Indikon
A Riverhawk Company

TMS 4500

Torque Metering System

User's Manual

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1 System Description

The TMS 4500 is a system for monitoring torque, speed, and power on two shafts. The system consists of two Torque Sensor/Transmitters, two Torque/Speed Receivers, a Processing Unit, and two Monitors.

1.1 Torque Sensor/Transmitter

The Sensor/Transmitter is a disc or collar mounted on each shaft. It is powered inductively by the Receiver, senses the torque via strain gages connected to it, and transmits a torque signal back to the Receiver.

1.2 Torque/Speed Receiver

The Receivers are mounted below the shafts and have a ring that surrounds the Sensor/Transmitter. It provides power to the Sensor/Transmitter, receives the torque signal, senses rotating speed, and provides outputs to the Processor. The electronics are enclosed in a painted steel NEMA 4 enclosure with mounting ears.

1.3 The Processor

The Processor provides power to and receives signals form the Receiver, converts the raw signals to calibrated values, calculates power, and provides display information to the Monitors. The Processor is housed in a fiberglass NEMA 4 enclosure. It has integrated mounting ears.

1.4 Monitors

The Monitors are powered by their own power supplies and receive display data from the Processor. The display is a Quarter VGA color LCD touch-screen. The display area is 4.6" wide by 3.5" high. The Monitor mounting frame is 7.7" wide by 5.7" tall. The LCD is housed in a fiberglass NEMA 4 enclosure. The enclosure is held within a "U" shaped bracket by two large clamping knobs. The bracket can be mounted on a horizontal or vertical surface and allows the monitor to be tilted for optimal viewing angle. The Monitor displays torque, speed, power, and power imbalance as values and horizontal bar graphs.

2 Wiring

Cable/cord grips are provided on the Receivers, Processor, and Monitors. Standard PVC jacketed cable is provided for all connections.

2.1 Torque/Speed Receiver Wiring

Two cables run between the Torque/Speed Receiver and the Processor; one for 12VDC power and one for analog signal wiring.

2.2 Processor Wiring

Besides the 2 cables to each Torque/Speed Receiver, there will be 3 additional cables; one for communications with each Monitor and one for 115VAC power.

2.3 Monitor Wiring

Besides the cable from the Processor, there will be one additional cable for 115VAC power.

3 Normal Operation

The system, as delivered, is ready for operation. After installation, apply power to the Monitors and then the Processor. Within a few seconds the "normal display screen" will appear with values and bar graphs. If the processor is operating properly, all values should be white and the top line should be moving back and forth one pixel every second.

4 User Interface

Each display has a touch screen that allows the user to access information and change the configuration. The touch screen is relatively sensitive, so a light press is all that is needed.

IMPORTANT NOTE

Never use sharp or pointed objects to actuate the touch screen.

Press "Indikon" to display company contact information. Then press "Exit" to return to the normal display.

Press on the area around the speed value to display information on the color code for the torque and speed. Then press "Exit" to return to the normal display.

Press "TMS 4500" to access the menus. The menus provide a mechanism for modifying the setup/configuration of the system and performing calibration (primarily intended for the factory, but also usable in the field).

The menus can be passcode protected by establishing a passcode other than zero. It is called a "passcode" rather than a "password", as it is numeric, not alphanumeric.

To do this, press "Change Passcode" and enter a value using the numeric touch pad. The next time someone tries to access the menus, they must first enter the passcode.

IMPORTANT NOTE

If you forget the passcode, there is a factory passcode that can be used to gain access and establish a new passcode. Establishing a passcode of zero disables the passcode protection.

5 Menus

Section 9 lists the menus essentially as they appear in the display. All of the selections not listed as "(for factory use)" may be used to reconfigure the system as desired.

6 Zero Correction

The torque value displayed when a shaft is not turning may not be zero, due to a slight calibration offset. If this is so, the offset can be eliminated by performing an Auto Zero function. To do so:

Press "TMS 4500" on the LCD touchscreen.

Press "Corrections".

Press "Auto Zero 1 (Port) for the port shaft

or

Press "Auto Zero 2 (Stbd) for the starboard shaft.

"Auto Zero Completed" will be displayed.

Press "Exit" to return to the Corrections screen.

Press "Exit" to return to the main screen.

Menu List

Main Menu

Change Passcode	Enter a new value
Corrections	Go to the Corrections menu
Configure Display	Go to the Display configuration menu
Configure Filters	Go to the Configure Filters menu
More	Go to a menu with more selections
Exit	Exit to Normal Display

Corrections

Auto Zero 1 (Port)	Automatically zero the Port torque value
Auto Zero 2 (Stbd)	Automatically zero the Starboard torque value
Adjust Torque 1	Port torque span adjustment factor
Adjust Torque 2	Starboard torque span adjustment factor
Exit	Exit to Main Menu

Display Configuration

Speed Bar FS	Speed Bar Graph Full Scale value
Torque Bar FS	Torque Bar Graph Full Scale value
Power Bar FS	Power Graph Full Scale value
Imbalance Bar FS	Imbalance Graph Full Scale value
Exit	Exit to Main Menu

Filter Configuration

Speed Filter	Minimum revolutions for speed value updates
Torque Filter	Seconds of filtering for torque value updates
Exit	Exit to Main Menu

More Selections

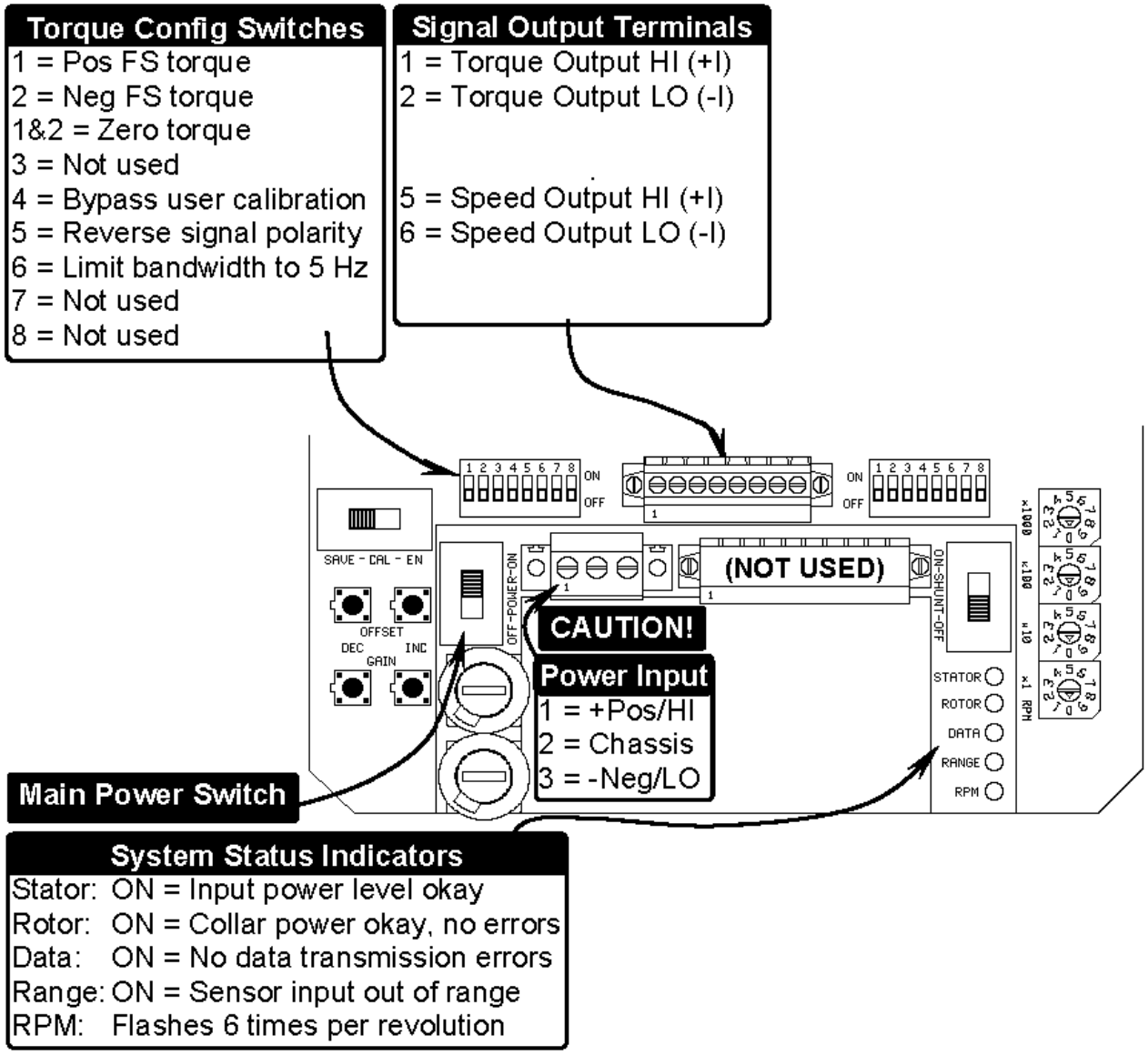
Configure Channel 1 (Port)	(for factory use)
Configure Channel 2 (Stbd)	(for factory use)
Calibration	(for factory use)
Entered Values	(for demonstration and factory use)
View Values	(for troubleshooting use)
Exit	Exit to Main Menu

View Selections

View Inputs	(for troubleshooting use)
View Calculations	(for troubleshooting use)
View Comm Info	(for troubleshooting use)
Exit	Exit to Main Menu

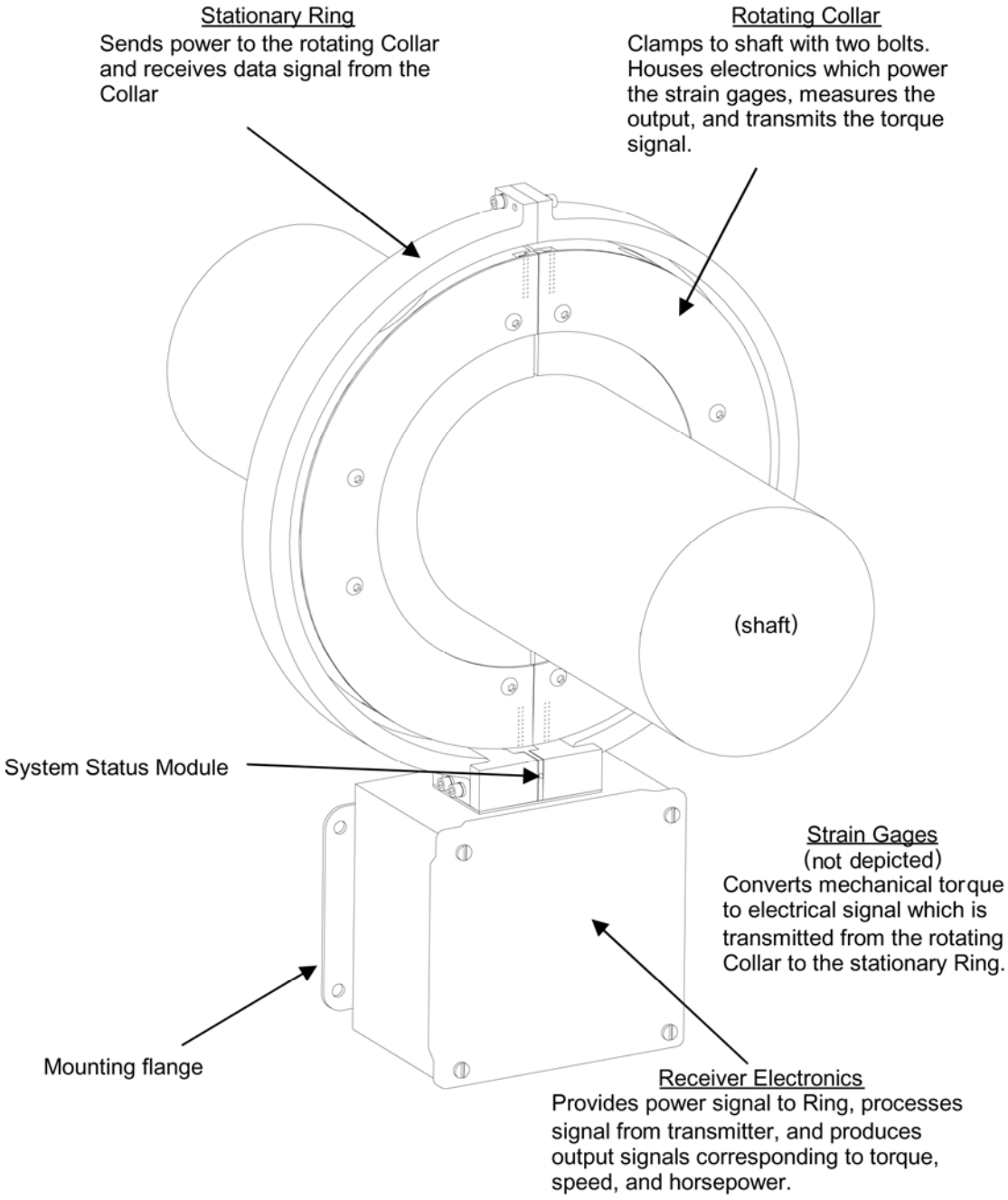
7 Receiver Configuration

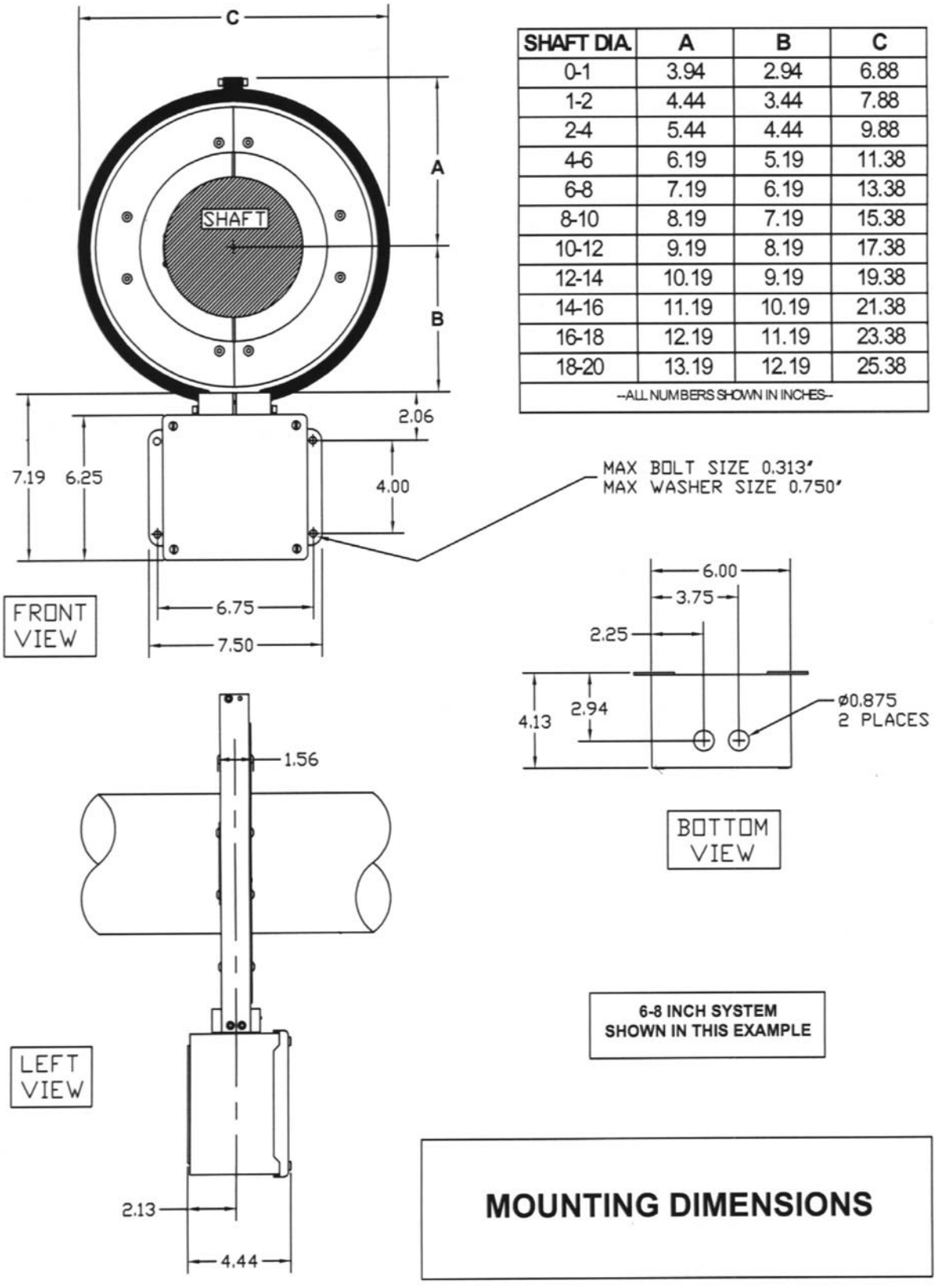
Be sure all Torque Configuration Switches are set to OFF.



Receiver Switches and Connections

8 Torque Sensor/Transmitter and Receiver





SHAFT DIA.	A	B	C
0-1	3.94	2.94	6.88
1-2	4.44	3.44	7.88
2-4	5.44	4.44	9.88
4-6	6.19	5.19	11.38
6-8	7.19	6.19	13.38
8-10	8.19	7.19	15.38
10-12	9.19	8.19	17.38
12-14	10.19	9.19	19.38
14-16	11.19	10.19	21.38
16-18	12.19	11.19	23.38
18-20	13.19	12.19	25.38
--ALL NUMBERS SHOWN IN INCHES--			

6-8 INCH SYSTEM SHOWN IN THIS EXAMPLE

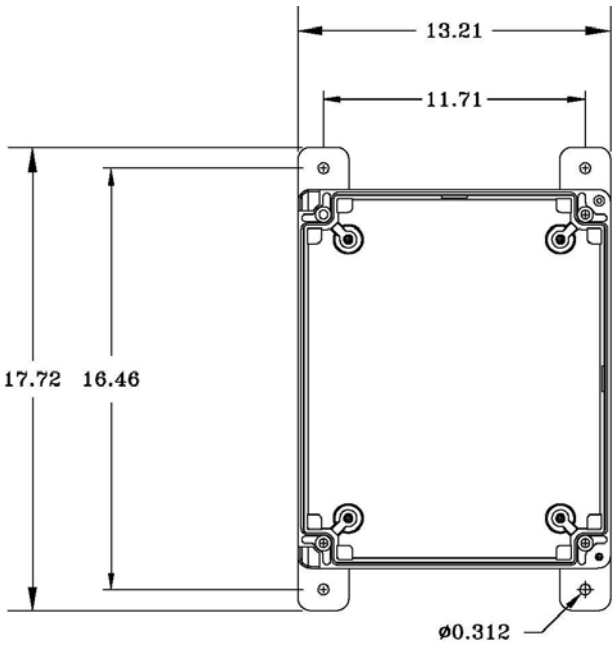
MOUNTING DIMENSIONS

9 Processor

Processor Enclosure

(Mounting ears not shown)

Inside the Processor Enclosure



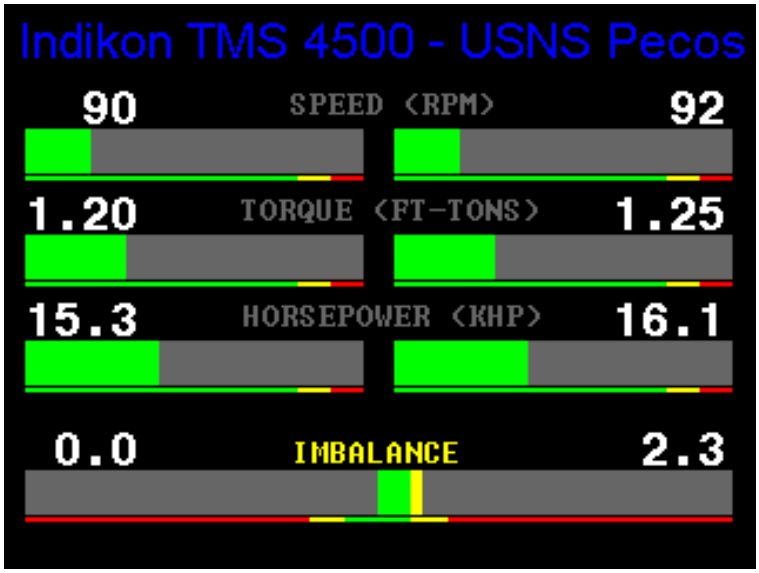
OPTION 1

Processor Enclosure Mounting Options

10 Monitor Enclosure and Display

Monitor Packaging

Actual Monitor Appearance



LCD Image

Displayed information is representative of the TMS 4500.

This image is provided to depict the resolution of the 320 by 240 pixel image.

11 Specifications

Sensors

Torque Sensor	Strain gages
Sensing Range	+/-500 microstrain
Speed Sensor	Hall-effect sensor
Torque Accuracy	1% of full scale worst case
Typical Torque Accuracy	Better than 0.5%

Display

Type	TFT Color LCD Touch-Screen
Viewing Area	4.6" wide by 3.5" high
Resolution	Quarter VGA – 320 by 240 pixels

Field Wiring Connectors

Type	Pluggable Phoenix type connectors with captive wire clamps

Operating Power

Voltage	85 to 265 VAC, 50/60 Hz
Power Consumption Processor	60 watts maximum
Power Consumption Monitor	10 watts maximum
Fuse - Processor	2 A, Slow Blow, 5x20mm
Fuse - Monitor	2 A, Slow Blow, 5x20mm
Fuse - Receiver	2 A, Slow Blow, 5x20mm

Mechanical - Torque Sensor/Transmitter and Receiver

Torque Sensor/Transmitter	Refer to separate drawing
Torque/Speed Receiver	Refer to separate drawing

Mechanical - Processor

Enclosure Type	Fiberglass
Enclosure Dimensions	13.2" wide by 15.2" high by 7.1" deep (excluding mounting ears)

Mechanical - Monitors

Enclosure Type	Fiberglass
Bezel Dimensions	7.7" wide by 5.7" high
Enclosure Dimensions	9.2" wide by 7.2" high by 5.1" deep
Monitor Overall Size	12.4" wide by 9.7" high by 6.4" deep (including bracket, knobs, and handle)

Environmental

Ambient Operation Temperature	32ºF to 131ºF (0ºC to 55ºC)
Humidity	0 to 100% RH, non-condensing
Fiberglass Enclosure Ratings	NEMA 4X
Transportation Vibration	IAW Commercial Handling/Shipping

Warranty

Standard	1 year

12 Status Indicators

There is one Main Status Indicator light located outside the Receiver at the base of the Stationary Ring and five secondary system status indicator lights inside the unit.

Main Status - Red LED on Receiver (not on the board)
On Solid * No errors
Fast flash a) Remote Shunt Switch is on
b) One or more system errors present

Stator - Green LED - LED1
On Solid * Input power to system is in range
Fast flash Input power to system is too high
Slow flash Input power to system is too low

Rotor - Green LED - LED2
On Solid * Rotating Collar Power is in range and no data errors present
Fast flash Rotating Collar Power is too high
Slow flash Rotating Collar Power is too low
Off Data transmission errors

Data - Green LED - LED3
On Solid * Data received without errors
Off Data transmission errors
(A flickering Data light indicates intermittent data transmission.)

Range - Red LED - LED4
On Solid Sensor input to transmitter is over range
Off * Sensor input to transmitter is within range
(The Range indicator may flash or flicker with a dynamic over-range condition. When the Range light is on**,** the torque signal is in error.)

RPM - Green LED - LED5
On* Speed sensor triggering properly
Off Speed sensor not triggering

(Flashes 6 times per shaft revolution so will appear on solid or flashing depending on shaft speed.)

In an error condition, the receiver output will be 24 mA.
Fast flash rate = 4 Hz; Slow flash rate = 2 Hz

* Indicates normal (error free) condition

13 Troubleshooting Guide

When the Receiver is first powered up, it cycles through the startup sequence, lasting 10-15 seconds. During startup mode, all of the Indicator LEDs flash in unison. If all system checks are positive, the Main Status LED on the outside of the Receiver remains on solid, and the system is ready for operation.

Normal Operating Mode (no errors)

Indicator	Condition
Main Status (red LED on outside)	On solid
Stator (green LED inside)	On solid
Rotor (green LED inside)	On solid
Data (green LED inside)	On solid
Range (red LED inside)	Off

If an error is present, the Main Status LED will flash and the system will display an error code briefly (another 10-15 seconds) before the startup cycle repeats. Below are the most common error modes and potential corrective actions.

Error Mode: Power supply voltage is incorrect

Indicator	Condition	Suggested Corrective Action
Main Status Stator	Fast flash (4 Hz) Flashing (2 or 4 Hz)	1. Verify the approximately 12VDC powering the Receiver.

Error Mode: Weak inductive interface

Indicator	Condition	Suggested Corrective Action
Main Status Stator Rotor Data	Fast flash (4 Hz) On solid Off or slow flash (2 Hz) Off or flickering	1. Verify the voltage is about 2 volts peak-peak or 0.7VAC across the Mounting Blocks on top of the Receiver. This must be measured with an oscilloscope or a special meter that will measure 460KHz signals. 2. Make certain the Power Ring is not shorted to the Receiver enclosure by water or other conductive material. 3. Remove any surrounding metal other than the shaft within 4 inches (10 cm) of the Power Ring. 4. Clean the mating surfaces of the Power Ring and tighten all the mounting screws. 5. Verify that the Rotating Coil voltage is about 20 volts peak-to-peak or 7 VAC (probe the two terminal dots on the outer surface of the Coil Boards attached to the Rotating Collar). This must be measured with an oscilloscope or a special meter that will measure 460KHz signals. 6. Check alignment of the Rotating Collar within the Power Ring: their midlines should be aligned. 7. Make certain the Rotating Collar terminal strips are soldered properly and not damaged.

Error Mode: Strain gage problem

Indicator	Condition	Suggested Corrective Action
Main Status Stator Rotor Data Range	Fast flash (4 Hz) On solid On solid On solid On solid	1. Verify the excitation voltage to the gage is 4.0VDC on older units or 2.5 VDC on newer units. 2. Check solder connections and wiring to the gage. 3. Balance the gage to reduce the offset or apply a new gage.

14 Warranty Statement

Limited Warranty: Torque measuring equipment and accessories are warranted by the Seller for one year to be free from defects in both materials and workmanship under normal use and service. This warranty is in lieu of and excludes any other warranty, express or implied, including, but not limited to, any implied warranty derived from quote or fitness of purpose. (Manufacturer's liability and Buyer's limited remedies under Manufacturer's warranty shall be limited solely to repair, replacement, credit or refund, at the manufacturer's option, with respect to products supported by a Return Material Authorization number obtained from the Manufacturer and returned to the Manufacturer. The Manufacturer shall not be liable, under any circumstances, for consequential or incidental damages, including, but not limited to, labor costs or loss of profits arising in connection with the use of or inability to use products purchased from the Seller)

Product Application: The Buyer is solely responsible in determining the suitability of the Manufacturer's products in its application regardless of circumstances.

Manufacturer reserves the right to make future design changes to any of its products without thereby incurring any obligations to make changes to or replacements of this product.

Manufacturer neither makes nor authorizes any person to make on its behalf any other guarantee or warranty concerning its products.

Service

To obtain service under this Limited Warranty call Riverhawk Customer Service Department in **New Hartford** to obtain an RMA (Return Material Authorization) number.

Pack the item(s) in its original shipping container (or equivalent)

Put the RMA number on the address label

Put the RMA number on the shipping carton

Insure it (or assume the risk of loss / damage during shipment)

Ship the product freight pre-paid to New Hartford

Manufacturer is not responsible for damage to inbound product.

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