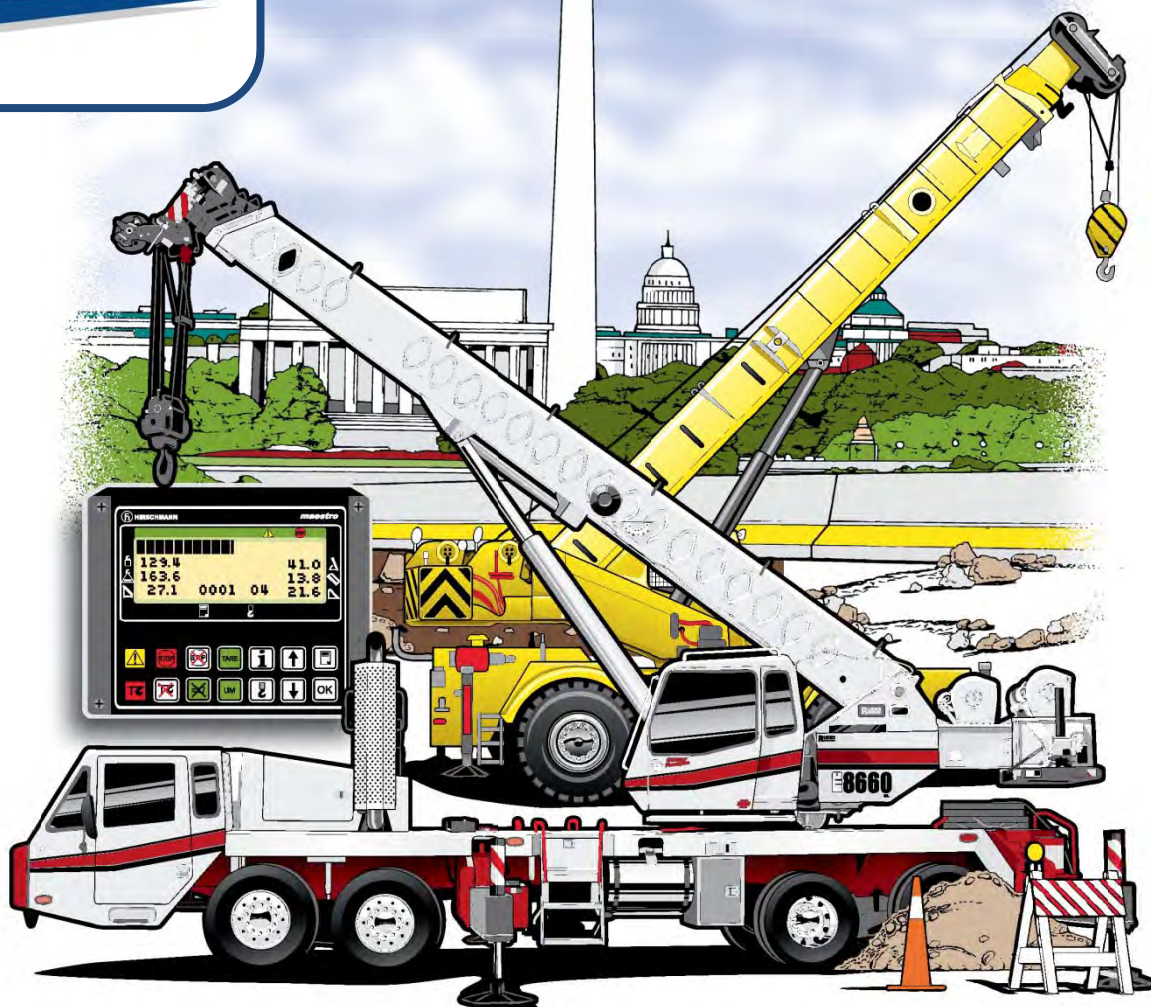




PRS 90

Multi-Sensor Display for PAT B5
Wireless Sensors



Operator's Manual

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Marking of Notices

Dangers and other important notices are marked as follows in this user manual:



WARNING

Warning of direct threat of personal injury and damage to property.

Instructions on precautions to avert the danger.



CAUTION

Warning of dangerous situations. Also warns of damage to property.

Instructions for averting the danger.

IMPORTANT

Warning of possibly damaging situation for the product.

Instructions for avoiding the possibly damaging situation.



NOTE

Usage instructions and information, but no dangerous situation.



HINT

Supplementary comments and recommendations for the user.

Safety Instructions

1 Safety Instructions

In order to avoid possible person injuries and damage to property when using this device, it is essential to observe the following safety instructions.

**CAUTION**

The PRS 90 is an aid for displaying measured values, which are measured by various sensors.

Although functions are integrated in the system for monitoring adjustable limit values with visual and acoustic warnings as well as a digital output when limit values are exceeded, the system may not be used as a safety device in the sense of EN 954 or EN 13849.

The relay output may not be used as an operation limit switch for the monitoring of limits values.

The system cannot and also should not be a replacement for the good judgment or experience of the operator or the use of safe working methods when using loading machines or other technical equipment.

The operator is responsible for the safe operation of the loading machine or other technical equipment. He must ensure that he understands and observes the information and instructions in their entirety.

**CAUTION**

The device is used together with wireless load sensors in lifting equipment with a multiple reeved lifting rope, then it is of fundamental importance for a correct load display and for the limit value monitoring to correctly input the number of rope reevings according to the actual number of rope reevings.

Therefore, the necessary inputs may only be made by operators who are familiar with the operation of the system.

IMPORTANT

Connection to the wrong power supply will cause damage to the device.

The device may only be connected to a DC voltage source of 10 V to 30 V!

Safety Instructions

1.1 EC Conformity Declaration



The technical design and construction of the **vSCALE D2** and **D3** console corresponds to requirements of the EMC directive 2004/108/EC and therefore carries the CE symbol.

The device complies with the following harmonized standards:
EN 12895:200, EN 13309:2010, EN ISO 14982: 2009

The full conformity declaration is available from the manufacturer on request.

Product Description

2 Product Description

2.1 General

The PRS 90 is an aid for displaying measured values, which are measured by various CAN and wireless sensors and transmitted wirelessly to the central device.

Although functions are integrated in the system for monitoring adjustable limit values with visual and acoustic warnings as well as a relay output when limit values are exceeded, the system may not be used as a safety device in the sense of EN 954 or EN 13849.

The vSCALE console is the operable component and display of the PRS 90, referred to below as the indicator system. The vSCALE is the control for both the CAN and wireless sensors from the xSENS-W1 family. The wireless sensors are connected by a radio link in the 2.4 GHz ISM band and may be operated license-free worldwide. In order to be able to use the device, at least one wireless sensor is necessary.

Which Sensors Can Be Used?

From the extensive range of WIKA Mobile Control sensors, the following are supported:

- All wireless sensors from the xSENS-W1 family (load, A2B, angle, and wind)
 - A TRS10-W2, Node ID 31, must be on the CAN-Bus
- LWG 9xx Cable Reels (non-redundant CAN only), Node IDs Default (Length 51, Angle 53, A2B 55)
- DWG30, Node ID 51 (contained within LWG 9xx reel, Node ID 51)
- WGX360, Node ID 53 (standalone or within LWG 9xx reel, Node ID 53)
- iSENS HES (through LWG 9xx reel, Node ID 55)
- fSENS KMD & SKM, Node ID 49

A comprehensive list can be found in [Section 7.3](#).

For hardwired sensors, it is important to note prior to adding to the system the Node IDs must match the above list. All kits in [Section 7.3](#) satisfy this requirement.

How Many Sensors Can Be Connected?

A total of up to 8 sensors or any combination can be connected.

Product Description

2.2 System Features

- Easily and clearly shows operator required information
- Wireless operation option
- Hardwired operation option
- Can display in Domestic or Metric units
- Load display: Display of current load & reeving
- Angle display: Display of current boom angle
- Wind display: Display of current wind speed
- A2B display: Display of monitoring OK or two-blocked
- Length display: Display of current boom length
- Multiple limits can be set
- Acoustic alarm on reaching a set limit value
- Monitoring and display of connection status of connected sensors
- Digital Output for exceeding set limit values and for two-blocked A2B switches
- Protection class IP 66/67
- Operating temperature range of -40°C to +75°C (-40°C to +85°C storage)
- Voltage supply 10 to 30 V DC
- CAN heartbeat monitoring

2.3 Product Identification

The type plate carries the unique identification of the operating console with PRS90 software installed. It is located on the left side of the console. The vSCALE D2 consoles will have the P/N: 061093 and vSCALE D3 consoles will have the P/N: 061163

Please ensure you make a note of all the information on your type plate for queries about this product.

Type Plate Example

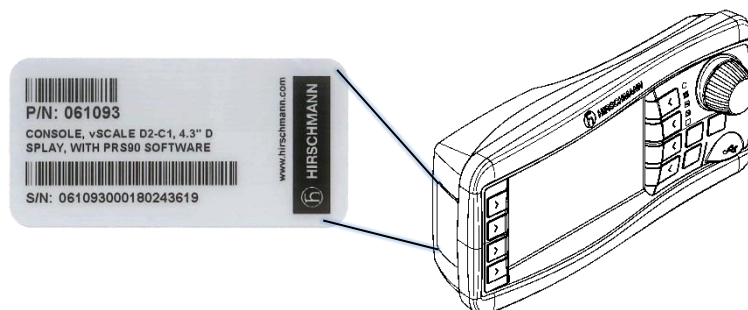


Figure 1: Type Plate Example

Product Description

2.4 Overview of Functional Elements

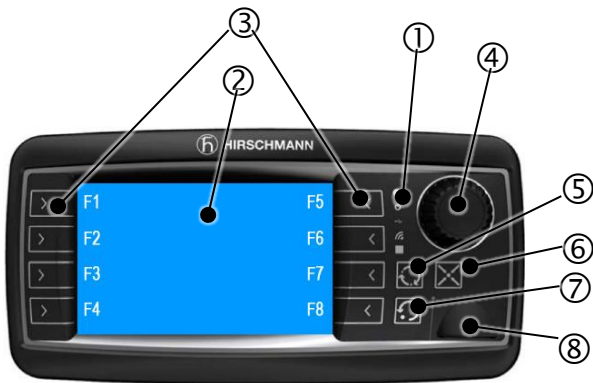


Figure 2: Functional Elements of vSCALE D2 Console

1. Ambient light sensor / Status LEDs
2. TFT color display 4.3"
3. Function keys **F1 – F8**
4. Rotary control (encoder) with pushbutton function
5. **Set** key 
6. **Home** key 
7. **Esc** key 
8. USB 2.0 interface (only for service purposes)

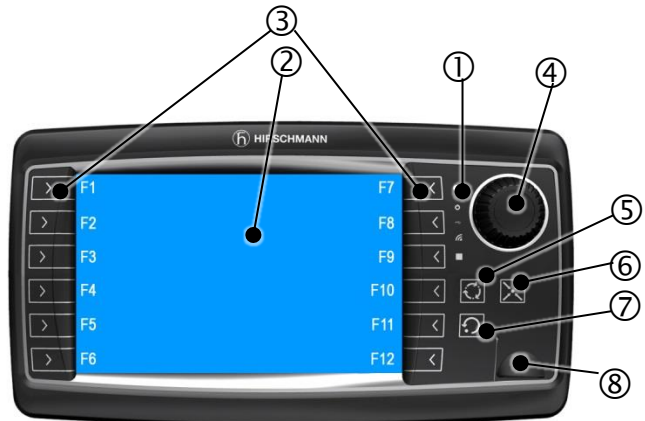
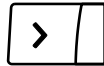


Figure 3: Functional Elements of vSCALE D3 Console

1. Ambient light sensor / Status LEDs
2. TFT color display 7"
3. Function keys **F1 – F12**
4. Rotary control (encoder) with pushbutton function
5. **Set** key 
6. **Home** key 
7. **Esc** key 
8. USB 2.0 interface (only for service purposes)

Product Description

2.5 Functional Elements



Function Keys F1 to F8 Calls Functions



Light Sensor: Not Used



Operating Display: Green While Supply Voltage is Connected



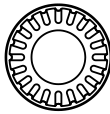
USB Data Display: Yellow During Data Exchange via Front USB Port



Multi-Function Light: Not Used



Wireless Indicator: Not Used



Encoder With Pushbutton Function: For Selection and Confirmation When Making Inputs



SET key: Selects Settings / Silences Alarm



HOME key: Returns to Main Working Screen



ESCAPE key: Returns to Previous Menu / Aborts Function

Operator's Manual

3 Operator's Manual

This section describes normal use case operation after the system has been configured with machine sensors. At least one sensor must be available in order to commission and operate the system. The first boot up will show an empty screen (see [Section 5.2](#)).

**NOTE**

Limits and Reeving will be saved after power cycle (i.e. no need to set up system every time power is cycled). Limits (see [Section 3.4.1](#)) and Reeving (see [Section 3.3.1](#)) will need to be updated when physical limits and functions of the crane change.

3.1 Main Working Screen

After boot-up the Main Working Screen appears on the display. Pressing the HOME  button from any non-user entry screen (example: wireless sensor ID input) will take you back to the main working screen. The sensor bar will display in all screens excluding the camera screen.

The vSCALE D2 (4.3") and vSCALE D3 (7") have different layouts on the main working screen.

Operator's Manual

3.1.1 vSCALE D2

The vSCALE D2 has three main working screens.

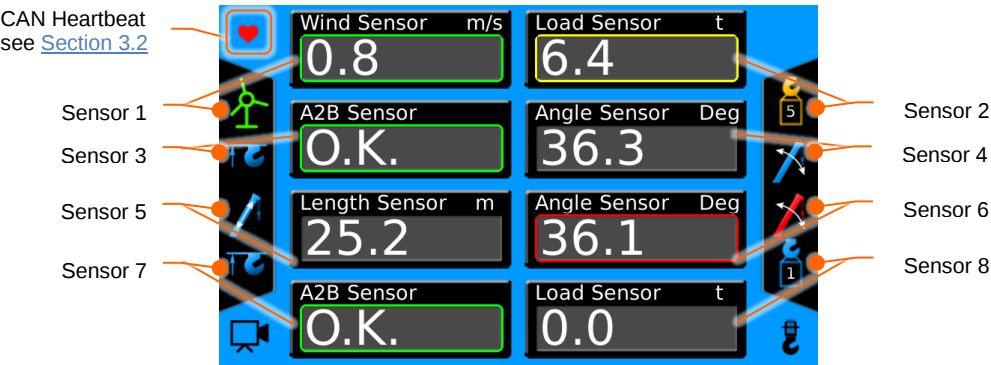
The first screen displays sensors 1-4 and is automatically displayed upon startup.

Turn the rotary knob counter-clockwise to scroll down to pages 2 and 3.

Main Working Screen 1	Sensor 1 points to Wind Sensor (0.9 m/s) Sensor 2 points to Load Sensor (6.7 t) Sensor 3 points to A2B Sensor (O.K.) Sensor 4 points to Angle Sensor (36.3 Deg) Main Working Screen 1 of 3
Main Working Screen 2	Sensor 3 points to A2B Sensor (O.K.) Sensor 4 points to Angle Sensor (36.3 Deg) Sensor 5 points to Length Sensor (25.2 m) Sensor 6 points to Angle Sensor (32.7 Deg) Main Working Screen 2 of 3
Main Working Screen 3	Sensor 5 points to Length Sensor (25.2 m) Sensor 6 points to Angle Sensor (32.8 Deg) Sensor 7 points to A2B Sensor (O.K.) Sensor 8 points to Load Sensor (0.0 t) Main Working Screen 3 of 3
Sensor Bar (displayed on all screens excluding camera screen)	Sensor 1 points to Wind icon Sensor 2 points to Load icon Sensor 3 points to A2B icon Sensor 4 points to Angle icon Sensor 5 points to Length icon Sensor 6 points to Angle icon Sensor 7 points to A2B icon Sensor 8 points to Load icon CAN Heartbeat see Section 3.2 Sensor Bar

3.1.2 vSCALE D3

The vSCALE D3 has one main working screen and shows the status of all eight sensors.



3.2 CAN Heartbeat

The CAN Heartbeat is monitored and displayed in all screens, excluding the camera screen. The CAN heartbeat transmits every 250ms for each CAN sensor added to the PRS90. If one heartbeat from any sensor is missed, an audible alarm will sound and the CAN Heartbeat icon in the sensor bar will flash on and off.

	CAN OK
 flashing	CAN Not OK

Operator's Manual

3.3 Sensor Bar

The sensor bar will display in all screens, excluding the camera screen. The sensor bar displays the state of active sensors.

States monitored and displayed include:

- If a limit has been set, and if set the state of the limit
- A2B status
- Reeving of load cell (shown inside load cell icon)
- CAN Heartbeat Status

Icons	Color	Description
	Blue	Limits Not Activated
	Green	Limit Activated and Within Set Limit
	Yellow	Limit Nearing Set Limit
	Red	Limit Exceeded or Sensor Communication Lost <i>Audible alarm will sound</i> <i>If Limit Output Signal Functionality is enabled the Digital Output will deactivate (see Section 5.3.4.1)</i>
	Blue	A2B OK
	Red	A2B Not OK or Sensor Communication Lost <i>Audible alarm will sound</i> <i>Digital Output 1 deactivates</i>

Operator's Manual



3.3.1 Setting Rope Reeving

MAIN WORKING
SCREENROPE
REEVING

Setting the rope reeving is only necessary and possible when using active load sensors. Pressing the function button adjacent to the rope reeving icon on the main working screen will call up the Load Reeving Screen.



CAUTION

The device is used together with load sensors in lifting equipment with a multiple reeved lifting rope, then it is of fundamental importance for a correct load display and for the limit value monitoring to correctly input the number of rope reevings according to the actual number of rope reevings.

Therefore, the necessary inputs may only be made by operators who are familiar with the operation of the system.

Rope Reeving
Screen Example

vSCALE D2



vSCALE D3

Press the function button to increase the reeving by 1 (until 25, when it then cycles to 1). When the reeving is changed, the in the sensor bar will show the number of reevings.



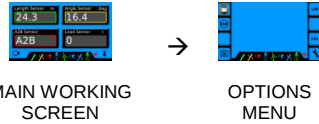
3.3.2 Camera Feed (Optional)

MAIN WORKING
SCREENCAMERA
SCREEN

You can (optionally) show the live video image on the display. Pressing the function button adjacent to the camera screen icon on the Main Working Screen will call up the Live Video.

Operator's Manual

3.4 Options Menu (Operator's)



All menus (except for setting the rope reeving, see [Section 3.3.1](#)) are accessed through the Options Menu Screen. Press any unassigned function key from the main working screen to enter the Options Menu Screen.

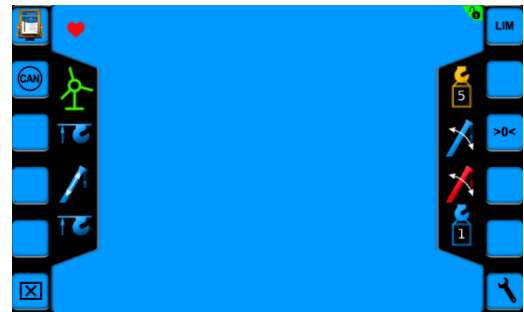
Function Buttons to Press to Enter Options Menu



Options Menu



vSCALE D2



vSCALE D3

Function Keys



See Commissioning Section
Add Wireless Sensor (see [Section 5.3.1.1](#))



See Commissioning Section
Add Hardwired CAN Sensor (see [Section 5.3.1.2](#))



See Commissioning Section
Delete Sensors (see [Section 5.3.2](#))



Limit Menu Screen (see [Section 3.4.1](#))



See Commissioning Section
Calibrate Sensors (see [Section 5.3.3](#))



See Commissioning Section
Setup Menu Screen (see [Section 5.4](#))



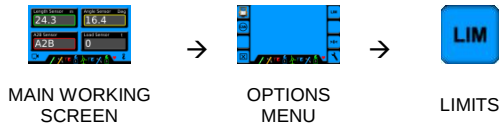
NOTE

The symbol  indicates that the screen is password protected. If the system is not unlocked, the password entry prompt will appear.

See [Section 5.3](#) for more information on unlocking the system.

Operator's Manual

3.4.1 Limit Value Monitoring (Operator's)

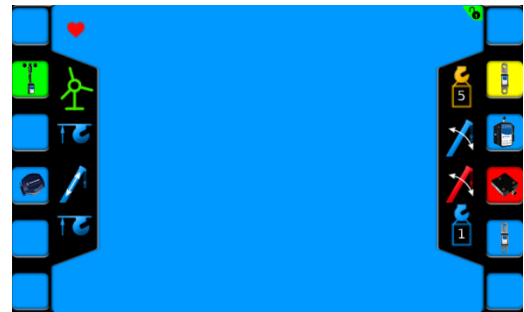


The system features a 'limit value monitoring' function with programmable limit values. The functions can be set individually or in combination. Press the Limits function button from the Options Menu Screen to call up the Limits Screen. Limit Output Signals can be set for individual sensors (see [Section 5.3.4.1](#))

Limits Screen



vSCALE D2



vSCALE D3

What Limits Can Be Set?



Program Limit for Angle Sensor (see [Section 3.4.1.1](#))
same process for both hardwired and wireless sensors



Program Limit for Length Sensor (see [Section 3.4.1.2](#))



Program Limit for Load Sensor (see [Section 3.4.1.3](#))
same process for both hardwired and wireless sensors



Program Limit for Wind Sensor (see [Section 3.4.1.4](#))

Limits for A2B are not able to be set.

Saving Values

If limit values are set they will be stored after the system is switched off. The limits will remain active if the system goes through a power cycle.



NOTE

Limit Output Signals are able to be activated for set active limits (see [Section 5.3.4.1](#))

Relays will need to be added for Limit Output Signals! DOs 1-3 supply ground.

Operator's Manual

Warnings and Alarms

Active limit values are indicated by the display of color-highlighted symbols. The icons in the sensor bar, the function buttons on the limit screen, and the sensor values on the main screen will change color.

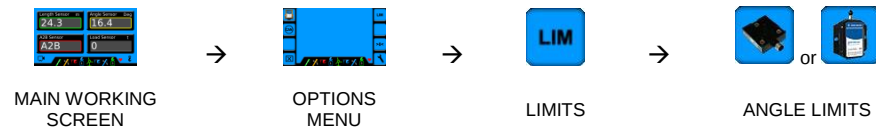
Icons	Color	Description
	Blue	Limits Not Activated
	Green	Limit Activated and Within Set Limit
	Yellow	Limit Nearing Set Limit
	Red	Limit Exceeded or Sensor Communication Lost <i>Audible alarm will sound</i> <i>If Limit Output Signal Functionality is enabled the Digital Output will deactivate (see Section 5.3.4.1)</i>
	Blue	A2B OK
	Red	A2B Not OK or Sensor Communication Lost <i>Audible alarm will sound</i> <i>Digital Output 1 deactivates</i>

Operator's Manual

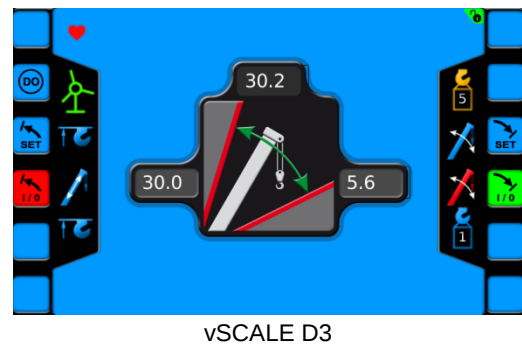
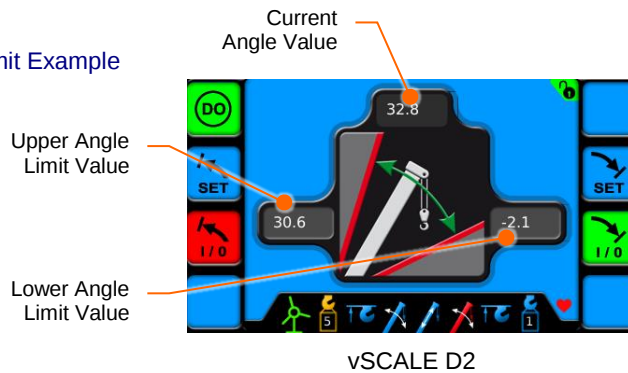


3.4.1.1 Angle Limit Value

To set the limit for an Angle Sensor, press the corresponding function button in the Limit Screen (see [Section 3.4.1](#)) for the desired sensor. This will call up the Angle Sensor Limit Screen.



Angle Limit Example



Function Keys



Enable Limit Output Functionality (see [Section 5.3.4.1](#))



Set Upper Angle Limit Value (changes upper angle limit value to current angle value)



Activate Upper Angle Limit Value (activates limit)



Set Lower Angle Limit Value (changes lower angle limit value to current angle value)



Activate Lower Angle Limit Value (activates limit)

Instructions

Upper Angle Limit Instructions

- Boom up to desired maximum angle value (current value is displayed at top of screen)
- Press the Set Upper Limit Button  to set the upper value as the current angle value (this will change the upper limit value)
- Press the  function button to activate/deactivate upper limit
The function button will change color (matches limit state)

Lower Angle Limit Instructions

- Boom down to desired minimum angle value (current value is displayed at top of screen)
- Press the Set Lower Limit Button  to set the lower value as the current angle value (this will change the lower limit value)
- Press the  function button to activate/deactivate lower limit
The function button will change color (matches limit state)

Operator's Manual

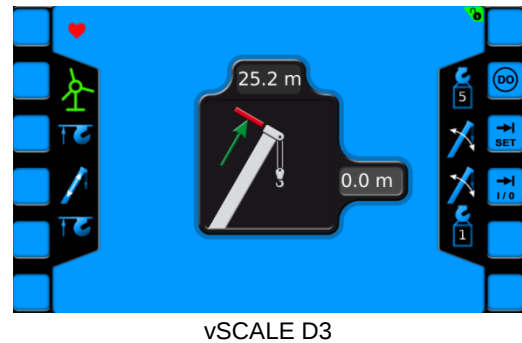
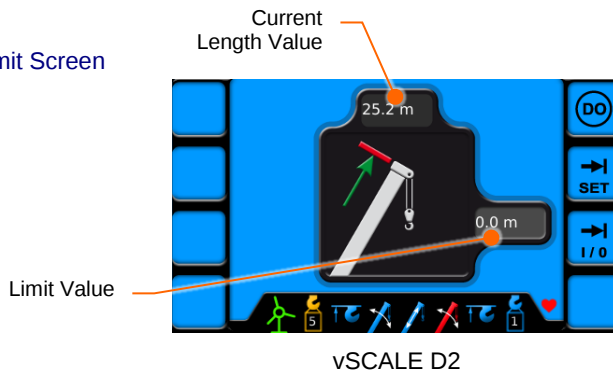


3.4.1.2 Length Limit Value

To set the limit for a Length Sensor, press the corresponding function button in the Limit Screen (see [Section 3.4.1](#)) for the desired sensor. This will call up the Length Sensor Limit Screen.



Length Limit Screen



Function Keys



Enable Limit Output Functionality
(see [Section 5.3.4.1](#))



Sets Limit Value
(changes limit value to current length value)



Activate Limit Value
(activates limit)

- Instructions**
- Boom out to desired maximum length value (current value is displayed at top of screen)
 - Press the Set Limit Button  to set the limit value as the current length value (this will change the length limit value)
 - Press the  function button to activate/deactivate upper limit
The function button will change color (matches limit state)

Operator's Manual

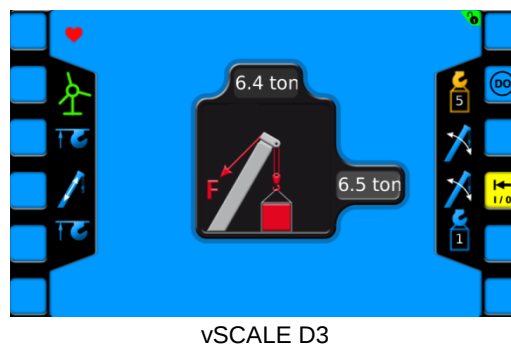
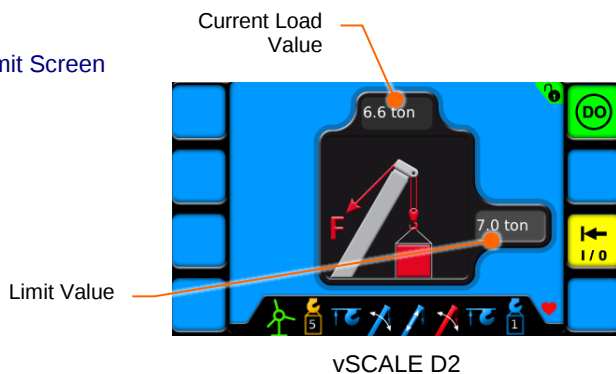


3.4.1.3 Load Limit Value

To set the limit for a Load Sensor, press the corresponding function button in the Limit Screen (see [Section 3.4.1](#)) for the desired sensor. This will call up the Load Sensor Limit Screen.



Load Limit Screen



Function Keys



Enable Limit Output Functionality
(see [Section 5.3.4.1](#))



Increase/Decrease Limit Value
(changes load limit value)



Activate Limit Value
(Activates Limit)

Instructions

- Use the rotary knob to increase or decrease Limit Value
 - Limit will increase/decrease by 0.1 units x reeving multiplier

Example: If the system is in metric units and load sensor has a reeving of 2, the limit value will increment by 0.2 tonnes (0.1 tonnes * 2 = 0.2 tonnes)
- Press the  function button to activate / deactivate set limit
The function button will change color (matches limit value)

Operator's Manual

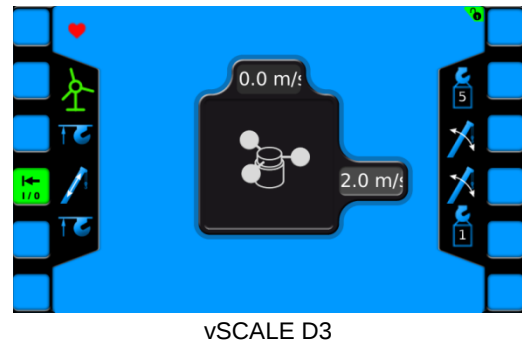
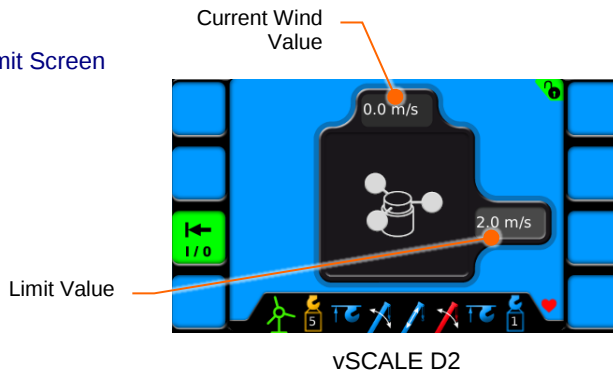


3.4.1.4 Wind Limit Value

To set the limit for a Wind Sensor, press the corresponding function button in the Limit Screen (see [Section 3.4.1](#)) for the desired sensor. This will call up the Wind Sensor Limit Screen.



Wind Limit Screen



Function Keys



Activate Limit Value
(Activates Limit)



Increase/Decrease Limit Value
(changes limit value)

Instructions

- Use the rotary knob to increase or decrease Limit Value
 - Limit will increase/decrease by 1 units

Example: If the system is in metric units the limit value will increment by 1 m/s

- Press the  function button to activate / deactivate set limit
The function button will change color (matches limit value)

Hardware Installation

4 Hardware Installation

The equipment is supplied complete with necessary mounting parts. Contained within this manual are summarized versions of the mounting procedures. Please refer to the appropriate user manual for the complete hardware information/instructions.

**NOTE**

When a sensor is added, it is added to the first available sensor spot (1-8). The sensor will not change spots unless the sensor is deleted and re-added.

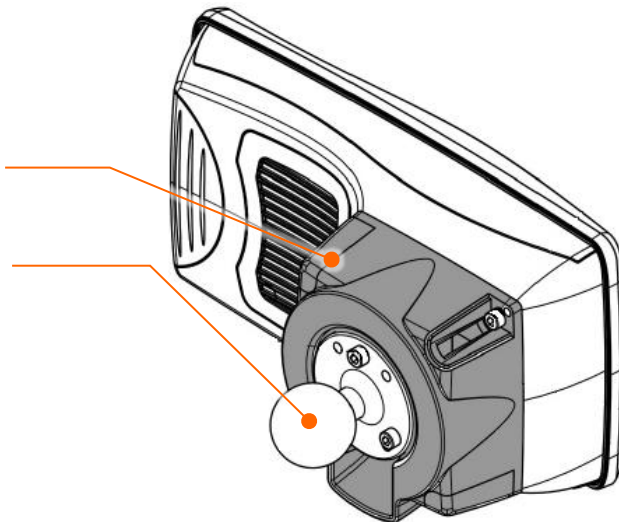
4.1 vSCALE Console

The vSCALE Console is mounted using a Ram Mount and Ram Mount Adapter (see figure below). The recommended mounting method is as follows:

- Route the vSCALE Console Power Harness through the Ram Mount Adapter
- Connect vSCALE Console Power Harness to the vSCALE Console
- Attach the Ram Mount Adapter to the back of the vSCALE Console
- Attach the Ram Mount to the Ram Mount Adapter
- Attach the other end of the Ram Mount to the cab

Ram Mount Adapter
D2 Part Number: 608460
D3 Part Number: 608464

Ram Mount (Partially Shown)
D2 Part Number: 031-300-060-382
D3 Part Number: 051170



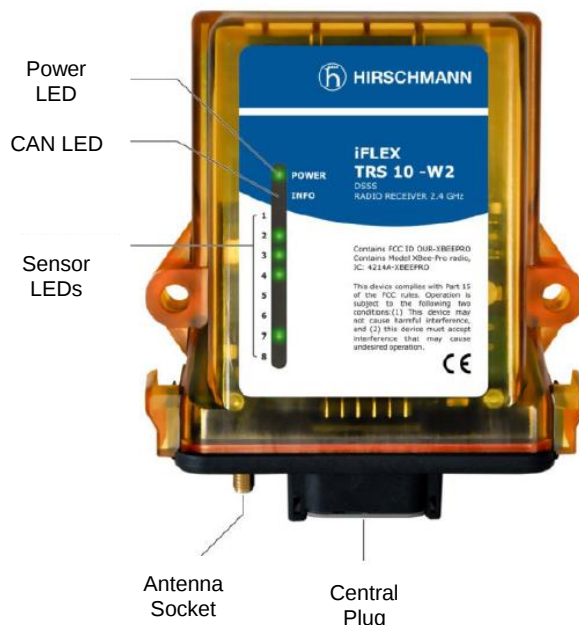
Hardware Installation

4.2 TRS10-W2 (Wireless Only)

The TRS 10-W2 must be mounted in a suitable place on a sufficiently firm surface with the connectors at the bottom. The device may be used both indoors and outdoors, but must be mounted such that the LEDs are visible. For more information on the TRS10-W2, please refer to the TRS10-W2 manual.

The distance between the mounting holes in the housing is 102mm.

When mounting the antenna to the TRS10-W2 it is imperative that the receiver has direct line of sight with the sensor transmitters. Obstructions will decrease signal strength and will attribute to drop outs.



IMPORTANT

The function of the antenna (and thus the whole system) can be impaired if a mismatching antenna radiator is used.

Always use the antenna radiator contained in the Wireless Receiver Kits (102054 or 102055).



NOTE

Optimal ranges are achieved if the antenna is in horizontal alignment with the wireless sensor antennas. Niches or recesses are not ideal mounting locations!

Hardware Installation

4.2.1 Direct Mount Antenna (kit 102055)

The 2.4GHz 90° Antenna mounts directly to the TRS10-W2 through the coax jack antenna socket.



When mounting the antenna onto the TRS10-W2 it is imperative that the direction of the antenna is horizontally in plane with the rest of the sensors.

Position the antenna on the transmitter such that the antenna is parallel to the sensor transmitter antennas.

IMPORTANT

DO NOT ROTATE THE ANTENNA WHILE IN CONTACT WITH THE RECIEVER. Rotating the antenna will cause the mating surfaces to abrade, which can cause burrs and degradation in tolerances.

OVERTIGHTENING THE ATNENNA WILL DAMAGE THE CONNECTION AND MAY RESULT IN SIGNAL STRENGTH DEGRADION. It is recommended to use an SMA Torque Wrench (8-in-lbs.) to tighten the antenna.



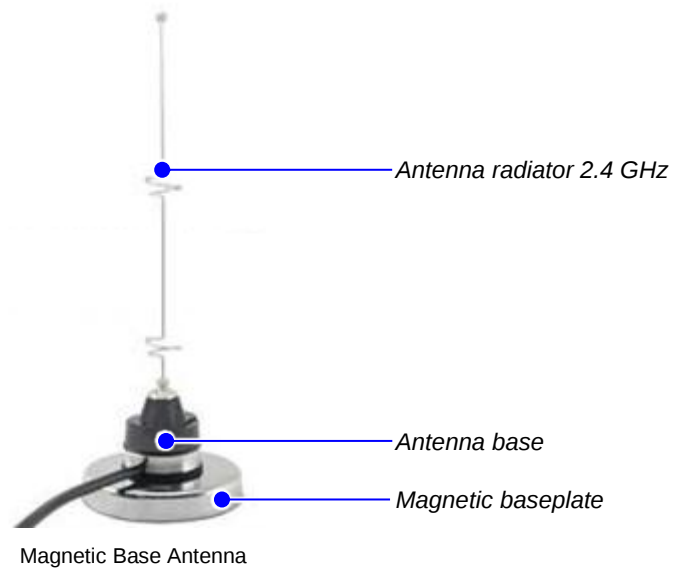
Hardware Installation

4.2.2 Magnetic Base Antenna (kit 102054)

The antenna radiator must first be screwed hand tight onto the thread on the top side of the antenna space until a soft stop is felt.

The antenna has a magnetic baseplate and adheres securely to all ferromagnetic surfaces.

Lay the antenna cable in such a way that it is neither squeezed nor laid upon sharp edges. Doing so can cause the cable to be damaged.



After laying the antenna cable, connect the coaxial connector of the antenna to the antenna socket on the underside of the TRS 10-W2. It is recommended to use an SMA Torque Wrench (8-in-lbs.) to tighten the magnetic mount cable to the TRS10-W2.

IMPORTANT

OVERTIGHTENING THE ANTENNA WILL DAMAGE THE CONNECTION AND RESULT IN SIGNAL STRENGTH DEGRADATION.



Connecting Antenna to TRS10-W2

Hardware Installation

4.2.3 TRS10-W2 Power Connection

Insert the central plug of the cable until it clicks, and then push the boot completely over the connector:



To comply with the EMC requirements for the surge voltages of power supply lines (EN 61000-4-5), it is necessary that the ground wire is conductively connected to the vehicle chassis when mounting the iFLEX TRS10-W2. Refer to the TRS10-W2 manual for more detail.



Hardware Installation

4.2.4 Status LEDs

There are 10 LEDs on the front panel of the TRS10-W2, which indicate the status of various operating conditions. The meaning of the signals can be taken from the table below.

LED:	off 	lights 	flashes slowly 	flashes rapidly 
 POWER	no supply voltage present, device is switched off	supply voltage is present, device is ready to operate		
 INFO			CAN bus mode "pre-operational"	CAN bus mode "operational"
1  ⋮ 8 	no sensor registered to this channel	sensor ¹ registered to this channel and ready for operation		limit switch has tripped (only when using iSENS HES-W1)
1  ⋮ 8 	no sensor registered to this channel	Radio link to the sensor ² on this channel interrupted or sensor not ready.		
1  ⋮ 8 	no sensor registered to this channel	Batteries of the wireless sensor on this channel are almost exhausted! (Capacity less than 6.5%) Replace the batteries soon!		

**NOTE**

If more than one limit switch iSENS HES-W1 has been coupled, the signals are as follows (different from the table above):

Channel LEDs, green: all coupled hoist limit have not tripped.

Channel LED flashes red: limit switch at first associated channel has been triggered.

The remaining signals of channel LEDs of the associated limit switch are to be ignored!

The signal transmission on the CAN bus is, however, carried out correctly.

¹ if limit switch iSENS HES-W1 on this channel: limit switch has not been triggered.

² if limit switch iSENS HES-W1 on this channel: limit switch was triggered and is in "sleep mode" to conserve battery life. After lowering the weight of the limit switch this state will be terminated automatically.

Hardware Installation

4.3 Hardwired Sensors

The PRS90 supports specific hardware that is configured to specific Node IDs. When the sensor is added to the PRS90, the Node ID of the sensor changes to the Sensor Spot number (example: when if the sensor is added to sensor spot 2, the node ID will change from the default to 2). This allows the user to add multiple sensors of the same type.

- 920/950 Series Cable Reel
 - Length CAN Node ID: 51
 - Angle CAN Node ID: 53
 - A2B CAN Converter Node ID: 55
 - Use CAN Cable for sensor connection
- WGX360 Angle Sensor
 - CAN Node ID: 53
 - Use CAN Cable for sensor connection
- fSENS KMD (COV Amplifier)
 - CAN Node ID: 49
 - Use CAN Cable for sensor connection
- fSENS SKM (COV Amplifier)
 - CAN Node ID: 49
 - Use CAN Cable for sensor connection
- HES A2B Switch (4.7k)
 - Simple Switch, wired to A2B CAN Converter Board within 920/950 Cable Reel
 - Use Sensor Cable for sensor connection

All kits listed in [Section 7.3](#) satisfy the above requirements.

A2B sensors are connected using Sensor Cables (orange connector, RSTS 5-RKTS 5-298/xM)

All other hardwired sensors can be connected using CAN Cables (black connector, 0935 253 103/xM)



NOTE

Hardwired Sensors (with exception of A2B Sensors) must be installed one at a time (with exception of the A2B sensor).

Example: When adding a Cable Reel and Standalone Angle Sensor

- First connect the CAN connection of the Cable Reel (with angle sensor CAN connection detached),
- Add the Cable Reel sensor(s) to the console,
- Then connect the Standalone Angle sensor,
- Add the Standalone Angle sensor to the Console.

Hardware Installation

4.3.1 Cable Reel

Mounting instructions are the same for both LWG950 and LWG920 variants

**WARNING**

Risk of injury due to the unintentional retraction of the length measuring cable!

In particular when the boom is fully extended, the spring inside the device is highly tensioned. If the length measuring cable detaches itself or snaps in this condition, it will be retracted suddenly and in an uncontrolled manner.

Check the careful and suitable mounting of the length measuring cable on the boom head.
Check the length measuring cable regularly for damage.

4.3.1.1 CAN Node IDs

In order to work with the PRS90 system the CAN IDs of the length and angle sensors and A2B converter board must be of the default setting (i.e. no changes should be made by the customer). The cable reels contained within the PRS90 kits are single channel CAN cable reels. The cable reel configurations are:

- 102082 (cable reel PN 068-920-062-025)
 - LWG920LA/01507-C11C111CH6-XXSLG-SH00-000
- 102083 (cable reel PN 068-950-062-025)
 - LWG950LA/03507-C11C111CH6-XXSLG-SH00-000
 -

The default CAN Node IDs for the cable reels kits are:

- | | |
|-----------------|----|
| ▪ Length | 51 |
| ▪ Angle | 53 |
| ▪ A2B Converter | 55 |

4.3.1.2 Preparation for Assembly

Care must be taken that the surface of the screw connection is level and that the length/angle sensor is mounted perpendicularly to the vehicle level.

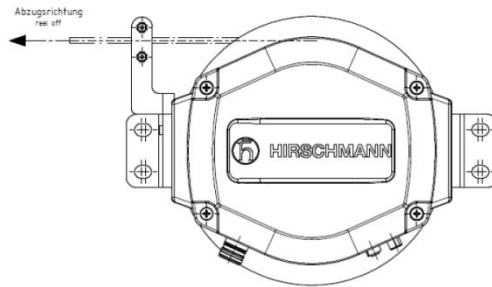
Fastening is done with four M10 bolts, at least 25mm long including lock washer (kits 102082 and 102083 include four stainless steel M10x25mm screws, PN 051273, and four stainless steel M10 lock washers, PN 051274). If screws/lock washers not provided in the kit are used ensure they are stainless steel.

Hardware Installation

4.3.1.3 Mounting on the Boom

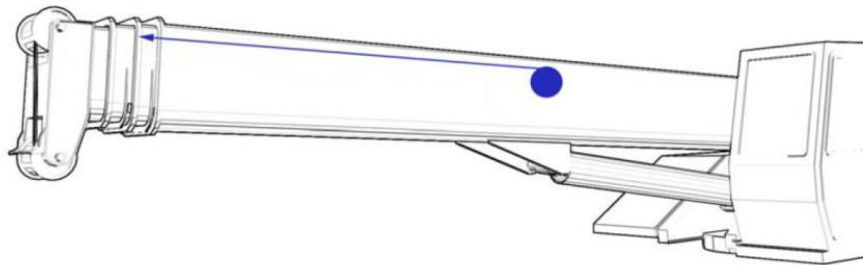
The reels contained in kits 102083 and 102084 are intended to mount on the left hand side of the boom. An illustration shows the length/angle sensor for mounting on the **left-hand** side of the boom.

Mounting on the Left



An area in the center of the main boom is recommended as the preferred mounting position. Mounting directly at the boom head negatively effects the quality of winding and the angle signal

Mounting Position



IMPORTANT

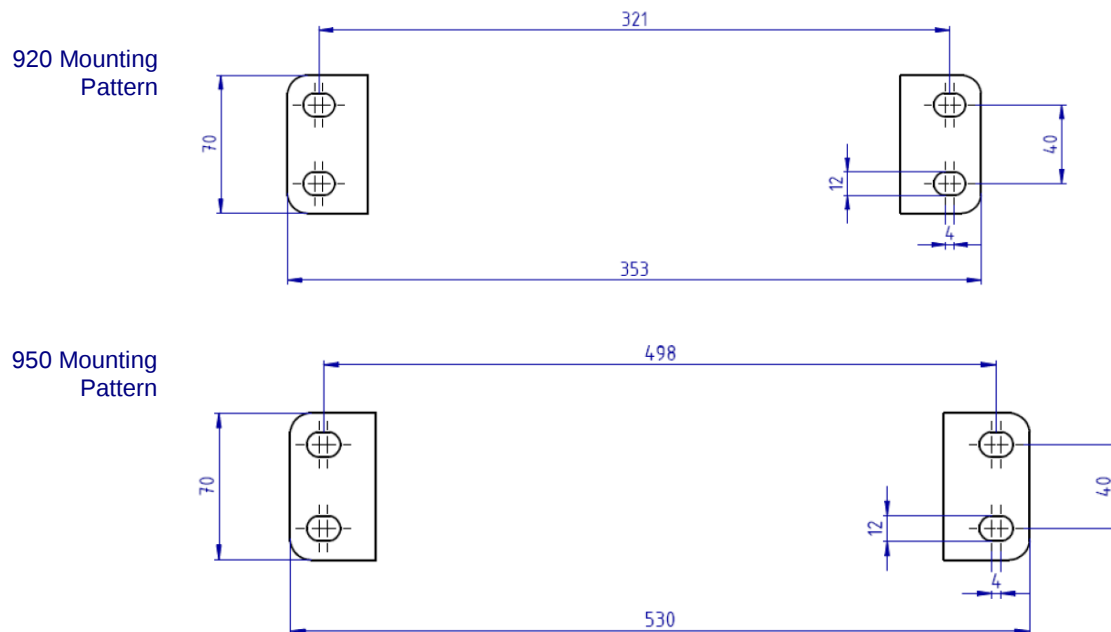
Damage to the length cable and/or the device due to exceeding the maximum measurement range or the permissible pull-off length.

Before mounting, ensure that the maximum measuring range and the maximum permissible pull-off length are suitable for the mounting position and the actual telescoping length.

The cable reels included in kits 102083 and 102084 are delivered with standard mounting brackets. The brackets are rigidly connected to the housing and cannot be removed.

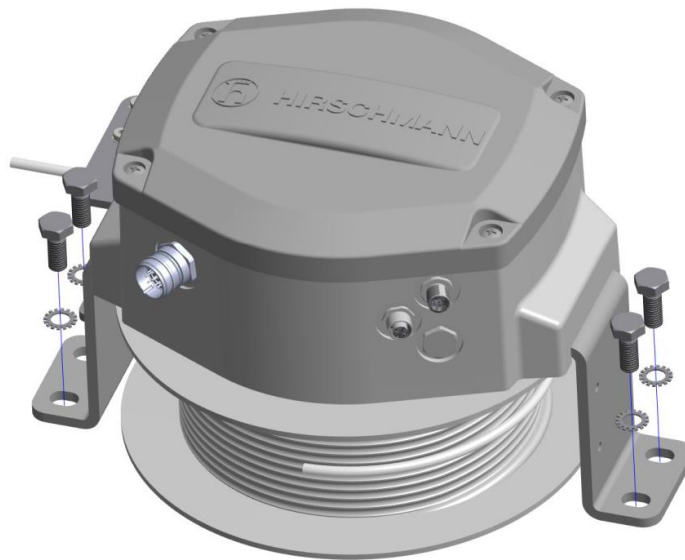
It is recommended to weld mounting plates with two M10 tapped holes directly to the boom.

Hardware Installation



The cable reel is mounting with four M10 bolts

- Bolt Length at Least 25mm
- Secured by Lock Washers
- Tightening Torque is 46Nm



Hardware Installation

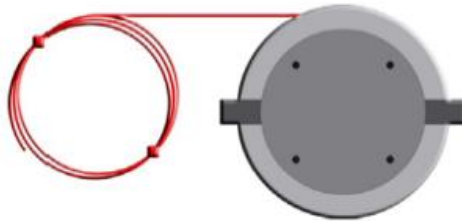
4.3.1.4 Cable Guidance

In order to ensure the measuring accuracy and correct winding of the cable reel, be sure to use an adequate number of suitable cable guides. Further cable guides are to be attached to each telescope collar.

It is essential to use cable guides with cable pulleys on all sides in order to preserve the high quality of the length sensor cable. These are available as accessories.

Optimum cable guidance takes place parallel to the boom with a deflection by the last cable guide. Cable guidance takes place centrally to the drum. Position of the first cable guide should be 19mm x the width of the drum (76.2mm) from the drum.

For the correct function of the length measurement it is necessary for the length cable to be taught at all times during operation. Therefore the cable reel is supplied with an already pretensioned length sensor cable. The cable is secured by a cable clip. The section between the length sensor and the fastening point of the cable (additional cable) is tied together separately..



- Remove the cable tie from the separately bound length sensor cable (additional cable)
- Lay this separate section of the length cable out without twists
- Now thread the length sensor cable through the cable guides to the desired point on the telescope collar
- Make sure that the length cable is routed without twisting
- Fasten the open end of the length cable to a suitable point
- It is important for the length cable to be tensioned after fastening and that the cable clip on the cable reel is pulled approximately 5-10cm out of the stop. This sets the correct pre-tension of the cable reel.



- The length cable is now correctly mounted. Only now should you remove the cable clip

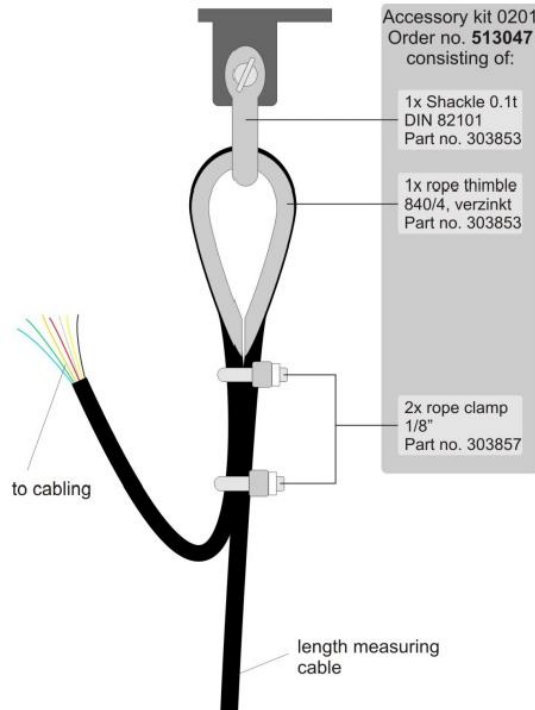
**CAUTION**

The cable clip must be removed before the commissioning of the cable reel.

Hardware Installation

4.3.1.5 Fixing the Length Cable to the Boom Head

Use the components from the accessory kit (PN 513047) to fix the length cable on the boom head.



After the length cable is mounted to the boom head, an M8 field attachable connector must be added in order to connect to the boom tip junction box.

4.3.1.6 Checking the Mechanical Assembly

The following things should be checked after assembly:

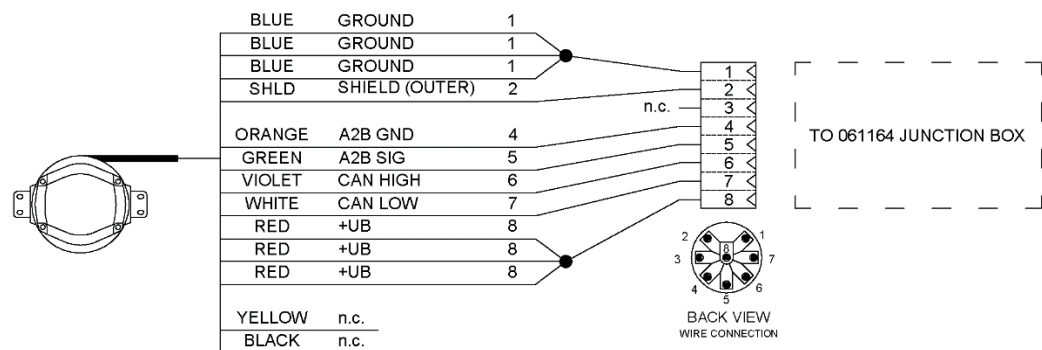
- Have all bolts/screws been firmly tightened?
- Has the prescribed pre-tension been adhered to?
- Are the plug connectors firmly screwed on?
- Are the remaining spring travel and the cable length sufficient for the maximum telescoping length?
- Are the guides on the main telescope positioned centrally to the drum center?
- Fully extend and retract the telescoping boom in order to check the quality of the winding. If necessary the cable guide must be realigned.

Hardware Installation

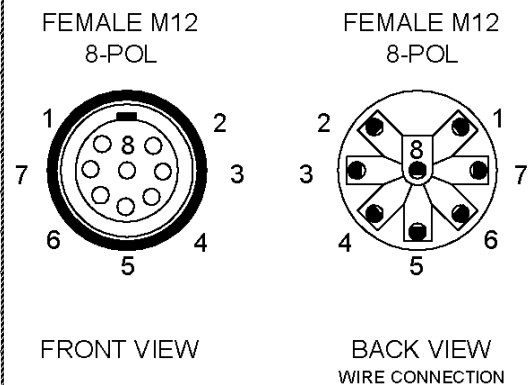
4.3.1.7 Cabling Connection

4.3.1.8 Length Cable

The length cable from the cable reel is shipped without a connector. After the cable reel is properly installed and the length cable is fixed to the boom head the female M12 8-pol field attachable connector can be installed directly to the length cable.



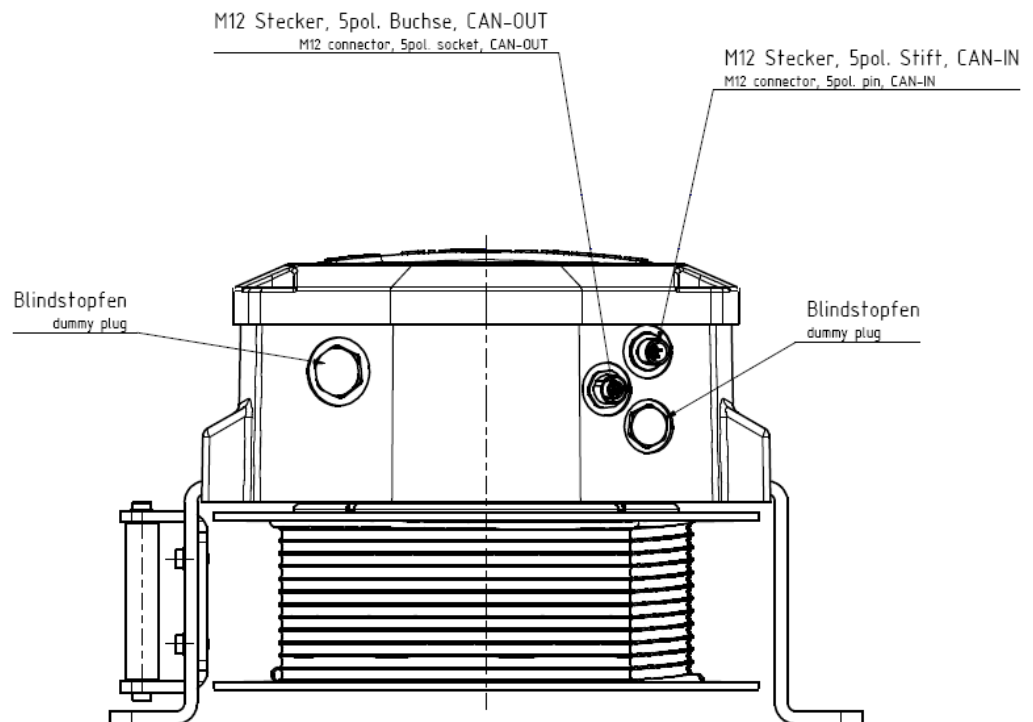
LENGTH CABLE TO M8 FIELD ATTACHABLE CONNECTION	
LENGTH CABLE COLOR	M8 PIN
BLUE (x3 WRES)	1
SHEILD (OUTER)	2
n.c.	3
ORANGE	4
GREEN	5
VIOLET	6
WHITE	7
RED (x3 WRES)	8
YELLOW	n.c.
BLACK	n.c.



Hardware Installation

4.3.1.9 CAN

The base portion of the reel has a male (CAN-In) and female (CAN-Out) M12 CAN Connection. The female connection is reserved for a 120Ohm CAN Terminating resistor (530207). The male connection is reserved for any length CAN cable. The recommended connection device is the 4-port CAN Junction Block (934637762).



When also using a Line Rider (SKM) with the system a CAN Y Splitter (PN 90000077, contained within line rider kits) may be installed into the male (CAN-In) port in order to only route one CAN cable down the boom (see system layout drawing for line riders for more detail).

Hardware Installation

4.3.2 Hardwired Angle Sensor (Standalone)

Mounting instructions are for the WGX360 Angle Sensor with Glass Fiber Reinforced (PBT) housing.

**WARNING**

Do not remove or mount while the sensor is under power!

Avert any modifications to the housing!

Avoid mechanical load!

4.3.2.1 CAN Node ID

In order to work with the PRS90 system the CAN IDs of the angle sensor must be 53. The Node ID of the angle sensor within the 102077 kit is set to 53 (i.e. no changes are required by the customer).

4.3.2.2 Preparation for Assembly

The mounting surface must be plane and free of dust and grease. Included in the 102077 kit are seven M4 bolts (PN 051278). If the supplied mounting plate within 102077 is not used the bolts may be substituted with UNC #6 bolts.

Use all three screws for mounting but restrict the tightening torque in the range of 1.5-2.5 Nm for the screws. The M12 connectors are to be perfectly aligned and screwed till the end with a tightening torque in the range of 0.4 – 0.6 Nm. Use all three screws for mounting and also note to use the same tightening torque for all of the screws.

Prior to installation, please check for all connection and mounting instructions to be complied with. Please do not observe the general rules and regulations on low voltage technical devices.

4.3.2.3 Cabling Connection

The standalone angle sensor has a male M12 CAN Connection. This connection can be connected to any length CAN cable. The recommended connection device is the 4-port CAN Junction Block. Alternatively, if mounting at the boom tip and the system has a cable reel installed, the angle sensor may be connected to the CAN port of the Boom Tip Junction Box (061164).

Hardware Installation

4.3.3 Hardwired A2B

The cable reel kits 102082 and 102083 contains all of the necessary mounting hardware and weight for the Main A2B switch.

If an Auxiliary or Swingaway A2B switch is to be added in conjunction to the Main A2B kit 102078 must be purchased.

4.3.3.1 CAN Node ID

The hardwired A2B sensors are simple switches and therefore do not have a CAN ID. The simple switch signal feeds through the length cable into an A2B CAN Converter board contained within the 920/950 cable reel.

In order to work with the PRS90 system the CAN ID of the A2B CAN Converter board must be of the default setting (i.e. no changes are required by the customer). The CAN ID for the A2B Converter Board is 55.

**NOTE**

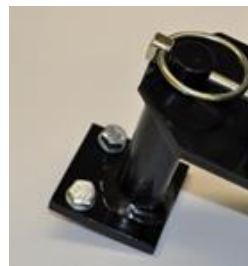
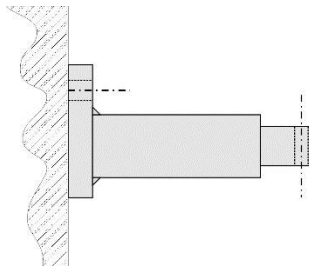
The A2B signal passes through a CAN converter board located within the Cable Reel. If an Auxiliary Boom Nose or Swingaway A2B switch is added the signal will be in series. Thus only one Hardwired A2B needs to be added to the system.

4.3.3.2 Preparation for Assembly

The hoist limit switch is intended for use on the point of the boom or alternatively on a boom extension. Two mounting bolts are included in the scope of supply for this purpose.

The mounting bolts can either be screwed or welded to a sufficiently stable surface.

Ensure when mounting that the mounting bolt is orientated horizontally, so that the hoist limit switch can settle in a vertical position during operation. The switch (comes attached to mounting plate already when 102030 kit is ordered) is pushed onto the mounting bolt and secured with a lynch pin.



Hardware Installation

The hoist limit switch weight included in the scope of supply is fastened to the end of the actuating cable with the aid of the chain connector included in the scope of supply.



After hooking on the hoist limit switch chain, remove both locking springs from the hoist limit switch weight and carefully pull the front half of the weight off the guide pins. Now insert the lifting rope. After the assembly and the fitting of the locking springs, the mounting of the hoist limit switch weight is complete. Finally, check the free movement of the weight and the function of the hoist limit switch.

4.3.3.3 Cabling Connection

The PRS90 system kits are designed so that all hardwired A2B connections are connected to a Boom Tip Junction Box (PN 061164, contained within 102082 and 102083 kits).

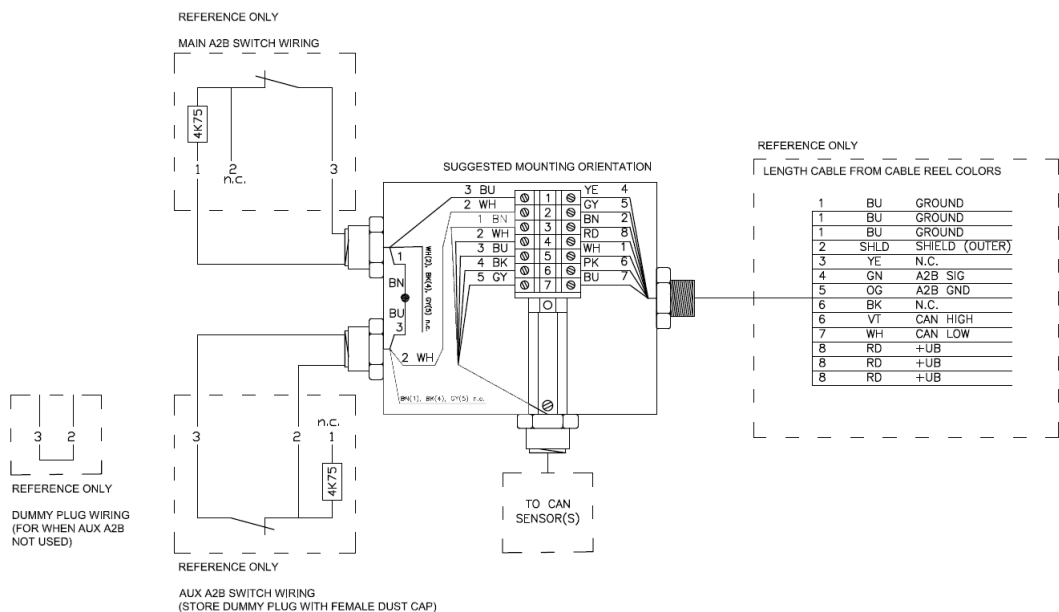


NOTE

The A2B switches must be connected using Sensor Cables, not CAN Cables!

When using one A2B switch, the switch must be installed to the “Main A2B Port” on the Boom Tip Junction Box, and the Dummy Plug must be installed into the “Aux A2B Port” on the Boom Tip Junction Box, regardless of the actual physical location of the A2B Sensor.

When Two A2B switches are in use the user may retain the dummy plug using the female dust cap connected to the junction box.



Hardware Installation

4.3.4 Hardwired Load Link (KMD)

Mounting instructions are the same for the Load Links contained in kits 102096 and 102097

4.3.4.1 CAN Node IDs

In order to work with the PRS90 system the CAN IDs of the Load Link sensor must be 49. The Node ID of the load cell (KMD) sensor within the 102096 and 102097 kit is set to 49 (i.e. no changes are required by the customer).

4.3.4.2 Preparation for Assembly

As they are precision sensors, the load cells (KMDs) must be handled with care during transport, mounting and operation.

The permitted mechanical, thermal and electrical limit values must be adhered to.

The fSENS KMD load cells come complete with an integrated amplifier and therefore do not require particular installation information. Assembly can be performed simply and quickly.

IMPORTANT

The Load Link (KMD) sensors contained within kits 102096 and 102097 may only be used for the tension direction and be subjected to the loads for which they were designed.



CAUTION

Destruction of the sensor due to incorrect loads.

fSENS KMD products may not under any circumstances be subjected to bending or torsion loads.

Tensile force measuring load cells are usually mounted between fork bearings or eye bearings of cable attachment points. The sensor can be installed in any position.



HINT

In order to minimize measuring errors, ensure when mounting that the bolts used have been greased beforehand. The measuring tongue must not be exposed to twisting and/or bending forces during operation.

Hardware Installation

IMPORTANT

Never press in the bearing bolt using force; this causes shunt forces, which may have a negative influence on the measured results.

**NOTE**

The measuring load cells may be stretched by up to 3 mm under load. Please ensure that this area remains free to ensure reliable measuring results.

4.3.4.3 Cabling Connection

The hardwired load link (KMD) sensor has a male M12 CAN Connection. This connection can be connected to any length CAN cable. The recommended connection device is either the CAN port on the CAN Boom Tip Junction Box (061164) or the 4-port CAN Junction Block (934637762).

Hardware Installation

4.3.5 Hardwired Line Rider (SKM)

Mounting instructions are the same for the Line Riders contained in kits 102090, 102091, 102092, 102093, 102094, or 102095.

4.3.5.1 CAN Node IDs

In order to work with the PRS90 system the CAN IDs of the Line Rider sensor must be 49. The Node ID of the line rider (SKM) sensor within the 102090, 102091, 102092, 102093, 102094, and 102095 kits is set to 49 (i.e. no changes are required by the customer).

4.3.5.2 Preparation for Assembly

As they are precision sensors, the line riders (SKMs) must be handled with care during transport, mounting and operation.

The permitted mechanical, thermal and electrical limit values must be adhered to.

The line riders (SKMs) come complete with an integrated amplifier and therefore do not require particular installation information. Assembly can be performed simply and quickly.

4.3.5.3 Cabling Connection

The hardwired line rider (SKM) sensor has a male M12 CAN Connection. This connection can be connected to any length CAN cable. The recommended connection device is a CAN Y Splitter (PN 90000077, contained within line rider kits). The CAN Y Splitter is then installed to the male port on the cable reel, therefore only have one CAN Cable to route down the boom (see system layout drawing for line riders for more detail).

Alternatively the Line Rider may be connected to either the CAN port on the CAN Boom Tip Junction Box (061164) or the 4-port CAN Junction Block (934637762).

Hardware Installation

4.4 Wireless Sensors

When mounting wireless sensors it is best to keep the shortest possible distance between the sensor and receiver antennas.

Optimal ranges are achieved if the antenna is aligned in accordance with the alignment of the receiver antenna and can radiate as freely as possible.

**HINT**

If the mounting area is not easy to access, you should only mount the wireless sensor after commissioning and establishing the radio link!

IMPORTANT

The function of the antenna and hence the whole system can be impaired if an antenna with a mismatching antenna radiator is used.

Always use the antenna included in the scope of supply!

The unique IDs of the wireless sensors must be added by the user through the console (see [Section 4.4.1](#)). Wireless sensors have unique IDs in order to register to the TRS10-W2 but do not have individual CAN Node ID. Individual sensor status is communicated on the CAN Bus via the TRS10-W2. Adding wireless sensors through the console will register the sensor to the TRS10-W2 (Node ID 31). The sensor spot on the PRS90 display console is determined by the sensor spot on the TRS10-W2.

Hardware Installation

4.4.1 Wireless Sensor Unique IDs

Every wireless sensor has a Unique ID located on the battery terminal and is used when adding wireless sensors to the system. Wireless sensors that are no longer to be used must be deleted from the list of installed sensors (see [Section 5.3.2](#)).

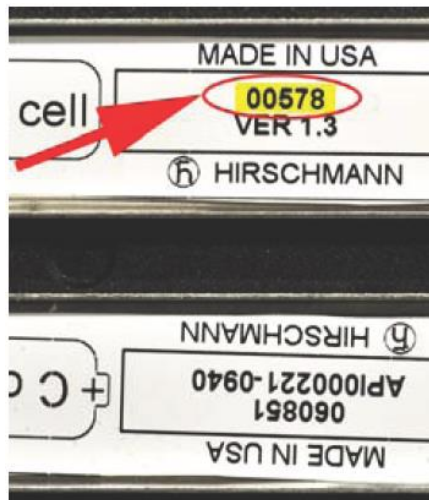
**NOTE**

THE FOLLOWING INFORMATION WILL BE NEEDED TO REGISTER SENSORS PRIOR TO INSTALLATION.

PLEASE COMPLETE THIS STEP BEFORE INSTALLING YOUR SENSORS

Before registering any sensor, the following must be done:

- Open the battery compartment
- Remove the batteries
- Make note of the Unique ID
 - The Unique ID is a 5 digit number
 - The Unique ID is located above the software version number (see figure below)
- Install batteries
- Close and secure the battery compartment
- Use [Section 5.3.1.1](#) to register wireless sensors



Hardware Installation

Sensor #	Sensor Type	Sensor ID
1		
2		
3		
4		
5		
6		
7		
8		

Example:

1	<i>Wind</i>	00578
---	-------------	--------------

Hardware Installation

4.4.2 Wireless Load Link (KMD)

The 102028 (EU 608182) and 102029 (EU 608183) kits include all of the necessary mounting hardware, along with batteries and required 2.4GHz antenna.

As they are precision sensors, the load cells (KMDs) must be handled with care during transport, mounting and operation.

Tensile force measuring load cells are usually mounted between fork bearings or eye bearings of cable attachment points. The sensor can be installed in any position.

The sensor can be installed in any position. However, it is useful for the status LED to be visible so that the function can be checked.

**HINT**

In order to minimize measuring errors, ensure when mounting that the bolts used have been greased beforehand. The sensor must not be exposed to twisting and/or bending forces during operation.

IMPORTANT

Never press in the bearing bolt using force; this causes shunt forces, which may have a negative influence on the measured results.

Hardware Installation

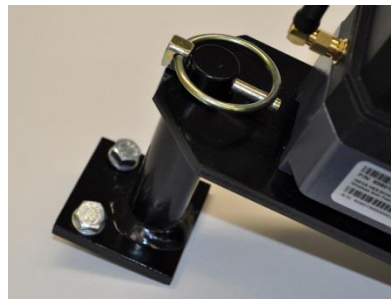
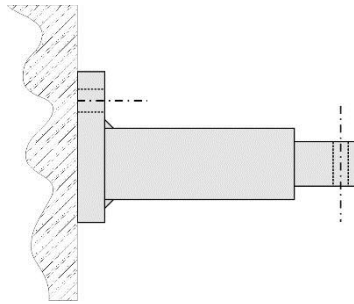
4.4.3 Wireless A2B

The 102030 (EU 608180) kit includes all of the necessary mounting hardware, along with batteries, required 2.4GHz antenna, and weight.

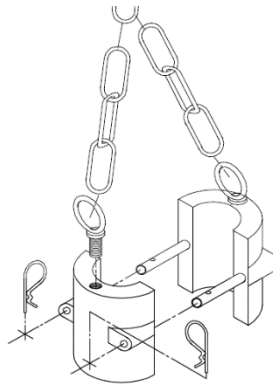
The hoist limit switch is intended for use on the point of the boom or alternatively on a boom extension. Two mounting bolts are included in the scope of supply for this purpose.

The mounting bolts can either be screwed or welded to a sufficiently stable surface.

Ensure when mounting that the mounting bolt is orientated horizontally, so that the hoist limit switch can settle in a vertical position during operation. The switch (comes attached to mounting plate already when 102030 kit is ordered) is pushed onto the mounting bolt and secured with a lynch pin.



The hoist limit switch weight included in the scope of supply is fastened to the end of the actuating cable with the aid of the chain connector included in the scope of supply.



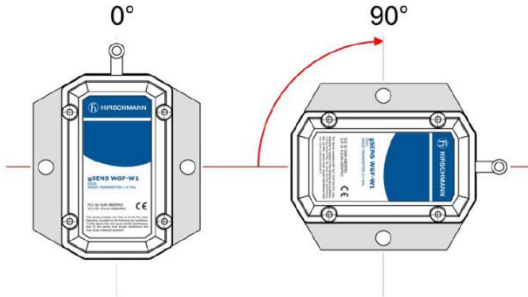
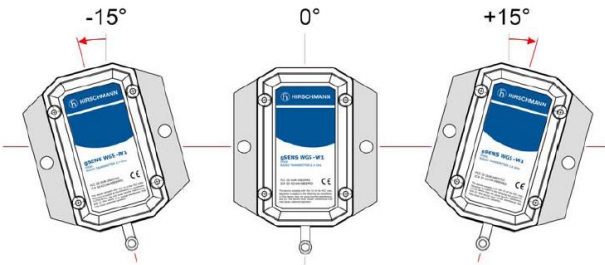
After hooking on the hoist limit switch chain, remove both locking springs from the hoist limit switch weight and carefully pull the front half of the weight off the guide pins. Now insert the lifting rope. After the assembly and the fitting of the locking springs, the mounting of the hoist limit switch weight is complete. Finally, check the free movement of the weight and the function of the hoist limit switch.

Hardware Installation

4.4.4 Wireless Angle

The 102031 (EU 608181) and 608360 kits include all of the necessary mounting hardware, along with batteries and required 2.4GHz antenna.

The wireless angle sensors are fastened to a mounting plate. The mounting plate is able to be installed with two screws on a sufficiently stable surface.

Angle Sensor Type	Angle Positions	Antenna Location
-10° to +100° WGF-W1 (kit 102031 EU 608181)		Top of the Sensor
±15° WGS-W1 (kit 608360)		Bottom of the Sensor

Hardware Installation

4.4.5 Wireless Wind

The 102032 (EU 608179) kit includes all of the necessary mounting hardware, along with batteries and required 2.4GHz antenna.

The kit includes a mounting tube with an angled mounting flange. It can be screwed or welded to a suitable surface. Alternatively pipe clamps (not included in kit) can be used. When mounting the tube ensures that the mounting flange is oriented horizontally, so that the wireless sensor can always settle in a vertical position during operation.

Please note the following when mounting the wind sensor:

- Mount the sensor at the highest possible position without shelter from the wind
- The sensor must always be able to settle in a vertical position during operation
- The cup rotary must always be able to turn freely during operation

The sensor is pushed onto the mounting flange of the mounting tube between two plastic washers and secured with a locking spring.

Be sure to use the two plastic washers included in the scope of supply in order to ensure permanent free movement:

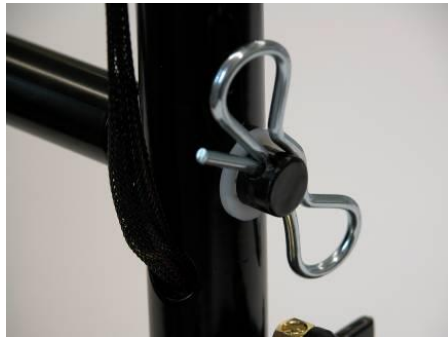


Figure 4: Mounting Between Two Plastic Washers and Securing With Bow Tie Cotter Pin



Figure 5: Mounting Tube with Sensor Mounted

Commissioning

5 Commissioning

At least one sensor must be available in order to commission and operate the system.

5.1 Switching the Device On and Off

The PRS 90 is switched on or off by connecting or disconnecting the power supply. After switching on, the acoustic alarm sounds briefly and the system begins with a self-diagnosis routine.

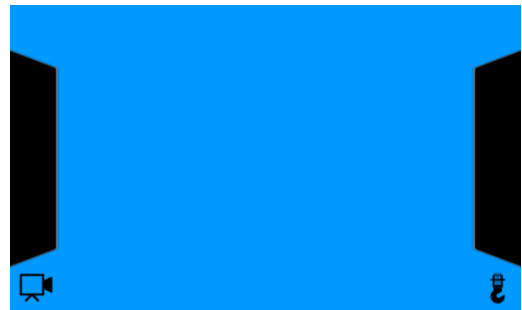
5.2 First Boot

The first boot up will show an empty screen. See [Section 5.1](#) for more detail on the main working screen(s).

First Boot Up Screen



vSCALE D2



vSCALE D3

Press any of the unassigned function buttons to enter the Options Menu (see [Section 5.2](#) for detail on the Operations Menu).

Function Buttons to Press to Enter Options Menu



5.1 Main Working Screen

The system will boot to the main working screen upon startup. See [Section 3.1](#) for the main working screen layout, including information on the CAN Heartbeat (see [Section 3.2](#)) and sensor bar (see [Section 3.3](#)).

Commissioning

5.2 Options Menu (Commissioning)

MAIN WORKING
SCREENOPTIONS
MENU

All menus (except for setting the rope reeving, see [Section 3.3.1](#)) are accessed through the Options Menu Screen. Press any unassigned function key from the main working screen to enter the Options Menu Screen.

Function Buttons to
Press to Enter
Options Menu



Options Menu



vSCALE D2



vSCALE D3

Function
Keys



Add Wireless Sensor
(see [Section 5.3.1.1](#))



Add Hardwired CAN Sensor
(see [Section 5.3.1.2](#))



Delete Sensors
(see [Section 5.3.2](#))



Limit Menu Screen
(see [Section 5.3.4](#))



Calibrate Sensors
(see [Section 5.3.3](#))



Setup Menu Screen
(see [Section 5.4](#))

**NOTE**

The symbol  indicates that the screen is password protected. If the system is not unlocked, the password entry prompt will appear.

See [Section 5.3](#) for more information on unlocking the system.

Commissioning



5.3 Password Entry

Screens that are password protected will prompt the user to enter a password.



Password Input is done by the following instructions:

Instructions



- When entering the screen, the first of the four digits will be highlighted in “green”
 - The Password for this system is **2034**
- Turn the rotary knob to change the highlighted digit to the desired number
- Once the highlighted digit has changed to the correct number, press the rotary knob to continue to the second digit
- Continue this process until all four digits have been entered
- Once the correct ID is entered, press the SET  key to register the sensor
- To abort, press the ESCAPE  key

If the password is incorrect there is no action.

Commissioning

5.3.1 Adding Sensors



Any combination of up to 8 sensors can be added to the system. The processes are different for adding wireless sensors and adding hardwired sensors. Press the Wireless Sensor function button to add wireless sensors and press the CAN function button to add hardwired sensors.

Function
Keys



Add Wireless Sensors
[Section 5.3.1.1](#)



Add Hardwired Sensors
[Section 5.3.1.2](#)

**NOTE**

If adding wireless sensors a TRS10-W2 must be on the CAN-Bus with a Node ID of 31. If the TRS10-W2 is missing or of the incorrect Node ID the Adding Wireless Sensor function button will have no function.

Hardwired sensors will not be added unless they have the expected Node ID

**NOTE**

If in the event a piece of hardware needs replaced, the sensor must be deleted from the console (and TRS10-W2 if wireless) then re-added!

Simply changing hardware will result in an invalid configuration!

**NOTE**

Hardwired Sensors (with exception of A2B Sensors) must be installed one at a time (with exception of the A2B sensor).

Example: When adding a Cable Reel and Standalone Angle Sensor

- First connect the CAN connection of the Cable Reel (with angle sensor CAN connection detached),
- Add the Cable Reel sensor(s) to the console,

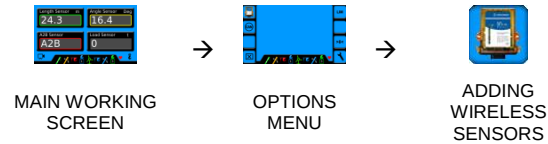
Commissioning

- **Then connect the Standalone Angle sensor,**
- **Add the Standalone Angle sensor to the Console.**

Commissioning



5.3.1.1 Adding Wireless Sensors



vSCALE D2



vSCALE D3

Function
Keys

Add Wireless Windspeed



Add Wireless A2B



Add Wireless KMD



Add Wireless Angle

Instructions The process for adding wireless sensors is the same between all sensor variants.

- Press the function button for the desired wireless sensor to be added
- A prompt to enter the Sensor ID will appear (see figure below) Enter the unique ID located on the transmitter battery terminal (see [Section 4.4.1](#))

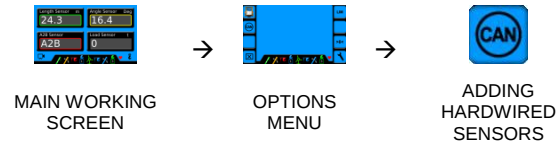


- Turn the rotary knob to change the highlighted digit to the desired number
- Once the highlighted digit has changed to the correct number press the rotary knob to continue to the second digit
- Continue this process until all five digits have been entered
- Once the correct ID is entered press the SET  key to register the sensor
- If the sensor was added successfully the icon will appear in the next available spot in the sensor bar.

Commissioning



5.3.1.2 Adding Hardwired Sensors



vSCALE D2



vSCALE D3

Function
Keys

Add Hardwired Length
Node ID 51



Add Hardwired Angle
Node ID 53



Add Hardwired A2B
Node ID 55



Add Hardwired Load
Node ID 49

Instructions

The process for adding hardwired sensors is the same between all sensor variants.

- Press the function button for the desired wireless sensor to be added
- If the sensor was added successfully the icon will appear in the next available spot in the sensor bar.

Node ID

It is important to note the hardwired sensors will not be added unless they have the expected Node ID: The Node ID of the sensor will change to the assigned sensor spot until the sensor is deleted. At that time the Node ID will revert to the expected starting Node ID.

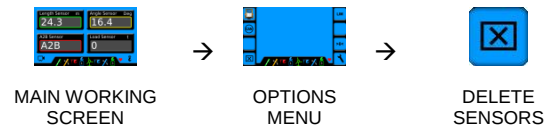
**NOTE**

The A2B signal passes through a CAN converter board located within the Cable Reel. If an Auxiliary Boom Nose or Swingaway A2B switch is added the signal will be in series. Thus only one Hardwired A2B needs to be added to the system.

Commissioning



5.3.2 Deleting (Removing) Sensors



vSCALE D2



vSCALE D3

Wireless sensors that are no longer to be used must be deleted from the list of available sensors. Press the Delete Sensors function button from the Options Menu will call up the Delete Sensor screen.

Instructions

- Press the corresponding function button to delete the desired sensor
- When a sensor is successfully deleted it will disappear from the sensor bar, main working screen, and all associated buttons

NOTE: All other sensors will keep their previous spot

Example when sensor #7 (hardwired A2B) is deleted:

Example

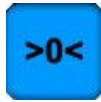


vSCALE D2



vSCALE D3

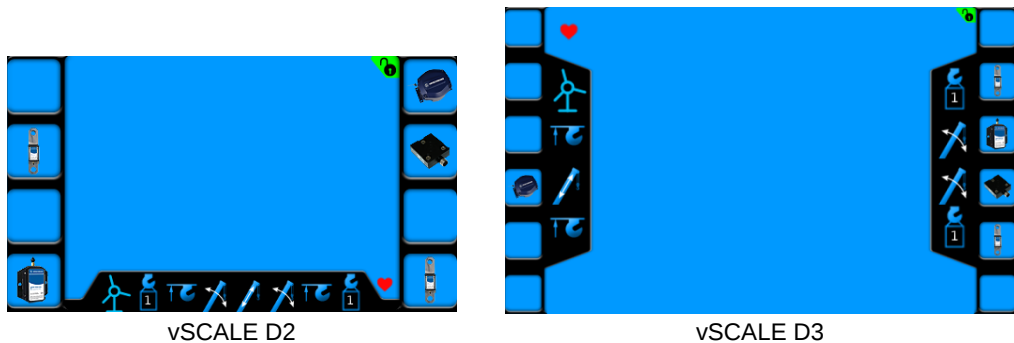
Commissioning

**5.3.3 Sensor Calibration**

When using load sensors (all types, wireless force transducer or hardwired force transducer or hard-wired line rider) the sensor must first be zeroed (see [Section 5.3.3.3](#)), then the correct rope reeving must be set (see [Section 3.3.1](#)).

If the system is used together with angle sensors, the zero point of the angle sensor must be adjusted after mounting (see [Section 5.3.3.1](#)).

If the system is used together with length sensors, the minimum and maximum telescoping boom lengths must be adjusted after mounting (see [Section 5.3.3.2](#)).



Setting the zero point is necessary after the installation of each angle, load, and length sensor. Pressing the Sensor Calibration function button from the Options Menu will call up the Sensor Calibration Screen.

What Sensors Must Be Calibrated?

Calibrate Angle Sensor (see [Section 5.3.3.1](#))
same process for both hardwired and wireless sensors



Calibrate Length Sensor (see [Section 5.3.3.2](#))



Calibrate Load Sensor (see [Section 5.3.3.3](#))
same process for both hardwired and wireless sensors



Commissioning



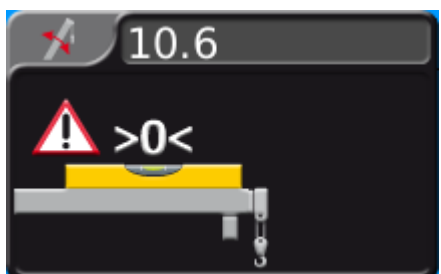
5.3.3.1 Angle Sensor Calibration



To calibrate Angle Sensor, press the corresponding function button in the Calibrate Sensors Screen (see [Section 5.3.3](#)) for the desired sensor. This will call up the Angle Sensor Calibration Screen.

Instructions

The calibration procedure is the same for boom angle sensors (wireless or hardwired) and wireless hook block angle sensors (PN: 608360)

1. Fully retract boom 2. Press the SET  key to confirm this step is completed	
3. Boom down to 0° 4. Measure the boom with a digital level to ensure it is at zero degrees. 5. Press the SET  key to confirm this step is completed	
6. Allow the boom to settle, and verify the boom is at 0° with a digital level 7. Press the SET  key to confirm this step is completed	

Commissioning

8. Set the positive direction for the angle sensor by booming up at least 5°
9. Press the SET  key to confirm this step is completed.
 - **NOTE:** If an optional angle sensor is added and mounted on the hook block move the hook block (or object the angle sensor is mounted on) at least 5°



10. Calibration Complete

NOTE: Pressing the ESCAPE  key at any point will abort the process.

Commissioning



5.3.3.2 Length Sensor Calibration



To calibrate Length Sensor, press the corresponding function button in the Calibrate Sensors Screen (see [Section 5.3.3](#)) for the desired sensor. This will call up the Length Sensor Calibration Screen.

Instructions



The Rotary Knob is used to set the retracted and extended boom length.

- Turning the rotary knob clockwise will increase the set length by 0.1unit (either meters or feet, refer to see [Section 5.4.5](#) to set system units)
- Turning the rotary knob counterclockwise will decrease the set length by 0.1unit

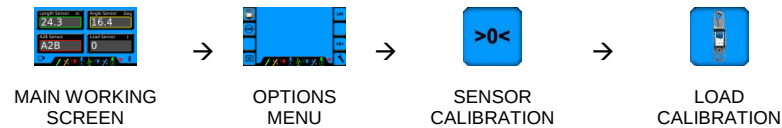
1. Fully retract boom 2. Use the Rotary Knob to set the retracted boom length (Example shows 25.7') 3. Press the SET  key to confirm this step is completed	
4. Fully extend boom 5. Use the Rotary Knob to set the extended boom length (Example shows 52') 6. Press the SET  key to confirm this step is completed	
7. Calibration Complete	

NOTE: Pressing the ESCAPE  key at any point will abort the process.

Commissioning



5.3.3.3 Load Sensor Calibration



To calibrate Load Sensor, press the corresponding function button in the Calibrate Sensors Screen (see [Section 5.3.3](#)) for the desired sensor. This will call up the Load Sensor Calibration Screen.

Instructions The calibration procedure is the same for both hardwired and wireless load sensors.

1. Remove all load from the sensor 2. Press the SET  key to confirm the zero point has been set.	
3. Calibration Complete	

NOTE: Pressing the ESCAPE  key at any point will abort the process.

Commissioning

5.3.4 Limit Value Monitoring (Commissioning)MAIN WORKING
SCREENOPTIONS
MENU

LIMITS

In addition to having a 'limit value monitoring' function with programmable limit values, digital output limit signals can be enabled or disabled. These are enabled / disabled in the sensor limit screen (see [Section 5.3.4.1](#)).

Press the Limits function button from the Options Menu Screen to call up the Limits Screen.

Limits Screen



vSCALE D2



vSCALE D3

Available Limit
Menus

Limit for Angle Sensor (see [Section 3.4.1.1](#))



Limit for Length Sensor (see [Section 3.4.1.2](#))



Limit for Load Sensor (see [Section 3.4.1.3](#))



Limit for Wind Sensor (see [Section 3.4.1.4](#))

Limits for A2B are not able to be set.

Commissioning

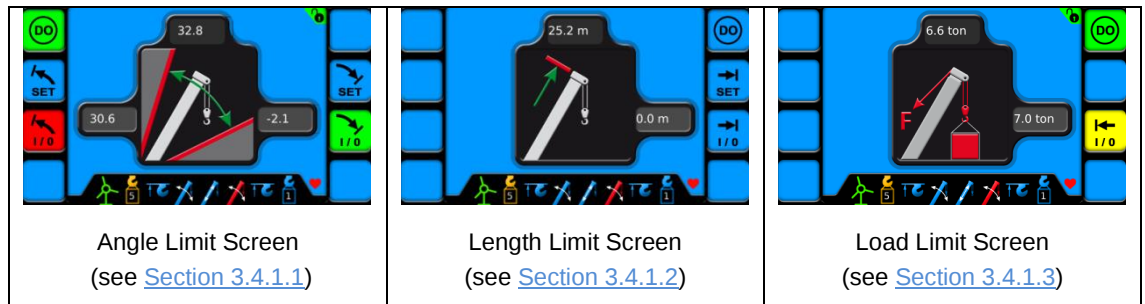


5.3.4.1 Limit Output Signals

Limit output signals can be enabled for individual sensors or in combination. Limit output signals are able to be enabled/disabled for Angle, Length, and Load sensors and is always enabled for A2B sensors.

When enabled the corresponding digital output for the sensor will deactivate (no longer supply ground) when an active set user limit is exceeded. If the limit is set but is not active, then the output will always be high (provide ground).

Limit Output Signals
are set in the
Individual Sensor
Limit Screen



Digital Output	Digital Output State	
	High Provides ground	Low Does not provide ground
DO 1 A2B, Load, and Length	If <u>all</u> of the following conditions are met: - A2B OK - Length Limit is either: - Activated and within Set Limits - Not Activated - Load Limit is either: - Activated and within Set Limits - Not Activated	If <u>any</u> of the following conditions are met: - A2B Not OK - Length Limit Activated and Exceeded or in error state - Load Limit Activated and Exceeded or in error state
DO 2 Angle Low	- Lower Angle Limit is either: - Activated and within Set Limits - Not Activated	Lower Angle Limit Activated and Exceeded or in error state
DO 3 Angle High	- Upper Angle Limit is either: - Activated and within Set Limits - Not Activated	Upper Angle Limit Activated and Exceeded or in error state

Commissioning

**NOTE**

Relays will need to be added for Limit Output Signals! DOs 1-3 supply ground.

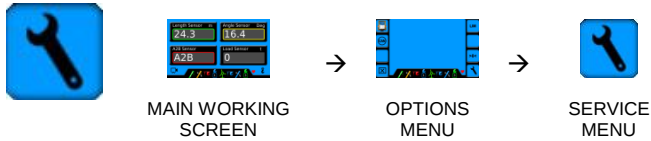
**5.3.4.2 Enabling Limit Output Signals**

Pressing the DO function button in the Angle Limit, Length Limit, or Load Limit screens will enable / disable the limit output signal.

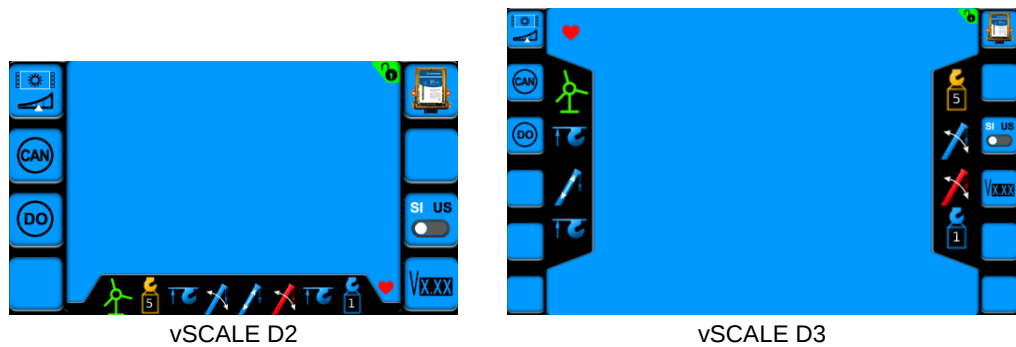


Commissioning

5.4 Service Menu



The Service Menu allows the user to adjust screen brightness, monitor Sensor and Digital Output information, sync sensors (in the event the console needs replaced), change system units, and view software version. Press the Service function button from the Options Menu Screen to call up the Service Menu.



Function Keys



LCD Brightness
(see [Section 5.4.1](#))



Sensor Information Transfer
(see [Section 5.4.4](#))



CAN Information
(see [Section 5.4.2](#))



Set Units
(see [Section 5.4.5](#))



Digital Output Information
(see [Section 5.4.3](#))



Version Info Screen
(see [Section 5.4.6](#))

**NOTE**

The symbol  indicates that the screen is password protected. If the system is not unlocked, the password entry prompt will appear.

See [Section 5.3](#) for more information on unlocking the system.

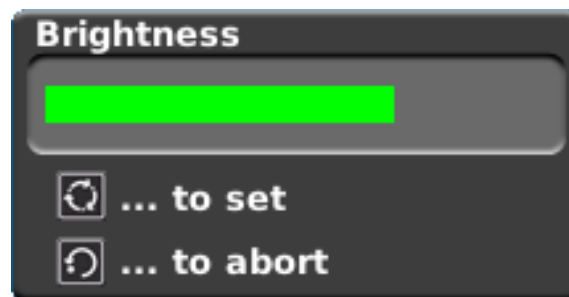
Commissioning



5.4.1 LCD Brightness



The brightness of the LCD screen is able to be adjusted from 5% to 100%. Pressing the LCD Brightness Function Button from the Service Menu Screen will call up the LCD Brightness Screen.



Instructions LCD Brightness is set by the following instructions:

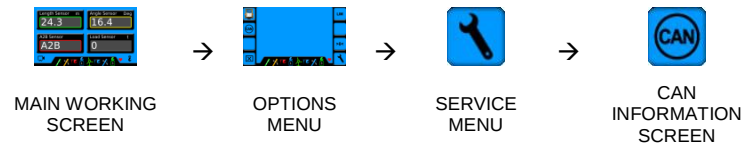


- Turn the rotary knob clockwise to increase the brightness
- Turn the rotary knob counterclockwise to decrease the brightness
- Once the desired brightness is selected, press the SET  key to set
- To abort, press the ESCAPE  key

Commissioning



5.4.2 CAN Information



All sensors have a CAN communication signal (wireless sensors are converted to a CAN signal through the TRS10-W2 Receiver, and hardwired A2B sensors are converted to CAN in the cable reel). Pressing the CAN Function Button from the Service Menu Screen will call up the CAN Information Screen.

Sensors	ID	Stat	Raw	Scaled
Wireless Wind	1391	12	0.0	0.00
Wireless Load	2241	12	15094	6.68
Wireless A2B	2205	12	242	-2.00
Wireless Angle	1739	12	3556	36.15
CAN Length	5	5	2331	25.19
CAN Angle	6	5	21238	32.38
CAN A2B	7	5	8.0	166.59
CAN Load	8	5	-2.0	0.00

vSCALE D2

Sensors	ID	Stat	Raw	Scaled
Wireless Wind	1391	12	0.0	0.00
Wireless Load	2241	12	3680	6.35
Wireless A2B	2205	12	242	0.00
Wireless Angle	1739	12	3629	36.29
CAN Length	5	5	973	25.22
CAN Angle	6	5	22204	42.04
CAN A2B	7	5	8.0	0.00
CAN Load	8	5	-2.0	0.00

vSCALE D3

The CAN Information Screen shows:

- Sensor Type
- Sensor ID
- Sensor Status
- Raw Value
- Scaled Value (value after sensor is calibrated)

Sensor IDs

The Sensor ID of wireless sensors is the ID entered in [Section 5.3.1.1](#)

The Sensor ID of hardwired sensors is the sensor spot they are added to (see [Section 5.3.1.2](#) for more detail)

Sensor Status

Wireless Sensors

0	TRS10-W2 Disconnected
8	Sensor Error
12	Sensor OK

Hardwired Sensor

0	Sensor Disconnected
5	Sensor OK
127	Sensor Not Initialized

Commissioning



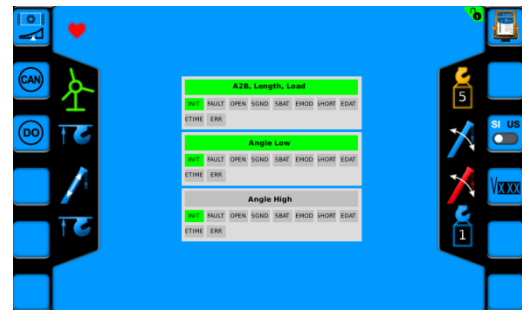
5.4.3 Digital Output Information



The system has three digital outputs. Pressing the Digital Output Function Button from the Service Menu Screen will call up the Digital Output Screen.



vSCALE D2



vSCALE D3

Limit output signals can be enabled for individual sensors or in combination. Limit output signals are able to be enabled or disabled for Angle, Length, and Load sensors and is always enabled for A2B sensors. See [Section 5.3.4.1](#) for enabling limit output signals and [Section 3.4.1](#) for setting user limits.

When enabled the corresponding digital output for the sensor will deactivate (no longer supply ground) when an active set user limit is exceeded. If the limit is set but is not active, then the output will always be high (provide ground).

Digital outputs will display green when high (supplying ground).

Digital outputs will display gray when low (no longer supplying ground).

**NOTE**

Relays will need to be added for Limit Output Signals! DOs 1-3 supply ground.

Commissioning

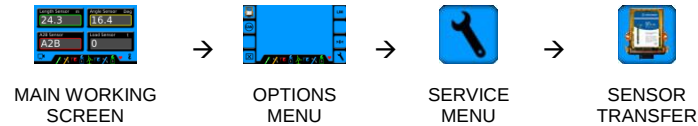
Description of DOs

Digital Output	Digital Output State	
	High Provides ground	Low Does not provide ground
DO 1 A2B, Load, and Length	If <u>all</u> of the following conditions are met: ■ A2B OK ■ Length Limit is either: ○ Activated and within Set Limits ○ Not Activated ■ Load Limit is either: ○ Activated and within Set Limits ○ Not Activated	If <u>any</u> of the following conditions are met: ■ A2B Not OK ■ Length Limit Activated and Exceeded or in error state ■ Load Limit Activated and Exceeded or in error state
DO 2 Angle Low	■ Lower Angle Limit is either: ○ Activated and within Set Limits ○ Not Activated	■ Lower Angle Limit Activated and Exceeded or in error state
DO 3 Angle High	■ Upper Angle Limit is either: ○ Activated and within Set Limits ○ Not Activated	■ Upper Angle Limit Activated and Exceeded or in error state

Commissioning



5.4.4 Sensor Transfer Information



In the event the console needs replaced there is a Sync function that allows the user to restore the previously set sensor setup. This function will only work when there is no sensor data on the console. The function only works one way (Example: it is not possible to download sensor information from the console to TRS10-W2 in the event the receiver needs replaced).

Navigate to the Service Menu and simply press the Sensor Transfer function button. If successful, the sensor bar will populate with the previous sensors.

IMPORTANT

SENSORS WILL NEED TO BE RECALIBRATED AND LIMITS RESET AFTER SENSOR TRANSFER



5.4.5 Set Units



The units can be set in the Service Menu by pressing the Units Function Button. The units will switch between Metric (SI) and Domestic (US) each time the function button is pressed and is indicated visually by the button in the setup screen. The main working screen, limit screen, and calibration screens will show the corresponding units.

Description Unit
Buttons

Icon	Actual Units		
	Length	metric ton	m
	Load	metric ton (tonne)	t
	Wind	meters per second	m/s
	Length	feet	ft
	Load	kilopound	kip
	Wind	miles per hour	mph

Service and Maintenance



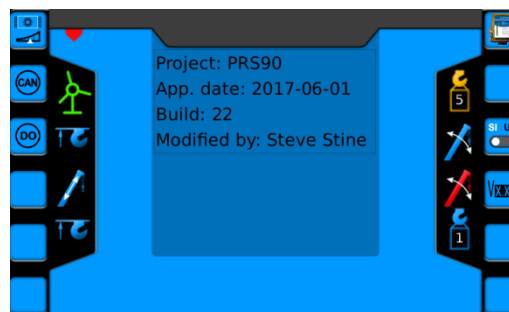
5.4.6 Version Info Screen



Pressing the Version Info function button from the Service Menu Screen will call up the Version Info Screen. This information will need to be provided in the event of a service issue.



vSCALE D2



vSCALE D3

6 Service and Maintenance

Maintenance

The **vSCALE** operating console contains no wearing parts and therefore cannot be opened. If you notice malfunctions or differences between actual and displayed measured values, you should switch the device off and have it checked and, if necessary, repaired immediately by an authorized WIKA Mobile Control service partner.

You must always keep the full details contained on the type plate on hand.

Cleaning

Clean the surface and the front screen of the device occasionally with a damp cloth and a mild detergent. Never use abrasive or aggressive detergents as these may damage the device.

IMPORTANT

Device may be damaged by the use of high-pressure cleaners.

The device must not be treated with a high-pressure cleaner or similarly aggressive method under any circumstances!

Service and Maintenance

Service and Maintenance

6.1 Uploading Software

**NOTE**

Item needed: 2 GB or less USB flash drive uploaded with software files.

Instructions

1. Ensure the system is turned off (crane ignition key turned to the “OFF” position).
2. Insert the USB flash drive with the software loaded into the USB port on the vSCALE console (see [Section 2.4](#) for more detail).
3. Press and hold F1 and F2 and turn the system ON (crane ignition key turned to “on” or ACCY” position). Continue to hold for an additional 10 seconds to ensure system recognizes the selection.



vSCALE D2



vSCALE D3

4. The system will now begin the uploading process. The screen will begin to display various messages as the software loads. This process may take several minutes.
5. Once step 4 has been completed, the console will boot normally. You may now power down the system (crane ignition key turned to the “OFF” position).
6. You can now safely remove the USB flash drive and replace the flap
7. The software has now been uploaded and the system is ready for use.

Appendix

7 Appendix

7.1 Technical Data

For the latest technical data, please refer directly to the vSCALE and TRS10-W2 manuals.

7.1.1 vSCALE

Part Number	608413 & 608416 (before software)
Operating voltage	9 - 36 V DC, suitable for 12 and/or 24 V on-board power supply
Protection	Short Circuit Protection yes Overvoltage Resistance 48V for 2 minutes Inverse Polarity Protection up to -48V DC
Digital Outputs	Short Circuit Protection up to 36 V I_{max} 300 mA, open drain $R_{DS,on}$ <1 Ohm $R_{DS,off}$ >100 kOhms
Protection Level	IP 6k6 and IP67 according to ISO 20653: Road Vehicles – Degrees of protection (IP-Code) – Protection of electrical equipment against foreign objects, water and access
Operating temperature range	-40°C to +75°C
Storage temperature range	-40 °C to +85 °C
vSCALE D2	Type TFT Color Graphic LCD with LCD Backlight Size 4.3", 95 mm (W) x 53 mm (H) Resolution 480x272px, WQVGA, 15:9 Colors 24bit / 16.7 Mio colors Brightness typ. 400 cd/m ² Contrast Ratio typ. 400:1 Buzzer 60 dB(A) in 30cm distance, lifetime 1000h
vSCALE D3	Type TFT Color Graphic LCD with LCD Backlight Size 7", 152mm (W) x 91mm (H) Resolution 800x400 px, WQVGA, 15:9 Colors 18bit / 262 K colors Brightness typ. 400 cd/m ² Contrast Ratio typ. 500:1 Buzzer 65 dB(A) in 30cm distance, lifetime 1000h

Appendix

7.2 Available Kits

The PRS90 kit can accept any combination of wireless or hardwired sensors. If using wireless sensors one wireless receiver kit must also be purchased.

Base Console Kits			
Kit Number	Kit Contents	Features	Picture
102052	■ vSCALE D2 ■ Ram Mount & Mounting Hardware ■ Power Harness ■ CAN Splitter ■ PRS90 Manual	■ 4.3" Display	
102053	■ vSCALE D3 ■ Ram Mount & Mounting Hardware ■ Power Harness ■ CAN Splitter ■ PRS90 Manual	■ 7" Display	

Wireless Receiver Kit			
Kit Number	Kit Contents	Features	Picture
102054	■ TRS10-W2 ■ Power Harness ■ Remote Mount 2.4GHz Antenna	■ Remote mount antenna allows optimal placement of antenna in short ranges	
102055	■ TRS10-W2 ■ Power Harness ■ 2.4GHz 90° Antenna	■ Non-remote mount antenna provides better signal quality	
102056	■ TRS10-W2 ■ Power Harness ■ Remote Mount 2.4GHz Antenna ■ 2.4GHz 90° Antenna	■ Both antennas for users that are not sure which antenna will work best in their application	

102050 Wireless Only Kit Upgrade			
Kit Number	Kit Contents	Features	Picture
102051	■ CAN Splitter ■ USB (for Software Update) ■ Updated PRS90 Manual	■ Upgrade existing wireless-only PRS90 Systems (102050) to system compatible with hardwired	n/a

Appendix

	Wireless Sensors³			
	Kit Number	Kit Contents	Features	Picture
Wireless Load	US: 102028	■ fSENS KMD-W1 (15k)	■ Direct Load Measurement up to 15,000lbs (6 tonnes)	
	EU: 608182	■ Mounting Hardware	■ Wireless	
	US: 102029	■ fSENS KMD-W1 (45k)	■ Direct Load Measurement up to 45,000lbs (20 tonnes)	
	EU: 608183	■ Mounting Hardware	■ Wireless	
Wireless Angle	US: 102031	■ gSENS WGF-W1 (-10° to +100°)	■ Boom angle measurement (-10° to +100°)	
	EU: 608181	■ Mounting Hardware	■ Wireless	
	US/EU: 608360	■ gSENS WGS-W1 (-15° to +15°)	■ Boom angle measurement (-15° to +15°)	
		■ Mounting Hardware	■ Wireless	
Wireless Wind Speed	US: 102032	■ iSENS WSS-W1	■ Wind speed measurement	
	EU: 608179	■ Mounting Hardware	■ Wireless	
Wireless Anti-Two Block	US: 102030	■ iSENS HES-W1	■ Anti-Two-Block (A2B) monitoring	
	EU: 608180	■ Mounting Hardware	■ Wireless	

³ To use Wireless Sensors with the PRS90 a Wireless Transceiver must be purchased (kits 102054, 102055, or 102056)

Appendix

Hardwired Sensors				
Kit Number		Kit Contents	Features	Picture
Cable Reel	102082	■ gSENS LWG 920 (49' tele, 72' total) ■ iSENS A2B Switch ■ Boom Tip Junction Box ■ CAN Termination Resistor ■ Cable Guides ■ Connection Cables ■ Mounting Hardware	■ Length, Angle, and A2B monitoring capability ■ Telescoping length range of 49' (72' total cable) ■ Not all sensors contained in reel are required to be programmed Example: only add A2B monitoring to system ■ Hardwired (CAN)	
	102083	■ gSENS LWG 950 (114' tele, 137' total) ■ iSENS A2B Switch ■ Boom Tip Junction Box ■ CAN Termination Resistor ■ Cable Guides ■ Connection Cables ■ Mounting Hardware	■ Length, Angle, and A2B monitoring capability ■ Telescoping length range of 114' (137' total cable) ■ Not all sensors contained in reel are required to be programmed Example: only add Length monitoring to system ■ Hardwired (CAN)	
Aux Nose / Swingaway A2B ⁴	102078	■ iSENS A2B Switch ■ Mounting Hardware ■ Connection Cables	■ Anti-Two-Block (A2B) monitoring ■ Hardwired ■ Must be used in conjunction with a cable reel kit (102080 or 102081)	
Standalone Angle	102077	■ WGX160/3510 (360°) ■ Connection (CAN) Cables ■ Mounting Hardware	■ Angle Measurement (360°) ■ Hardwired (CAN)	

⁴ Auxiliary/Swingaway Hardwired A2B Kit (102078) must be used in conjunction with a Cable Reel kit (102080 or 102081)

Appendix

Hardwired Sensors (cont.)			
Kit Number	Kit Contents	Features	Picture
Load Cell	■ fSENS KMD (10t)	■ Direct Load Measurement up to 10t (22,046lbs)	
	■ Mounting Hardware		
	■ Connection (CAN) Cables	■ Hardwired (CAN)	
	■ fSENS KMD (20t)	■ Direct Load Measurement up to 20t (44,092lbs)	
Line Rider	■ Mounting Hardware	■ Hardwired (CAN)	
	■ fSENS SKM (1/2")	■ Rope size of 1/2"	
	■ Mounting Hardware	■ Direct Load Measurement	
	■ Connection (CAN) Cables	■ Hardwired (CAN)	
	■ fSENS SKM (3/8")	■ Rope size of 3/8"	
	■ Mounting Hardware	■ Direct Load Measurement	
	■ Connection (CAN) Cables	■ Hardwired (CAN)	
	■ fSENS SKM (3/4")	■ Rope size of 3/4"	
	■ Mounting Hardware	■ Direct Load Measurement	
	■ Connection (CAN) Cables	■ Hardwired (CAN)	
	■ fSENS SKM (7/8")	■ Rope size of 7/8"	
	■ Mounting Hardware	■ Direct Load Measurement	
	■ Connection (CAN) Cables	■ Hardwired (CAN)	
	■ fSENS SKM (1")	■ Rope size of 1"	
	■ Mounting Hardware	■ Direct Load Measurement	
	■ Connection (CAN) Cables	■ Hardwired (CAN)	
	■ fSENS SKM (1-1/8")	■ Rope size of 1-1/8"	
	■ Mounting Hardware	■ Direct Load Measurement	
	■ Connection (CAN) Cables	■ Hardwired (CAN)	

Appendix

7.3 Wiring

Please refer to the following illustration for the pin configuration of the console, located on the back of the vSCALE Console.

Connector View

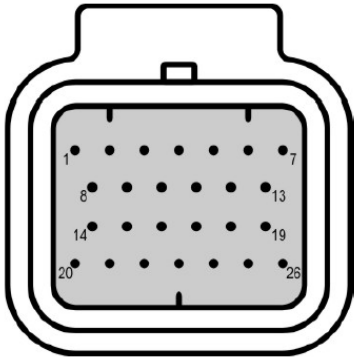


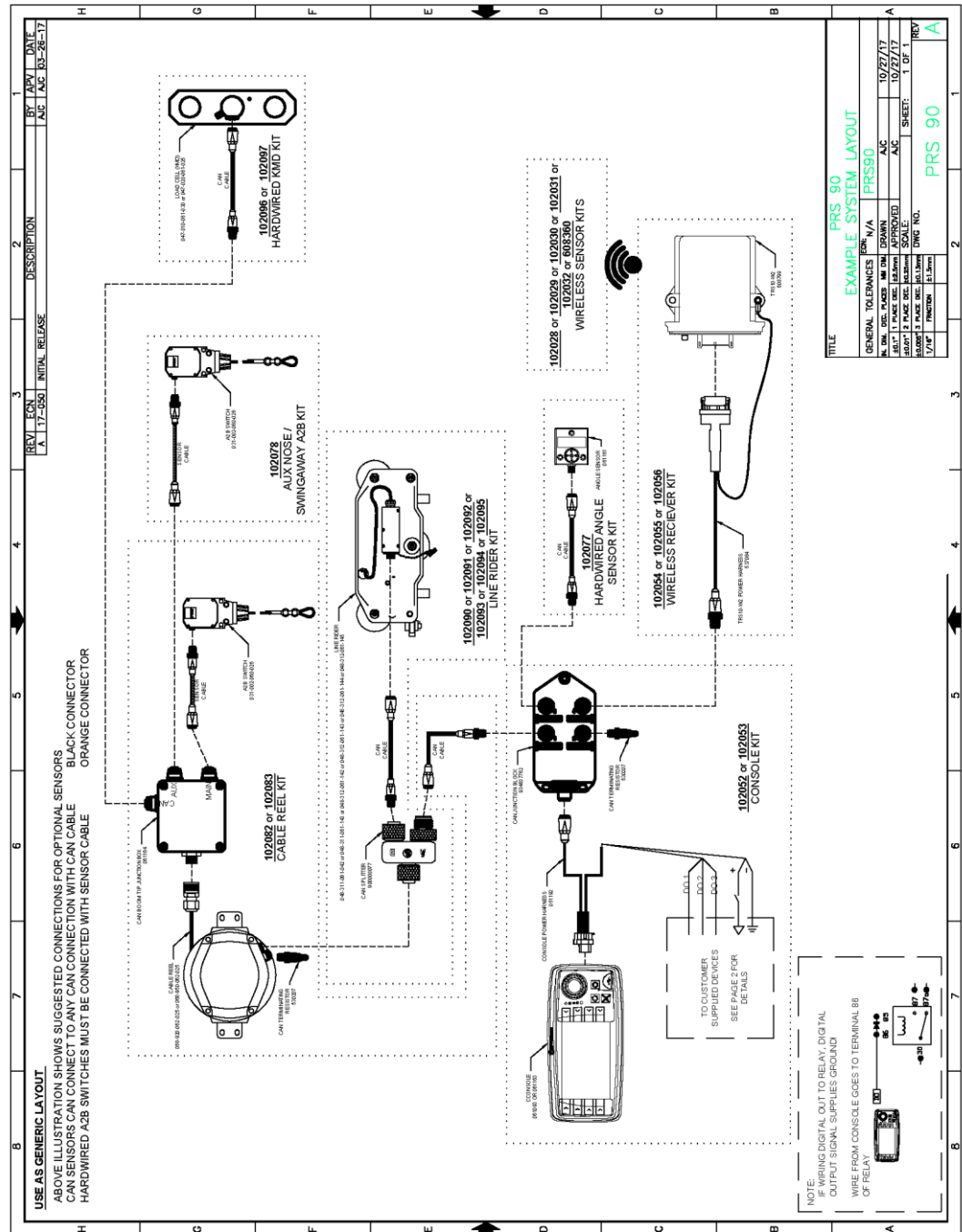
Figure 6: vSCALE D2 Pinout

Pin Assignment

Pin	Description	Pin	Description
1	Vcc +9...36 V DC	14	USB D-
2	Ignition	15	USB D+
3	GND	16	RS232 RxD
4	Car GND	17	RS232 TxD
5	n.c	18	RS232 GND
6	n.c.	19	AI/DI 3
7	n.c.	20	AI/DI 1
8	CAN 1 High	21	AI/DI 2
9	CAN 1 Low	22	AI/DI 4
10	CAN 2 High	23	SERV_ENABLE
11	CAN 2 Low	24	DO3
12	USB Vcc (+5V)	25	DO 1
13	USB GND	26	DO2

Appendix

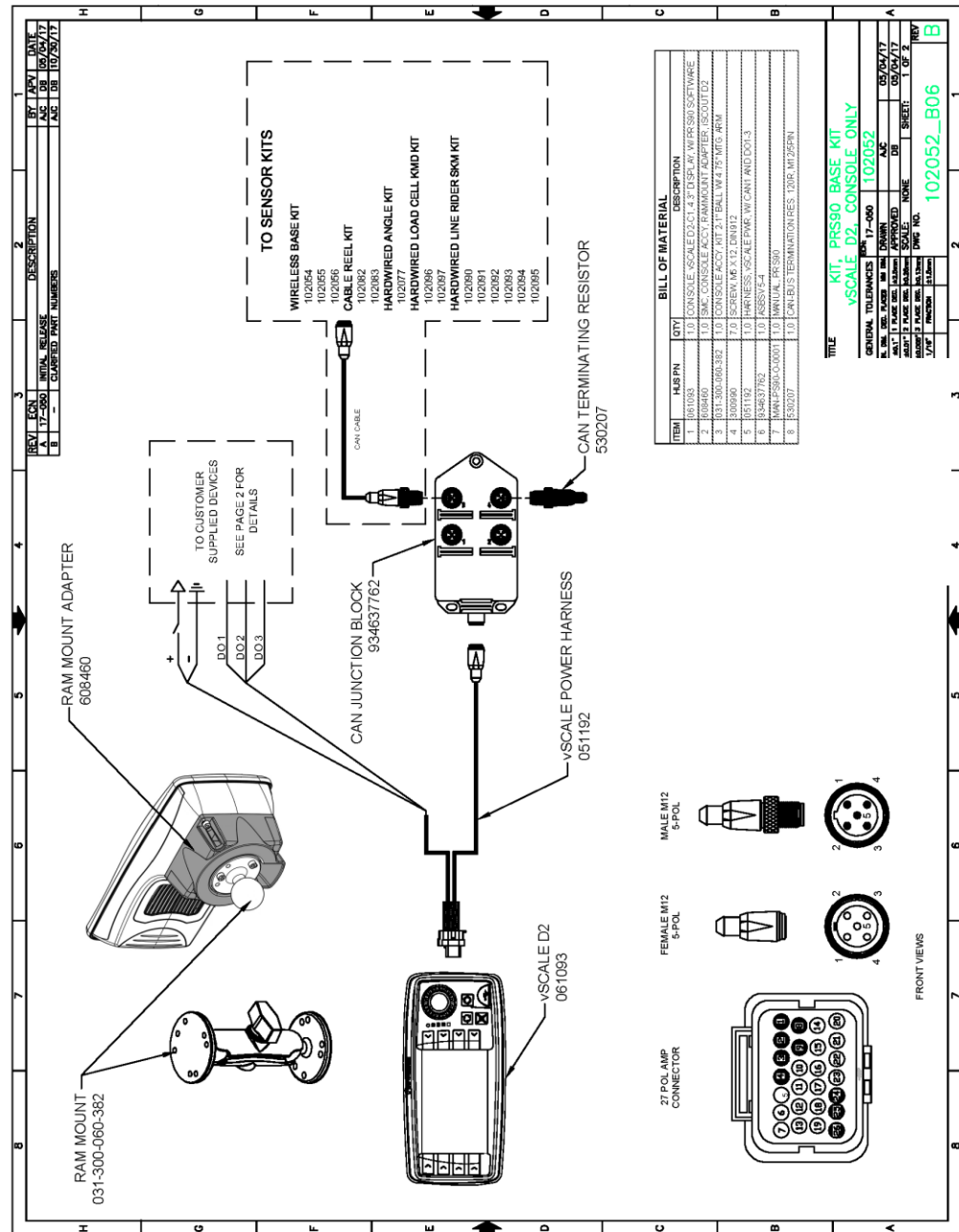
7.3.1 System Layout



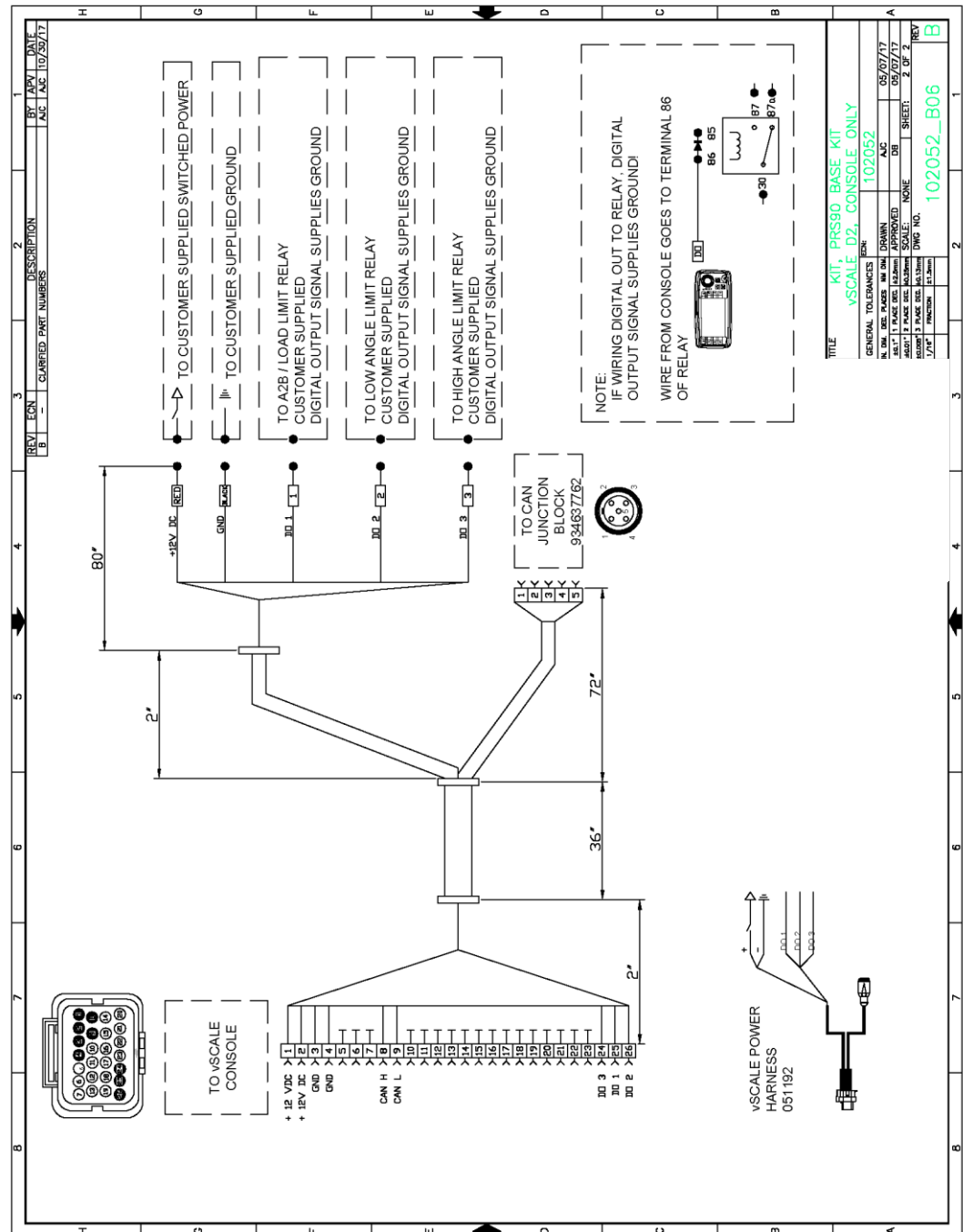
Appendix

7.3.2 Console Kits

7.3.2.1 102052 – D2 Console Kit

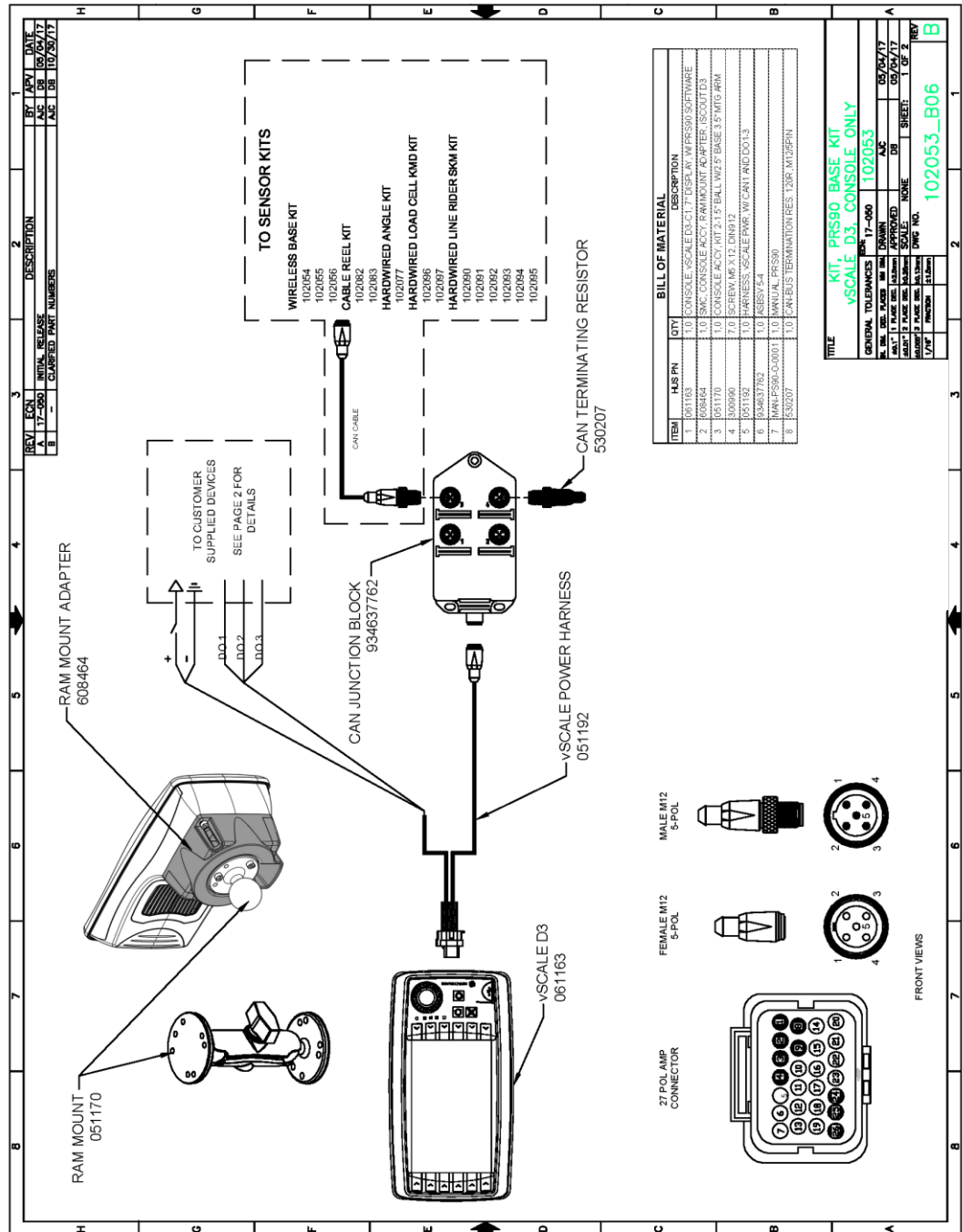


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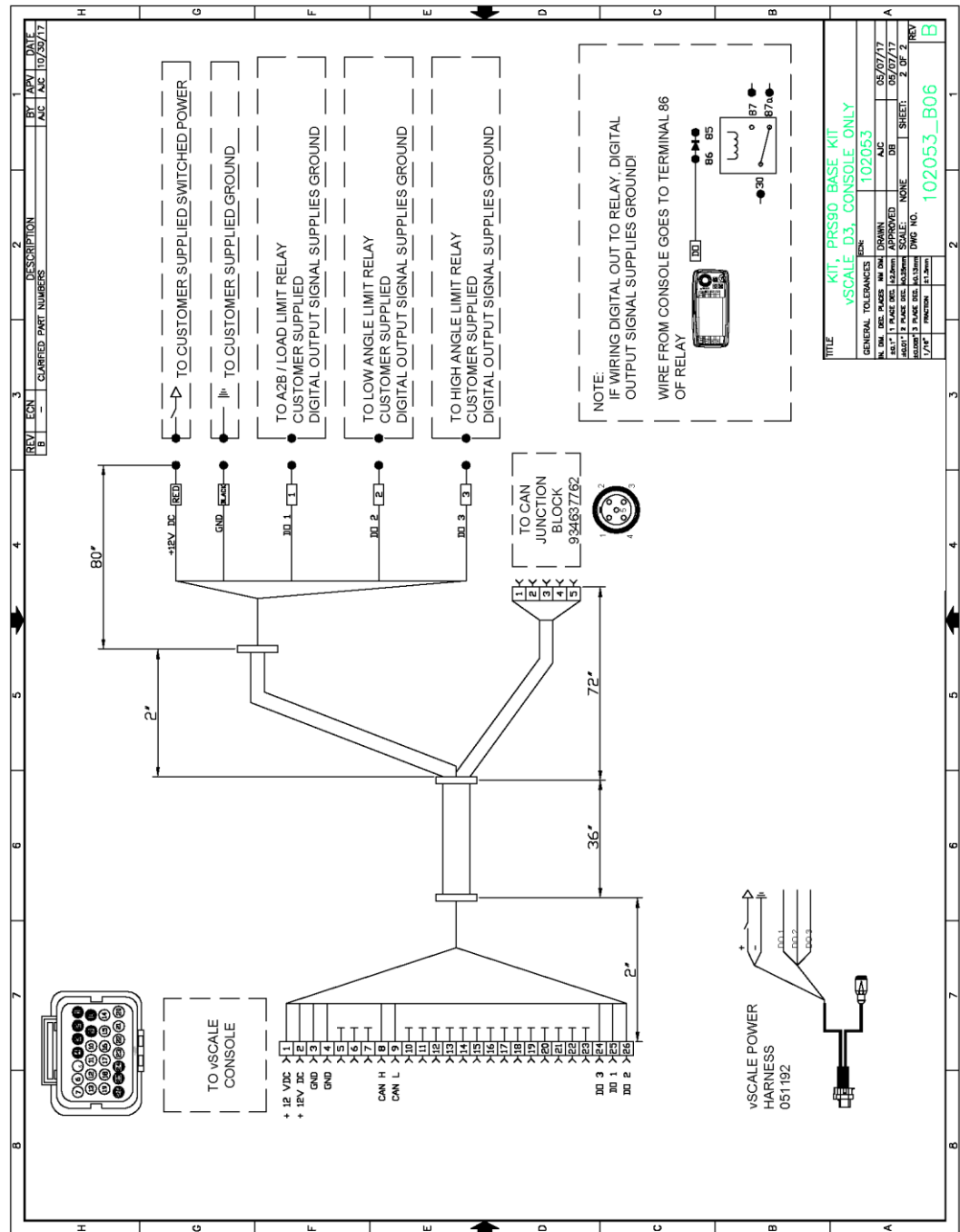


Appendix

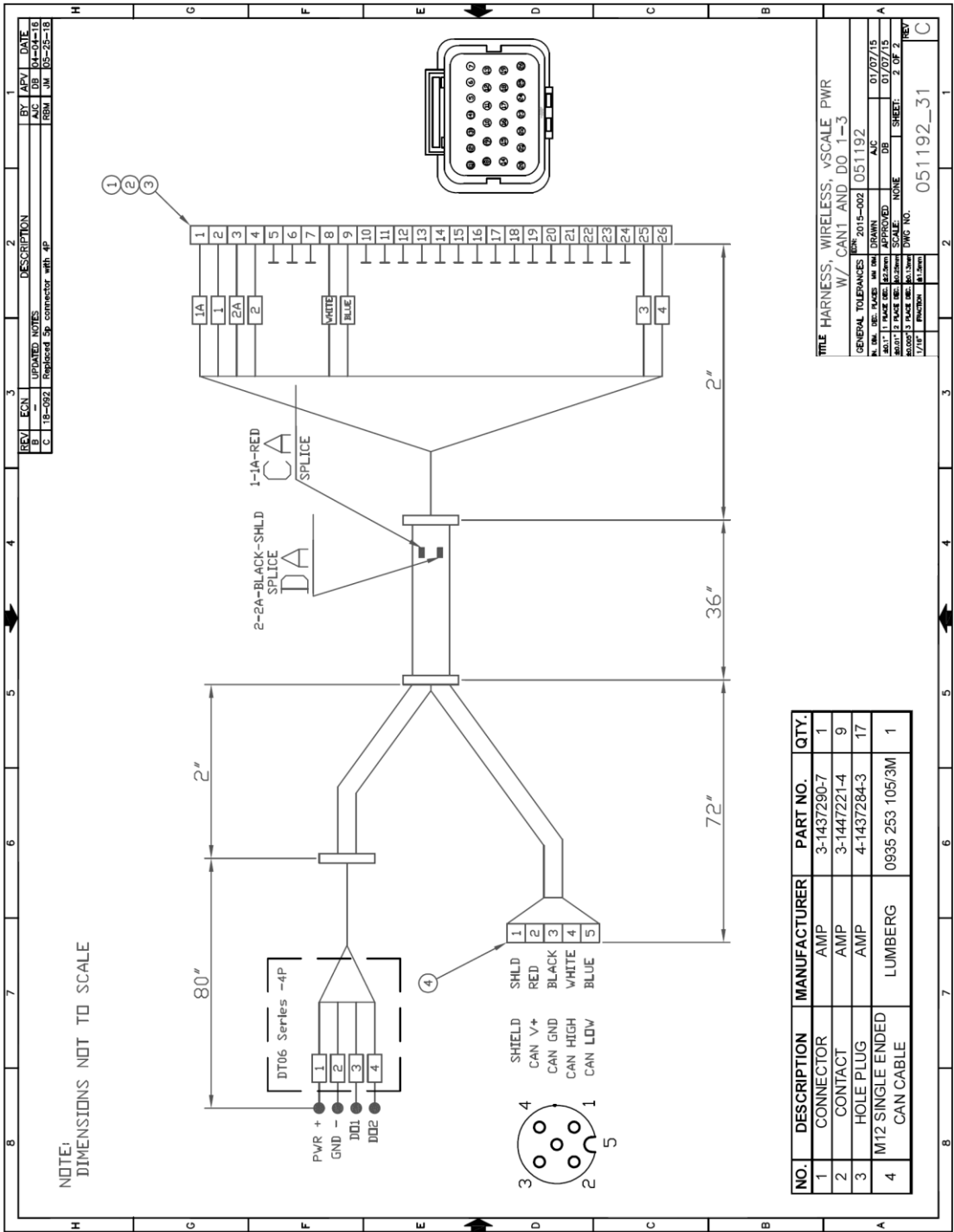
7.3.2.2 102053 – D3 Console Kit



Appendix

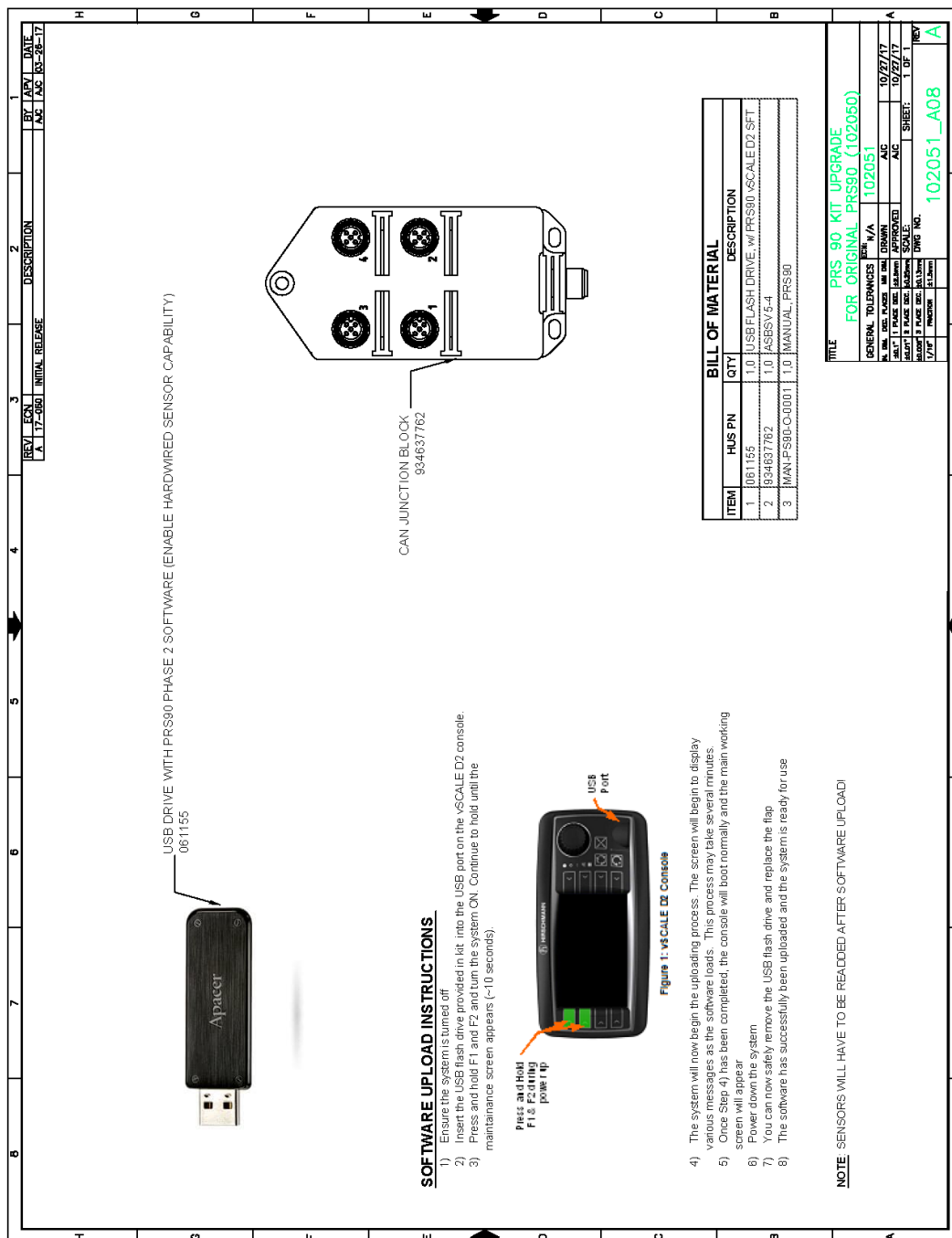


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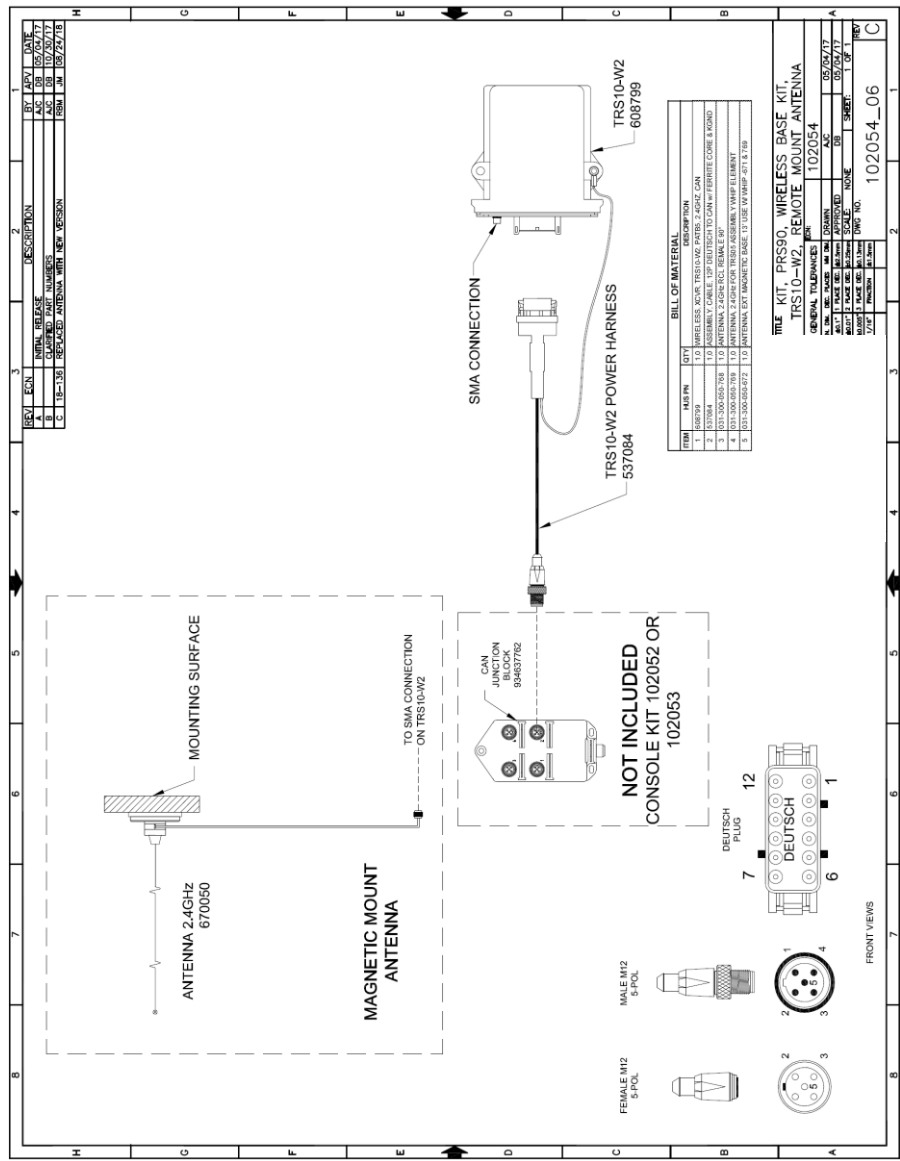


Appendix

7.3.4 102051 - Wireless Only Upgrade Layout – from Kit 102050

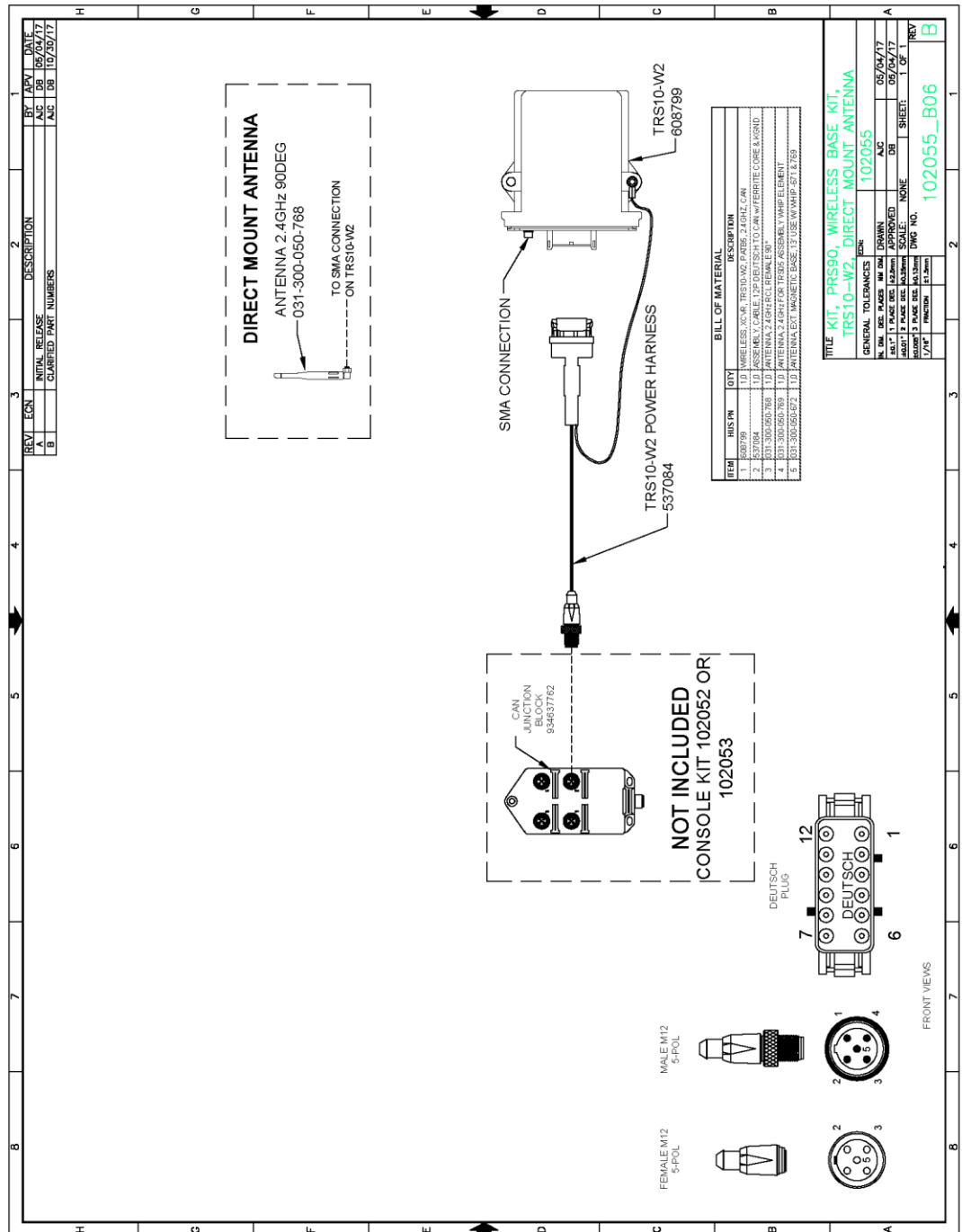


Appendix



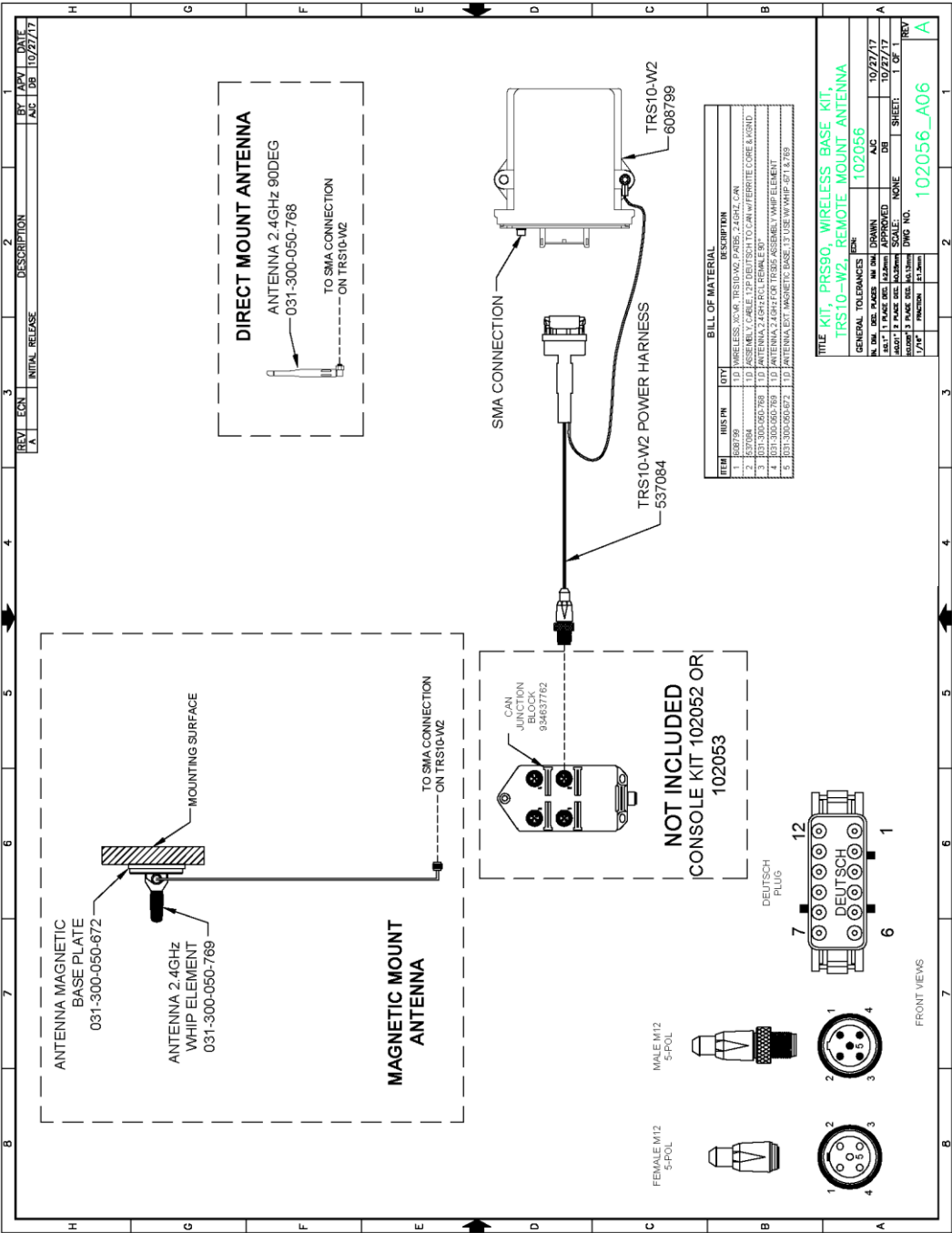
Appendix

7.3.5.2 102055 - TRS10-W2 (Direct Mount) Kit



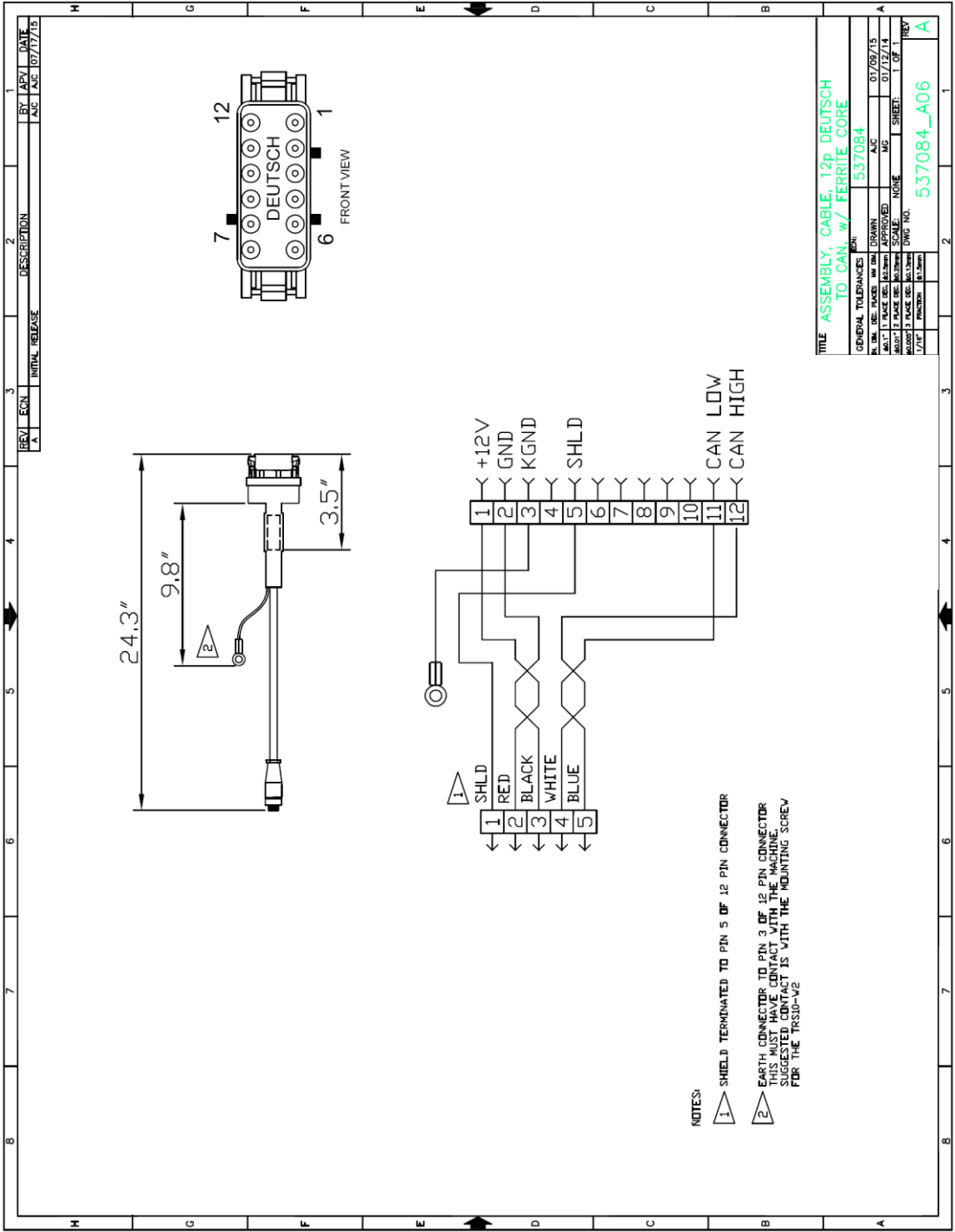
Appendix

7.3.5.3 102056 - TRS10-W2 (Both Antennas) Kit



Appendix

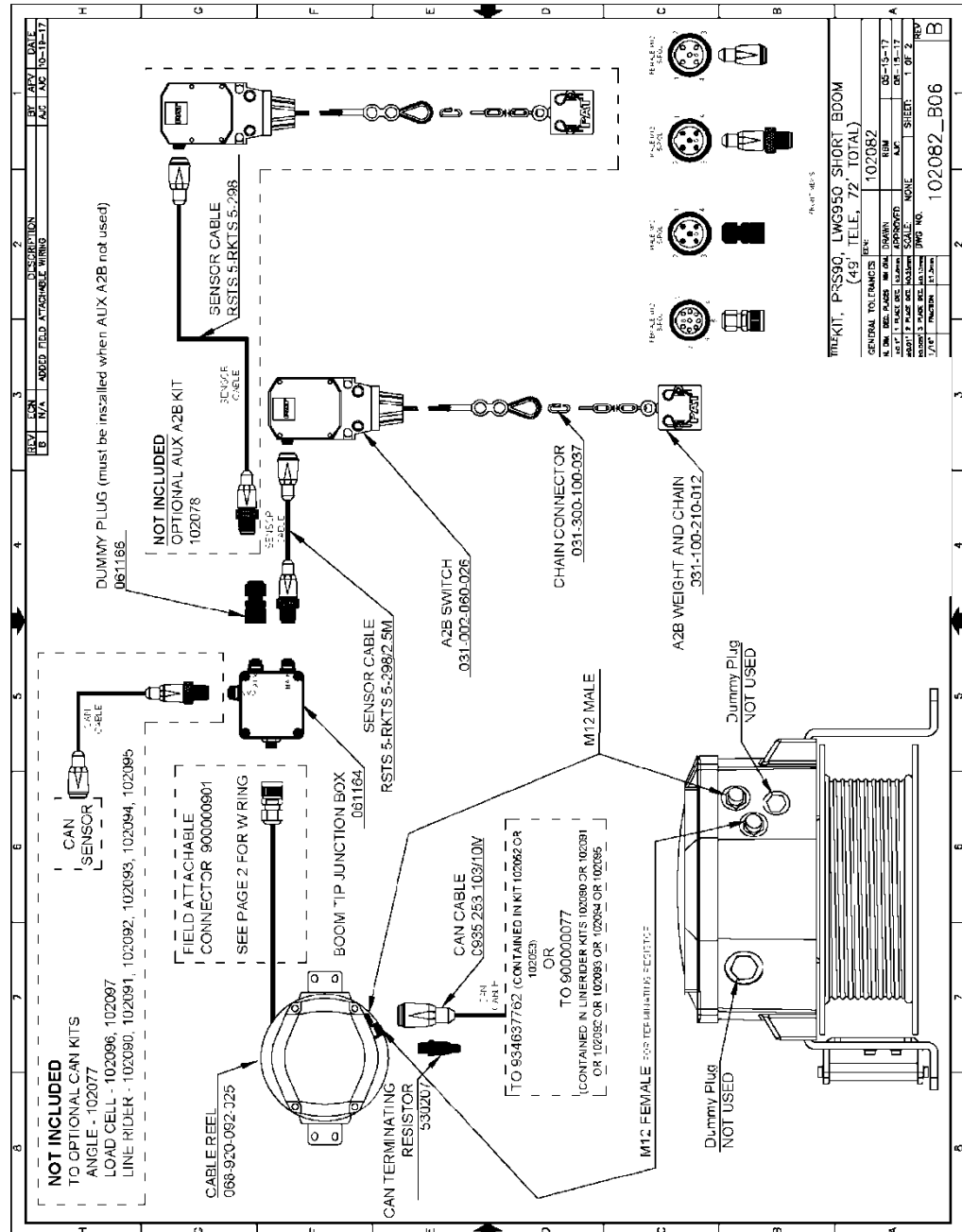
7.3.5.4 537084 – TRS10-W2 Power Harness Wiring



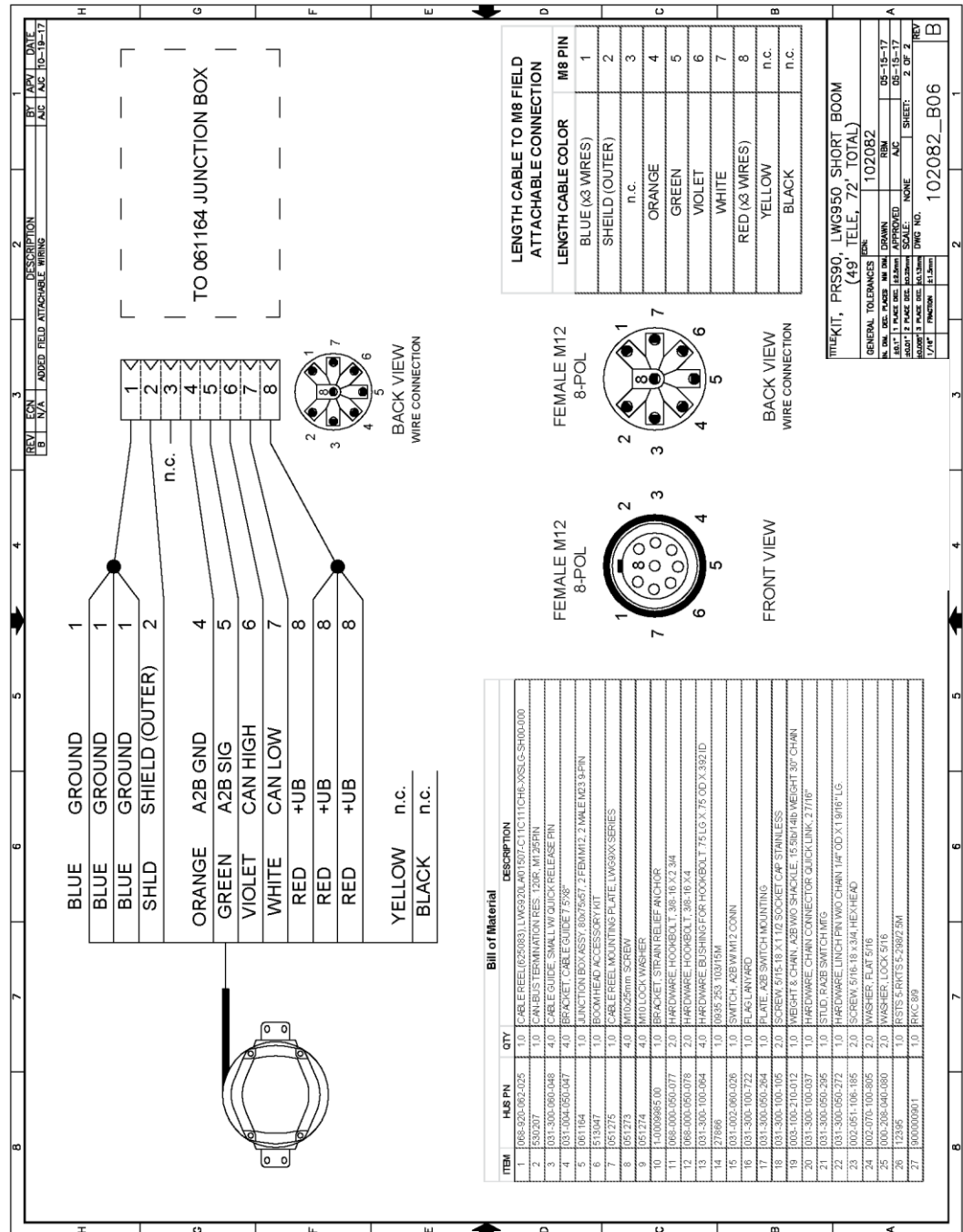
Appendix

7.3.6 Hardwired CAN Sensor Layouts

7.3.6.1 102082 – Short Boom Cable Reel Kit

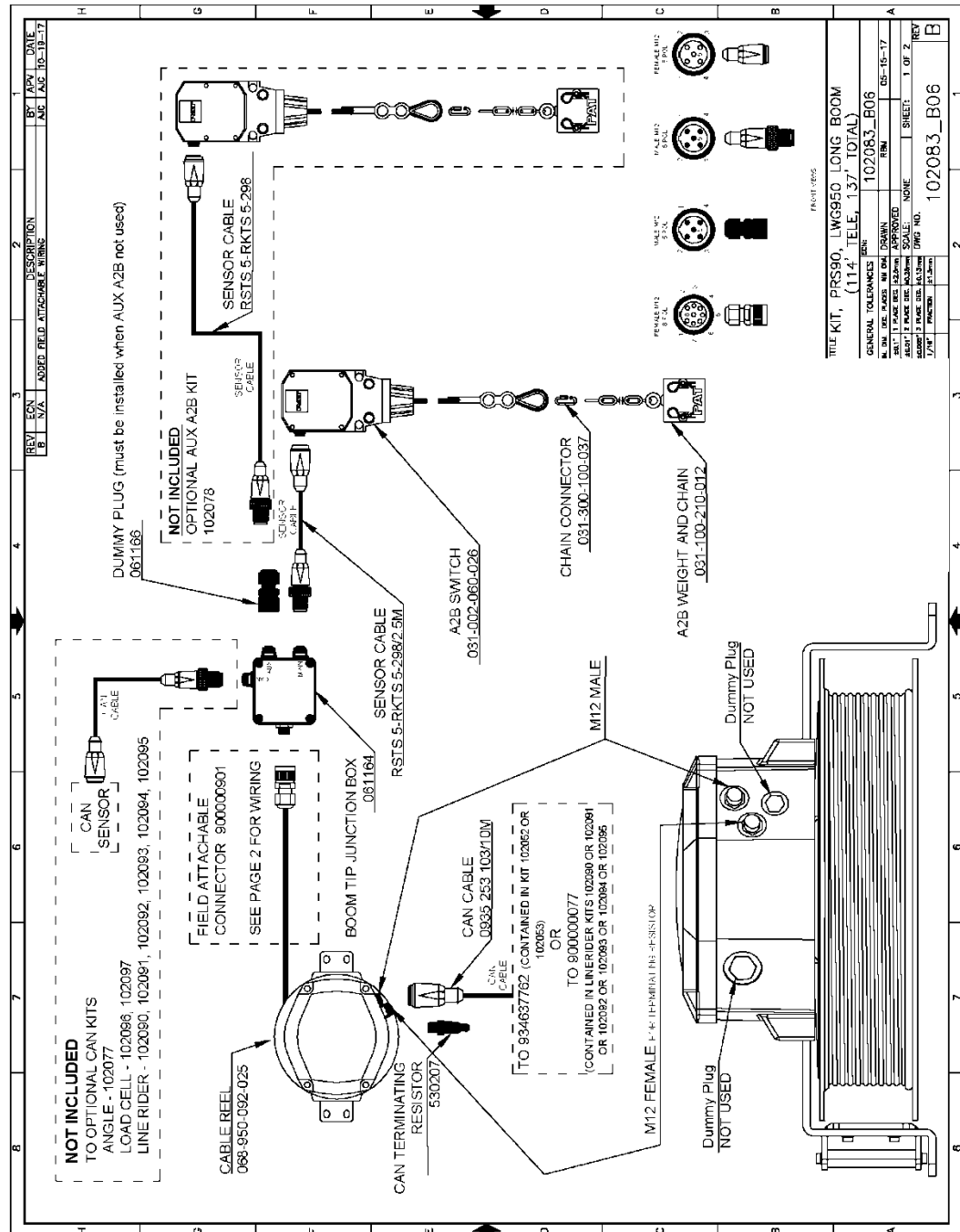


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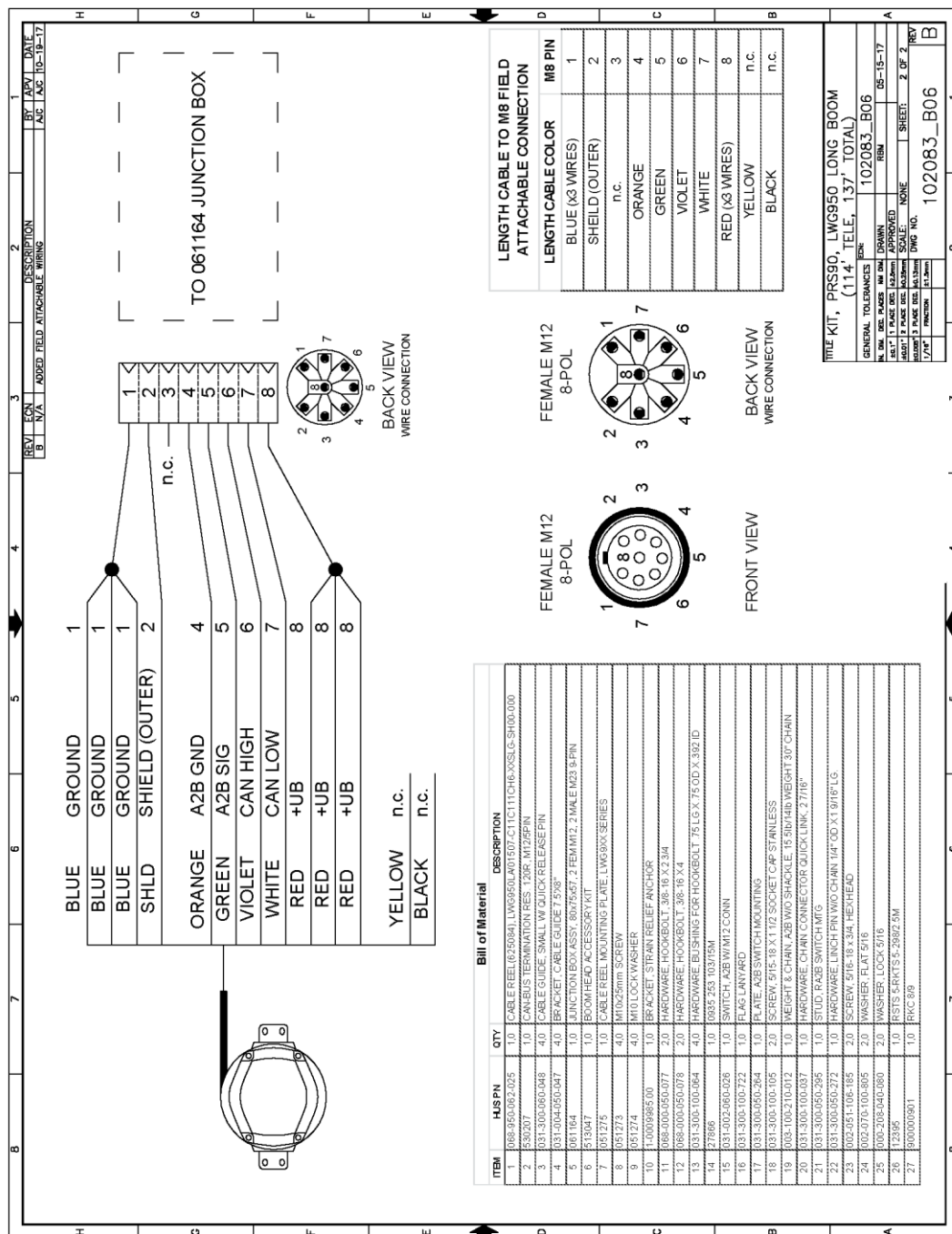


Appendix

7.3.6.2 102083 – Long Boom Cable Reel Kit

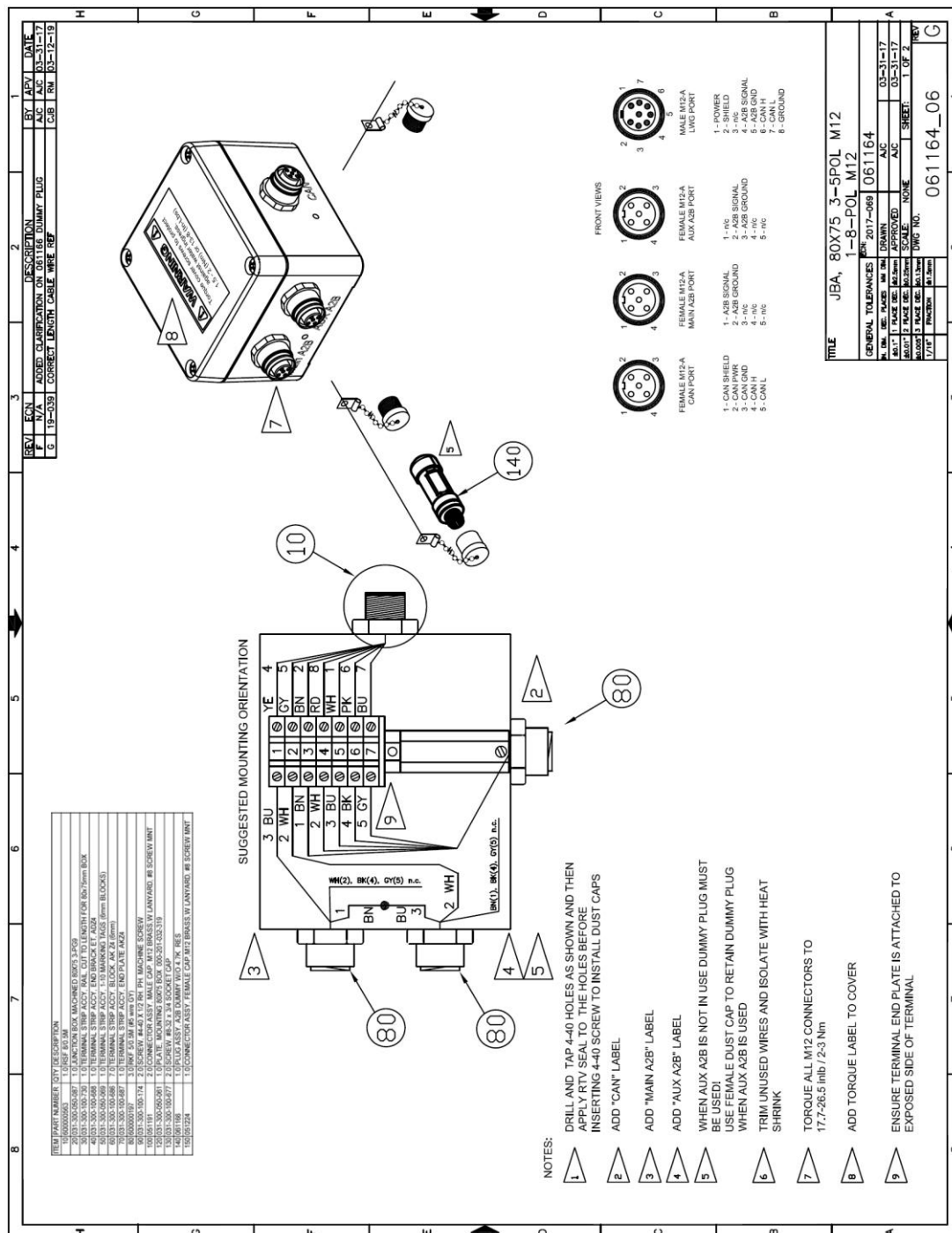


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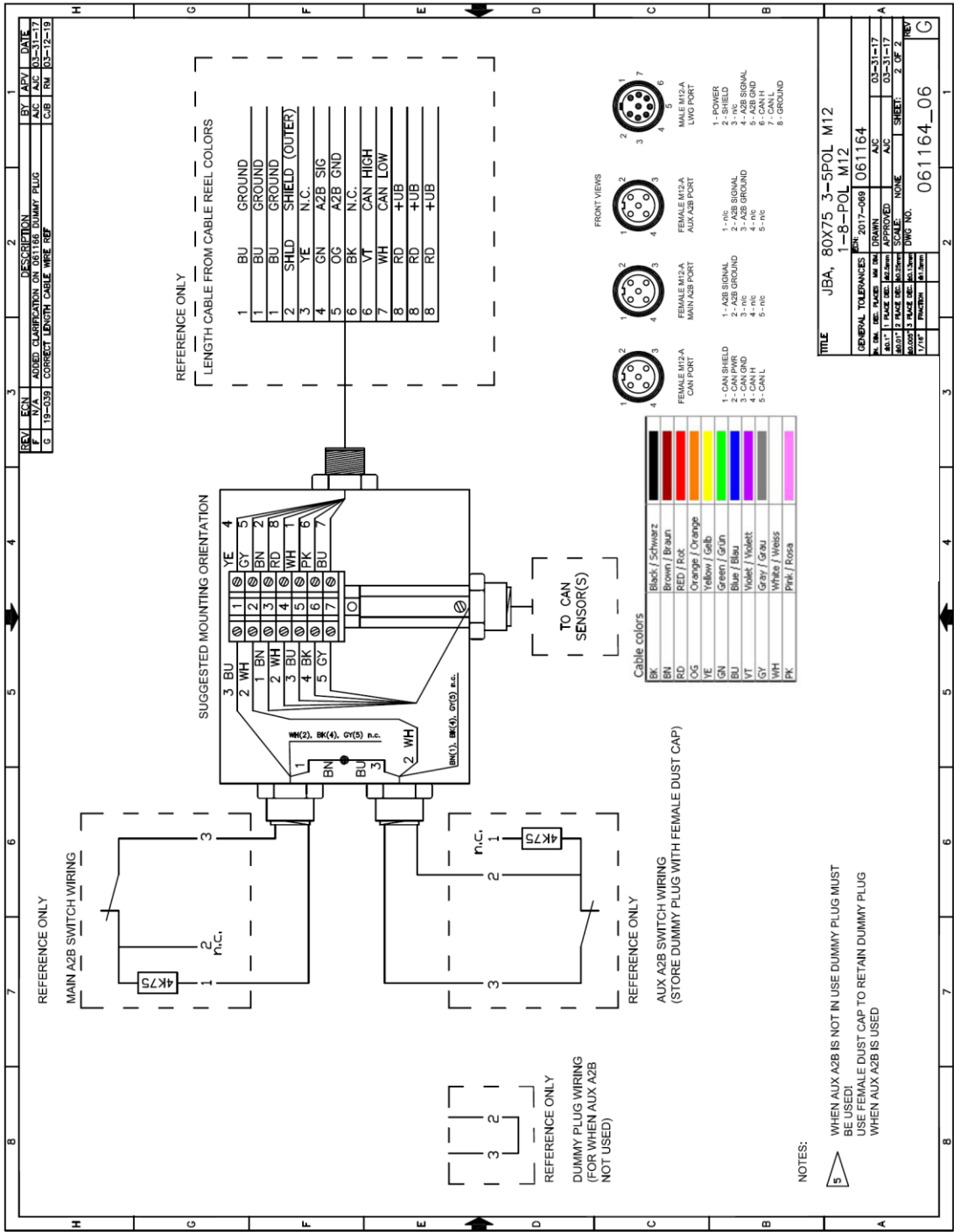


Appendix

7.3.6.3 061164 - Boom Tip Junction Box

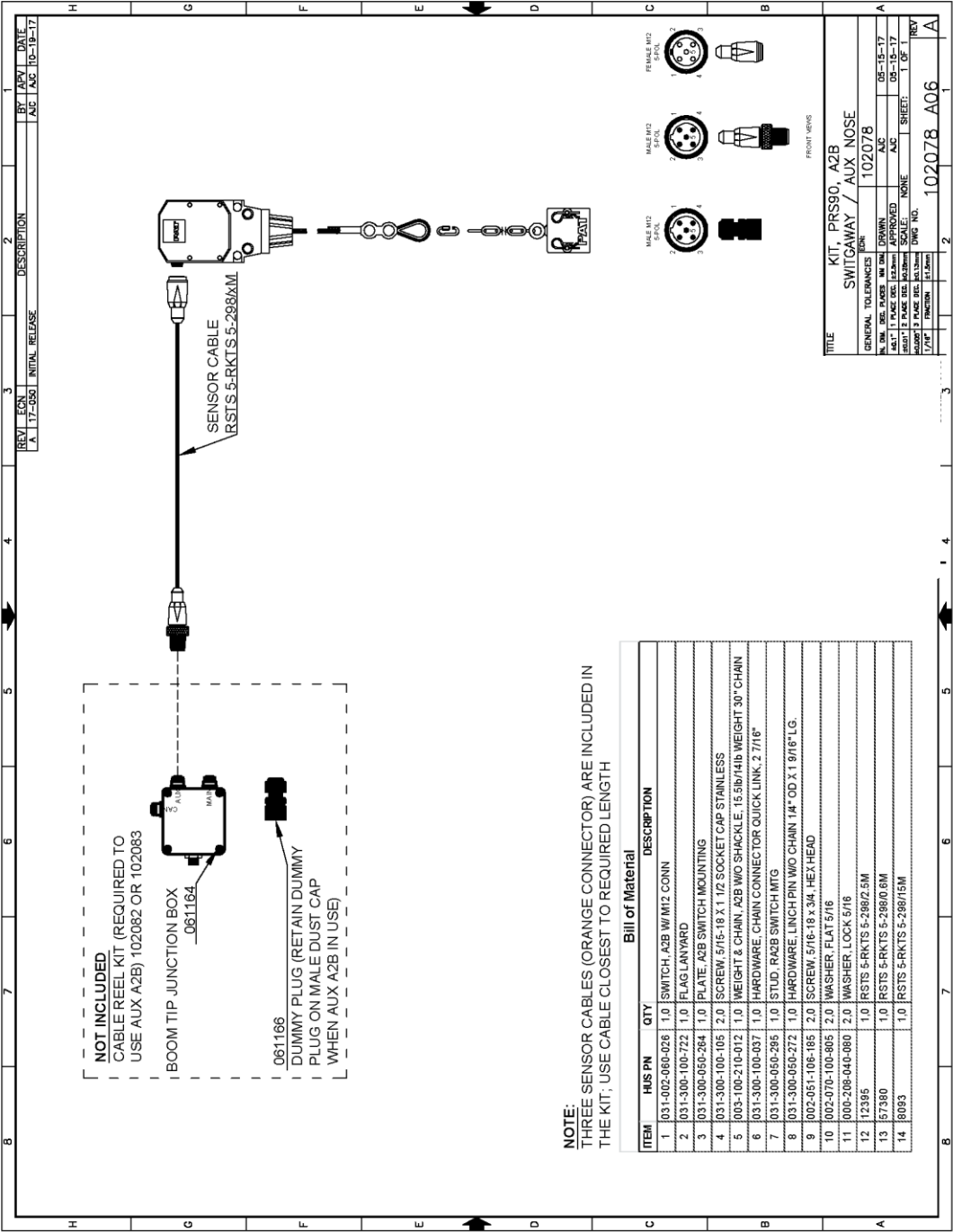


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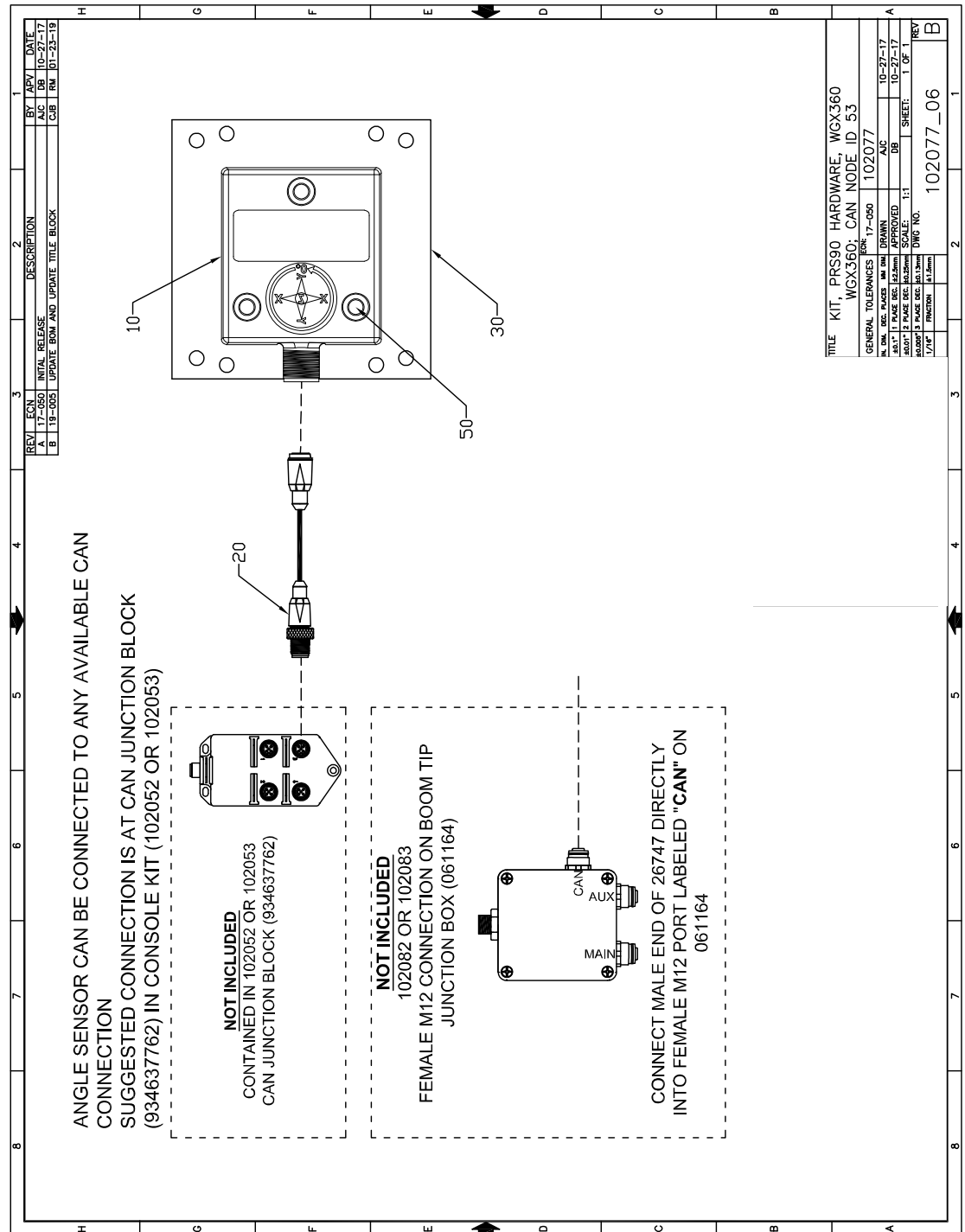
Appendix

7.3.6.4 102078 - Aux / Swingaway A2B Kit



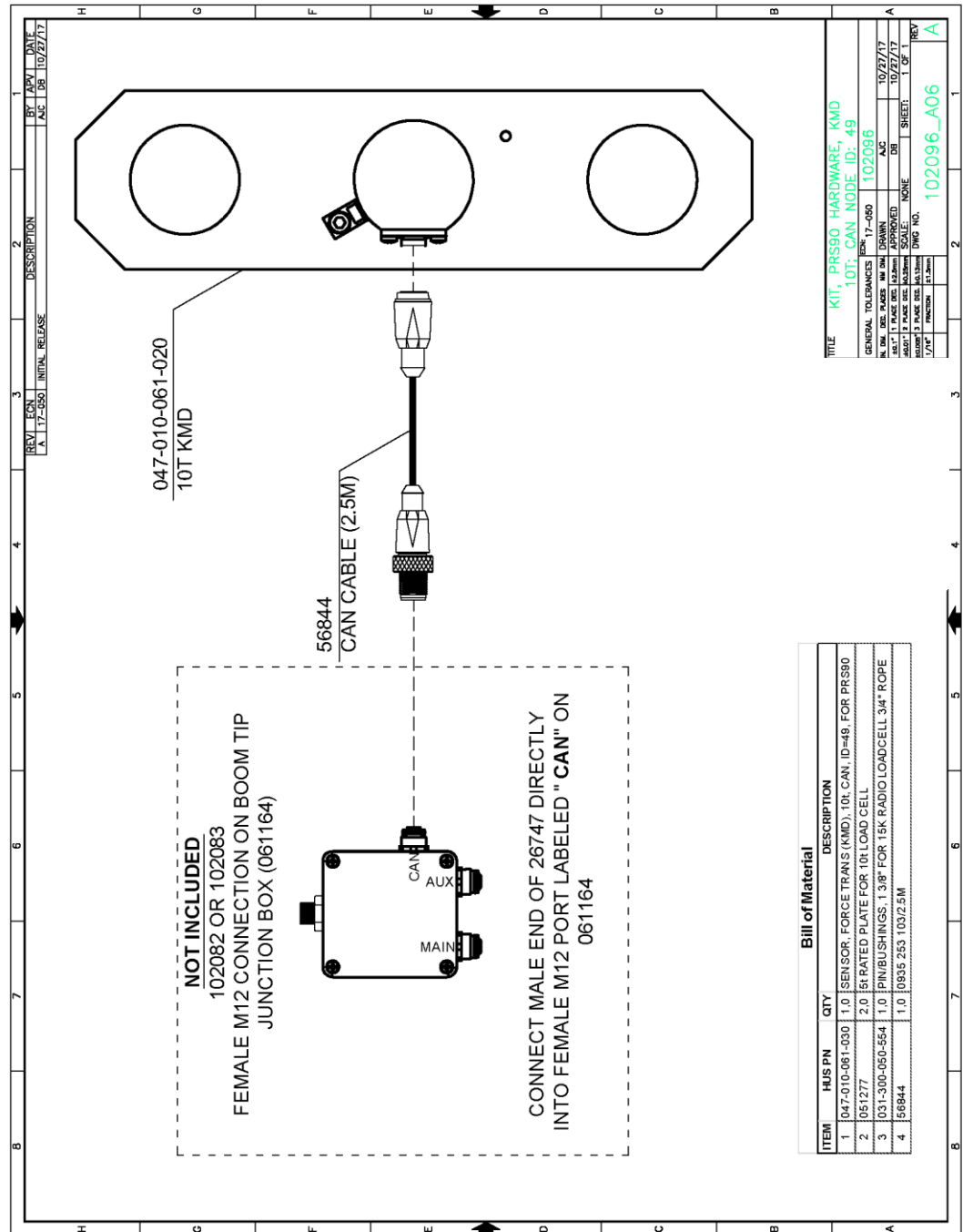
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7.3.6.5 102077 - Hardwired Angle Sensor Kit



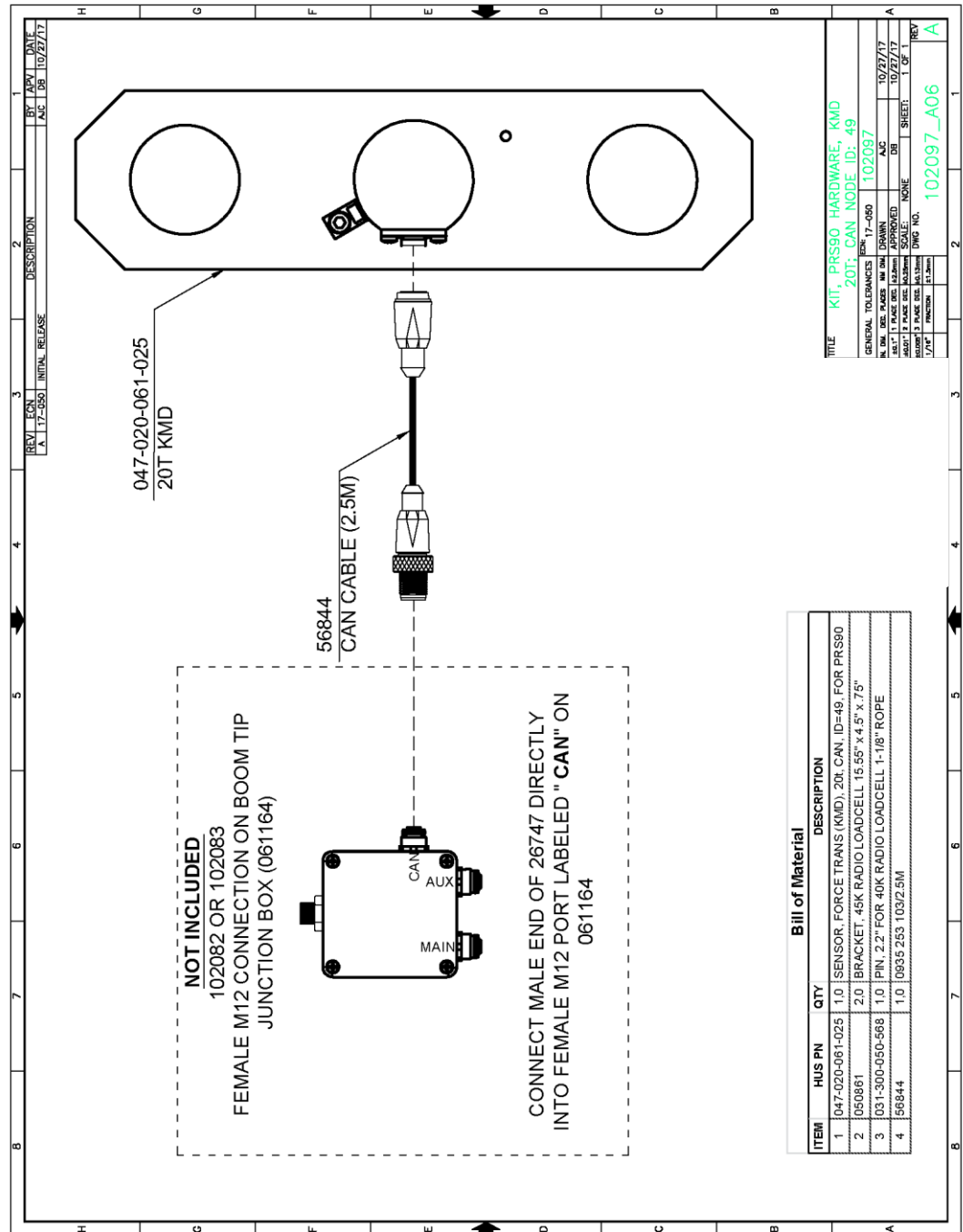
Appendix

7.3.6.6 102096 - Hardwired 10t Load Cell (KMD) Kit



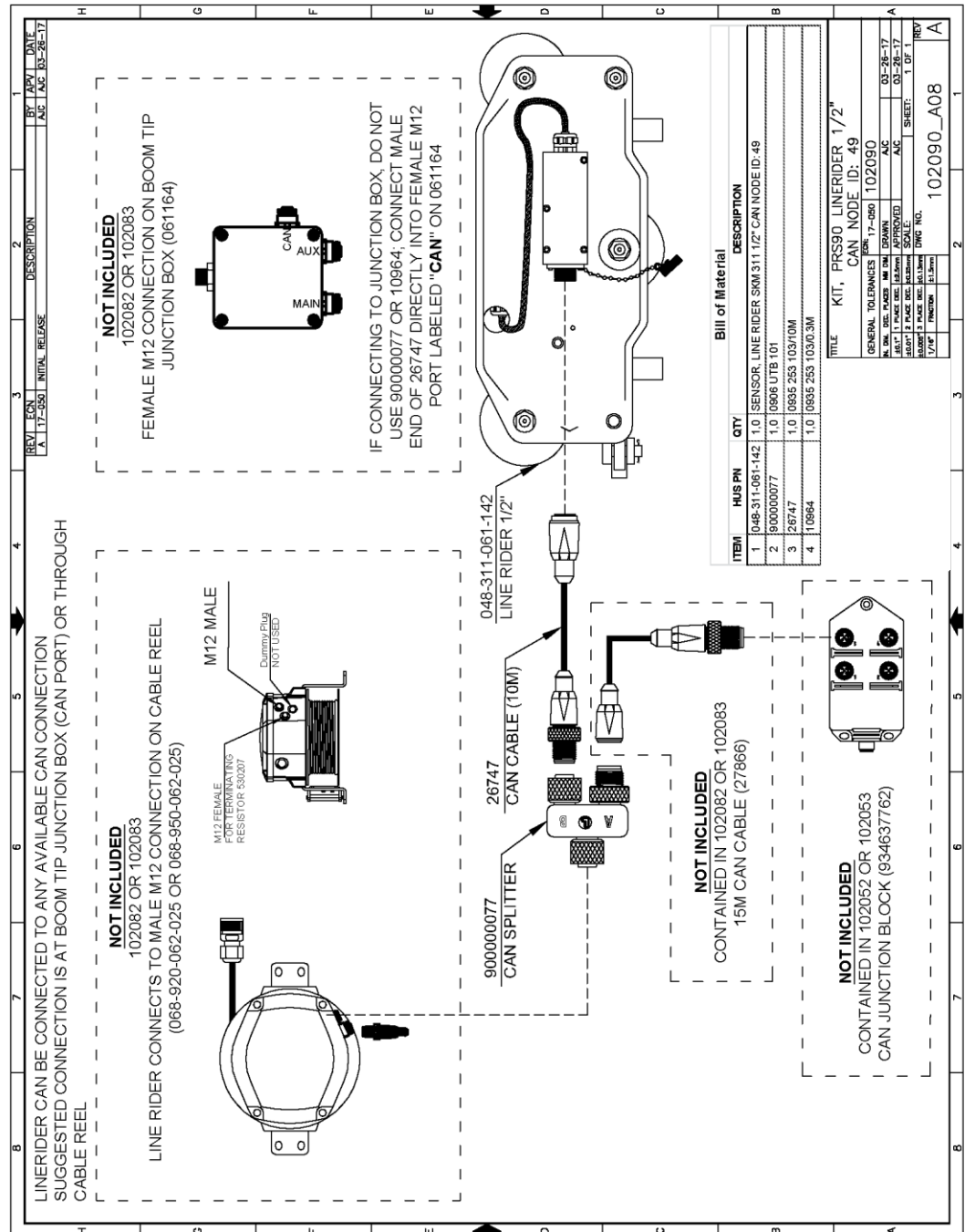
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7.3.6.7 102097 - Hardwired 20t Load Cell (KMD) Kit (102097)



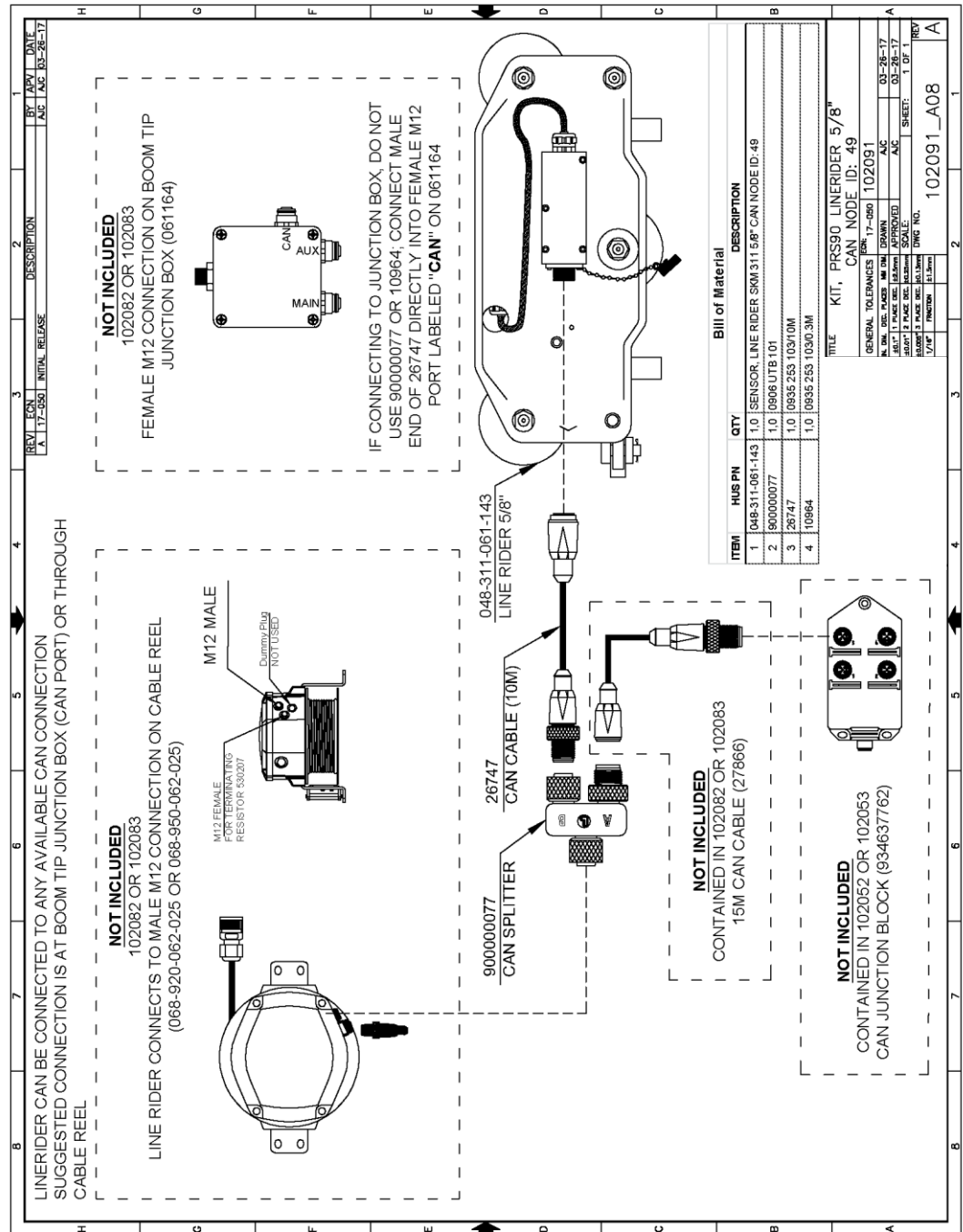
Appendix

7.3.6.8 102090 - Hardwired Linerider (SKM) Kit 1/2" Rope Kit



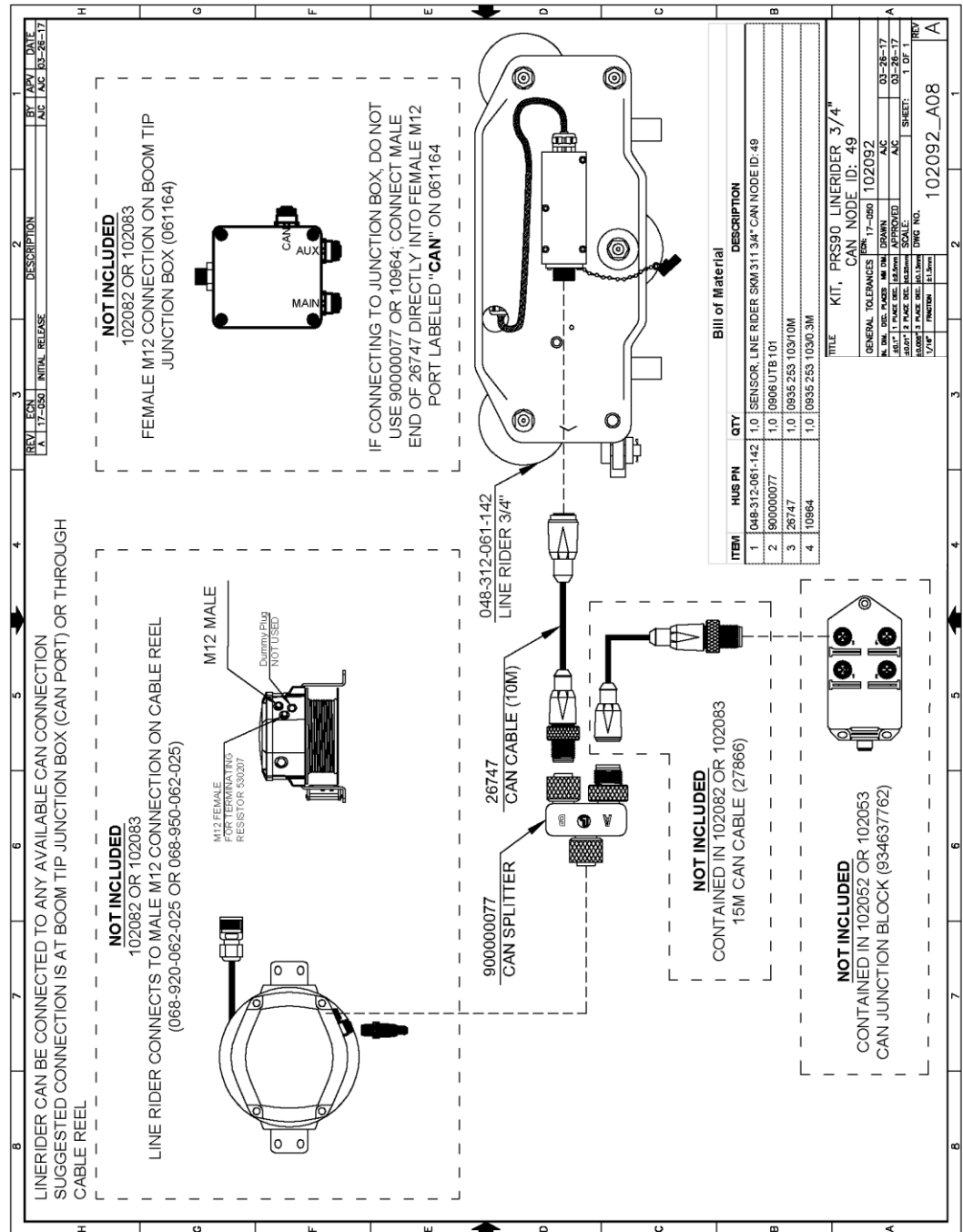
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7.3.6.9 102091 - Hardwired Linerider (SKM) Kit 5/8" Rope Kit



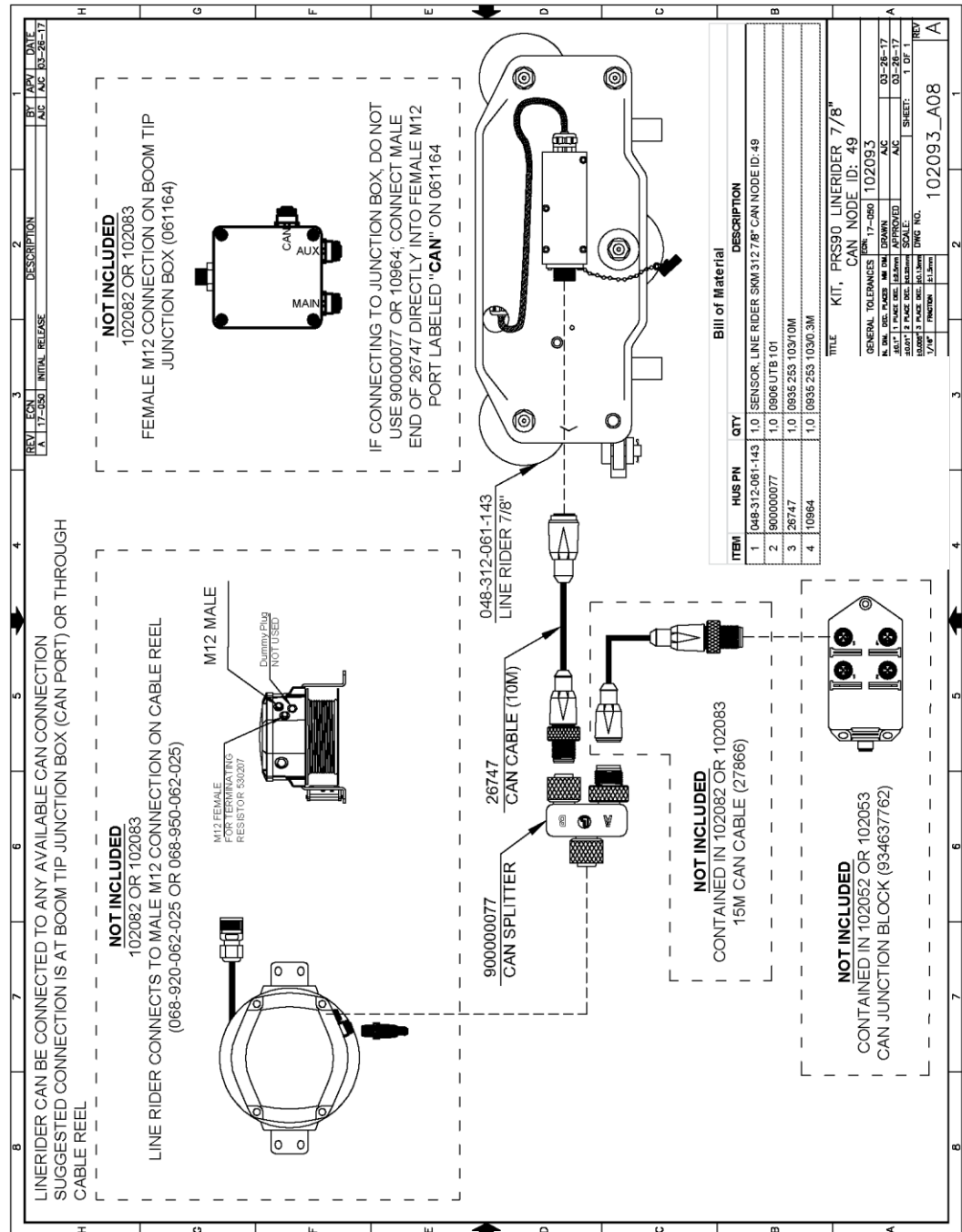
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7.3.6.10 102092 - Hardwired Linerider (SKM) Kit 3/4" Rope Kit



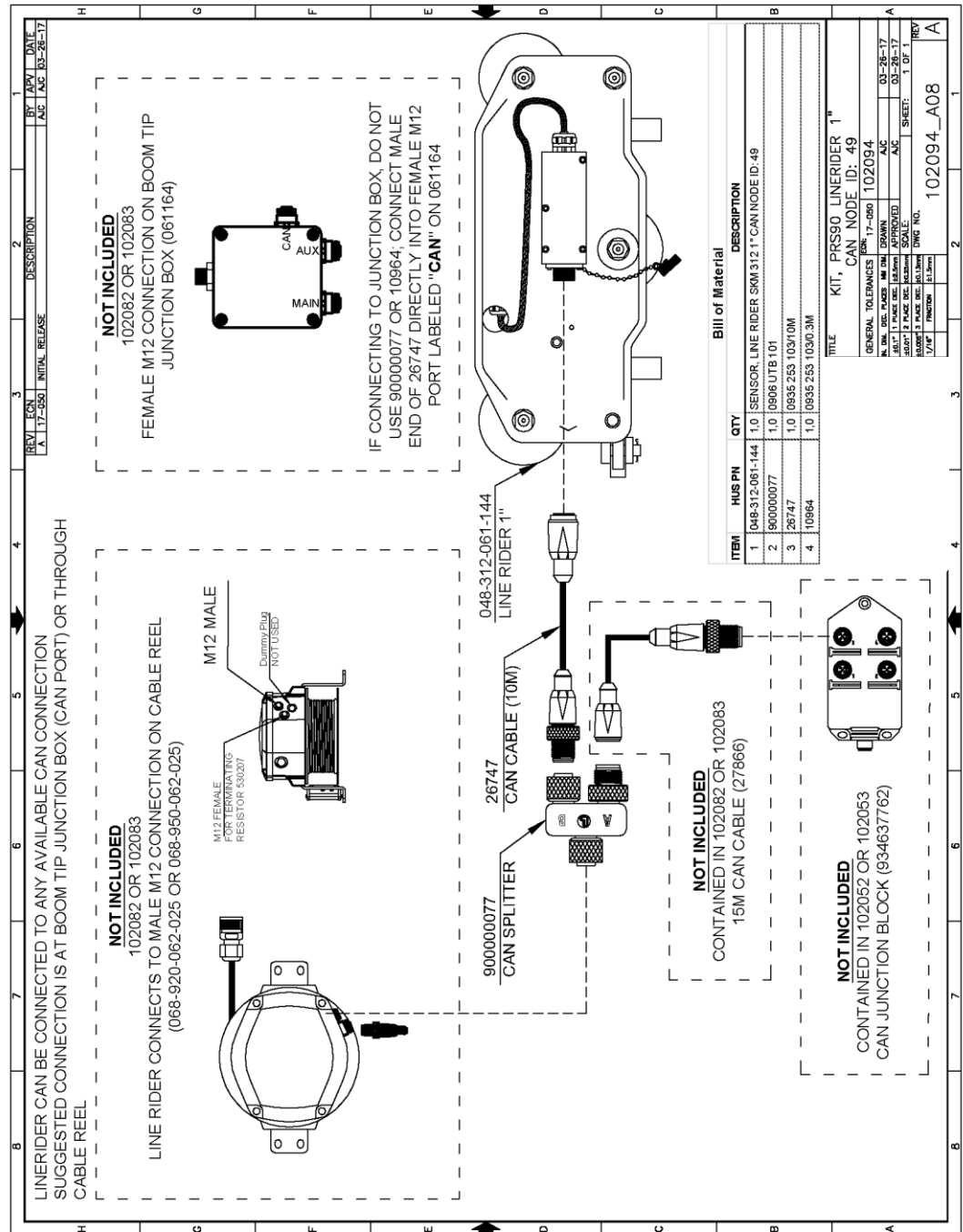
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7.3.6.11 102093 - Hardwired Linerider (SKM) Kit 7/8" Rope Kit



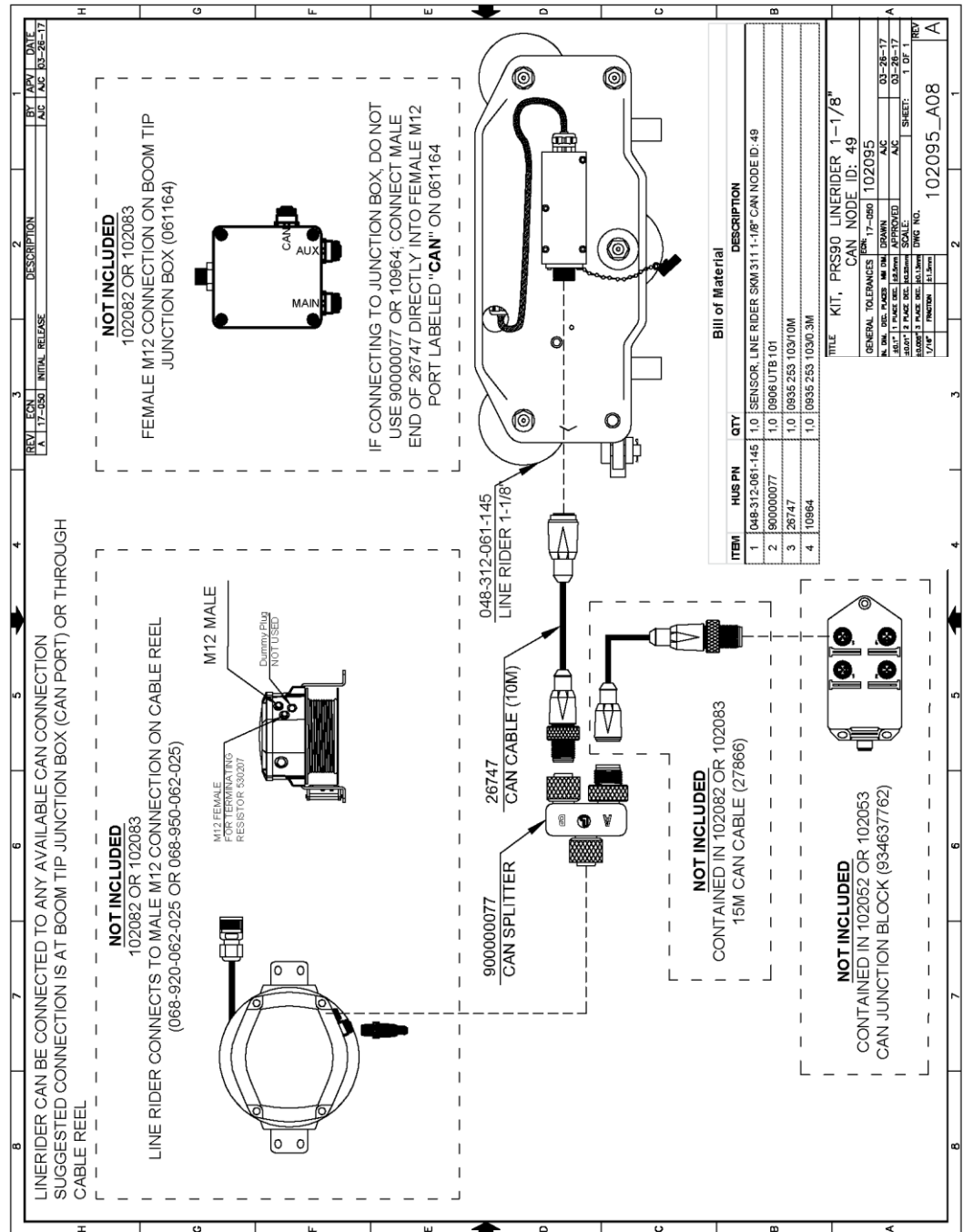
Appendix

7.3.6.12 102094 - Hardwired Linerider (SKM) Kit 1" Rope Kit



Appendix

7.3.6.13 102095 - Hardwired Linerider (SKM) Kit 1-1/8" Rope Kit



Appendix

7.3.7 Additional Cables

If the standard cables provided within a kit are too long or too short they can be substituted with different length cables of the same cable type.

7.3.7.1 Additional Sensor Cable Lengths (A2B Only)

A2B sensors use sensor cables (RSTS 5-RKTS 5-298/xM). These are M12 cables with orange connectors.

	HUS PN	LENGTH (m)	LENGTH (ft)	DESCRIPTION
	57380	0,6	1,97	RSTS 5-RKTS 5-298/0.6M
	58828	1,0	3,28	RSTS 5-RKTS 5-298/1M
	61629	2,0	6,56	RSTS 5-RKTS 5-298/2M
	12395	2,5	8,2	RSTS 5-RKTS 5-298/2.5M
	61630	5,0	16,4	RSTS 5-RKTS 5-298/5M
	5892	7,0	22,97	RSTS 5-RKTS 5-298/7M
	49237	10,0	32,81	RSTS 5-RKTS 5-298/10M
	8093	15,0	49,21	RSTS 5-RKTS 5-298/15M

7.3.7.2 Additional CAN Cable Lengths

CAN sensors use CAN cables (0935 253 103/xM). These are M12 cables with black connectors.

	HUS PN	LENGTH (m)	LENGTH (ft)	DESCRIPTION
	10964	0,3	0,98	0935 253 103/0.3M
	63296	0,6	1,97	0935 253 103/0.6M
	10935 LUMBERG	1,0	3,28	0935 253 103/1M
	26732	1,5	4,92	0935 253 103/1.5M
	10966	2,0	6,56	0935 253 103/2M
	56844	2,5	8,2	0935 253 103/2.5M
	10967	3,0	9,84	0935 253 103/3M
	27157	4,0	13,12	0935 253 103/4M
	10968	5,0	16,4	0935 253 103/5M
	47825	6,0	19,69	0935 253 103/6M
	54779	7,0	22,97	0935 253 103/7M
	26747	10,0	32,81	0935 253 103/10M
	27866	15,0	49,21	0935 253 103/15M
	45847	25,0	82,02	0935 253 103/25M
	11770	70,0	229,66	0935 253 103/70M



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