以评价其称量的准确度。

1）将已知重量的标定棒置于称量框架的标定架上,并换算(标定棒重量×2)成检测重量设定值作为 C09 参数输入。(参见参数及技术参数表)

2）调用功能分配器，选择校验(Calibra Function)

3）输入口令 07734

4）选择重量校验（CW）

5）起动 CW 程序，程序运行结果，窗口上部显示在运行时间内的设定给料量，下部显示设定量与测量量之比值 KOR

6）中止退出程序。

- 误差<1%:KOR=0.99...1.01 称重器正常。
- 误差<5%:KOR=0.95...1.05 将 KOR 值为 D02 参数输入。
- 误差>5%:KOR<0.95 或 KOR>1.05,C 参数及 D 参数输入不准确或秤体未调整好。

6、实物标定

用称量校验(CW)的方法无法达到符合实际的完美效果，要得到高精度的称量结果，只能用实际输送的物料来进行测定，并进行相应的校正，即修正 D02 参数值。 其方法：用斗或车收集定量给料机在一段时间内输送的物料，并准确称量，将称量的实际值与称重器显示的读数值比较，若不相符，则修改 D02 参数值。

$$D02(新值)=D02(原先值)\cdot(Za/Zg)$$

式中：

Za：称量的物料实际值

Zg：称量器显示的物料值

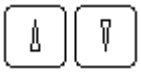
注：校验前 D02 参数值一般系统设置为 1.0。

第六章、系统参数

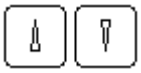
参数是具有可变特性的数据，利用这些数据可以使系统运行时更适合现场工况要求，所有参数出厂时设有预定值，这些都是有用的建议值。参数被划分为 A...Q 功能组，字母后的数字是参数的序号，参数分为数值和选择项两种类型。

1、 读参数

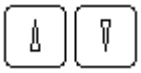

调分配功能


选程序功能(Programming)进入下显示区

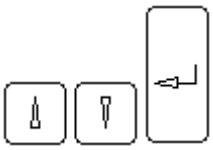

确认


选读参数功能(Read Parameters)


确认


选择参数功能块

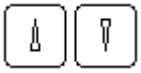

确认


选组内参数并确认

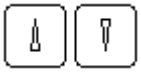

按一次此键，返回到选参数组；再按一次，回到工作状态显示

2 、输入和修改参数


调分配功能


选程序功能进入下显示区

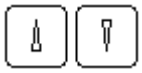

确认


选输入参数进入下显示区(Enter Parameters)

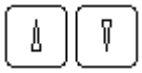

确认

输入密码 07734

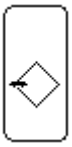
显示参数组 A 和 S5 信息（口令有效）

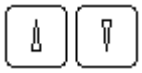

选择参数组

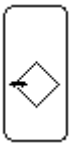

确认


选参数序号


确认


准备输入和修改参数


选参数的选择项并输入参数值


确认输入值


删除单个数值


中断输入

3、装入缺省值

调用此功能后，仪表内参数恢复到出厂值初始状态。

4、参数表

A组　对话状况

A01　语言　英语

A02　单位　SI

B组　额定数据

B01　流量单位

出厂值：　------kg/h

可选参数：------ kg/h；----. - kg/h；---.-- kg/h；--.--- kg/h

------t/h；----.- t /h；---.--t /h；--.--- t /h

B02　额定流量

出厂值：10.0000 t/h

最小值：0.0020 t/h；　最大值：99999.9 t/h

用于极限值和服务数值的标准。

B03　转速测量有效

出厂值：YES

可选参数： YES；NO

B04　速度传感器特征值

出厂值：10000 I/m

最小值：10.00 I/m；　　最大值：100,000 I/m

皮带每运行一米时速度传感器在所输出的脉冲数。

B05　额定速度

出厂值： 0. 10 m/s

最小值：0.0100 m/s；　　最大值：10.000 m/s

用于极限值的参考值。

B06　启动源

出厂值：KEYB

可选参数： KEYB；SER

可选键盘或串行接口

B07　设定值源

出厂值：键盘

可选参数：键盘；模拟

B08　外部设定值有效

出厂值：NO

可选参数：YES；NO

B09　负载传感器工作

出厂值：NO

可选参数：YES；NO

B10　FMZ1 单位

出厂值：　　------ t

可选参数： ----.-t； ---.-- t； -.---t

B11　FMZ1 脉冲宽度

出厂值： 0 ms

最小值：50 ms；　　最大值：1000 ms

给外部计数器的输出脉冲宽度。

B12　FMZ2 单位

出厂值： ------ t

可选参数： ----.-t； ---.-- t； -.---t

B13 FMZ3 单位

出厂值：----t

可选参数：---.-t;--.—t;-.---t

B14 亮度调节

出厂值：1 LEVEL

可选参数：1 LEVEL；2 LEVEL；3 LEVEL；4 LEVEL

C 组 校验和计算数据

C01 电源频率

出厂值：50Hz

可选参数：50Hz ； 60Hz

C02 皮带周期数

出厂值： 1

最小值：1； 最大值：100

确定调零、自重和称重校验的运行时间。但不用于自动调零。

C03 皮带周期时间

出厂值： 30.0s

最小值：1.0s； 最大值：9999.0s

确定“Imp/皮带循环周期”程序的运行时间，一般选皮带运行三圈的时间。

C04 L/C 灵敏度

出厂值：2.0mV/V

最小值：0.5 mV/V； 最大值：9.9999 mV/V

L/C:称重传感器，按 L/C 技术参数输入。

C05 L/C 额定负荷

出厂值：50.0kg

最小值：0.5kg； 最大值：22000.0kg

称重传感器的额定负荷。

C06 有效平台长度

出厂值：50.000m

最小值：0.1000m； 最大值：50.000m

C07　杠杆比

出厂值：1.000

最小值：0.0100；　　最大值：2.0000

称重传感器与称重托辊负荷之比。

F=C07・Q　Q:平台负荷，F:称重传感器负荷。

C08　角度 a

出厂值：0.0 degr

最小值：0.0 degr；　最大值：25.00 degr

给料机安装后的倾角，此角即为给料机纵向中心线的倾角。

C09　检测重量

出厂值：　10.0 kg

最小值：1.000 kg；　最大值：22000.0 kg

用砝码或标定棒替代物料压在平台上的负荷。

D 组　校验结果

D01　额定皮带负荷

单位：　kg/r

非输入量，由 B02、B05 计算得到

D02　校正范围

出厂值：　1.0000

最小值：0.5000；　　最大值：2.000

该参数影响皮带负荷 q 的测量，q（校正后）＝q（测得的）• D02。

D03　总的自重（皮重）

单位：　kg/m

非输入值，总皮重＝基本自重＋自重校正。

D04　基本自重 N

单位：kg/m

非输入值，最大 10000kg/m。它是自重校验(TW)程序的结果。

D05　自重校正 T

单位：　kg/m

非输入值，最大±1000kg/m，它是零点校验的结果。

D06　皮带周期码

非输入值。最大 9E6。是“Imp/Belt Circuit”运行结果。

E 组 模拟输出

E01 AA 源

出厂值： I

可选：I（流量），Q（皮带负荷），V（皮带速度）

E02 AA 的最小值

出厂值： 4.0mA

最小值： 0.00mA； 最大值：20.00mA

E01 的零点输出电流,一般选择 4.00mA。

E03 AA 的极限

出厂值： 20.00mA

最小值： 0.00mA； 最大值：1000.00mA

额定输出电流。一般选择 20.00mA。

F 组 极限值

如果测量数据低于最小值则输出 L1～L4 信息，高于最大值输出 H1～H4 信息，控制仪表起动 10s 后开始监控。

F01 最小值

出厂值： V MIN

可选值：V MIN；Q MIN；V MIN

F02 最大值

出厂值： V MAX

可选值：V MAX；Q MAX；V MAX

F03 I MIN 值

出厂值：5%I

最小值：-10%I； 最大值：200%I

参考 B02 值

F04 I MIN 的事件等级 [L1]

出厂值：W1

可选参数：W1；W2； Ign；A

注：[ ]内为显示的事件代码，下同。

F05 I MAX

出厂值：120%I

最小值：-10%I； 最大值：200%I

深圳市科尔达电气设备有限公司
SHEN ZHEN KERTA ELECTRIC EQUIPMENT CO.,LTD.

参考 B02 值

F06　I MAX　事件等级　[H1]

出厂值：W1

可选参数：W1；W2；　Ign；A

F07　Q MIN

出厂值：60%Q

最小值：-10%Q；　最大值：200%Q

参考 D01 值

F08　Q MIN　事件等级　[L2]

出厂值：W1

可选参数：W1；W2；　Ign；A

F09　Q MAX 值

出厂值：120%Q

最小值：-10%Q；　最大值：200%Q

F10　Q MAX　事件等级　[H2]

出厂值：W1

可选参数：W1；W2；　Ign；A

F11　V MIN

出厂值：0.5%V

最小值：-10%V；　最大值：200.0%V

F12　V MIN 的事件等级　[L3]

出厂值：W1

可选参数：W1；W2；　Ign；A

F13　V MAX

出厂值：120.0%V

最小值：-10%V；　最大值：200.0%V

F14　V MAX　事件等级　[H3]

出厂值：W1

可选参数：W1；W2；　Ign；A

F15～F18 略

G组　滤波设置

G01　流量显示

出厂值：3.0S

最小值：0.0S； 最大值：600.0S

G02 流量Ⅰ模拟输出

出厂值：3.0S

最小值：0.0S； 最大值：600.0S

G03 流量Ⅰ串行接口

出厂值：3.0S

最小值：0.0S； 最大值：600.0S

G04 皮带负荷显示

出厂值：3.0S

最小值：0.0S； 最大值：600.0S

G05 皮带速度显示

出厂值：3.0S

最小值：0.0S； 最大值：600.0S

G06 传感器滤波

出厂值： 1.0S

最小值：0.0S； 最大值：600.0S

取决于皮带负载状况。

G07 皮带跟踪时间

出厂值： 3.0S

最小值：0.0S； 最大值：2000.0S

停机后，计数器继续计数的时间。

H组 未定义

Ⅰ组 未定义

J组 未定义

Ⅹ组 内部运行

K01 电气运行

出厂值：3000h

最小值：1h；最大值：10000h

设置电气工作时间。

K02 电气维护事件 [S4]

出厂值：W1

可选参数：W1；W2； Ign

电气工作时间超出了 K01 的规定。

K03 运行 V 大于 Vmin

出厂值：3000h

最小值：1h；最大值：10000h

设置电机工作时间。

K04 运行维护事件 [S3]

出厂值：W1

可选参数：W1；W2； Ign

皮带总的运行时间超过了 K03 的规定。

K05 SPC 时间

出厂值：8h

最小值：1h； 最大值：24h

获得内部服务值，皮带无负荷运行时间。

SPC＝无载过程控制

K06 SPC 滤波

出厂值：1h

最小值：1h； 最大值：24h

L 组 串行接口

L01 波特率 1

出厂值：9600

可选参数：1200；2400；4800；9600；19200

L02 自身地址

出厂值：1

最小值：1； 最大值：999

L03 接口标准

可选：RS422 或 RS485(Mod 总线)

L04 事件级 [S9]

出厂值：Ign

可选参数：W1；W2；A； Ign

10s 未收到信息。

L05 分辨率

出厂值：4096

最小值：1000； 最大值：32767

L06 数据传输

可选：正常或交换

M组 串行打印接口（略）

N组 喂料机控制（未用）

O组 VAP/BIC 设置（未用）

P组 未用

Q组 事件

Q01 电源故障 [E1]

出厂值：A

可选参数：A；W1；W2； Ign

Q02 存贮器故障 报警 [S1]

出厂值：A

非输入值，内存故障，仪表停止工作

Q03 测速电机 GAI 输入信号 [C2]

出厂值：A

可选参数：A；W1

输入频率超过 2700Hz，要求 B03=YES。

Q04 未用

Q05 GA1 错误 [E2]

出厂值：A

可选参数：A；W1；W2； Ign

短路或线断。条件 B03=YES。

Q06 未用

Q07 Imp/Belt 错误 [E4]

出厂值：A

可选参数：A；W1；W2； Ign

Q08 L/C 输入故障 [C1]

出厂值：A

可选参数：A；W1；W2

称重传感器线接错或没接。

Q09　无释放信号　S2

出厂值：W1

可选参数：W1；W2；Ign；A

控制设置为 STOP。

Q10　L/C 输入大于最大值　[H4]

出厂值：A

可选参数：A；W1；W2

称重传感器负荷超过 110%的额定负荷。

Q11　L/C 输入小于最小值　[L4]

出厂值：A

可选参数：A；W1；W2

称重传感器小于 3%的额定负荷。

Q12　口令有效　警告 2　[S5]

警告 2，口令输入后，显示 S5，两分钟内不必再输入口令即可调用功能。

Q13　模拟有效　警告 2　[S7]

警告 2

Q14　受限设置值　[S8]

出厂值：W1

可选参数：W1；W2 ；Ign

R 组　控制器

R01　控制器型号

出厂值：DOSIER

可选参数：UNIVERS；DOSIER

R02　P 参数（比例）

出厂值：0.02000mA/%

最小值：0.00000mA/%；　最大值：1000.00000mA/%

R03　I 参数（积分）

出厂值：1.0s

最小值：1s；　最大值：6s

R04　D 微分参数

出厂值：　1s

最小值：0.0 s；　最大值：3s

根据实际情况选择 0～3 秒即可，0 表示无微分调节。

R05　屏保时间参数

出厂值：　20.0Min

最小值：0.0 Min；　最大值：600.0 Min

选择正数，在停止键盘操作相应时间后自动关闭显示，选择负数停止屏保功能。

R06　　控制偏差　MAX

出厂值：5.0%

最小值：0.0%；最大值：100.0%

以 P 或 Q 值为参考

R07　　控制偏差　　[H5]

出厂值：W1

可选参数：W1；W2 ；Ign；A

R05 值超过 R06 的限值，输出事件 H5。

R08　控制器限度　　H6

出厂值：W1

可选参数：W1；W2 ；Ign；A

控制上限达 R10 值，输出事件 H6。

R09　下限

出厂值：0mA

最小值：0mA；　　最大值：20.00mA

R10　上限

出厂值：20.00mA

最小值：0mA；　　最大值：20.00mA

R11　　控制量值升高

出厂值：0mA

最小值：0mA；　　最大值：20.00mA

R12　停止位

出厂值：0

可选参数：0；R09

停止状态下控制量值

R13　起动

出厂值：0circuit/s

最小值：2circuit/s；　　最大值：2circuit/s

起动之前，控制器预先显示方式。

R14　　特许

出厂值：0circuit/s

最小值：2circuit/s；　　最大值：2circuit/s

关机时，预给料机是否立即关断。

R15　复位 VFD 显示屏

出厂值：NO

可选参数：NO；YES

NO 表示不复位；YES 表示复位。

R16　设定值范围

出厂值：20.0mA

最小值：0mA；　　最大值：200.0mA

R17　　零值设定值

出厂值：0mA

最小值：0mA；　　最大值：200.0mA

R18　体积测定方式

出厂值：Q

可选参数：Q；Y

R19　旁路

出厂值：10mA

最小值：0mA；　　最大值：200.0mA

R20　设定值过滤器 t1

出厂值：0s

最小值：0s；　　最大值：6000s

R21　设定值过滤器 t2

出厂值：0s

最小值：0s；　　最大值：6000s

R22　PID 调节模式

出厂值：PID Mode 1

可选参数：PID Mode 1；PID Mode 2

R23　设置值 / 实际值源

出厂值：I

可选参数：I；Q

R24　配合 1

出厂值：NO

可选参数：NO；V；　I/Q；I/W

R25　配合 2

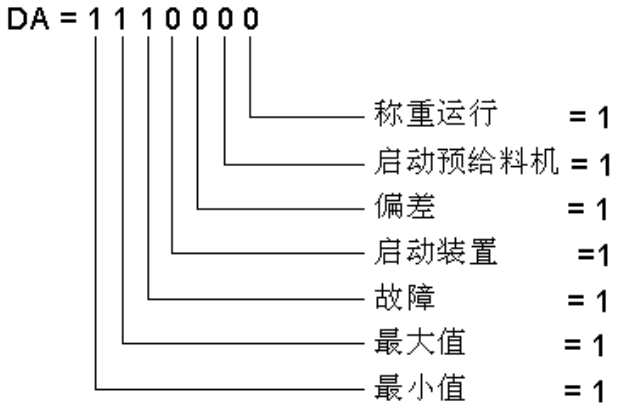
出厂值：NO

可选参数：NO；W

第七章、系统服务值

服务值表中有详细的系统信息，调用查看时不会影响称重功能。

1. 版本号：例：FDB0200-00
2. 设备号：F－Nr.＝G×××
3. 选择卡，NO（不带选择卡），V05（装有任选板）
4. 日期和时间
5. 继电器输出的开关状态，1＝接通，0＝断开



6. 继电器输入的开关状态。
7. EL=xxxxh，电源接通时间。用于监控参数 K01，信息 S4。
8. ED:>0=XX:yyh，上次除皮，测自重，手动或自动调零到现在的运行时间。
9. ED=xxxh，称重器和输送皮带的运行时间。
10. 速度 1=xxxxHz，速度传感器输入频率，5-2500Hz 之间。
11. aW=xx、yyy%，称重传感器负荷与传感器额定负荷的百分比，大于 100%超载，大于 110%，信息 H4 输出。
12. vap-roh=xxxx，称重传感器放大器的非标准化输出。
13. WZ-roh=xxxx，称重传感器放大器的非标准化输出。
14. 皮带空转打滑 S=xxxx,yyyyy%，单位总皮带长度的百分比，监控 005，信息 C8。
15. 皮带跑偏 tr=xx,yycm
16. 平均极限值=xxx,yy%，实际流量平均值与额定流量的百分比。
17. 比例 var=xxx,yy%，实际流量方差与额定流量的百分比。
18. 最大皮带负荷 Q MAX=xxx%
19. 低负荷区间 TQ<MIN=xxx%
20. 最后一次除皮，测自重 T（日期），xxx,yy%，单位额定皮带负荷的百分比。
21. AA1=xx,yymA，模拟输出电流（给料速率、皮带负载）。
22. AA2=xx,yyymA，控制值 Y 的模拟输出电流。
23. AE=xx,yyymA，设置值的模拟输入电流。
24. Y=xx,yymA，控制量值
25. xd-mitt=xxx,yy%，与额定流量偏差平均值。
26. xd-var=xxx,yy%，与额定流量平方偏差方值。
27. ZO:E yy xxxx 外部累加器脉冲输出。

第八章、事件信息

称重器的所有重要功能都受到内部监视，如有故障，将被作为事件信息代码显示在下部左侧，如果同时发生几个事件，其优先级排列为：报警、警告 1，警告 2。

按可以确认事件，调用“显示事件”功能可以查看文件。

1、系统信息 S

- S1:内存故障

  存贮的参数和程序被周期性地检测。如有错误，仪表不能进行操作。

- S2:未释放

  外部释放信号丢失，仪表不能启动。称重器处于停止状态。

- S3:运行时间大于最小设定时间

  皮带输送和测量的时间超过预定值，见参数 K03，K04。

- S4:内部电气运行

  控制仪表通电时间，如果需要，进行必要的维护工作。

- S5:口令有效

  口令输入后两分钟内有效，仪表可从额定操作转到校验和服务功能。

- S6:未用

- S7:模拟有效

- S8:设置值被限制

  设置值过高

- S9:主机数据联接

  串行通信被中断大于 10s

2、批量 B

- B1:超过允差

3、电气 E

- E1:电源故障

  电源故障或线断路，这个期间不能计量流量。

- E2:GA1 故障

  速度传感器线短路或断路，仪表不能操作。

- E3:未用

- E4:Imp/Belt 短路

皮带速度传感器短路或断路。见参数 Q07。

- E5:备用

4、校验 C

- C1:L/C 输入

  称重传感器线断或接线错误。见参数 Q08。

- C2:GA1 输入

  皮带周期传感器输出频率超过 2700Hz。见参数 Q03。

- C3:未用
- C4:未用
- C5:未用
- C6:未用
- C7:未用
- C8:空转故障（打滑）

  皮带周期传感器测得输送皮带长度已改变。

- C9:未用

5、极大值 H

- H1:流量大于最大值。
- H2:皮带负荷大于最大值

  实际皮带负荷超过了预定的极大值。

- H3:速度高于最大值

  实际皮带速度超过了预定的极大值

- H4:称重传感器输入值高于最大值
- H5:偏差

  流量过分偏离设置值。

- H6:控制量受限

  控制量值输出已达到 20mA,仍无法调整。

- H7:电机不转
- H8:皮带歪斜
- H9:皮带跑偏

6、极小值 L

- L1:流量小于最小值

- L2:皮带负荷小于最小值
- L3:皮带速度小于最小值
- L4:称重传感器输入值小于最小值

7、信号灯

a）信号灯

⎓ 电源正常（绿色）

如果没有指示，请检查：

- 没有送电
- 仪表损坏
- 指示灯损坏

CPU 正常（绿色）

如果闪烁或熄灭，检查仪表，系统停止工作。

报警灯（红色）

如果有报警信号，灯闪烁，同时仪表显示故障信息。

MIN 灯（红色）

低于极限值时闪烁，参见故障信息。

MAX 灯（红色）

高于极限值时闪烁，参见故障信息。

第九章、安装与调整

1、机械秤体的安装

1）秤体应水平安装在坚固的基础上，料斗与料仓之间，卸料罩与卸料溜子之间用法兰相连，安装前应检查安装位置及尺寸是否符合要求。

2）秤体应通过吊环螺钉吊装，秤体皮带纵向中心线与料斗及卸料罩中心线重合，以防物料在输送过程中偏载。

3）秤体安装时应检查纵横两个方向的水平度，可用簿钢垫片，在地脚螺钉处调整，调好后，加斜垫川、弹簧川，用螺母紧固。

4）称重传感器的工作状态：

- 将称量框架上承重螺杆向下旋动，使螺杆端头刚好与传感器支柱上的钢球表面良好接触，并拧紧螺杆上的紧固螺母。
- 松开支架上的保护螺钉，使称重框架的重量能通过承重螺杆和钢球全部加载在传感器上。
- 检查传感器底面的限位保护螺钉与传感器之间的间隙是否在 30～40um 左右，此间隙在出厂前已调整好，其螺钉位置已用胶固定，更换传感器时，应仔细检查与调整。

5）投入运行时，将料斗下的水平闸门板拉开，有 2/3 左右料柱压在皮带上。垂直闸板位置，应根据物料粒度及流量大小调整，一般开度在 12mm 左右。

6）更换环形皮带步骤：

- 拆下卸料罩及档料装置；
- 拆下传动装置对面一侧的标定棒支架；
- 将犁形清扫器吊在两侧的框架上；
- 松下皮带张紧装置的螺母，把从动滚动的轴承座移向框里，拆下该侧的张紧装置；
- 拆下卸料罩下方的皮带清扫器；
- 拆下该侧秤体框架与支座之间的方形支架，使秤体成悬臂状态；
- 将旧皮带抽出，将新皮带套入；
- 将秤体拆下部份依次还原装好。

2、电控柜的安装与系统接线

1）电控柜应安装在粉尘小，电源干扰小，便于观察秤体运转的控制室内，控制室应有良好可靠的接地点。

2）现场控制盒应在秤体附近就近安装，便于现场操作。

3）给料机的系统控制仪表全部安装在电控柜内，电控柜与现场的接线与电缆敷设应设置电缆沟,电缆桥架和电缆防护管,动力电缆与信号电缆应分开敷设,若信号电缆与动力电缆平行敷设,两者相距大于 300mm。

4）按系统接线图将系统各部件设备的信号线及动力线接妥，并严格检查是否正确。

3、调整

定量给料机和电控柜全部安装到位后,应作空载运转检查,以便于进行调试与标定工作。

1）传感器输出信号极性检查：

- 清扫传感器压头间粉尘杂物，松开支架上的保护螺栓，使承重螺杆与传感器上的钢球良好接触。
- 接通电源，通过仪表查看 Q 值：稍给称量框架施加负载，Q 值应上升，若 Q 值下降，说明信号输入极性接反，应对换信号输入两根连线。

2）检查皮带运转

- 将现场控制盒置于手动位置，按一下起动按钮，缓慢旋动电位器，观看给料机皮带运转方向是否正确，皮带是否跑偏。若运转方向不对，对换电机三相电源线其中任意两相，若皮带跑偏，适当调节秤体侧板皮带张紧调节螺母。
- 将现场控制盒置自动位置，变频器置外给定运行状态，分别用电控柜的运行钮和仪表上起动键起动皮带运行，以检查系统连线是否正确。

3）分别调用各仪表功能分配器，查看仪表系统参数是否符合技术资料中预置数值，若有误，按参数项说明逐项输入。

第十章、维护

1）称量框架是秤体使用中需维护的重点，应经常保持称重传感器压头和钢球清洁，随时检查十字簧片是否变形，其紧固螺栓是否松动；称量架是否卡料，称量托辊转动是否灵活。

2）齿轮箱要定期换润滑油，换油时一定要注意油的清洁与质量，带有杂质的油反而会起相反作用。

3）机架需电焊作业时，应在焊点最近处接地线，或将称重传感器隔离绝缘，以免损坏传感器。

4）长期不用或维修时应旋动传感器的保护螺栓将称量框架稍稍支起，以免传感器过载，同时将料斗闸门关闭，以免皮带局部长期受压而造成皮带变形。

5）皮带、滚筒及托辊均易沾料，应酌情调整皮带内外层清扫器橡胶板与皮带的间距，以消除沾料对计量准确度的影响。

6）皮带长度及皮带张力的变化影响称量准确度，兑换皮带后，应注意调节皮带张力和从动滚筒调整螺栓，并重新进行标定与调试。

7）电控柜虽然远离灰尘大的环境，仍要注意清理柜内电气元件和线路上的粉尘，更换元件和事故处理由专业人员操作。

8）不要使用变频器的电气通断开关来控制电机的起动与停机，当某路给料机不需投入使用时，可将该台设备仪表电气开关断开，停止仪表的供电。

9）设备在运行过程中，若经常出现某一事件报警，应及时针对性检查，排除事故原因。

10） 定量给料机某些关键部件是根据用户的工艺要求，物料特性专门设计和选用的，如果用户更换物料或改变给料速率范围，应根据具体情况考虑是否可行或更换部件，如传动装置、传感器和料斗等。

11） 每台定量给料机都随机带上一份设备档案资料，内有定量给料机的全部数据与参数，维修更换请严格按资料上提供的同型号的备件。

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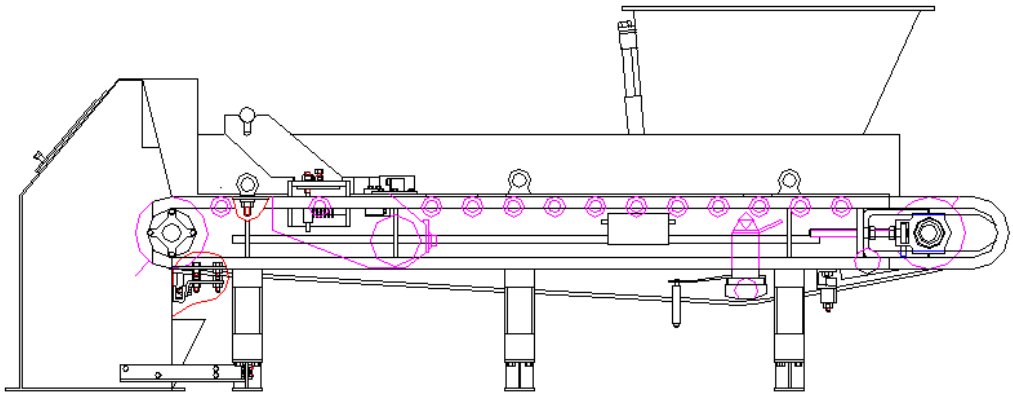
DEL/DEM Type Weighing Feeder

Operation, Installation & Maintenance Manual



SHENZHEN KERTA ELECTRIC EQUIPMENT CO.,LTD.

⚠Caution
Read through this instruction manual and be familiar with the handing method for correct use。

Content

I. General Description

1.Weighing Feeder

DEL/DEM Weighing Feeder is a kind of equipment used for the continuous transportation, dynamic weighing as well as the feeding control of bulk granule or piece materials, it is suitable for building, metallurgy, mine, and chemical industry etc.

In the control aspect, DEL/DEM Weighing Feeder could adjust material turnout automatically by adjusting the belt speed according to preset feeding rate to ensure the conveying of material with the same feed rate continuously, and accumulate the total material conveyed automatically; and in the aspect of operation, it could be operated through instrument and keyboard, it could also be connected with upper unit or process management system (DCS) for automatic control.

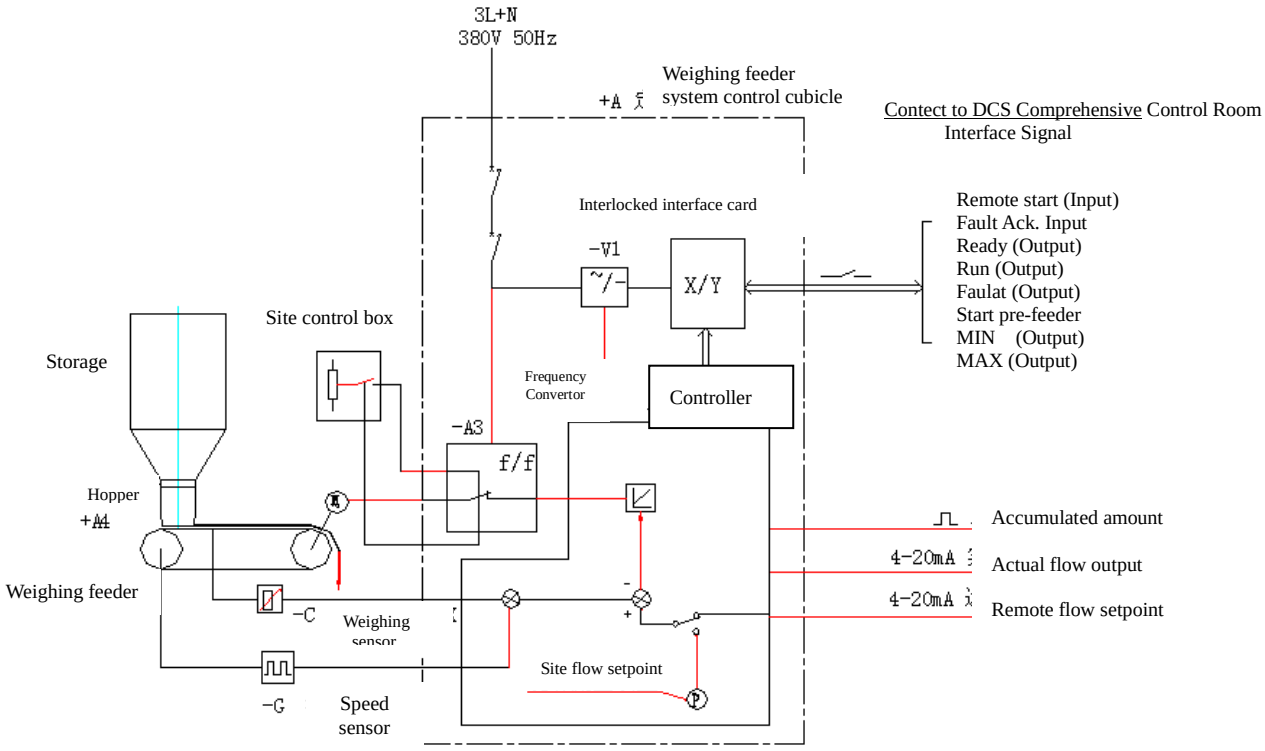
DEL/DEM Weighing Feeder is subjected to excellent manufacture technique and qualified quality control system to ensure the product quality. The accurate and highly stable DEL/DEM Weighing Feeder is a kind of ideal equipment suitable for the feeding and measuring of bulk industry material.

2.Description of some characters used in the system

P	Definition: Preset feeding rate	Unit: kg/h; t/h
I	Definition: Actual feeding rate	Unit: kg/h; t/h
Z	Definition: Accumulated feeding amount	Unit: kg; t
V	Definition: Belt speed	Unit: m/s
Q	Definition: Belt load	Unit: kg/m
QB	Definition: Load of measuring platform	Unit: kg
Y	Definition: Control signal	Unit: mA
Ir	Definition: Feed rate	Unit: %
Qr	Definition: Belt load	Unit: %
Xd	Definition: Deviation	Unit: %
Pr	Definition: Percental setpoint	Unit: %
Pe	Definition: External setpoint	Unit: kg/h

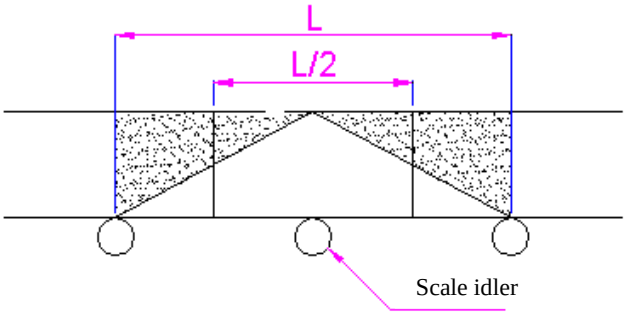
3.Working principle

a) Principle diagram



b) Measuring principle

(1) Belt load



As shown in the figure, during the working process of the weighing feeder, material from the storage hopper is applied to the belt on the frame evenly, and in the weighing section L, the load of material is transferred from the weighing frame to the sensor. Known from the above figure, the effective weighing belt section is L/2, therefore the belt load is:

$$Q = QB/(L/2)$$

Where:

QB－Weight of material in the weighing section	Unit : kg
Q －Belt load	Unit : kg/m
L －Length of the weighing section	Unit : m
L/2－Effective weighing section	Unit : m

(2) Belt speed signal

Belt speed signal is normally replaced by the pulse frequency signal generated from frequency converter, or indirectly measured roller speed signal in the motor by installing speed or encoder on the shaft end of the salve roller. The pulse frequency signal of belt speed is then converted to belt speed signal V(m/s) through the conversion of control instrument.

(3) Feeding rate

The multiplication of belt load signal and belt speed signal in control instrument results the instantaneous turnout I(kg/s)，which is also called as feeding rate. Namely:

$$I=Q\times V=\frac{2QB}{L}\times V$$

(4)Total accumulated amount

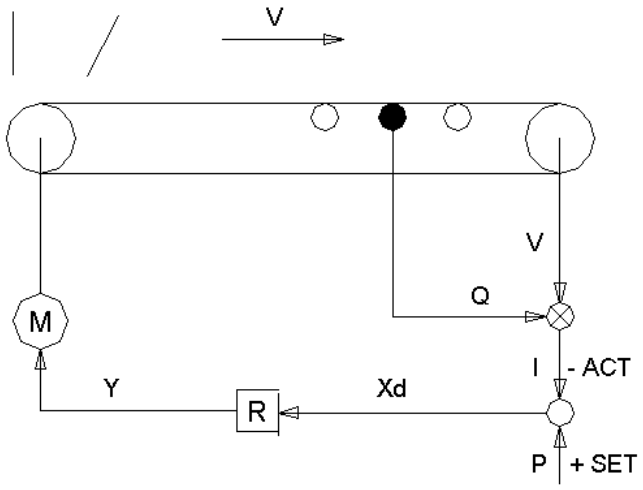
Total accumulated amount $Z=\int Idt$, namely the integral of feeding rate.

Known from the above analysis, feeding rate is decided by the load of weighing frame and the belt speed. During the operation of weighing feeder, it compares the setpoint P and I successively, the difference calculated by control instrument in converted as the difference control value. Then it is used to adjust the motor speed by frequency converter, namely to maintain the feeding rate I close to its setpoint by adjusting the belt speed, and to maintain it unchanged.

4.Control

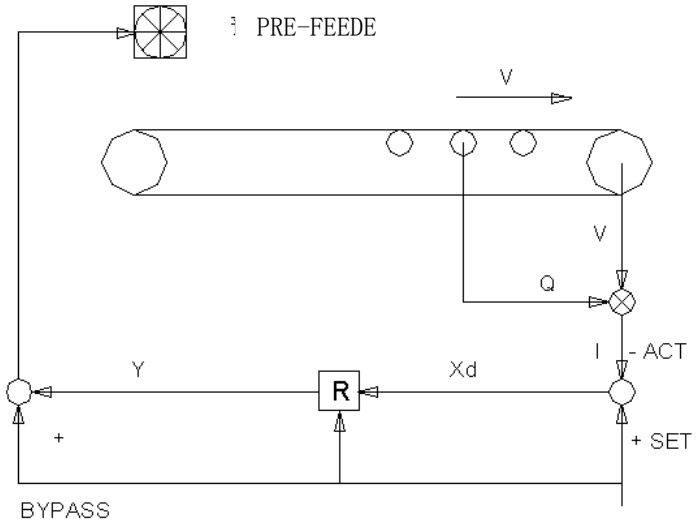
a) Direct feeding control

Feed directly from the storage by the hopper. Measure the actual feeding rate, and compare it with the preset feeding rate, their difference is used to control the motor rotating speed of the weighing feeder, and hence to realize feeding control.



b) Control with pre-feeder

The speed of pre-feeder follows the preset value, and the belt is worker at constant speed.



5.Control mode

a) Gravity mode

Control mode as mentioned above.

b) Volume mode

Non-control mode, the proportion and setpoint of weighing feeder or per-feeder in speed.

6.Operation source

a) Setpoint

Keyboard or external analog signal.

b) Startup/stop

Keyboard or external digital signal

II. Technical parameters and Specification

1. Technical parameters

a) Control precision

Weighing precision: ＜±1 %

Feeding control precision: ＜±0.5 %

b) Control cubicle

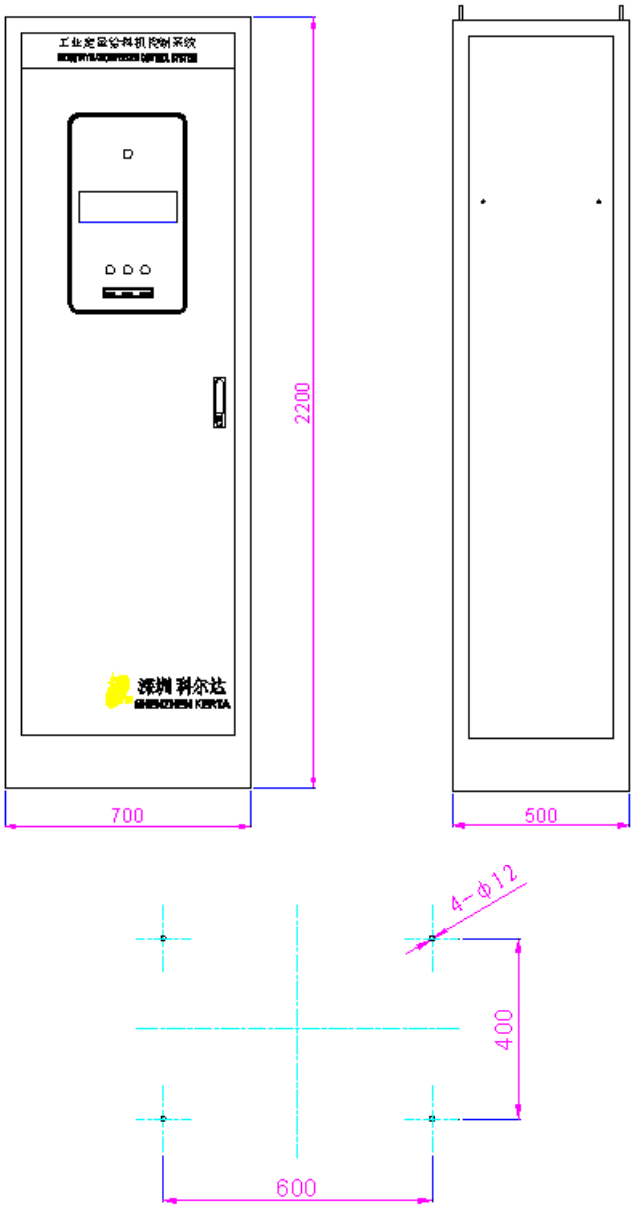
To carry out all required functions in the system.

(1) Specification of the control cubicle

External size(W×H×D): 700×2200×500 mm

Erection size(W×D): 600×400 mm

4× ϕ 12 mm



Erection Size of Control Cubicle

(2) Power supply

Instrument: 220V AC 50Hz
Scale: 380V AC 50Hz

(3) Power demand

<2KW (including gearing)

(4) Work environment

Scale: -20～70℃
Instrument: 0～50℃
Relative humidity: 30～85%RH, without condensing dew

(5) Binary input

Quantity: 2 relay input contacts
State: Remote Start/Stop Close/Open
Fault Acknowledge Normal Open
Requirement: External contact without source

(6) Binary output

Quantity: 6 relay output contacts

State:	Operation	Normal Open
	Ready	Normal Open
	Fault	Normal Open
	Pre-feeder startup	Normal Open
	Maximum	Normal Open
	Minimum	Normal Open

Load: Contact capacity: AC 220V 3A or DC 35V 5A

(7) Analog input

Quantity: 1
Description: Feeding rate
Standard: 4~20 mA

(8) Analog output

Quantity: 1
Description: Actual feeding rate
Standard: 4~20 mA

(9) Pulse output

Quantity: 1
Description: Material accumulation
Frequency: <10 Hz
Width of pulse: 50~1000 ms

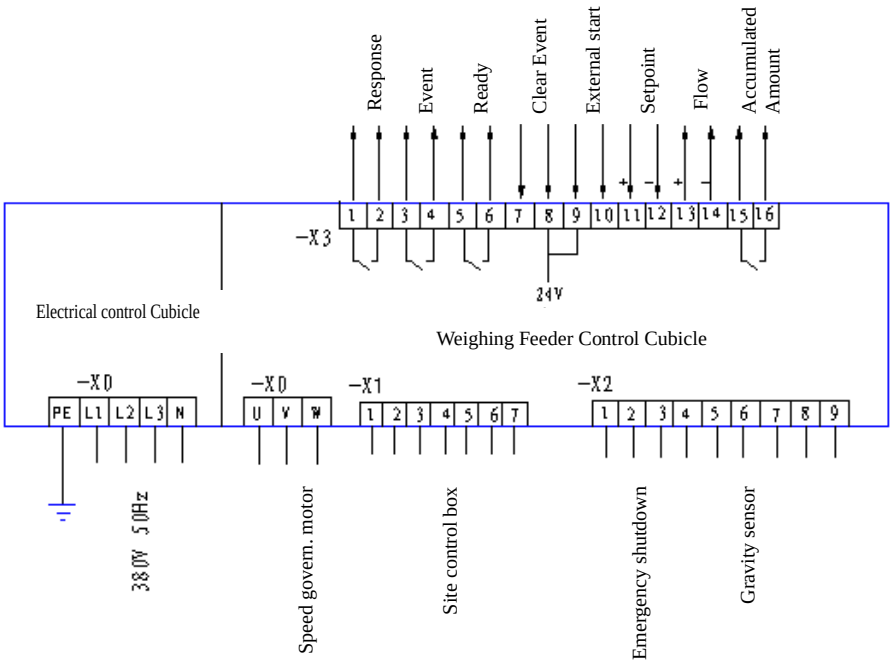
(10) Speed input

Quantity: 1
Description: Encoder, Speedsensor
Input Frequency: 0.05~2500 Hz
System monitoring: Encoder cable open circuit, short-circuit
Cable length: ≤500 m

(11) Gravity sensor

Quantity:	1
Power supply:	5V DC
Measuring cycle:	80ms
Cable length:	≤500 m
Measuring scope:	0~30 mV

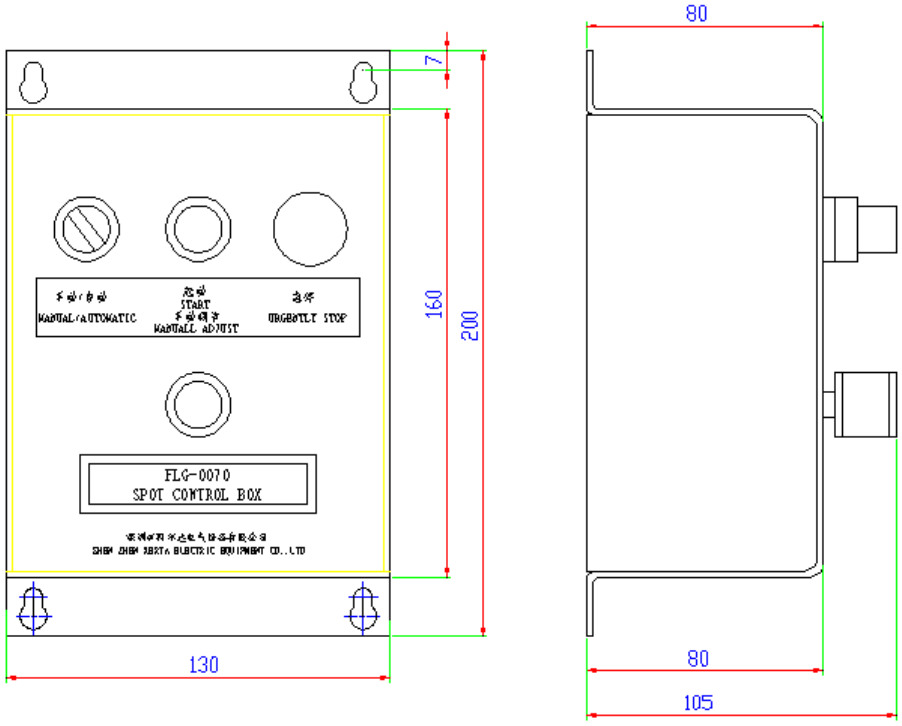
(12)External wiring diagram



c) Site control box

External size (W×H×D): 130×200×105 mm

Erection size: As shown in the figure.



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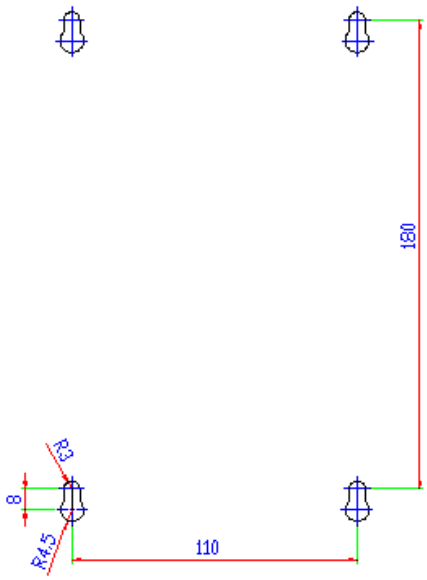
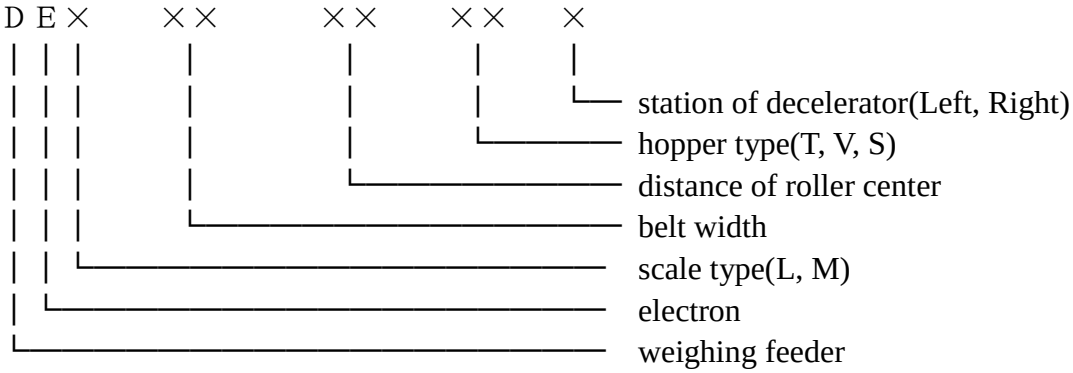


2. Specification of DEL/DEM weighing feeder

a) Specification



b) Specification description:

(1) Scale Type: L -light type scale, roller diameter 190mm.
M -heavy type scale, roller diameter 320mm.

(2) Belt Width (represented by 2 digit):

06 ———	650mm	08 ———	800mm
10 ———	1000mm	12 ———	1200mm
14 ———	1400mm	18 ———	1800mm

(3) Distance between Roller Centers (represented by 2 digit):

13 ———	1300mm	15 ———	1500mm
20 ———	2000mm	27 ———	2700mm
35 ———	3500mm	40 ———	4000mm
45 ———	4500mm		

(4) Hopper Type:

T4/T6	T20
V2	V5
S1	S2

(5) Station of Decelerator:

There are two ways that decelerator can be installed on the scale: left transmission and right transmission.

Note: Way to distinct left transmission and right transmission: Given person's sight accords with the material conveyed direction, if decelerator is installed on the left of scale is called left transmission, on the right of scale is called right transmission.

c) Example of model selection

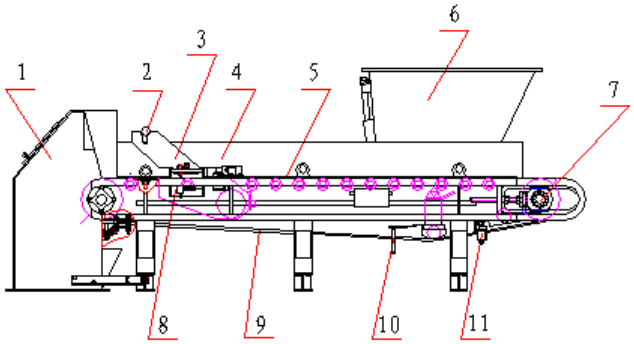
DEL-08-20-T4-Left refers to:
Light type of weighing feeder; roller diameter 190mm;belt width 800mm; distance of roller centers 2000mm; T4 hopper, left transmission.

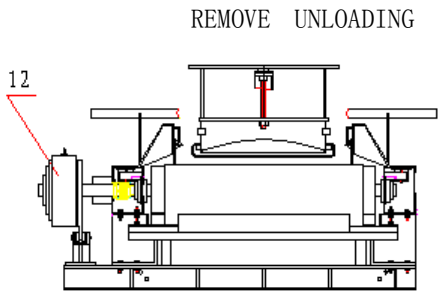
III. Basic Structure of Weighing Feeder

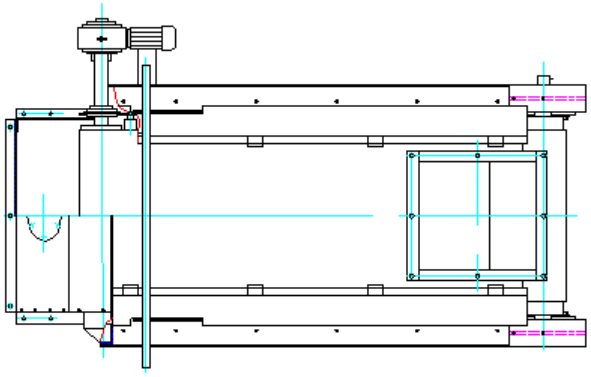
DEL/DEM weighing feeder is consist of machinery scale body and control instrument two parts.

1. Machinery Scale Body

Machinery scale body includes: scale body frame, hopper (or pre-feeder), transmission device, weighing sensor and discharge cover, automatic tension device etc.







1.Discharge Cover 2.Calibration Stick 3.Weighing Frame 4.Block-Off Plate
5.Scale Body 6.Hopper 7.Tension Adjusting Device 8.Weighing Sensor
9.Hopper 10.Error Correction Device
11. Automatic Cleaning Device 12.Transmission Device

• Scale body is the foundation part of the feeder, the box construction of bending formation is used as scale body frame with great rigid and good stability.

• Transmission device consists of AC motor and decelerator. The decelerator is adopted with helical-worm geared motor of SA type, which is compact in design and large in specific speed rate. It is directly connected with initiative roller through a hollow shaft. AC frequency converter is used to adjust the speed of the AC motor.

• Weighing device consists of weighing frame and weighing idler. Weighing frame is supported by two groups of cross spring, the weight of material on the belt is acted onto the weighing sensor through weighing supporting idler, the frame is also furnished with support for the calibration stick, the entire device has been balanced, without horizontal or side moving, free

from frictional affection and no maintenance is required.

• The weighing sensor is adopted with metal corrugated pipe sealed sensor with double connecting hole connected with steel bead and sensor enduring pillar. It is provided with the features of resistance against side force, shock, vibration, high precision and small deformation.

• It is equipped with automatic belt tension and protection from running error device of multiple-supporting idlers so as to ensure consistent belt tension force and stable measuring precision.
• Belt cleaning device furnished inside and outside the belt could protect belt from tainting material, and guard against any material grain dropping into the belt.
• It is provided with limited switch for belt running error. When the belt running error exceeds permitted value, it could generate alarm or stop automatically so as to avoid any product or equipment accident.
• There are many kinds of hoppers in structure. According to material characteristic: it can be equipped with common T–type hopper; or V-type hopper with vibrator for places where material flowing is not so fluent; or S-type hopper for pouring material.

2. Control Cubicle

The control part of weighing feeder is installed in IRC-type of control cubicle, including FP403 instrument, interlocking interface board and AC frequency converter etc.

• There are three basic functional cards inside instrument FP403, including CPU and power supply card, A/D and I/O card and keyboard display card; And the panel is furnished with fluorescent display screen, 22 touch keys and 5 indicative lamps.

• There are two major functions for the interlocking interface panel, one is to carry out logic combination of input signal as well as signal interlocking with other equipment; And another is to isolate input signals and output signals.

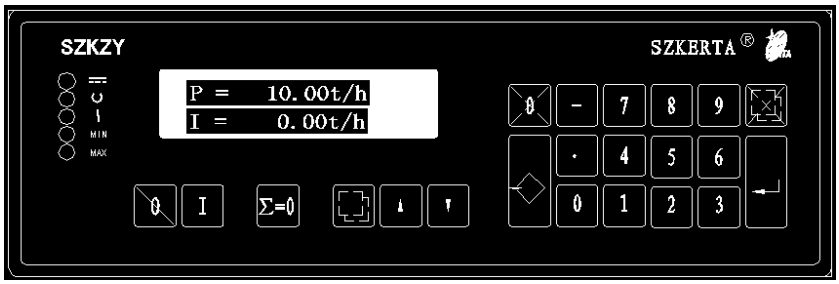
• Frequency converting speed controller is the control device for the weighing feeder transmission device.

• Electrical control cubicle could conduct online control with the upper-level unit or other control equipment.

• Control system is provided with functions such as alarm and fault number display, weighing automatic calibration system, automatic tare and dynamic zero point adjustment, and data protection in case of power cut or shutdown.

IV. Use & Operation

1. Control Instruments



(1). Signal Lamps

⎓	POWER OK (Green)
∪	CPU OK (Green)
!	ALARM (Red)
MIN	MIN Lump (Red)
MAX	MAX Lump (Red)

(2). Keyboard

O I	Start/ Stop
Σ=0	Reset Counter
	Call function distributor and event messages
	Select function, select previous/next page to display
	Acknowledge event messages or delete entry
	Abort function, Abort input, quit function distributor
	Prepare entry or change setpoint
	Acknowledge input or display information
0 ~ 9	Number keys, enter parameters
− .	Minus and decimal point

(3) Display window

- 5×7-dot matrix, character height 6mm

  Upper Display

  Left: Running Message Right: Setting of Feeding Rate

  Lower Display

  Left: Event Message Right: Select Display Parameters

2. Operation on Control Cubicle

(1). Turn on the main power switch and switch of every branch circuit of control instruments in the electric control cubicle. The system is ready to operate when two green lamps on the left top of the control instrument are lit on.

(2). Frequency converter controls Scale transmission device. The frequency converter should be set as "external input" when system operates in state of automatic feeding.

(Please refer to Frequency Converter Operating Manual in details).

(3). Spot control box is installed on the side of the scale body. Only when its control switch is placed at “Manual” position, press the “Start” button could adjust belt speed through the electrograph adjuster on the box. Spot control box should be placed at “Auto” position under automatic feeding state. Emergency Shutdown button is used for safe isolation. In case of abnormity, press this button to trip the breaking switch, and the belt scale will be stopped. In normal condition, the switch is closed by pressing the start button.

(4). Run, Stop and Event three buttons in the electrical cubicle are main control buttons in the operation of the weighing feeder. The Event button is used to acknowledge event message of instrument displayed in the electrical control cubicle. For separate operation on single branch, Start/Stop buttons can only be pressed after the Run button is pressed for a while. When the instrument is in the state of operation, a rotating point appears in the upper left display field.

(5). When the instrument is started by external driven signal, the “Stop” button on the electric control cubicle will be invalid, but the Stop/Start buttons on the panel of instrument remain effective.

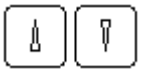
(6). Input feeding rate setpoint

The setpoint of feeding rate can be input from the keyboard on the control instrument or external source:

• When keyboard mode is selected by parameter B07, press Ready for input key, the lower window will be displayed with P=----kg/h or t/h, enter the required value, then press Acknowledge key; Press Delete input key to delete a value, press Abort to terminate input.

• When parameters B07 is selected as Serial or Simulation mode, parameter B08 is selected as external input active(YES), then the setpoint of feeding rate is entered and controlled by external signal (e.g. upper level unit, DCS system), immediately received by the instrument.

(7). Display of operation state.

 buttons can be used to select the state display during the system operation:

- Z1: Counter 1 kg (t)
- I: Feeding rate (throughput) kg/h or t/h
- Ir: Feeding rate (%)
- Q: Belt load (kg/m)
- Qr: Belt load (%)
- V: Belt speed m/s

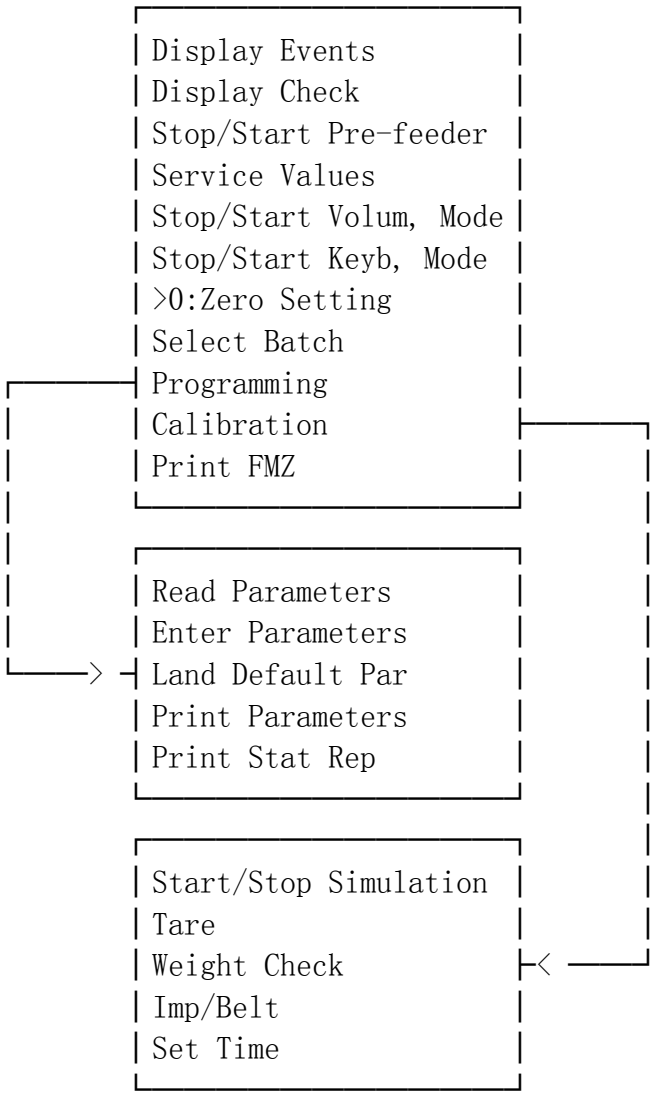
(8). Clear accumulated value, press  to reset; and press  to acknowledge event message.

3. System Operation

System operation is mainly carried out on the control instrument through the calling of functional distributor.

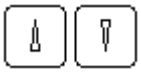
a) Functional distributor

Functions such as calibrate and parameters correction of instrument are carried out through the calling of functional distributor. Functional distributor is as follows:



b). Method of calling

Call functional distributor



Scroll the directory of functional distributor in the display area

Acknowledge the function called

Quit and resume normal display

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V. Correction and Calibration

After the weighing feeder is installed, it is subjected to correction and calibration before putting into operation. Correction and calibration are carried out by calling the Calibration and Zero Setting functions in the functional distributor respectively.

1. Preparation work before correction

(1). Weighing feeder and electrical control cubicle must be well installed and necessary adjustment work has been done so as to ensure consistent belt tension force without running error, an the weighing sensor in normal work status.

(2). Control instrument must be selected in Volume mode, and the belt must be in running status when the system is calibrated.

(3). Check the belt speed, finalize parameter B04, and correct the belt speed display rate. The way is: select belt running cycle parameter C02 properly, exactly measure and calculate the average value of belt running speed, and compare it with the displayed speed value in the scale, if they are not in accordance, modify parameter B04:

B04(New Value)=B04(Original Value)×(Vg/Va)

Where: Va: measured speed

Vg: speed displayed in the scale

(4). According to the technical parameters sheet, enter parameters of group B and C. Among them, Parameter C03 is the belt cycle time, which needs to be the exactly measured time of belt running per cycle (S), input with the actual value.

(5). Functional check

Start the scale, a rotating point will appear in top left display field, in case there is any event message at bottom left display field, it needs to get rid of trouble.

2. Pulse Number/Belt Cycle Calibration (LB)

(1). Call functional distributor and select calibration function.

(2). Follow the screen display, enter password 07734

(3). Select "LB: Imp/Belt"

(4). Start program LB. The belt speed average value is displayed in the top of the window, and the total pulse number of belt cycle is displayed in the bottom.

(5). Acknowledge running result (it will be saved as parameter D06 automatically) or stop running to abort the result.

Note: Call program LB in the following cases:

- Initial calibration
- Changed belt
- Changed parameter B04 and B05.

3. Tare Calibration (TW)

(1). Call the functional distributor, select calibration function.

(2). Enter password 07734

(3). Select "TW: Tare"

(4). Start program TW, the error between tare weight and previous measured tare weight will be displayed at the top of the window, the percentage of the averaged tare weight to nominal belt load is indicated at the bottom of the window.

(5). Acknowledge running result (it will be saved as parameter D04 automatically) or stop running to abort the result.

Note: There must have no any load on the belt when measures the tare weight. If error exceeds 20%, check the feeder for any mechanical fault.

4. Zero Calibration

Program TW only acquires basic tare weight, but zero calibration could acquire error between the tare weight and basic tare weight to correct the present measured result.

(1). Call functional distributor

(2). Select zero calibration function (>0:Zero Setting)

(3). Start zero setting program, the result of error between this and last zero calibration is displayed at the top of the window, and the error with basic tare weight is displayed in the bottom.

(4). Acknowledge the result, the zero of the scale is calibrated.

(5). Or abort to refuse the result.

5. Weight Check (Calibration: CW)

Call weight calibration program CW, the purpose is to put a known testing weight on the weighing frame (also named as weighing platform). During one or several complete cycles, compare the weighing result measured by the instrument with the setpoint to evaluate the weighing accuracy.

(1).Put the known weight calibration stick on the calibration support of weighing frame and convert it (weight of calibration stick×2) as test weight setpoint in the entry of parameter C09. (Please refer to parameters and technical parameter sheet)

(2). Call functional distributor, select calibration function.

(3). Enter password 07734.

(4). Select calibration weight (CW).

(5). Start program CW, the feed setpoint with running time is displayed at the top of the window, the ratio of setpoint compared with measured value KOR is displayed in the bottom.

(6). Stop and quit the program.
Note:
Error<1%: KOR=0.99~1.01 The scale is normal
Error<5%: KOR=0.95~1.05 Input KOR value as parameter D02
Error>5%: KOR<0.95 or KOR>1.05 Inaccurate parameter C and D or the scale is not well adjusted.

6. Object Calibration

The way of weight calibration can not meet perfect result complies with actual situation. In order to get high precision in weighing result, the only way is to use actual conveyable materials to measure and calibrate it accordingly, i.e. to modify parameter D02. The way is to collect materials that weighing feeder conveyed in a certain time by using hopper or vehicle, weight it exactly and have it compared with the reading displayed on the scale, if they are not consistent, modify parameter D02.

D02(New Value)=D02(Original Value)×(Za/Zg)

Where:

Za: materials actual weight

Zg: materials weighing display.

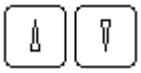
Note: Parameter D02 before calibration is usually set to 1.0 in the system.

VI. System Parameters

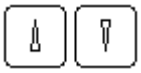
Parameters are variable data, which can be used to better meet the operating requirement on site. All parameters have been preset in factory, and all of them are useful recommendation values. All parameters is divided into functional groups named A...Q, and the figure after the letter is the number of parameters, which is divided into two parts, numeric value and option.

1. Read Parameters

Call functional distributor

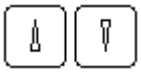


Acknowledge



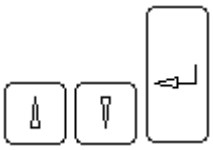
Select Read Parameters

Acknowledge



Select parameter functional module

Acknowledge

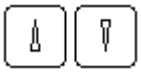


Select parameter in the group and acknowledge

Press this key, return to parameter groups, and press it again to return to normal display

2. Enter and Modify Parameters

Call functional distributor



Select a function to enter the next display

Acknowledge

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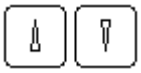
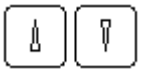


Enter Parameters

Acknowledge

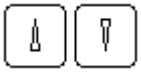
Input password 07734

Display parameter group A and S5 (Valid password)



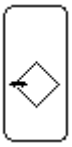
Select parameter group

Acknowledge

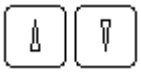


Select parameter number

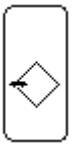
Acknowledge



Prepare input and modify parameter



Select parameter option and input a value



Acknowledge

Delete a value

Abort input

3. Load Default Value

After calling this function, parameters of instrument resume to original state.

4. Parameters Sheet

Group A Dialog State
A01 Language ENGLISH
A02 Units SI

Group B Rated Data

B01 Feeding Rate Units

Default ------kg/h

Optional ------ kg/h； ----. - kg/h； ---.-- kg/h； --.--- kg/h

------t/h； -----.- t /h； ---.--t /h； --.--- t /h

B02 Nominal Feeding Rate

Default 10.0000 t/h

Range: 0.0020...99999.9t/h

Used for limited value and service display.

B03 Tacho Active

Default: YES

Optional: YES or NO

Select NO for any belt speed measurement.

B04 Characteristic Value of speed sensor

Default: 10000 I/m

Range: 10.00...100,000.0I/m

Number of pulse sent by speed sensor while belt moves one meter.

B05 Nominal Speed

Default: 0. 10 m/s

Range: 0.0100...10.000m/s

Reference value for limited values.

B06 START Source

Default: KEYB

Optional: KEYB or SER

B07 Setpoint Source

Default: KEYB

Optional: KEYB or SER or ANALOG

B08 External Setpoint Active

Default: NO

Range: YES or NO

B09 W/S Active

Default: NO

Optional: YES, NO

B10 FMZ1 Unit

Default: ------ t

Range: ----.-t； ---.-- t； -.---t

B11 FMZ1 Pulse Width

Default: 0 ms

Range: 50...1000ms

Output pulse width to external totalizing counter.

B12 FMZ2 Unit

Default: ------ t

Optional: ----.-t； ---.-- t； -.---t

B13 FMZ3 Unit

Default: ----t

Optional: ---.-t； --.-- t； -.---t

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B14 Regulate Lighteness
Default:1 LEVEL
Optional: 1 LEVEL；2 LEVEL；3 LEVEL；4 LEVEL

Group C Calibration and Calculation Data

C01 Power Frequency
Default: 50Hz
Optional: 50Hz or 60Hz

C02 Belt Circuit No.
Default: 1
Range: 1...100
Determine the running time of programs for "Zero adjusting, Tare and Weight Check". Does not apply to automatic zero setting.

C03 Belt Circuit Time
Default: 30.0s
Range: 1.0...9999.0s
Determines measuring time for calibration program "Imp/Belt Circuit". Normally, time is selected for one belt circuit.

C04 L/C Sensitivity
Default: 2.0mV/V
Range: 0.5...9.9999mV/V
L/C : Weighing Sensor, input according to L/C technical parameters.

C05 L/C Rated load
Default: 50.0kg
Range: 0.5000...22000.0kg
Rated load of weighing sensor.

C06 Eff. Platf. Length
Default: 50.000m
Range: 0.1000...50.000m

C07 Lever Ratio
Default: 1.000
Range: 0.0100...2.0000
Lever ratio between weighing sensor and weighed load on the idler of platform.
F=C07 • Q Q=Platform load F=Weighing sensor load

C08 Angle a
Default: 0.0 degree
Range: 0.0...25.00 degree
Inclination of longitudinal scale axis, if weighing sensor is mounted vertically to the belt.

C09 Check Weight
Default: 10.0 kg
Range: 0.001...22000.0kg
Weight or the weight of calibration stick replacing material on the platform.

Group D Calibration Results

D01 Nominal Belt Load
Unit: kg/r

Not input value
Computed from characteristic data B02 and B05
D02 Range Correction
Default: 1.0000
Range: 0.5000...2.0000
The belt load q is influenced by this parameter.
q(corrected)=q(measured)・D02
D03 Total Tare
Unit: kg/m
Not input value
Total Tare=basic tare+tare correction
D04 Basic Tare N
Unit: kg/m
Not input value, Max.10000kg/m
Result of taring program
D05 Tare Correction T
Unit: kg/m
Not input value, Max. ±1000kg/m
Result of zero programs
D06 Belt cycle code
Default:
Not input value, Max.9E6
Result of "Imp/Belt Circuit"

Group E Analog Output
E01 Source AA
Default: I
Optional: I (Feed Rate), Q (Belt Load), V (Belt Speed)
E02 Elevation AA
Default: 4.0mA
Range: 0.00...20.00mA
Zero point output Current of E01, usually select 4.00mA
E03 Limit Value AA
Default: 20.00mA
Range: 0.00...1000.00mA
Rated output current, usually select 20.00mA

Group F Limit Values
If measured values are below the min. value of L1... L4 or beyond the max value of H1...H4 , it will be monitored 10s after-starting.

F01 Limit Value MIN
Default: V MIN
Optional: V I MIN, one of Q MIN V MIN
F02 Limit Value MAX
Default: V MAX
Optional: V I MAX, Q MAX, and V MAX

F03 Value for I MIN
Default: 5%I
Range: -10...200.0%I
Reference: B02
F04 Event Class IMIN L1
Default: W1
Optional:WARNING1 WARNING2 IGNORE ALARM
F05 Value for I MAX
Default: 120%I
Range: -10...200.0%I
Reference B02
F06 Event Class I MAX H1
Default: W1
Optional: WARNING1 WARNING2 IGNORE ALARM
F07 Value for Q MIN
Default: 60%Q
Range: -10...200.0%Q
Reference: D01
F08 Event Class Q MAX L2
Default: W1
Optional:WARNING1 WARNING2 IGNORE ALARM
F09 Value for Q MAX
Default: 120%Q
Range: -10...200.0%Q
Reference: D01
F10 Event Class Q MAX H2
Default: W1
Optional: WARNING1 WARNING2 IGNORE ALARM
F11 Value for V MIN
Default: 0.5%V
Range: -10...200.0%V
Reference: B05
F12 Event Class V MIN L3
Default: W1
Optional:WARNING1 WARNING2 IGNORE ALARM
F13 Value for V MAX
Default: 120.0%V
Range: -10...200.0%V
Reference: B05
F14 Event Class V MAX H3
Default: W1
Optional:WARNING1 WARNING2 IGNORE ALARM
F15...F18 Omit

Group G Filter Setting
G01 I Display

Default: 3.0S
Range: 0.0...600.0s

G02 I Analog Output
Default: 3.0S
Range: 0.0...600.0s

G03 I Interface
Default: 3.0S
Range: 0.0...600.0s

G04 Q Display
Default: 3.0S
Range: 0.0...600.0s

G05 V Display
Default: 3.0S
Range: 0.0...600.0s

G06 Sensor Filter
Default: 1.0S
Range: 0.0...600.0s
Depending on belt load state.

G07 Belt Tracking Time
Default: 3.0S
Range: 0.0...2000.0s
Time counted by counter continuously after stopping.

Group H Not indicated

Group I Not indicated

Group J Not indicated

Group K Internal operation

K01 Electrical operation
Default: 3000h
Range: 1...10000h
Set electrical operation time

K02 Electrical Maintenance Event S4
Default: W1
Range: WARNING 1 WARNING 2 IGNORE
Total of power-ON times exceeds time specified in K01

K03 Operation V >V min
Default: 3000h
Range: 1...10000h
Set motor operation time.

K04 Operation Maintenance event S3
Default: W1
Optional: WARNING 1 WARNING 2 IGNORE
Total of conveyor belt running times exceeds time specified in K03

K05 SPC filtering
Default: 8h

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Range: 1...24.00h
Acquisition interval for service, belt running time at no load.
SPC= No load process control

K06 SPC Filter
Default: 1h
Range: 1...24.00h

Group L Serial Inferf.

L01 Band Rate 1
Default: 9600
Optional: 1200, 2400,4800,9600,19200
L02 OWN Address
Default: 1
Range: 1...999
L03 Interface standard
Optional: RS422 or RS485 (Modbus)
L04 Event Class [S9]
Default: Ign
Optional: IGNORE ALARM WARNING1 WARNING2
If no message is received within 10s, sent event message "S9 Host Data Link".
L05 Resolution
Default: 4096
Range: 1000...32767
L06 Data Transmission
Optional: Normal or swap

Group M Serial Printer Interf. (Omit)

Group N Weighing Feeder Control (Not Dedicated)

Group O VAP/BIC (Not Dedicated)

Group P (Not Dedicated)

Group Q Events

Q01 Power Failure E1
Default: A
Optional: WARNING1 WARNING2 ALARM
Q02 Memory Error S1
Default: A
Not an input, memory fault, scale is out of operation.
Q03 Tacho Input GA1 C2
Default: A
Optional: WARNING1 or ALARM
Input frequency exceeds 2700Hz.

Prerequisite: B03=YES

Q04 Not dedicated

Q05 Error GA1 E2

Default: A

Optional: WARNING1 WARNING2 ALARM IGNORES

Short circuit or cable breakage.

Prerequisite: B03=YES

Q06 Not dedicated

Q07 Err. Imp/Blt E4

Default: A

Optional: A；W1；W2； Ign

Q08 W/S Input C1

Default: A

Optional: A；W1；W2

Weighing sensor cable wrong or not connected.

Q09 No Release S2

Default: A

Optional: A；W1；W2； Ign

Control input is set to STOP.

Q10 W/S Input>MAX H4

Default: A

Optional: A；W1；W2

Load of weighing sensor exceeds rated load of 110%.

Q11 W/S Input<MIN L4

Default: A

Optional: A；W1；W2

Load of weighing sensor is smaller than rated load of 3%.

Q12 Password Active WARNING2 S5

WARNING2

After inputting password, S5 is displayed, you may call function without entering the password within 2 min.

Q13 Analog Active WARNING2 S7

WARNING2

Q14 Setpoint Limited S8

Default: W1

Optional: W1；W2 ； Ign

Group R Controller

R01 Controller Type

Default: DOSIER

Range: UNIVERS or DOSIER

R02 P-Component

Default: 0.02

Range: 0...1000.00

R03 I-Component

Default: 1s

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Range: 1...6s

R04 D-Integral Parameter

Default: 1s

Range: 0.0...3s

Select time parameter in range of zero to three seconds, zero corresponds no differential ceoefficient regulation

R05 Parameter of screen protection

Default: 20.0Min

Range: 0.0...600.0Min

If the positive is selected, the screen will be shut off after keyboard operation otherwise the function of screen protection will be stop.

R06 MAX. CONTR. Dev.

Default: 5.0%

Range: 0.0...100.0% Default: 5.0%

Reference P or Q

R07: Contr. Deviation H5

Default: W1

Range: WARNING1 WARNING2 ALARM IGNORES

If the deviation absolute value for time R05 exceeds threshold R06, event message"H5 Control Deviation" is output.

R08 Controller Ltd. H6

Default: W1

Range: WARNING1 WARNING2 ALARM IGNORES

Event message"H6 Controller Limited" is output as soon as the upper response threshold R10 is reached.

R09 Lower Limit

Default: 0mA

Range: 0...20.00mA

Controller control magnitude lower limit.

R10 Upper Limit

Default: 20.00mA

Range: 0...20.00mA

Controller control magnitude upper limit.

R11 Contr. Magn. Elev.

Default: 0mA

Range: 0...20.00mA

Limited value is raised for controlling value.

R12 Position at Stop

Default: 0

Range: 0 or R09

Control value in STOP State.

R13 Start-up

Default: 0 circuit/s

Range: 0...20.00 2circuit/s

Controller pre-display mode before starting the scale.

R14 Clearance

Default: 0 circuit/s

Range: 0...2circuit/s

Whether to stop the pre-feeder immediately or not while the scale is shutdown.

R15 Reset VFD screen

Default: NO

Optional: NO YES

NO:no reset, YES:reset

R16 Setpoint Range

Default: 20.0mA

Range: 0...200.0mA

Analog setpoint input value I.e. of for 100% setpoint.

R17 Zero Setpoint

Default: 0mA

Range: 0...200.0mA

Setpoint input value I.e. for 0% setpoint.

R18 Volumetric Mode

Default: Q

Optional: Q or Y

R19 Bypass

Default: 10.00mA

Range: 0...20.00mA

R20 Setpoint Filter t1

Range: 0...6000s Default: 0.0s

R21 Setpoint Filter t2

Default: 0.0s

Range: 0...6000s

R22 Set PID mode

Default: PID Mode 1

Range: PID Mode 1 or PID Mode 2

R23 Set/Act Sources

Default: I

Optional: I or Q

R24 Adaptation 1

Default: NO

Optional: NO, V, I/Q, I/W

R25 Adaptation 2

Default: NO

Optional: NO, W

VII. System Service Values

The service value table comprises details on system. This call has no effect on the weighing function.

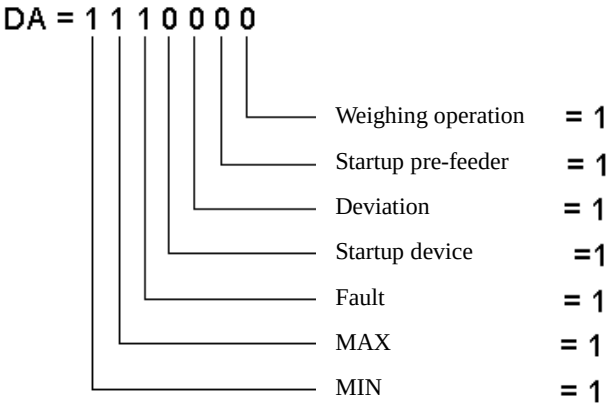
1.Version Number: e.g. FDB0200-00

2.Device Number: F-Nr.=G xxxx

3.OPTION Card: NO (without option card) V05 (option card available)

4.Date and Time

5.State of Relay Outputs: 1=On, 0=Off



6.State of Relay Inputs.

7.EL=xxxxh when power on. It is used to monitor parameter K01 and message S4.

8.ED: >0=xx: yyh, operation time since the previous taring, set to zero automatically or manually.

9.ED=xxxxh, operation time of the scale or conveyor belt.

10.Tacho 1=xxxxHz, input frequency of speed transducer, between 5 and 2500Hz.

11.aW=xx, yyy%, percentage of weighing sensor's load to sensor's rated load. If exceeds 100%, means overload, and if is greater than 110%, a message of H4 will be generated.

12.vap_roh=xxxx, non-standardized output value of weighing sensor amplifier.

13.WZ_roh=xxxx, non-standardized output value of weighing sensor amplifier.

14.Belt slip S=xxxx, yyyyy%, belt length change in % of total belt length.
Parameter O05, Message C8

15.Belt drift tr=xx, yycm

16.Mean limit=xxx, yy%, percentage of average feeding rate to nominal feeding rate.

17.Propotional var=xxx, yyy%, percentage of square root difference of actual feeding rate to nominal feeding rate.

18.Max. Belt Load Q MAX=xxx%

19.Idling Portion TQ<MIN=xxx%

20.Latest Taring (Date) xxx, yy%, percentage of total tare related to nominal belt load.

21.AA1=xxx, yyymA, analog output current (feeding rate, belt load).

22.AA1=xx, yyymA, analog output current of control variable Y.

23.AE=xx, yyymA, analog input current for setpoint.

24.Y=xx, yymA, value of control variable

25.Xd-mitt=xxx, yy%, deviation mean value related to nominal feeding rate.

26.Xd_var=xxx, yy%, deviation variance related to nominal feed rate square.

27.ZO: E yy xxxx, pulse output of external totalizing counter.

VIII. Event Messages

All significant functions of the scale are internally monitored. If an error is found, an event message code will be displayed on the bottom left. If several events are occurred at the same time, they will be displayed according to the priority: ALARM, WARNING1 and WARNING2.

Press the button to acknowledge the event. Call the "display events" function could look over related documents.

1.System Messages S

- S1: Memory Error

  Program and parameter memories are checked in cycles. In case of error, the scale can no longer be operated.

- S2: Not Released

  External release signal missed, the scale can no longer be operated.

- S3: Running time is greater than the minimum setting time

  Total belt conveying and measurement time exceeds the setting, see parameters K03, K04.

- S4: Internal Electrical Operation

  The INTECONT power supply has been switched ON for a certain period of time. Perform requisite service works, if necessary.

- S5: Password Active

  Password remains valid within 2 min after input, and the instrument can be transferred to calibration and service function from rated operation.

- S6: Not dedicated

- S7: Simulation Active

- S8: Setpoint limited

  Setpoint is too high.

- S9: Host Data Link

  Serial communication is interrupted for more than 10s.

2.Batching B

- B1 Out of Tolerance

3.Electrical E

- E1: Power Failure

Power failed or cut off.
Feed amount cannot be calculated during this period.

- E2: GA1 Failure

Short circuit or breakage in speed transducer cable, the scale can no longer be operated.

- E3: Not dedicated
- E4: Imp/Belt Short Circuit

Short circuit or breakage in the cable of belt speed sensor.
See parameter Q07.

- E5: Stand-By

4.Calibration C

- C1: L/C Input

Weighing sensor cable broken or not properly connected.
See parameter Q08.

- C2: GA1 Input

Belt speed transducer output frequency exceeds 2700Hz.
See parameter Q03.

- C3: Not dedicated
- C4: Not dedicated
- C5: Not dedicated
- C6: Not dedicated
- C7: Not dedicated
- C8 Slip Error

The belt length measured by belt speed sensor has been changed.

- C9 Not dedicated

5.Maximum H

- H1: Flow I is greater than the maximum.
- H2: Belt Load is greater than the maximum.

Actual belt load exceeds the maximum preset value.

- H3: Speed is greater than the maximum.

Actual belt speed exceeds the maximum preset value.

- H4: Weighing sensor input is greater than the maximum.
- H5: Deviation

Actual feed rate with big difference from the setpoint.

- H6: Control variable limited

The output of control variable is reached 20mA, which can’t be adjusted anymore.

- H7: Motor Blocked
- H8: Belt Skew
- H9: Belt Drift

6. Minimum L

- L1: Flow I is less than the minimum.
- L2: Load is less than the minimum.
- L3: Speed is less than the minimum.
- L4: Weighing sensor input is less than the minimum.

7. Signal Lamp

(1) Signal Lamp

Power supply normal (Green)
If no indication, please check:

- Power supply is normal or not;
- Instrument is in good order or not;
- Indicative lamp is damaged or not.

CPU normal (Green)
If it is flash or goes out, please check the instrument, and the system will stop.

Alarm lump(Red)
In case of alarm signal, the lamp will flash with fault information displayed in the instrument at the same time.

MIN (Red)
It flashes when the value is less than the minimum, see fault information.

MAX (Red)
It flashes when the value is greater than the maximum, see fault information.

IX. Installation and Adjustment

1.Installation of Machinery Scale

(1). Scale body should be horizontally installed on solid base, between the hopper and hopper bin, and between the discharge cover and discharge chute is connected with flange respectively. Before installing, check whether the installation situation and dimensions comply with requirements.

(2). Scale is suspended by screw on the hoisting ring, the longitudinal centerline of scale belt and centerlines of the hopper and the discharge cover are in superposition in order to prevent materials from running error during convey.

(3). Check the levelness in longitudinal and horizontal directions when the scale is being installed. It can be adjusted at the place of anchor bolt with flimsy steel washer, and it can be fixed by nut with adding chute washer and spring ring when adjusted.

(4). Working Status of Weighing Sensor:

• Turn down bearing bolt of weighing frame, the top of the bolt just right touch the surface of steel ball at the sensor pillar, and screw down the tightening nut of the bolt.

• Loose the protective nut on the support frame to allow the weight of weighing frame entirely loaded on the weighing sensor through the bearing bolt and the steel ball.

• Check whether the distance between the limited space protective screw below the weighing sensor and the sensor is around 30-40μm. The distance has been adjusted at factory and the position of the screw is fixed by glue. It needs to be checked and adjusted when the weighing sensor is replaced.

(5). Open the horizontal gate board under the hopper when the system is put into operation. About 2/3 of the material pillar is pressed on the belt. The position of vertical gate board is adjusted in accordance with materials grain and the flow, and the opening is generally about 12mm.

(6). Steps to replace the ring belt:

• Dismantle the discharge cover and the block off device;

• Dismantle the support of calibration stick opposite to the transmission device;

• Sling the plough form cleaning device on the frame of both sides;

• Loose the nuts of belt tension device, move the bearing base of driven roller into the frame, and dismantle the tension adjusting device at this side.

• Dismantle the belt cleaning device under the discharge cover;

• Dismantle the square support between the scale body frame of this side and the support, make the scale body on suspending condition;

• Take out the old belt and put in new belt;

• Scale body parts dismantled return to the original condition in turn.

2.Installation of Electric Control Cubicle and Connection of the System

(1). Electric control cubicle should be installed in control room, where has less dust and interference on power supply, and is convenient to observe the operation of the scale. The control room should be furnished with good and reliable grounding point.

(2). Spot control box should be installed in the nearby of the scale body so as to facilitate site operation.

(3). The system control instruments of feeder are all installed in the electric control cubicle. Cable channel should be arranged for the connection between the control cubicle and spot and cable placing. The cable bridge and the protective pipe for power cable and signal cable should be laid separately. If the signal cable and the power cable are laid in parallel, the distance between them shall be greater than 300mm.

(4). The signal cable and motive power cable of every system parts be well connected according to the system connection diagram and check them strictly.

3.Adjustment

Check for no-load running is required when the weighing feeder and the electric control cubicle are well installed so as to test and to calibrate.

(1). Check output signal polarity of the weighing sensor

•Clean dust and sundries on the sensor constrictor, loose the protective bolts on the support, and allow the bearing bolt just right in touch of the steel ball of sensor.

• Turn on the power and look over the Q value by using of the instrument. The Q value should be risen when load slightly to the weighing frame. If the Q value is fallen, it shows that the input polarity of the signal is connected on the contrary, and two lines of input signal should be mutually changed.

(2). Check belt running

•Spot control box is placed on Manual. Press the start button, turn the electrograph slowly, look over whether the running direction of the feeder belt is correct, whether the belt run error. If the running direction is wrong, change any two ends of the three phases power supply for the motor. If the belt runs error, properly adjust the belt tension adjusting nut on the sideboard of scale body.

• Spot control box is placed on Auto, and the frequency converter is placed on external feeding running state, start the belt by pressing the running button on the electric control cubicle and the start key on the instrument respectively in order to check whether the system is connected correctly.

(3). Call every instrument function distributor respectively to look over whether the instrument system parameters comply with the pre-set value in the technical documents, input one by one according to the parameter item description in case of error.

X. Maintenance

1.The weighing frame is the key point to be maintained for the using of the scale. The weighing sensor constrictor and steel ball should be always kept cleaning, and check whether the spring is deformed; whether trip bolts are loose; whether the weighing frame is blocked; whether the weighed idler is agile.

2.It is necessary for lubricating oil in gearbox to be changed regularly. Pay attention to quality of oil when replacing the oil. The oil with impurity can lead to opposite action.

3.When welding operation is needed for the frame, it should be grounded at the nearest welding spot, or the weighing sensor to be isolated in order to prevent it from damaging.

4.Protective bolt should be turned to lift the weighing frame so as to prevent the weighing sensor from overloading when the system is not needed to work for a longtime or when service is needed.

5.The belt, roller and idler are easily to be stained with materials. According to circumstances, the distance between the external and internal rubber boards of the belt
cleaning device and the belt should be adjusted so as to eliminate its influence for weighing accuracy.

6.Weighing accuracy is also influenced by belt length and belt tension force. After changing the belt, pay attention to adjust the belt tension force and the adjusting bolts of the driven roller, and to test and calibrate it again.

7.Although the electric control cubicle is far away from dusty, attention on the cleaning of electric parts and lines in the cubicle is still needed. Only professional persons are allowed to change parts and to deal with accidents.

8.Don't use electric switch of frequency converter to control motor start or stop. Turn off the electric switch of this equipment or instrument to cut its power supply in case a certain feeder unit is not needed.

9.When a kind of event alarm is frequently happened during the equipment operating, it needs to be checked in time to eliminate accidents.

10.Some key parts of weighing feeder are especially designed and selected according to the technical requirements of user as well as the material features. If user want to change material or the range of feeding rate, they need to consider whether it is practicable or to change the parts such as transmission device, weighing sensor and hopper according to specific condition.

11.A set of equipment document is enclosed for each weighing feeder, including weighing feeder data and parameters. Please use the same type of spare parts described in the document only in case of maintenance and parts replacement.

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