Mipeg 2000

Safe Load Indicator System

Installation Guide

Introduction

The following “Installation Guide” is not to replace the Mipeg Operator and Maintenance Manual supplied with each project. This manual will contain project unique information and documents.

The “Installation Guide” is a supplement to other documentation meant to assist in preparation/planning and to install a Mipeg 2000 Safe Load Indicator System.

This guide will not give all technical details or calibration procedures and should therefore be read in conjunction with the Operation and Maintenance Manual.

1.0 System Over-View

The following system schematics are typical only, showing the main parts in a Mipeg system and how they are intended connected with parts used in the Mipeg installation kit.

The main parts are;

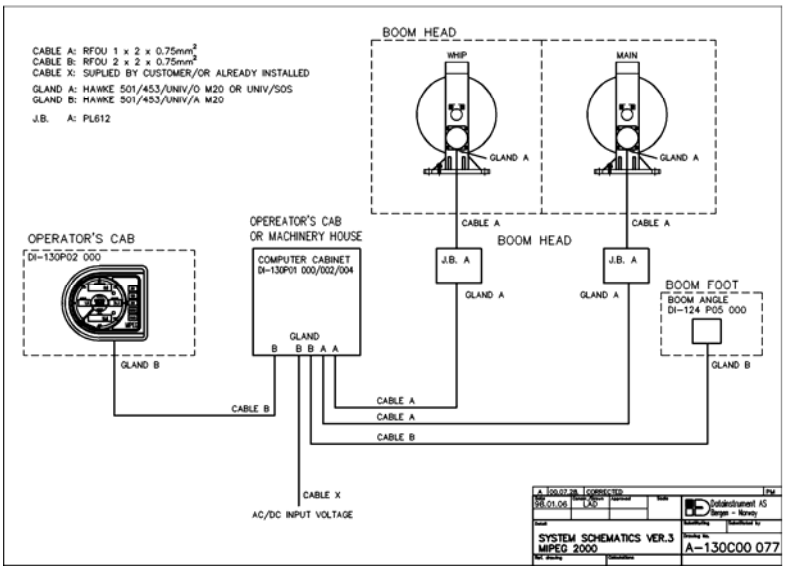
Operator`s Display
DI-130 P02 000

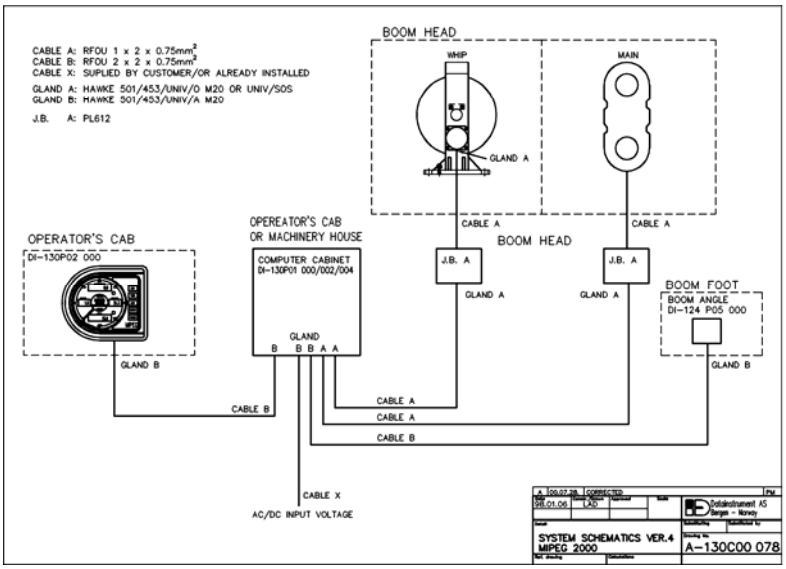
Computer Cabinet
Safe area; DI-130 P01 002
Zone 2; DI-130 P01 000
Zone 1; DI-130 P01 004

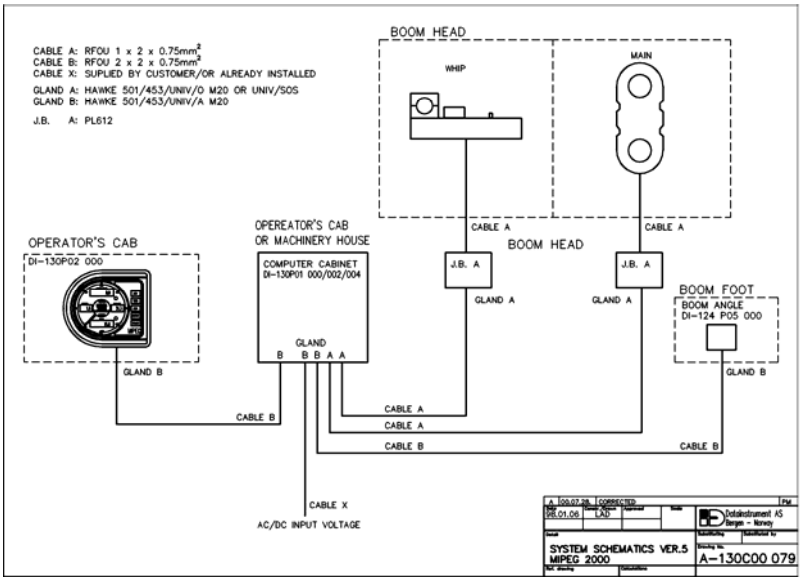
Boom Angle Sensor
DI-124 P05 000 or
DI-130 P05 003

Main Hoist Sensor
DI-112 P01 xxx, project dependent

Whip Hoist Sensor
DI-112 P01 xxx, project dependent





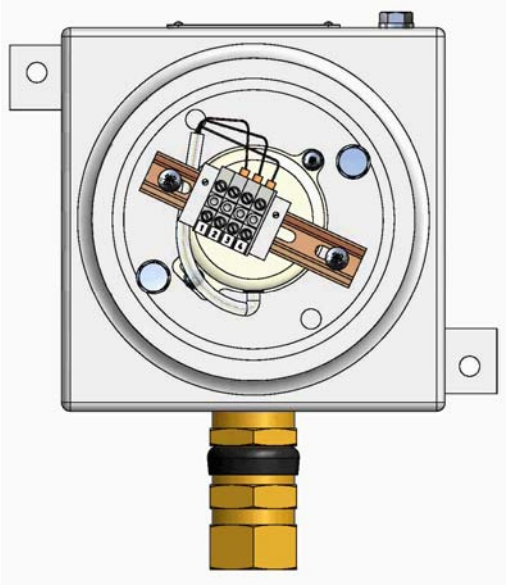


2.0 Installing the Boom Angle Sensor

2.1 Mechanical Installation

The Mipeg Boom Angle Sensor is identified with the following part number, DI-130 P05 003. The sensor is mounted inside a zone 1 certified box and is certified to comply with the II 2 GD EEx d IIB T6, Atex standard. The unit is sealed to comply with the ingress protection, IP66.

The outside overall box dimensions are H x W x D; 133 x 133 x 128 (mm), the material is cast iron (weight approx. 8 kg) and the box is coated for offshore use.



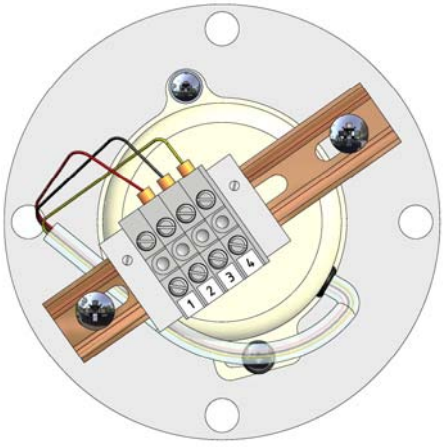
The box is to be bolted down to the existing side plate of the crane or a support plate has to be provided in the boom foot to carry the box. The box has two 7.0 mm “box fixing holes”.

The unit is to be mounted in the boom foot. The unit may be mounted on either side of the boom, left/right hand side or inside or outside of the boom. We however recommend that the box is installed so the gland is pointing downwards when the boom is horizontal. This is to minimise the risk of water getting into the box.

Boom Angle sensor installed inside the boom on the left hand side using existing side plates

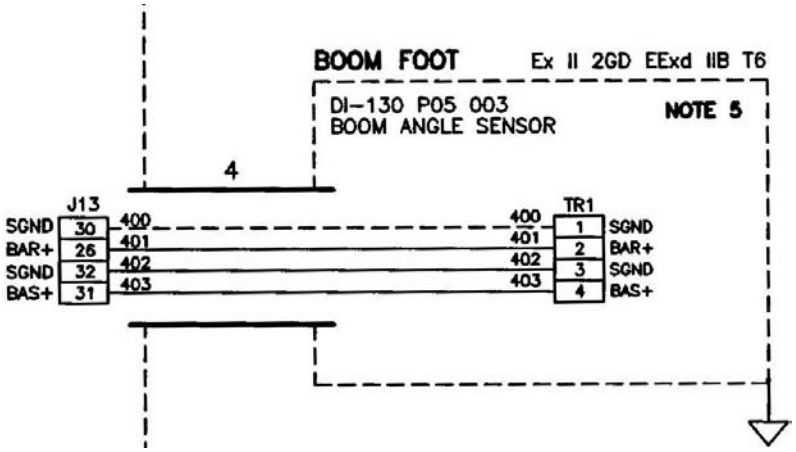
2.2 Electrical Installation

The angle sensor must be installed so it reads a voltage in between approx. 4 and 7 Vdc. This range will be reached if the angle sensor name on the sensor unit (inside the Ex box), is horizontal when the boom is at approx. 45 deg. inclination. The sensor may be repositioned internally in the box by removing the two screws which bolts it down to the mounting plate. Please observe that small adjustments may be done since one side of the sensor has an adjustment/sliding hole.



The unit is connected according to the typical wiring diagram, below, with a three core cable. Please always refer to the project specific wiring diagrams for details.

Connections;



TR1	Description
1	SGND; Signal Ground
2	BAR+, (Boom Angle Reference +) positive side of power supply
3	SGND, (SignalGrouND) negative side of power supply
4	BAS+, (Boom Angle Signal+) the actual analogue signal 4-7 Vdc from the sensor

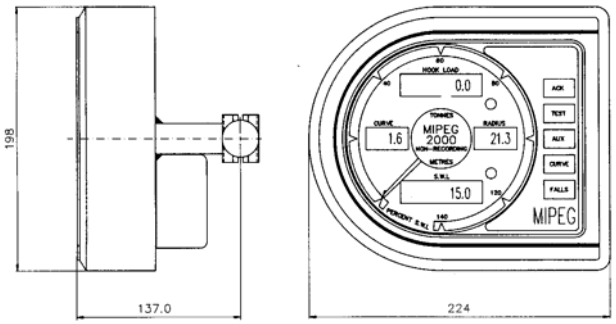
The cable may be a two pair cable with one spare core. The cable must have a collective shield and an armour/brading.

3.0 Installing the Operator`s Display Unit

3.1 Mechanical Installation

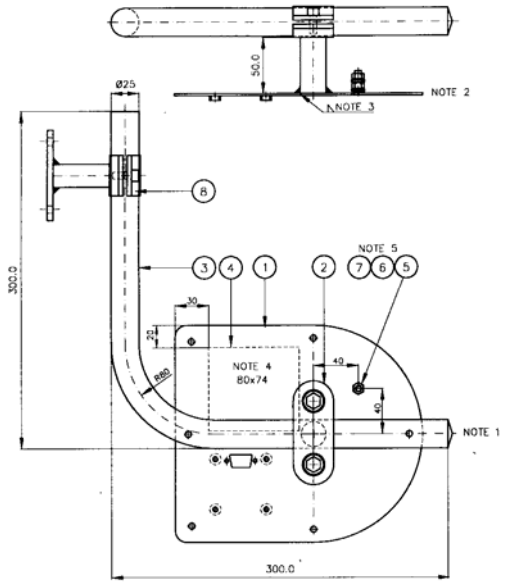
The Operator`s Display is identified with the following part number, DI-130 P02 000.
The display is designed to operate in a zone 1 environment and is certified to comply with the II 2 G EEx ia IIB T4, Atex standard. The unit is sealed to comply with the ingress protection, IP65 (dust tight and water jets)

The outside overall box dimensions are H x W x D; 198 x 224 x 60 (mm), the material is copper free aluminium (weight approx. 3 kgs) and the unit is anodised and epoxy coated black.



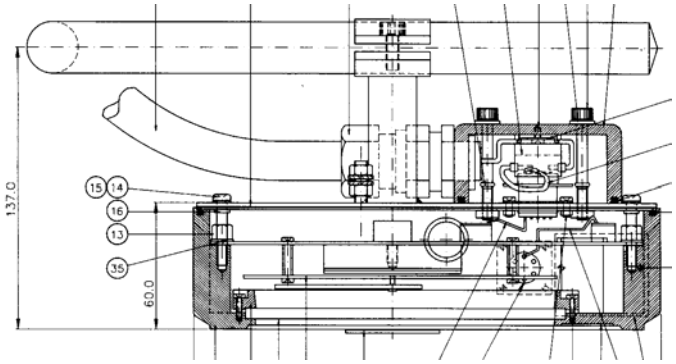
The display is mounted on a L-shaped tube with brackets which allows the display to be tilted in all angles for optimum viewing angle. The display should be mounted in the lower section of the front corner of the crane cab to allow the crane operator to have the display in the corner of the eye, while maintaining full attention to the lifting operation.

The L-shaped tube may be cut to optimum length.

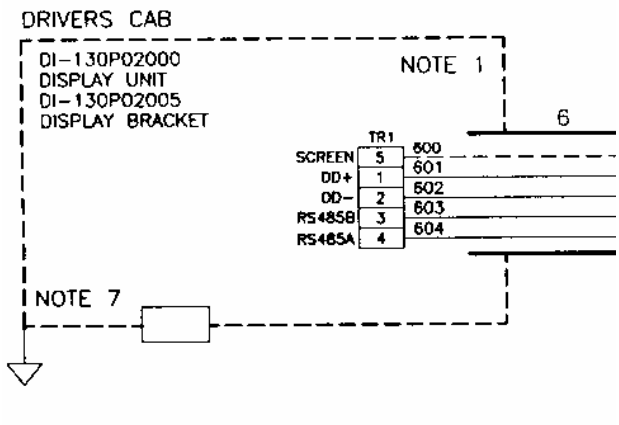


3.2 Electrical Installation

All project cables, four cores and shield, are connected in a small connection compartment in the back of the display, as per the typical wiring diagram below;



TR1	Description
1	12Vdc, Power to display unit (from computer cabinet)
2	SGND, SignalGrouND, negative side of dc power
3	RS485B, Channel B in the RS485 communication
4	RS485A, Channel A in the RS485 communication
5	Shielding, termination point of cable/core shielding



Please note that the connector mounted in the bottom of the display is used for connections to a Lap-Top computer for calibration and faultfinding checks. This is optional in a Mipeg 2000 Non-Recording system and will also be the point of retrieving stored crane operation records in a Recording version.

4.0 Installation of the Computer Cabinet

4.1 Mechanical Installation

4.1.1 Safe Area Computer Cabinet

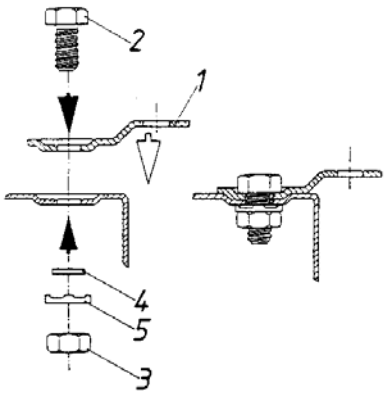
The Computer Cabinet is sealed to comply with the ingress protection, IP66 (dust tight and heavy seas)

The outside overall cabinet dimensions are H x W x D; 300 x 380 x 155 (mm), the material is mild steel (weight approx. 10 kg) and the cabinet is epoxy coated grey, RAL 7032.

The computer cabinet is designed for indoor mounting and may be mounted either in the machinery house or in the crane cab. The cabinet has a removable bottom plate where the cable glands should be located. The cable armour/brading is connected to chassis earth through the glands and the cable shielding is connected to the appropriate terminals as per the wiring diagram.

The Computer Cabinet is locked by a key mounted in the hinged door.

Although the Computer Cabinet is to be mounted inside either operator`s cab or machinery house, we also supply four mounting brackets for the box. The use of these brackets will also avoid the risk of water ingress/condensation possible in the cabinet if the mounting bolts are drilled through the wall of the operator`s cab or machinery house.

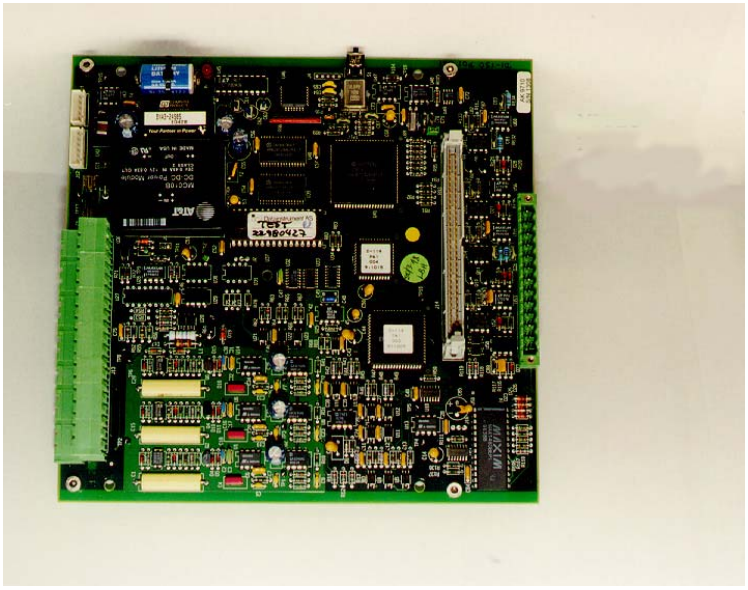


Computer Cabinet contains three main parts;

1. The Master card, which is the microprocessor based computer with all required inputs and outputs. It contains the software which is designed for each project and may be modified by changing the Eprom. The Master card mounted with five screws; one in each corner and one in the centre of the PCB.

2. The Power Conversion Unit, which converts the available crane ac power (100 to 240 Volts, 50 to 60 Hz) input to the nominal internal 24 Vdc level.

3. Terminal rows, TR1 and J13, for termination of the project cables. (J13 is on the MasterCard). Please make reference to the wiring diagram for the project for the actual connections.



Master II, main electronics board in the Mipeg 2000 system

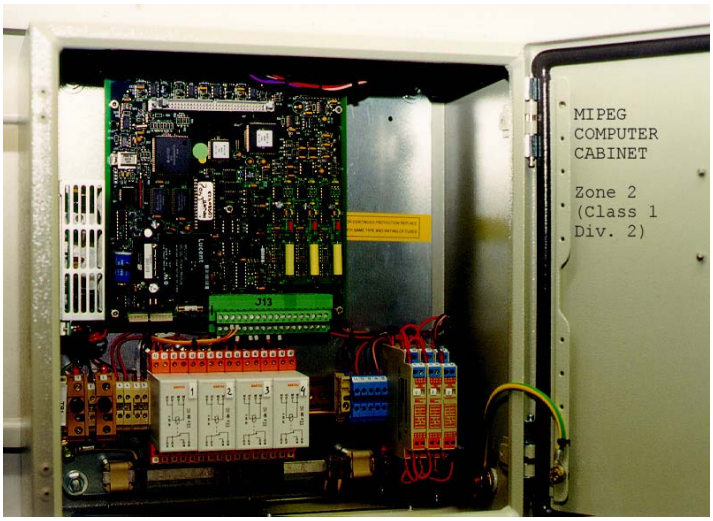
4.1.2 Hazardous condition, Zone 2, Computer Cabinet

The Computer Cabinet is certified to comply to the zone 2 requirements, II 3G EEx nC IIC T4, Atex standard. This is equivalent to the US Class 1 Division 2 requirements.

The Computer Cabinet is sealed to comply with the ingress protection, IP66 (dust tight and heavy seas)

The outside overall cabinet dimensions are H x W x D; 380 x 380 x 210 (mm), the material is mild steel (weight approx. 10 kg) and the cabinet is epoxy coated grey, RAL 7032.

A zone 2 Computer Cabinet is mechanically slightly different to the safe are unit described above but contains different fuses, relays (if required) and zener barriers will be required to protect the Operator`s Display.



Computer Cabinet, Zone 2 certified, with zener barriers, relays, Master II card and power conversion unit.

4.1.3 Hazardous condition, Zone 1, Computer Cabinet

The Computer Cabinet is certified to comply with the Atex zone 1 requirements,
II 2(1)G EExd d(ia)IIB T6. This is equivalent to the US Class 1 Division 1 requirements.

The Computer Cabinet is sealed to comply with the ingress protection, IP66 (dust tight and effects of immersion)

The outside overall cabinet dimensions are H x W x D; 519 x 315 x 200 (mm), the material is cast iron (weight approx. 75 kg).

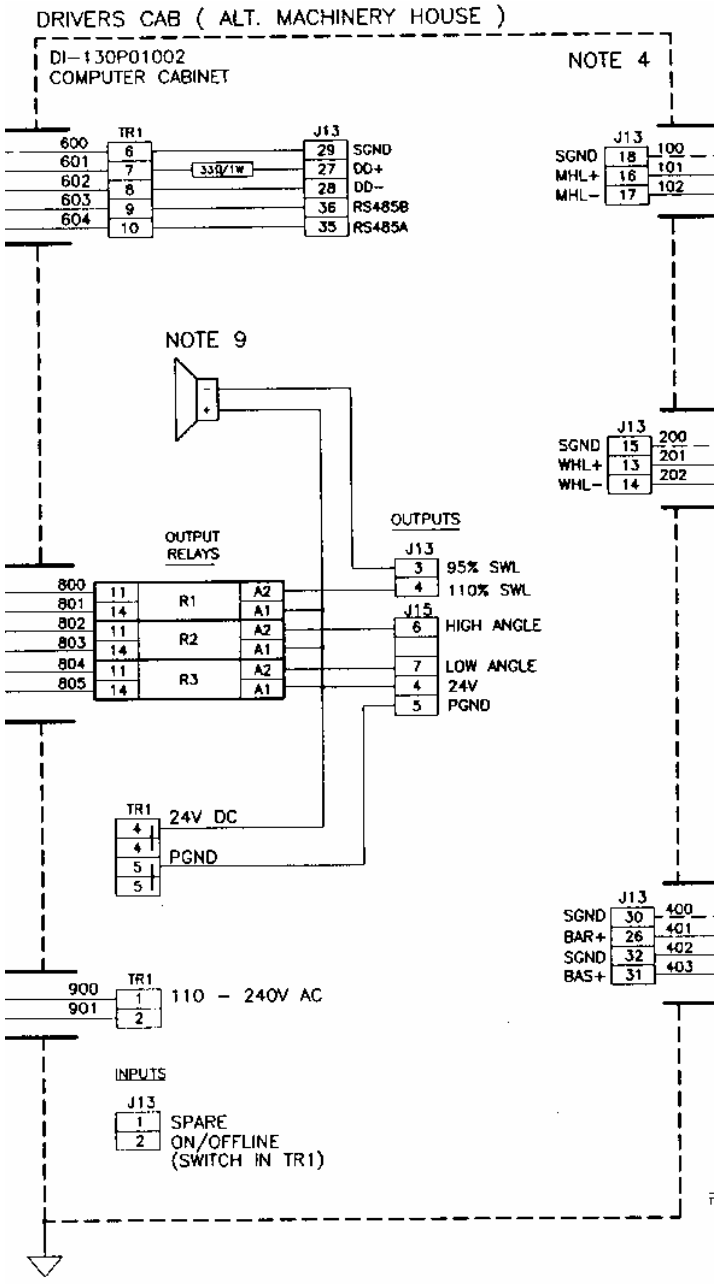
Access to the Computer parts is through the heavy bolt on lid. The content of the zone 1 system is equal to the zone 2 system containing zener barriers. There are no requirements for special relays in the zone 1 enclosure.

4.2 Electrical Installation of Computer Cabinet

All electrical cables are terminated into the Computer Cabinet. The Safe Area and Zone 2 Cabinet offer an un-drilled, loose bottom plate to accommodate the glands. The Zone 1 box has a metric tapped entry section in the bottom of the box suitable for 8 x M20 and 2 x M25 glands.

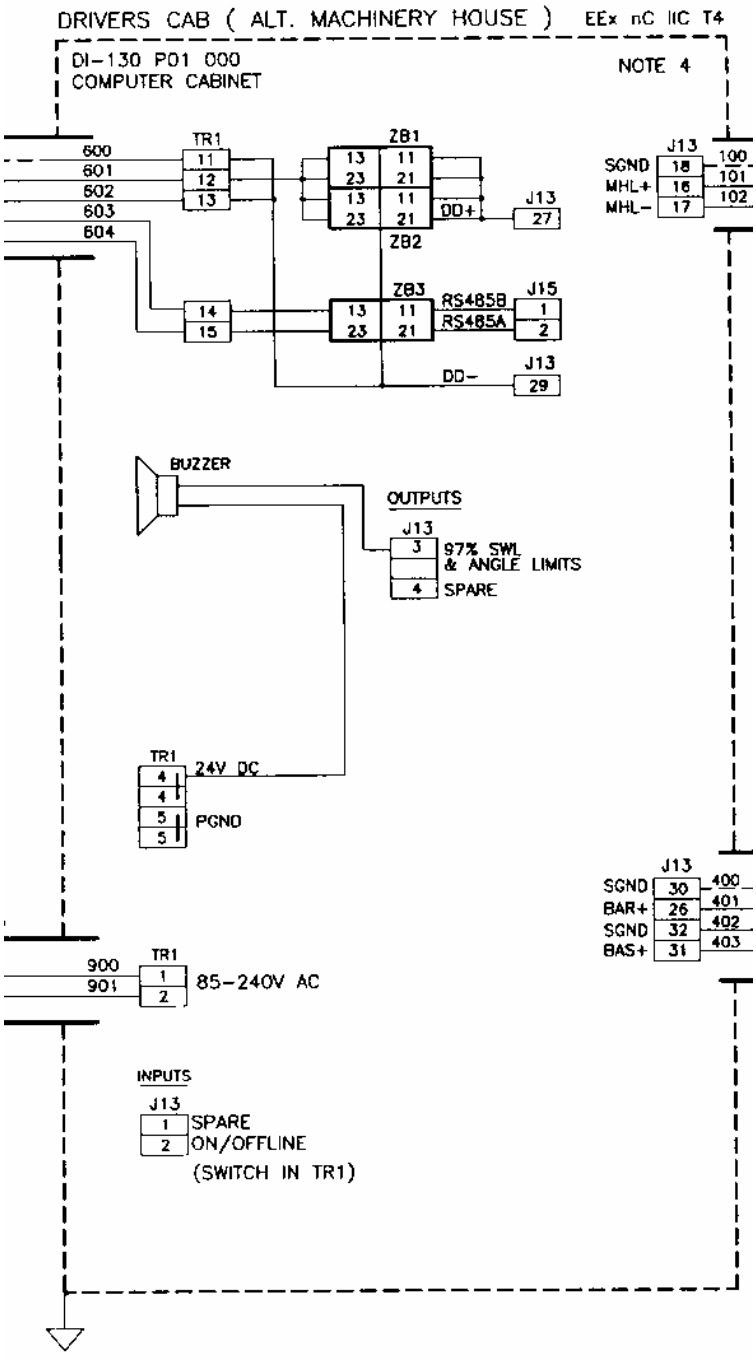
Please be aware that there are three different earth systems in a Mipeg system. This is part of the design to offer the best reliability of sensors and signal conditions. The three earth systems are opto isolated or galvanic separated and must not be mixed during the installation. This could cause or result in false read out.

Please connect all cable shields to specified termination points only located as described in the project Operation and Maintenance manual delivered with the system. This earth potential is referred to as SGND. Make sure that all shields are isolated and will not make electric contact with different chassis parts and glands. This because the chassis and glands are connected to the crane/structure (dirty earth/power earth)



Typical safe area simplified wiring diagram.

Note: The computer Cabinet is the common and only point for all cable shields to be connected to signal earth (SGND), the other end of the shield must be left isolated or terminated as described in project drawings.



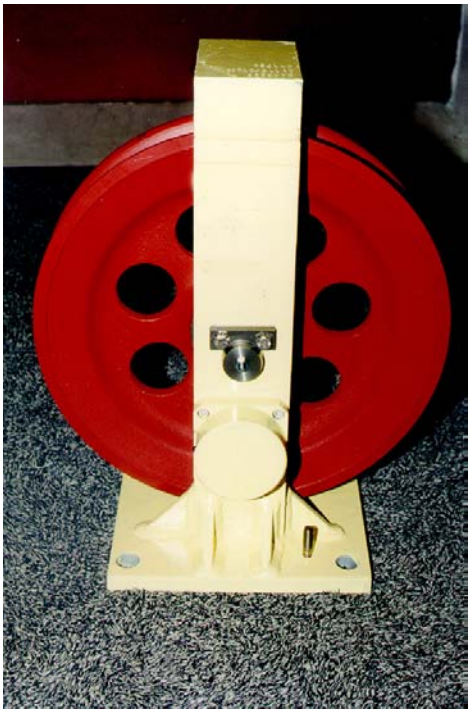
Typical Zone 2 simplified wiring diagram which includes the use of zener barriers for connections through to the Operator`s Display.

5.0 Installation of Load Hoist Sensors

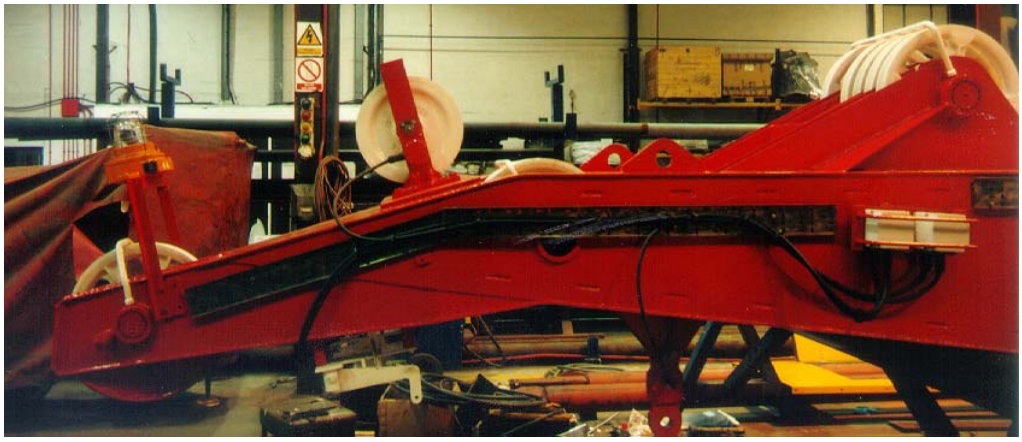
5.1 Mechanical Installation

5.1.1 Whip Hoist sensor (odd numbers of rope falls/parts of line)

The Whip Hoist sensor is a sensor which is measuring the load suspended by the whip hoist rope. This sensor may also be called the Aux Line or the Fast Line and is normally a single part of line configuration. To be able to measure the load on a single line (1 fall) or any other odd number of parts of line, a deflection of the load line is normally required. This may be done by the use of different sensors but in principle they all require a deflection of approximately 15-20 degrees of the rope to allow a portion of the strain onto the sensor. Two commonly used deflector sensors are shown below.

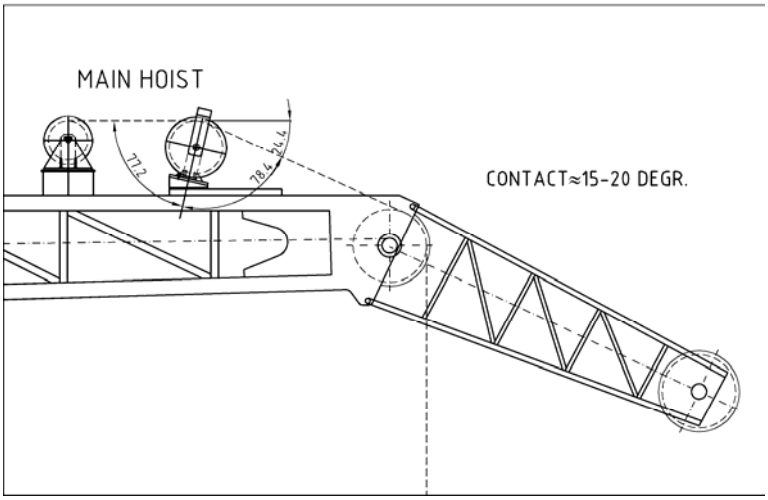


Although the deflection of the load hoist rope gives a sufficient portion of the strain onto the sensor, a guide sheave is often required to maintain a constant wrap angle (contact angle) on the load sensor sheave as the crane operates from minimum to maximum working radius. If constant wrap angle is not obtained the load reading will change with the boom radius. The existing sheaves on the crane may be used or moved to act also as a guide sheave for the load sensor.



Boom tip with Whip Hoist sensor installed between two existing crane sheaves, maintaining a constant wrap angle on the sensor.

If no existing sheaves exist or may be moved, guide sheaves have to be installed on the boom as shown below in the picture and the relevant drawing:



5.1.2 Main Hoist Sensor (even numbers of rope falls/parts of line)

The Main Hoist winch in a crane may be operated in both even and odd numbers of parts of line or falls. If the crane is only reeved in odd numbers, please refer to chapter 4.1.1.

The main hoist operated in even numbers, e.g 2, 4 and 6, a dead end link type sensor will be used between the crane dead end eye and the wedge socket of the rope. This dead end location could be located under the boom as shown below:

In this application it is very important that the sensor will be able to “swing with the rope” in all directions. Although the sensor being proof load tested by Det Norske Veritas this is in the load direction which also is the load measuring direction. Side forces may cause false readings of the load and could cause malfunction of the crane, crane control system connected to the Mipeg system.

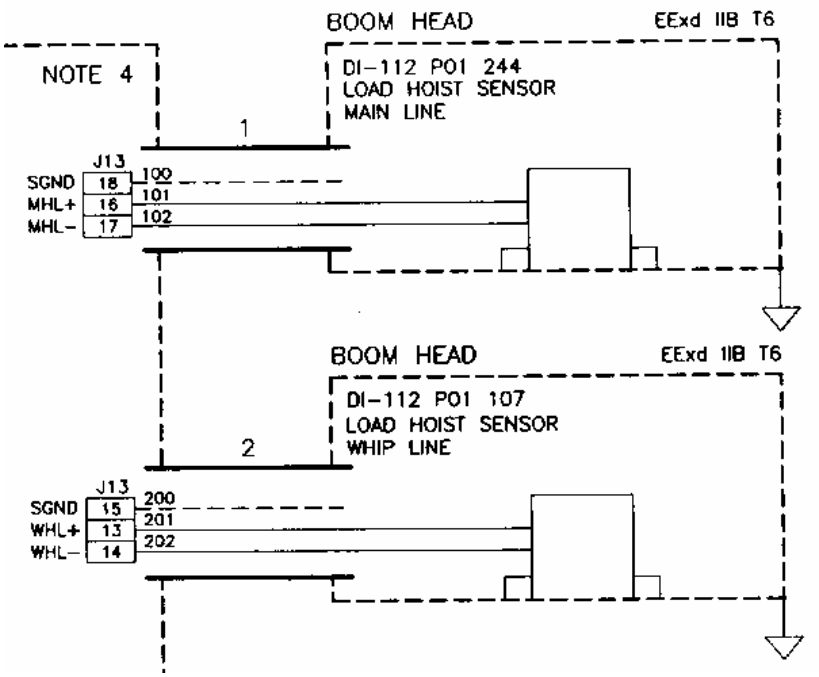
The required movement is obtained by using a gimble or two D-shackles in the connection.

In some cranes the dead end is located in a different position where the movement from the rope is eliminated. A typical example is shown below;

5.2 Electrical Installation of Load Hoist Sensors

The standard Mipeg Load Hoist Sensor (Whip, Main or Moment Sensor) is connected with two cores only, using a single, twisted, shielded pair of cable. There is no polarity requirement and the sensor is short circuit proof.

The typical, simplified wiring diagram is shown below. Please always refer to the project specific wiring diagram in the Operation and Maintenance manual for details.



It is very important to note that the shielding of the cable is cut and isolated in the sensor side and terminated in terminal J13 in the Computer Cabinet. Please make sure that the shield is isolated and will not make contact to the chassis through the gland etc. If the shield is not isolated it will create measuring noise and false/unstable readings.

Also, please note that both the Main Hoist Sensor and the Whip Hoist Sensor are connected to the Computer Cabinet using their own separate single pair cable. Under no circumstances should a two pair cable be used. This will cause cross talk between the sensors leading to false/unstable readings.