CR-INTELLIGENT CONVEYOR BELT PROTECTOR

CR MINING SOLUTIONS

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INTRODUCTION: CR-INTELLIGENCE CONTROLLER

The CR-intelligent conveyor belt protector is specifically designed for mining applications. It monitors the belt for any fires or the overheating of the belt. The benefits of this unit is normally to be found with more expensive units. All parts were carefully selected to comply with industrial standards and in some instances, exceeds the standard.

The Screen/PLC is a proven combination since 2005 in the industry, in harsh environments. The Mitsubishi PLC programming that is used, is an industrial standard for more than 30 years.
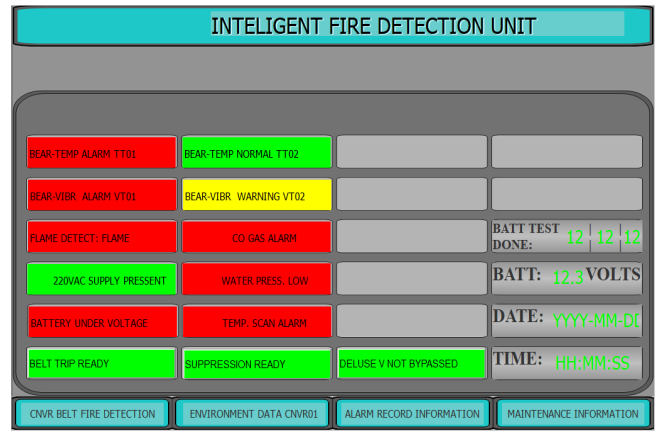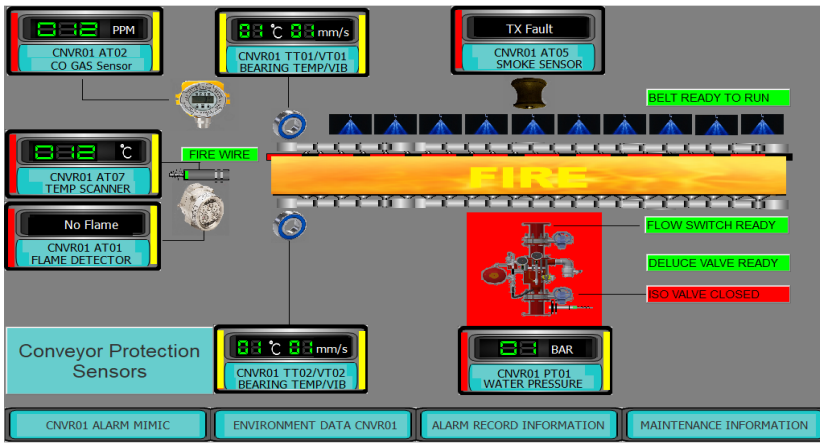
This unit gives maintenance personnel, accurate, identifiable visual information at point of interest. No need to contact the control room for local information. Sensor information can be identified visually on screen by instrument tag number and location. This unique character of this unit separate it from other systems in a cost effective way. Normally, maintenance personnel must first establish which sensor/instrument detected a problem. The latter can take hours to identify which bearing is overheating etc.

It monitors water pressure in real time and maintenance personnel do not have to wait for a fire to establish that the water pressure is insufficient. It is important that all sensors connected to this unit are carefully selected. Only approved sensors are to be used in combination with this unit. This will ensure durability and accuracy.

The unit will prevent long downtime due to the fact that the problem can be identified in the shortest time. This Prevent and Protect unit, can be connect to all known SCADA system for recording historical data and monitoring purposes. Fire prevention is achieved by means of temperature and smoke detectors at critical points in a system.

Fire detection is achieved with the use of flame detectors:
1.   (UV/IR or IR3) which in turn activates a water/foam based sprinkler system for extinguishing the fire.
2.   Belt trip function is also present on the system.

DETECTION OPTIONS

2.1 Flame detection
The Controller caters for the connection of 2 independent flame detectors that can be connected to the system. The unit is capable of utilizing any type of flame detector, although UV/IR or IR3 is the preferred choice. Detection is interpreted by means of monitoring analogue signals and one is thus capable of determining the exact state of the detector. The input type is 4-20mA.

2.2 Smoke or carbon monoxide detection
Either Smoke, Carbon Monoxide or both can be connected to the Controller.

2.3 Temperature scanners
Temperature scanners are also used for surface temperatures.

2.4 Flow / pressure monitoring
Flow/pressure sensor. Accurate local display on screen.

2.5 Bearing temperature
Bearing temperature measurement is achieved by mounting temperature semiconductor sensor on Plummer block assembly and convert to 4 to 20 mA. Configuration of the Controller determines what action is to be taken, should the temperature exceed the prescribed tripping temperature value.
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2.6 Fire suppression activation
A potential free contact is supplied by CR-intelligent controller for activating appropriate suppression agent.
A 'System Test' key switch is available to disable the activation of the suppression agent, whenever a system test is conducted.

2.7 Belt trip activation
As above, an additional potential free contact is available for a conveyor belt trip function. Activation of a 'Belt Trip disable' key switch, is available to disable this output whenever maintenance is conducted.

CR-INTELEGENT CONTROLLERS

Monitor to indicate accurate system status to the operator.

3.1 Power
The 24V DC supply voltage, for controller and sensors.

3.2 Fire
The Controller will indicate 'Fire' condition has been detected and the suppression agent has been discharged. A red light will indicate this condition. This indication stays present until 'Fire' is reset and condition is no longer present.

3.3 Fault
A yellow light is used to indicate a fault condition on any of the pre-configured sensors that are installed and active. This indication is used in conjunction with a siren, to make the operator aware that a fault condition has occurred and will only be cleared once the fault is repaired. The system still remains fully functional on all other sensors and will function normally in event of a 'Fire' Occur on any of the other working sensors.

3.4 Trip
A yellow pilot light is used to indicate, should a condition occur where a belt trip is required. The criteria for a belt trip are pre-configured on the Controller according to the site specific requirement. This condition will remain active as long as the pre-configured settings are exceeded and will clear automatically.

3.5 Maintenance – battery test
This indication will illuminate once a battery test has been initiated.

3.6 Maintenance – system test active
This indication will illuminate once the 'System Test' key switch is activated, indicating that the suppression activation output will not activate the suppression agent. The key can only be removed in normal operation mode, thus ensuring that the operator removes the key after performing system tests. The position of this key switch can be monitored via the SCADA.

3.8 Belt trip key switch
This key is used by the operator to activate or de-activate the belt trip output function and can be removed in any position. The position of this key switch can be monitored via the SCADA

CONFIGURATION

The CR-intelligent Controller is completely configurable to user specifications. This includes the following parameters:

1. Which inputs / sensors are active and monitored by the controller
2. Alarm / activation levels
3. Fire Suppression output selection
4. Belt Trip output selection
5. Which sensor activates what type of output 6. Fault indication monitoring 7. Battery voltage levels.

CR-Mining solutions can consult and assists with the configuration and setup of the sensors.

GENERAL INSTALLATION

5.1 Flame Detector
The flame detector is usually installed at a general belt and pulley area and is also aimed to the area. It is seldom necessary for more than one flame detector, although it is important to remember that wherever the field of view is obstructed at a certain point, analysis have to be done to see whether protection is adequate and if not, to add an additional unit.

5.2 Smoke sensor
Installation should be done downstream in relation to the area being protected in order to be able to detect any kind of smouldering or smoke due to a possible fire.

5.3 Temperature scanner
The temperature scanner is aimed at the general belt surface area on the return from the pulley. Whenever two temperature scanners are installed per area, the second sensor should be aimed at the incoming belt surface. It is also important to take into consideration the angle of the scan area. If a pulley is jammed and belt slip occurs, the belt surface temperature will increase dramatically due to friction. This rise in temperature on the belt surface area will be indicated by the temperature scanner and can be used to activate the suppression agent, in order to cool down the belt temperature and thus preventing a probable fire.
The output from the temperature scanner can also be used to – Initiate a belt trip if needed.

5.4 Bearing sensors

The bearing sensors are supplied with a mounting lug in order to attach the sensor to the plumber block. In most cases the installation can be done at the grease point (nipple) on the bearing housing thus eliminating the need for additional fixtures.

OPERATION

The operation of the CR-intelligent is completely configurable and should be done to the site specific requirement.

MAINTENANCE

Due to the harsh environment where the system and sensors are installed, it is of upmost importance that regular maintenance and system tests are conducted on the system. Recommended intervals are once every six weeks. These tests and maintenance should be conducted by a competent and trained person.

Maintenance and system tests should include but are not limited to the following:

1. Clean and check operation of Flame detectors
2. Clean and check operation of Smoke/Carbon Monoxide sensors
3. Clean and check operation of Temperature scanners
4. Check wiring and operation of bearing sensors
5. Conduct a functional test on each area installation
6. Inspect Battery Management system and backup battery condition

ALARM RECORD

The last 30 alarms is reordered and stored in the HMI page#4 and can only be cleared by a supervisor with the relevant log in code.


Alarm Record List

Alarm Time	No.	Alarm Type	
###	###	###	

No Alarms | Clear Alarm Data

CNVR BELT FIRE DETECTION | ENVIRONMENT DATA CNVR01 | CNVR01 ALARM MIMIC | MAINTENANCE INFORMATION

SPECIFICATIONS

For Suppression delivery

1. 2 x Flame Detectors (UV/IR, IR3) -4-20mA
2. 3 x Smoke / Carbon Monoxide /SO2 sensors - 4-20mA
3. 2 x Temperature Scanners (15:1, 0 – 800 ºC)) - 4-20mA
4. 1 x Pressure transmitter 0-25 Bar) - 4-20mA
5. 1 x Flow switch
6. 2 x Temperature(Bearings sensor) - 4-20mA
7. 2 x Vibration - (Bearings sensor) - 4-20mA
8. Enclosure Rating: IP66
9. Support Protocols: Modbus TCP/IP,
10. RS-485 Serial Port for field network
11. Audible and Visual local alarm indication
12. Output for Suppression Control Valve activation and Belt Trip
13. Local display: Power, Fire, Fault, Belt Trip, Battery Maintenance, System Test
14. Power Reversal Protection
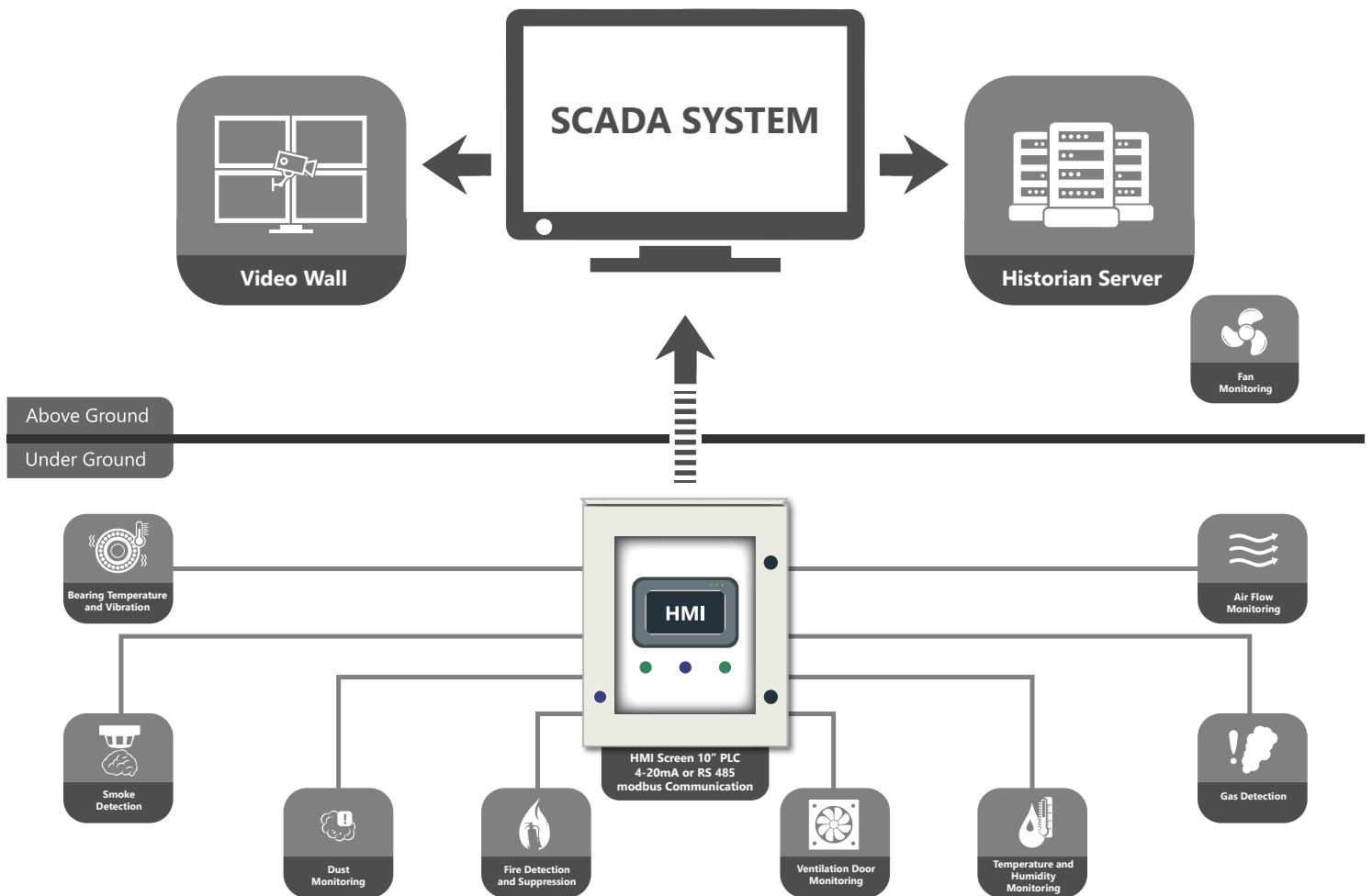
CR-INTELLIGENCE CONTROLLER
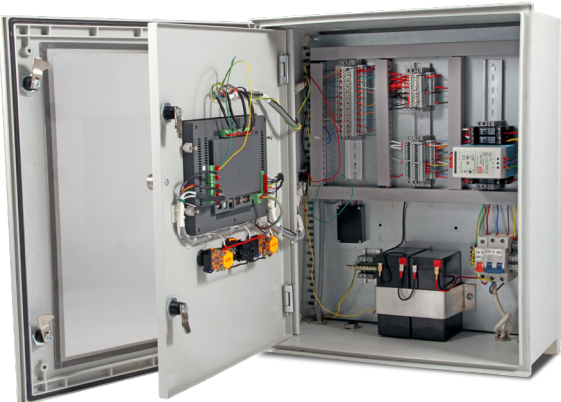
Technical Specifications

Description	Information
Screen Size	10"
Hmi Display	1024X600
Plc	Fx3g /Mitsubishi Program/Rs232
Analog In 4-20Ma	15
Analog In 0-20Ma	1
Analog Out 4-20Ma	8
Digital In	12
Digital Out	8
Serial Rs485 Modbus Plc	2
Polly Fibre Enclosure	600X500X230 / Dubble Door/ Lockable/ See Tru Glass
Polly Fibre Box Rating	Ip 66\Ik8
Tower Light	Ip 65 / Led-Green,Red, Yellow
Components	Ce
Power Supply	24V Dc\Process 2.5Amp/1.25Amp Battery Charging

ANNEXURES
ANNEXURE A – WIRING CONNECTIONS

Environmental Monitoring, Fire detection and Condition Monitoring

SCADA SYSTEM

Video Wall

Historian Server

Fan Monitoring

Above Ground

Under Ground

Bearing Temperature and Vibration

Air Flow Monitoring

HMI

HMI Screen 10" PLC 4-20mA or RS 485 modbus Communication

Smoke Detection

Dust Monitoring

Fire Detection and Suppression

Ventilation Door Monitoring

Temperature and Humidity Monitoring

Gas Detection

SALES

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