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**沈阳华润热电有限公司异地扩建项目**

**堆取料机无人值守系统**

**远程驱动接口文档**

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1. 远程驱动功能设计

远程驱动子系统相当于斗轮机PLC的上位机，部分功能和界面可以从触摸屏迁移过来，主要支持两个方面，一是PLC基本命令的远程调用，基本命令包括各类设备启停和斗轮机运动参数设置等；二是PLC内部变量的访问，内部变量包括关键参数、状态、报警和故障等。远程驱动子系统屏蔽了不同斗轮机PLC的差异，使得整个无人值守系统支持不同厂家的斗轮机。

远程驱动系统自动运行，24小时不停机。运行过程中需要保持内存和

CPU和GPU计算资源的稳定性，稳定运行时间不低于7\*24小时。

* 1. 远程调用

远程驱动子系统基于TCP/IP或串口向PLC发起远程调用。

可能的基本命令集包括：

（1）控制方式：单动、联动、半自动

（2）堆取料控制：堆料、停止、取料

（3）尾车变换：堆料、停止、取料

（4）大车速度选择：慢速、快速

（5）皮带模式选择：堆料、停止、取料

（6）挡板模式选择：堆料、停止、取料

（7）洒水模式选择：堆料、停止、取料

（8）与系统连锁：解锁、连锁

（9）变幅油泵：运行、停止

（10）复位、急停

（11）启车报警

（12）蜂鸣报警

（13）俯仰（上仰、停止、下俯）、俯仰步进（上、俯仰步进设置、下 ）

（14）回转（左转、停止、右转）、回转步进（左、回转步进设置、右）

（15）行走（后退、停止、前进）、行走步进（后、大车步进设置、前）

（16）高压合闸、高压分闸

（17）控制电源合闸、控制电源分闸

（18）动力电源合闸、动力电源分闸

（19）夹轨器放松、夹轨器夹紧

（20）照明合闸、照明分闸

（21）雨刷器运行、雨刷器停止

（22）斗轮电机运行、斗轮电机停止

（23）变幅油加热、变幅油加热停止

（24）变幅风机运行、变幅风机停止。

**以上基本命令的执行过程本质上是在修改PLC的某个地址下的变量值，其对应的PLC地址、PLC数值类型、外部命令名称、外部命令类型等请参看附录（PLC变量表）**。

* 1. 内部变量访问

远程驱动子系统基于TCP/IP通信在给定的时间间隔内向PLC或其他子系统发起变量查询，PLC内部变量可分为**关键参数**、**状态、报警和故障**四类。

**关键参数可能包括：**日期、时间、温度、湿度、风速、大车位置、回转角度、俯仰角度、悬臂胶带电流、尾车胶带电流、斗轮电流、高压上机电源电压和实时流量等。

**状态信息可能包括**：单动、联动、半自动、系统允许堆料、系统允许取料、大车变频器运行、大车制动器运行、悬臂胶带堆料、悬臂胶带取料、悬臂制动器运行、夹轨器放松、夹轨器夹紧、回转变频器运行、回转制动器运行、回转左转、回转右转、大车前进、大车后退、悬臂上仰、悬臂下俯、变幅油泵运行、变幅油泵加热器运行、变幅风机运行、1号水泵电机运行、斗轮运行、斗轮润滑油泵运行、尾车堆料位、尾车取料位、2号水泵电机运行、尾车变换制动器运行等。

**报警信息可能包括：**司机室急停按钮、电气室急停按钮、大风预报警、大风报警、司机室火灾报警、电气室火灾报警、变压器超温报警、尾胶料流检测、尾胶急停拉线、尾胶打滑、尾胶纵向撕裂、回转过力矩、回转左防撞、回转右防撞、回转制动电阻超温、料斗堵煤、悬胶一级跑偏、悬胶二级跑偏、悬胶打滑、悬胶纵向撕裂、大车制动电阻超温、变幅堵油、变幅油低温、变幅油超温、变幅油位超低、变幅油低压、斗轮过力矩、大车变频器故障、回转变频器故障、动力卷筒过张力和控制卷筒过张力。

**故障信息可能包括：**暂定！

以上内部变量对应的PLC地址、PLC数值类型、外部变量名称、外部变量类型等信息，如有需要请参看文件夹中附带的“PLC变量表”。

1. 接口概述
   1. 客户端向远程驱动发送的查询格式

如表2-1所示，外部子系统需要通过套接字向远程驱动发送的JSON字符串格式如下。

表2-1 远程驱动通信---客户端发送

|  |  |  |
| --- | --- | --- |
| **外部子系统向远程驱动子系统发出查询请求** | | |
| **属性名** | **数据类型** | **备注** |
| QUERY\_SYSTEM | string | **子系统ID**： 以“MC”为例  (本系统之外的其他子系统) |
| DATA\_TYPE | int | **数据类型**： 6-远程驱动系统交互 |
| QUERY\_TYPE | int | **查询类型**：0-备用，1-PLC的一帧数据，2-命令模式 |
| COMMAND\_NAME  (注：在QUERY\_TYPE选择进入命令模式(2)后生效) | string | **命令名**：命令详情位于本文档下方 |
| COMMAND\_TYPE  (注：在QUERY\_TYPE选择进入命令模式(2)后生效) | int | **命令内容**：0-False，1-True |
| COMMAND\_DATA  (注：在QUERY\_TYPE选择进入命令模式(2)后生效) | float | **数据内容**：例：度数，深度 |
| **查询示例：**  //查询PLC1和PLC2上的一帧数据  {  “QUERY\_SYSTEM”: “MC”, // 三维扫描子系统正在查询  “DATA\_TYPE”: 6, // 远程驱动系统交互  “QUERY\_TYPE”: 1 // PLC的一帧数据  }  或者基于基本命令集（“PLC2变量表.xlsx” 中的“英文命令名”）对PLC2进行控制，进而控制PLC1，从而达到远程控制堆取料机的功能。  **示例1：**  {  “QUERY\_SYSTEM”: “MC”,  “DATA\_TYPE”: 6,  “QUERY\_TYPE”: 2, // 进入命令模式，启用“COMMAND\_NAME”和“COMMAND\_TYPE”属性  “COMMAND\_NAME”: "REVERSE\_LEFT", //命令名为“取料回转左转”  “COMMAND\_TYPE”: 0 //命令内容为“False”  }  **示例2：**  {  “QUERY\_SYSTEM”: “MC”,  “DATA\_TYPE”: 6,  “QUERY\_TYPE”: 2 ,  “COMMAND\_NAME”: "REVERSE\_LEFT", //命令名为“取料回转左转”  “COMMAND\_TYPE”: 1 //命令内容为“True”  }  **示例3：**  {  “QUERY\_SYSTEM”: “MC”,  “DATA\_TYPE”: 6,  “QUERY\_TYPE”: 2, // 进入命令模式，启用“COMMAND\_NAME”和“COMMAND\_TYPE”属性  “COMMAND\_NAME”: " STACKING\_START ", //命令名为“堆料胶带启动”  “COMMAND\_TYPE”: 1 //命令内容为“True”  }  **示例4：**  {  “QUERY\_SYSTEM”: “MC”,  “DATA\_TYPE”: 6,  “QUERY\_TYPE”: 2, // 进入命令模式，启用“COMMAND\_NAME”和“COMMAND\_TYPE”属性  “COMMAND\_NAME”: " PICKUPING\_START\_ANGLE ", //命令名为“堆料胶带启动”  “COMMAND\_TYPE”: 60 //命令内容为60度  }  远程驱动子系统（编码：RC）、综合运控子系统（MC）、任务规划子系统（PC）、运动定位子系统（LOC）、安全防护子系统（CA）、三维扫描子系统（SCAN）、流量检测子系统（FD）、系统管理子系统（SM）和视频监测子系统（VM）  远程驱动系统的IP地址和端口：可配置  **沈阳现场服务器IP**：待定  **端口号**：11000 | | |

* 1. 远程驱动向客户端返回的报文格式

如表2-2所示，当客户端发送的报文为“6，1”（即数据类型-6，查询类型-1）时，远程驱动通过套接字返回给外部子系统的JSON字符串报文格式如下。

表2-2 远程驱动通信---服务器返回

|  |  |  |
| --- | --- | --- |
| **远程驱动子系统通过TCP连接返回结果** | | |
| **属性名** | **数据类型** | **备注** |
| TIME | DateTime | 查询时间 |
| PLC的所有变量  （属性） | PLC机上变量映射到C#语言中的各种变量 | 由于数据量过大，不便在此展示  详情请结合性地参考” PLC1变量表.xlsx”、” PLC2变量表.xlsx”和本文档结尾处的[主要实现类](#主要实现) |
| **结果示例1：**  //PLC的一帧数据  {    }  注：由于其他子系统无法直观的看到命令对远程驱动系统的影响，目前测试版中对远程驱动系统使用命令会通过套接字返回一个中文字符串说明命令的成功传递。  \*出于时间有限，目前能够返回字符串的命令仅包括  SUPPLYPOWER\_ON  SUPPLYPOWER\_OFF  CONTROLPOWER\_ON  CONTROLPOWER\_OFF  已足够满足子系统进行通信测试，后续如有需要可提供远程驱动系统最新程序，届时可进行适配完全的测试。 | | |

* 1. 远程驱动向客户端返回的报文格式

如表2-3所示，表中“**命令名**”即通信接口中传递的“COMMAND\_NAME”属性。

|  |  |  |
| --- | --- | --- |
| **远程驱动子系统**操作命令 | | |
| 命令名 | 中文名 | 备注 |
| SUPPLYPOWER\_ON | 使动力电源合闸 | 脉冲 |
| SUPPLYPOWER\_OFF | 使动力电源分闸 | 脉冲 |
| CONTROLPOWER\_ON | 使控制电源合闸 | 脉冲 |
| CONTROLPOWER\_OFF | 使控制电源分闸 | 脉冲 |
| LIGHTPOWER\_ON | 使远程照明合闸 | 脉冲 |
| LIGHTPOWER\_OFF | 使远程照明分闸 | 脉冲 |
| ROTATE\_LEFT | 堆料回转左转 | 脉冲 |
| ROTATE\_RIGHT | 堆料回转右转 | 脉冲 |
| ROTATE\_STOP | 堆料回转停止 | 脉冲 |
| ROTATE\_MODE | 堆料回转速度选择（0：慢速，1：快速） | 已弃用 |
| STACKING\_START | 堆料皮带启动 | 脉冲 |
| STACKING\_STOP | 堆料皮带停止 | 脉冲 |
| REVERSE\_LEFT | 取料回转左转 | 脉冲 |
| REVERSE\_RIGHT | 取料回转右转 | 脉冲 |
| REVERSE\_STOP | 取料回转停止 | 脉冲 |
| REVERSE\_MODE | 取料回转速度选择（0：慢速，1：快速） | 已弃用 |
| ELEVATE\_UP | 取料俯仰上仰 | 脉冲 |
| ELEVATE\_DOWN | 取料俯仰下俯 | 脉冲 |
| ELEVATE\_STOP | 取料俯仰停止 | 脉冲 |
| ELEVATE\_MODE | 取料俯仰速度选择（0：慢速，1：快速） | 已弃用 |
| SCRAPER\_CONTROL | 手动刮板启动 | 脉冲 |
| SCRAPER\_STOP\_BUTTON | 手动刮板停止 | 脉冲 |
| STARTUP\_ALARM | 启车打铃命令  （启车报警） | 脉冲 |
| FAULT\_RESET | 远程故障复位命令 | 脉冲 |
| EMERGENCY\_STOP | 远程急停命令 | 置位/复位切换 |
| BYPASS\_BUTTON | 远程旁路命令 | 按下置位，1分钟后PLC自动复位 |
| SYSTEM\_UNLOCK | 与系统连锁解锁  （仅接收1） | 两个为一组  互斥的属性 |
| SYSTEM\_LOCK | 与系统连锁连锁  （仅接收1） |
| STACKING\_MODE\_HM | 手动堆料模式选择命令（仅接收1） | 两个为一组  互斥的属性 |
| STACKING\_MODE\_AUTO | 自动堆料模式选择命令（仅接收1） |
| PICKUPING\_MODE\_HM | 手动取料模式选择命令（仅接收1） | 两个为一组  互斥的属性 |
| PICKUPING\_MODE\_AUTO | 自动取料模式选择命令（仅接收1） |
| STACKING\_MID\_LUB\_BUTTON | 堆料中部润滑按钮 | 脉冲 |
| STACKING\_MID\_STOP\_BUTTON | 堆料中部润滑停止按钮 | 脉冲 |
| STACKING\_UP\_LUB\_BUTTON | 堆料上部润滑按钮 | 脉冲 |
| STACKING\_UP\_STOP\_BUTTON | 堆料上部润滑停止按钮 | 脉冲 |
| PICKUPING\_WR\_LUB\_BUTTON | 取料钢丝绳润滑按钮 | 脉冲 |
| PICKUPING\_WR\_STOP\_BUTTON | 取料钢丝绳润滑停止按钮 | 脉冲 |
| PICKUPING\_RO\_LUB\_BUTTON | 取料回转润滑按钮 | 脉冲 |
| PICKUPING\_RO\_STOP\_BUTTON | 取料回转润滑停止按钮 | 脉冲 |
| SCRAPER\_LUB\_BUTTON | 刮板润滑按钮 | 脉冲 |
| SCRAPER\_LUBSTOP\_BUTTON | 刮板润滑停止按钮 | 脉冲 |
| SCRAPER\_FR\_LUB\_BUTTON | 刮板框架润滑按钮 | 脉冲 |
| SCRAPER\_FR\_STOP\_BUTTON | 刮板框架润滑停止按钮 | 脉冲 |
| PICKUPING\_BE\_LUB\_BUTTON | 取料轴承润滑按钮 | 脉冲 |
| PICKUPING\_BE\_STOP\_BUTTON | 取料轴承润滑停止按钮 | 脉冲 |
| SCREEN\_TM\_START\_BUTTON | 触摸屏张紧手动启动按钮 | 脉冲 |
| SCREEN\_TM\_STOP\_BUTTON | 触摸屏张紧手动停止按钮 | 脉冲 |
| AUTO\_STACKING\_START | 自动堆料启动HMI | 脉冲 |
| AUTO\_STACKING\_PAUSE | 自动堆料暂停HMI | 置位/复位切换 |
| AUTO\_STACKING\_STOP | 自动堆料停止HMI | 脉冲 |
| AUTO\_PICKUPING\_START | 自动取料启动HMI | 脉冲 |
| AUTO\_PICKUPING\_PAUSE | 自动取料暂停HMI | 置位/复位切换 |
| AUTO\_PICKUPING\_STOP | 自动取料停止HMI | 脉冲 |
| AUTO\_JOBPOINT\_CONFIRM | 确认当前作业点HMI | 脉冲 |
| AUTO\_SCRAPING\_CONFIRM | 刮平确认按钮 | 置位/复位切换 |
| PICKUPING\_START\_ANGLE | 自动取料起始角度 | 参数设置 |
| PICKUPING\_STOP\_ANGLE | 自动取料终止角度 | 参数设置 |
| STACKING\_START\_ANGLE | 自动堆料起始角度 | 参数设置 |
| STACKING\_STOP\_ANGLE | 自动堆料终止角度 | 参数设置 |
| AUTO\_PICKUPING\_CONFIRM | 取料启动二次确认后启动 | 脉冲 |
| AUTO\_PICKUPING\_STOP\_CONFIRM | 取料结束二次确认后停止 | 脉冲 |
| AUTO\_STACKING\_CONFIRM | 堆料启动二次确认 | 脉冲 |
| AUTO\_STACKING\_STOP\_CONFIRM | 堆料结束二次确认 | 脉冲 |
| STACKING\_HEIGHT\_SET | 自动堆料高度设定 | 参数设置 |
| MANUAL\_ROTATION | 自动取料手动回转换向 | 脉冲 |
| PICKUPING\_HEIGHT\_SET | 自动取料刮板吃料深度设定 | 参数设置 |
| ROTATION\_ENTRY | 自动取料回转切入点 | 参数设置 |
| FEEDER\_MAINTENANCE | 取料机构检修按钮（1：检修， 0：正常） | 置位/复位切换 |
| STACKER\_MAINTENANCE | 堆料机构检修按钮（1：检修， 0：正常） | 置位/复位切换 |
| STACKER\_SPEED\_SET\_BUTTON | 手动设定堆料回转速度按钮 | 置位/复位切换 |
| ROTATION\_SPEED\_SET\_BUTTON | 手动设定取料回转速度按钮 | 置位/复位切换 |
| PITCH\_SPEED\_SET\_BUTTON | 手动设定取料俯仰速度按钮 | 置位/复位切换 |
| STACKER\_SPEED\_SET | 手动设定堆料回转速度 | 参数设置 |
| ROTATION\_SPEED\_SET | 手动设定取料回转速度 | 参数设置 |
| PITCH\_SPEED\_SET | 手动设定取料俯仰速度 | 参数设置 |
| AUTO\_MAX\_CURRENT\_SET | 自动取料刮板超载电流设置  （暂停回转临界值） | 参数设置 |
| AUTO\_NORMAL\_CURRENT\_SET | 自动取料刮板正常电流设置  （启动回转最大值） | 参数设置 |
| FEEDER\_ENCODE\_ANGLE | 取料编码器角度手动校准预设值 | 参数设置 |
| STACKER\_ENCODE\_ANGLE | 堆料编码器角度手动校准预设值 | 参数设置 |
| FEEDER\_ENCODE\_ENABLE\_BUTTON | 取料编码器手动预置值使能按钮 | 按下置位，10秒后PLC自动复位 |
| STACKER\_ENCODE\_ENABLE\_BUTTON | 堆料编码器手动预置值使能按钮 | 按下置位，10秒后PLC自动复位 |
| FEEDER\_ENCODE\_ALIGN\_BUTTON | 取料编码器手动校准按钮 | 按下置位，1秒后PLC自动复位 |
| STACKER\_ENCODE\_ALIGN\_BUTTON | 堆料编码器手动校准按钮 | 按下置位，1秒后PLC自动复位 |
| LEFT\_LOWER\_PREVENTION | 左侧料位计下俯防撞投入/切除（0：投入，1：切除） | 置位/复位切换 |
| RIGHT\_LOWER\_PREVENTION | 右侧料位计下俯防撞投入/切除（0：投入，1：切除） | 置位/复位切换 |
| LEFT\_ROTATE\_PREVENTION | 左侧料位计回转防撞投入/切除（0：投入，1：切除） | 置位/复位切换 |
| RIGHT\_ROTATE\_PREVENTION | 右侧料位计回转防撞投入/切除（0：投入，1：切除） | 置位/复位切换 |
| SET\_SCRAPER\_MOTOR | 手动设定刮板电机同时启动按钮  （1：同时启动，0：轮流启动） | 置位/复位切换 |

表2-3 远程驱动命令接口

1. 主要实现代码
   1. 实现系统命令的基本类

//远程驱动命令类

public class SystemCommand

{

public string QUERY\_SYSTEM { get; set; }

//正在控制/查询的子系统的ID

public int DATA\_TYPE { get; set; }

//数据类型：1-流量，2-运动参数，3-三维料堆，4-安全信息，5-任务规划信息，6-远程驱动系统交互

public int QUERY\_TYPE { get; set; }

//命令类型：0-提供给本地服务器端以初始化的数据，1-PLC的一帧数据，2-命令模式

public string COMMAND\_NAME { get; set; }

//命令名：该名字即为“基本指令表.xlsx”中的“英文指令名”

public int COMMAND\_TYPE { get; set; }

//命令内容：0-False，1-True

public float COMMAND\_DATA { get; set; }

//数据内容：度数，深度

}

* 1. 实现PLC完整变量的的基本类

public class SystemVariables

{

public DateTime TimeStamp { get; set; }

// ID1

public ushort LargeCarElectricCurrent { get; set; }// 1

public ushort RotaryElectricCurrent { get; set; }

public ushort SuspensionBeltElectricCurrent { get; set; }

public ushort BucketWheelElectricCurrent { get; set; }

public ushort LargeCarTravelDistance { get; set; }

public ushort RotaryAngle { get; set; }

public ushort VariableAmplitudeAngle { get; set; }

public bool VacuumCircuitBreakerClosed { get; set; }

public bool LowVoltageControlPowerClosed { get; set; }

public bool LowVoltagePowerClosed { get; set; }

public bool LargeCarCentralizedLubricationLowOilLevel { get; set; }

public bool LargeCarCentralizedLubricationOilBlockage { get; set; }

public bool AllowBucketWheelMaterialLoading { get; set; }

public bool AllowBucketWheelMaterialUnloading { get; set; }

public bool LargeCarMainCircuitBreaker { get; set; }

public bool LargeCarMotorCircuitBreaker { get; set; }

public bool LargeCarBrakeCircuitBreaker { get; set; }

public bool LargeCarFrequencyConverterContact { get; set; }

public bool LargeCarBrakeContact { get; set; }

public bool LargeCarFrequencyConverterFault { get; set; }

public bool LargeCarBrakeResistorOverheatSwitch { get; set; }

public bool LargeCarForwardLimit { get; set; }

public bool LargeCarReverseLimit { get; set; }

public bool LargeCarForwardExtremeLimit { get; set; }

public bool LargeCarReverseExtremeLimit { get; set; }

public bool CableReelMainCircuitBreaker { get; set; }

public bool CableReelMotorOverload { get; set; }

public bool PowerReelContact { get; set; }

public bool ReelOverTensionLimit1 { get; set; }

public bool ReelOverLooseLimit1 { get; set; }

public bool VibrationMotorMainCircuitBreaker { get; set; }

public bool RotaryBrakeOverload { get; set; }

public bool RotaryMainCircuitBreaker { get; set; }

public bool ClampMotorOverload { get; set; }

public bool LeftAnchorLiftLimit { get; set; }

public bool RightAnchorLiftLimit { get; set; }

public bool LeftClampRelaxLimit { get; set; }

public bool RightClampRelaxLimit { get; set; }

public bool BucketWheelMotorMainCircuitBreaker { get; set; }

public bool RotaryFanContact { get; set; }

public bool RotaryBrakeContact { get; set; }

public bool RotaryFrequencyConverterContact { get; set; }

public bool SystemInterlockSwitch { get; set; }

public bool VariableAmplitudeMainCircuitBreaker { get; set; }

public bool VariableAmplitudeMotorOverload { get; set; }

public bool VariableAmplitudeMotorContact { get; set; }

public bool VariableAmplitudeHeaterContact { get; set; }

public bool VariableAmplitudeFanContact { get; set; }

public bool SuspensionBeltMainCircuitBreaker { get; set; }

public bool SuspensionBeltMotorOverload { get; set; }

public bool SuspensionBeltMaterialLoadingRunningContact { get; set; }

public bool SuspensionBeltMaterialUnloadingRunningContact { get; set; }

public bool SuspensionBeltBrakeContact { get; set; }

public bool CentralMaterialDustDetectionSwitch { get; set; }

public bool DiversionBaffleMainCircuitBreaker { get; set; }

public bool VibrationMotorOverload { get; set; }

public bool ClampMainCircuitBreaker { get; set; }

public bool BucketWheelMotorOverload { get; set; }

public bool BucketWheelLubricationPumpContact { get; set; }

public bool RotaryLeftTurnLimit { get; set; }

public bool RotaryRightTurnLimit { get; set; }

public bool RotaryLeftTurnExtremeLimit { get; set; }

public bool RotaryRightTurnExtremeLimit { get; set; }

public bool RotaryLeftTurnForbiddenZoneLimit { get; set; }

public bool RotaryRightTurnForbiddenZoneLimit { get; set; }

public bool RotaryZeroPositionLimit { get; set; }

public bool BucketWheelOverTorqueSwitch { get; set; }

public bool BucketWheelForcedLubricationFlowSwitch { get; set; }

public bool VariableAmplitudeUpperLimit { get; set; }

public bool VariableAmplitudeLowerLimit { get; set; }

public bool VariableAmplitudeUpperExtremeLimit { get; set; }

public bool VariableAmplitudeLowerExtremeLimit { get; set; }

public bool VariableAmplitudeLowerForbiddenZoneLimit { get; set; }

public bool CabinFrontBalanceLimit { get; set; }

public bool VariableAmplitudeOilHeaterStartup { get; set; }

public bool VariableAmplitudeOilHeaterStop { get; set; }

public bool VariableAmplitudeFanStop { get; set; }

public bool VariableAmplitudeFanStartup { get; set; }

public bool VariableAmplitudeOilLevelLowSignal { get; set; }

public bool VariableAmplitudePumpStationOverheatAlarm { get; set; }

public bool VariableAmplitudeOilLevelVeryLowSignal { get; set; }

public bool RotaryCentralizedLubricationLowOilLevelFault { get; set; }

public bool LargeCarFrequencyConverterPowerOn { get; set; }

public bool LargeCarBrakeOpen { get; set; }

public bool LargeCarFrequencyConverterFaultReset { get; set; }

public bool LargeCarReverseCommand { get; set; }

public bool LargeCarHighLowSpeedSelection { get; set; }

public bool BucketWheelMaterialLoadingRunning { get; set; }

public bool BucketWheelFault { get; set; }

public bool SuspensionBeltFirstLevelDeviationSwitch { get; set; }

public bool SuspensionBeltSecondLevelDeviationSwitch { get; set; }

public bool SuspensionBeltEmergencyStopSwitch { get; set; }

public bool SuspensionBeltSpeedDetectionSwitch { get; set; }

public bool SuspensionBeltMaterialFlowDetectionSwitch { get; set; }

public bool SuspensionBeltLongitudinalTearSwitch { get; set; }

public bool RotaryCentralizedLubricationOilBlockageFault { get; set; }

public bool LargeCarForwardCommand { get; set; }

public bool VariableAmplitudeOilPumpMotorRunning { get; set; }

public bool VariableAmplitudeOilHeaterRunning { get; set; }

public bool VariableAmplitudeFanRunning { get; set; }

public bool LeftClampPumpRunning { get; set; }

public bool RightClampPumpRunning { get; set; }

public bool LeftClampElectromagneticValveOpen { get; set; }

public bool RightClampElectromagneticValveOpen { get; set; }

public bool RotaryFrequencyConverterPowerOn { get; set; }

public bool RotaryBrakeOpen { get; set; }

public bool RotaryLeftTurnCommand { get; set; }

public bool RotaryRightTurnCommand { get; set; }

public bool RotaryFrequencyConverterFaultReset { get; set; }

public bool RotarySpeedGivenSelection { get; set; }

public bool RotaryFanRunning { get; set; }

public bool VariableAmplitudeLowerElectromagneticValveOpen { get; set; }

public ushort RiseCount { get; set; }

public bool SingleAction { get; set; }

public bool LinkAction { get; set; }

public bool Automatic { get; set; }

public bool LargeCarFault { get; set; }

public bool LargeCarForwardLimiting { get; set; }// 118

public bool LargeCarReverseLimiting { get; set; }

public bool AnchorClamp { get; set; }

public bool LargeCarForward { get; set; }

public bool LargeCarReverse { get; set; }

public bool RotaryFault { get; set; }

public bool RotaryLeftTurnLimiting { get; set; }

public bool RotaryRightTurnLimiting { get; set; }

public bool RotaryLeftTurn { get; set; }

public bool RotaryRightTurn { get; set; }

public bool VariableAmplitudeFault { get; set; }

public bool VariableAmplitudeUpperLimiting { get; set; }

public bool VariableAmplitudeLowerLimiting { get; set; }

public bool VariableAmplitudeUpper { get; set; }

public bool VariableAmplitudeLower { get; set; }

public bool SuspensionBeltFault { get; set; }

public bool SuspensionBeltManualLoading { get; set; }

public bool SuspensionBeltManualUnloading { get; set; }

public bool SuspensionBeltLinkLoading { get; set; }

public bool SuspensionBeltLinkUnloading { get; set; }

public bool BucketWheelFaulting { get; set; }

public bool BucketWheelSingleStartup { get; set; }

public bool BucketWheelLinkStartup { get; set; }

public bool ClampFault { get; set; }

public bool ClampRelax { get; set; }

public bool CentralBaffleFault { get; set; }

public bool TailCarBeltFault { get; set; }

public bool MaterialLevelMeter { get; set; }

public bool ManualIntervention { get; set; }

public bool InterventionRelease { get; set; }

public bool SuspensionBeltLoadingButton { get; set; }

public bool SuspensionBeltStopButton { get; set; }

public bool SuspensionBeltUnloadingButton { get; set; }

public bool BucketWheelStartupButton { get; set; }

public bool BucketWheelStopButton { get; set; }

public ushort RotaryCount { get; set; }

public bool LeftAnchorNotLifted { get; set; }

public bool RightAnchorNotLifted { get; set; }

public bool ClampNotRelaxed { get; set; }

public bool LargeCarBrakeNotOpen { get; set; }

public bool LargeCarFrequencyConverterNotPowered { get; set; }

public bool LargeCarBrakeContactAuxiliaryFault { get; set; }

public bool LargeCarFrequencyConverterContactAuxiliaryFault { get; set; }

public bool RotaryFrequencyConverterNotPowered { get; set; }

public bool RotaryFrequencyConverterContactAuxiliaryFault { get; set; }

public bool RotaryBrakeContactAuxiliaryFault { get; set; }

public bool VariableAmplitudeOilPumpMotorNotRunning { get; set; }

public bool SuspensionBeltBrakeContactAuxiliaryFault { get; set; }

public bool SuspensionBeltLoadingContactAuxiliaryFault { get; set; }

public bool SuspensionBeltUnloadingContactAuxiliaryFault { get; set; }

public bool SuspensionBeltFirstLevelDeviation { get; set; }

public bool BucketWheelLubricationPumpContactAuxiliaryFault { get; set; }

public bool WindproofSystemCableLimit1 { get; set; }

public bool RotaryFrequencyConverterFault { get; set; }

public bool RotaryFanOverload { get; set; }

public bool RotaryBrakeResistorOverheatSwitch { get; set; }

public bool DiversionBaffleMotorOverload { get; set; }

public bool TailCarFirstLevelDeviationSwitch { get; set; }

public bool TailCarSecondLevelDeviationSwitch { get; set; }

public bool TailCarEmergencyStopSwitch { get; set; }

public bool RotaryLeftTurnForbiddenLimit { get; set; }

public bool RotaryRightTurnForbiddenLimit { get; set; }

public bool BucketWheelMaterialUnloadingRunning { get; set; }

public bool VariableAmplitudeUpperElectromagneticValveOpen { get; set; }

public bool SuspensionBeltLoadingRunning { get; set; }

public bool SuspensionBeltUnloadingRunning { get; set; }

public bool SuspensionBeltBrakeOpen { get; set; }

public bool BucketWheelMotorRunning { get; set; }

public bool BucketWheelLubricationPumpRunning { get; set; }

public bool DiversionBaffleDownRunning { get; set; }

public bool DiversionBaffleUpRunning { get; set; }

public bool VibrationMotorRunning { get; set; }

public bool VariableAmplitudeBoostValveOpen { get; set; }

public bool BaffleDownLimit { get; set; }

public bool BaffleUpLimit { get; set; }

public bool RotaryOverTorque { get; set; }

public bool VariableAmplitudeOilPumpMotorContactFault { get; set; }

public bool BucketWheelMotorContactAuxiliaryFault { get; set; }

public bool TailCarOilPumpMotorContactAuxiliaryFault { get; set; }

public bool VibrationMotorFault { get; set; }

public bool ReelEmptySwitch { get; set; }

public bool WindproofSystemCableNotOpen { get; set; }

public bool LargeCarLimitAction { get; set; }// 200

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public bool RotaryLimitAction { get; set; }

public bool VariableAmplitudeLimitAction { get; set; }

public bool ForbiddenZoneLimitAction { get; set; }

public bool RotaryCrashSwitchAction { get; set; }

public bool LargeCarCentralizedLubricationLowOilLevelAlarm { get; set; }

public bool LargeCarCentralizedLubricationOilBlockageAlarm { get; set; }

public bool RotaryCentralizedLubricationLowOilLevelAlarm { get; set; }

public bool RotaryCentralizedLubricationOilBlockageAlarm { get; set; }

public bool StrongWindPreAlarm { get; set; }

public bool BucketWheelCentralizedLubricationLowOilLevelAlarm { get; set; }

public bool BucketWheelCentralizedLubricationOilBlockageAlarm { get; set; }

public bool ManualGuideSlotLiftButton { get; set; }

public bool ManualBucketWheelSlotStopButton { get; set; }

public bool ManualBucketWheelSlotDownButton { get; set; }

public bool CentralBaffleManualLiftButton { get; set; }

public bool CentralBaffleManualStopButton { get; set; }

public bool CentralBaffleManualDownButton { get; set; }

public bool VariableAmplitudeOilHeaterManualStartupButton { get; set; }

public bool VariableAmplitudeOilHeaterManualStopButton { get; set; }

public bool VariableAmplitudeFanManualStartupButton { get; set; }

public bool VariableAmplitudeFanManualStopButton { get; set; }

public bool ElectricRoomEmergencyStopButtonAction { get; set; }

public bool CabinEmergencyStopButtonAction { get; set; }

public bool EmergencyStopRelayNot { get; set; }

public bool TransformerOverheatAlarm { get; set; }

public bool ElectricRoomPLCModulePowerFault { get; set; }

public bool CabinPLCModulePowerFault { get; set; }

public bool ElectricRoomFireAlarm { get; set; }

public bool CabinFireAlarm { get; set; }

public bool SuspensionBeltEmergencyStop { get; set; }

public bool TailCarBeltEmergencyStopSwitch { get; set; }

public bool LargeCarMainCircuitBreakerFault { get; set; }

public bool LargeCarMotorCircuitBreakerFault { get; set; }

public bool LargeCarBrakeCircuitBreakerFault { get; set; }

public bool Spare1 { get; set; }

public bool CarFrequencyConverterFault { get; set; }

public bool LargeCarBrakeResistorOverheatJump { get; set; }

public bool CableReelMainCircuitBreakerFault { get; set; }

public bool CableReelMotorOverloading { get; set; }

public bool PowerReelCableOverLooseAlarm { get; set; }

public bool PowerReelCableOverTightAlarm { get; set; }

public bool PowerReelFullDiskAlarm { get; set; }

public bool PowerReelEmptyDiskAlarm { get; set; }

public bool LargeCarOperationHandleFault { get; set; }

public bool RotaryMainCircuitBreakerFault { get; set; }

public bool RotaryBrakeOverloadAlarm { get; set; }

public bool RotaryFanOverloadAlarm { get; set; }

public bool RotaryFrequencyConverterFaulting { get; set; }

public bool RotaryBrakeResistorOverheatSwitching { get; set; }

public bool RotaryOverTorqueSwitch { get; set; }

public bool ReversalHandleFault { get; set; }

public bool LinkedBucketWheelNotRunning { get; set; }

public bool VariableFrequencyMainCircuitBreakerFault { get; set; }

public bool VariableFrequencyMotorOverload { get; set; }

public bool VariableFrequencyPumpClogged { get; set; }

public bool VariableFrequencyPumpStationHighTemperatureAlarm { get; set; }

public bool VariableFrequencyOilTankLowLevelAlarm { get; set; }

public bool Spare2 { get; set; }

public bool VariableFrequencyHandleFault { get; set; }

public bool SuspendedBeltCircuitBreakerFault { get; set; }

public bool SuspendedBeltMotorOverload { get; set; }

public bool SuspendedBeltSecondLevelDeviationSwitch { get; set; }

public bool SuspendedBeltEmergencyStop { get; set; }

public bool SuspendedBeltSlip { get; set; }

public bool SuspendedBeltLongitudinalTearSwitch { get; set; }

public bool CentralHopperCloggedDetectionSwitch { get; set; }

public bool StackingSwitchFault { get; set; }

public bool CentralControlRoomNoStackingCommand { get; set; }

public bool BucketWheelMotorMainCircuitBreakerFault { get; set; }

public bool BucketWheelMotorOverloading { get; set; }

public bool BucketWheelOverTorqueSwitching { get; set; }

public bool BucketWheelTemperatureUpperLimitAlarm { get; set; }

public bool ClampingDeviceMainCircuitBreakerFault { get; set; }

public bool ClampingDeviceMotorOverload { get; set; }

public bool LeftClampingDeviceTimeout { get; set; }

public bool RightClampingDeviceTimeout { get; set; }

public bool StrongWindAlarm { get; set; }

public bool DryFogSystemLowAirPressure { get; set; }

public bool DryFogSystemLowWaterPressure { get; set; }

public bool DryFogSystemFilterClogged { get; set; }

public bool DryFogSystemWaterTankLowLevel { get; set; }

public bool DiversionPlateCircuitBreakerFault { get; set; }

public bool DiversionPlateMotorOverload { get; set; }

public bool DiversionPlateTimeout { get; set; }

public bool CentralControlRoomNoStackingOrDiversionCommand { get; set; }

public bool BucketWheelFeederCircuitBreakerFault { get; set; }

public bool BucketWheelFeederMotorOverload { get; set; }

public bool BucketWheelFeederTimeout { get; set; }

public bool CentralControlRoomNoStackingUnloadingCommand { get; set; }

public bool TailCarBeltFirstLevelDeviation { get; set; }

public bool TailCarBeltSecondLevelDeviation { get; set; }

public bool TailCarBeltLongitudinalTear { get; set; }

public bool Spare3 { get; set; }//293

public bool VibrationMotorCircuitBreakerFault { get; set; }

public bool VibrationMotorOverloading { get; set; }

public bool DriverRoomEmergencyStopButton { get; set; }

public bool ElectricalRoomEmergencyStopButton { get; set; }

public bool EmergencyStopRelay { get; set; }

public bool TwoMachineCollisionAlarm { get; set; }

public bool RollerFullDiskSwitch { get; set; }

public bool RollerMiddleSwitch { get; set; }

public bool BucketWheelMotorContactor { get; set; }

public bool VariableFrequencyOilBlockageSignal { get; set; }

public bool VariableFrequencyOverpressureStop { get; set; }

public bool VariableFrequencyPumpStationOverpressureAlarm { get; set; }

public bool PowerRollerRunning { get; set; }

public bool DriverRoomLevelingContactor { get; set; }

public bool DryFogSystemIsLowAirPressure { get; set; }

public bool DryFogSystemIsLowWaterPressure { get; set; }

public bool WaterTankLowLevelSwitch { get; set; }

public bool DriverRoomRiseValve { get; set; }

public bool DriverRoomDescentValve { get; set; }

public bool PowerCableRollerNotRunning { get; set; }

public bool TailCarDrivenRollerBearingTemperatureUpperLimitAlarm { get; set; }

public bool TailCarDrivenRollerBearingTemperatureLowerLimitAlarm { get; set; }

public bool AllowBucketWheelDiversion { get; set; }

public bool WindproofSystemCableLimit2 { get; set; }

public bool WindproofSystemCableLimit3 { get; set; }

public bool RollerOverTightLimit2 { get; set; }

public bool RollerOverLooseLimit2 { get; set; }

public bool DryFogSystemFilterIsClogged { get; set; }

public bool DryFogSystemAutoRun { get; set; }

public bool DryFogSystemManualRun { get; set; }

public bool DryFogSystemSprayStatus { get; set; }

public bool DryFogSystemHeatRun { get; set; }

public bool BucketWheelSlotMainCircuitBreaker { get; set; }

public bool BucketWheelSlotMotorOverload { get; set; }

public bool TailCarBeltLongitudinalTearing { get; set; }

public bool ReversalBrakeRelease { get; set; }

public bool BucketWheelSlotLiftLimit { get; set; }

public bool BucketWheelSlotLowerLimit { get; set; }

public bool DiversionPlateLimit { get; set; }

public bool SuspendedBeltBrakeRelease { get; set; }

public bool BrokenBeltCaptureAlarm { get; set; }

public bool BucketWheelCentralizedLubricationLowOilLevel { get; set; }

public bool BucketWheelCentralizedLubricationClogged { get; set; }

public bool DriverRoomRearBalanceLimit { get; set; }

public bool BucketWheelDiversionRunning { get; set; }

public bool DriverRoomLevelingPumpRunning { get; set; }

public bool BucketWheelSlotLift { get; set; }

public bool BucketWheelSlotLower { get; set; }

public bool RemoteEmergencyStop { get; set; }

public ushort DiversionPlateAngle { get; set; }

public bool DryFogDustSuppressionStackingRunning { get; set; }

public bool DryFogDustSuppressionReclaimingRunning { get; set; }

public bool DryFogDustSuppressionDiversionRunning { get; set; }

public bool DryFogDustSuppressionRemoteStartRunning { get; set; }

public bool DryFogDustSuppressionRemoteStopRunning { get; set; }// 348

public bool TailCarDrivenRollerBearingUpperLimitAlarm { get; set; }

public bool TailCarDrivenRollerBearingLowerLimitAlarm { get; set; }

public bool UnmannedEmergencyStop { get; set; }

public bool RemoteEmergencyStoping { get; set; }

public bool LargeVehicleMotor1OvertemperatureAlarm { get; set; }

public bool LargeVehicleMotor2OvertemperatureAlarm { get; set; }

public bool LargeVehicleMotor3OvertemperatureAlarm { get; set; }

public bool LargeVehicleMotor4OvertemperatureAlarm { get; set; }

public bool LargeVehicleMotor5OvertemperatureAlarm { get; set; }

public bool LargeVehicleMotor6OvertemperatureAlarm { get; set; }

public bool WalkingReducerBearingTemperatureUpperLimitAlarm { get; set; }

public bool WalkingReducerBearingTemperatureLowerLimitAlarm { get; set; }

public bool WalkingReducerOilTemperatureUpperLimitAlarm { get; set; }

public bool WalkingReducerOilTemperatureLowerLimitAlarm { get; set; }

public bool ReversalTemperatureUpperLimitAlarm { get; set; }

public bool ReversalTemperatureLowerLimitAlarm { get; set; }

public bool BrokenBeltCaptureAlarming { get; set; }

public bool SuspendedBeltTemperatureUpperLimitAlarm { get; set; }

public bool SuspendedBeltTemperatureLowerLimitAlarm { get; set; }

public bool SuspendedBeltRollerBearingTemperatureUpperLimitAlarm { get; set; }

public bool SuspendedBeltRollerBearingTemperatureLowerLimitAlarm { get; set; }

public bool BucketWheelTemperatureLowerLimitAlarm { get; set; }

public bool CableRollerContactorAuxiliaryContactFault { get; set; }

public bool DriverRoomBalancePumpMotorNotRunning { get; set; }

public bool DriverRoomBalancePumpMotorAuxiliaryContactFault { get; set; }

public bool Remote { get; set; }

public ushort TwoMachineDistance { get; set; }

public ushort DriverRoomAngle { get; set; }

public bool DriverRoomRiseButton { get; set; }

public bool DriverRoomDescentButton { get; set; }

}

}