

# PSD

## PORTABLE SENSOR DISPLAY

### USER MANUAL



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## SAFETY PRECAUTIONS

**WARNING**

WARNING! IN ORDER TO MINIMIZE RISKS, IT IS OF UTMOST IMPORTANCE TO RESPECT THE CURRENT SAFETY STANDARDS WHEN PLANNING, CONFIGURING AND OPERATING A LOAD-FORCE-WEIGHT SYSTEM OR INSTALLATION.

**WARNING**

WARNING : THE INSTALLATION AND THE CALIBRATION IS RESERVED TO THE QUALIFIED STAFF. PLEASE CONSULT THIS MANUAL BEFORE ANY MANIPULATION AND FOLLOW ATTENTIVELY THE INSTRUCTIONS.

**CAUTION**

CAUTION! OPERATE THE PSD PORTABLE SENSOR DISPLAY WITH GREAT CAUTION! THE DEVICE MAY BE IRREVERSIBLY DAMAGED BY MECHANICAL SHOCK (FALLING), EXPOSURE TO CHEMICAL COMPONENTS (ACIDS) OR THERMAL EXPOSURE (HOT AIR, STEAM).

1. Make sure that all Magtrol electronic products are earth-grounded, to guarantee personal safety and proper operation.
2. Check line voltage before operating electronic equipment.
3. The calibration requires to observ securized electrical working methods.
4. The cabling must be done with power supply switched off
5. Periodically check all connections and attachments.
6. In case of rotating elements, ensure that all rotating parts are equipped with appropriate safety guards.
7. Always wear protective glasses when working close to rotating elements.

### QUALIFIED PERSONNEL

Persons in charge of using the PSD - Portable Sensor Display must have read and understood this user manual, paying extra close attention to all safety-related information.

The PSD - Portable Sensor Display is a high-precision product integrating the most recent measurement techniques. The device can give rise to residual dangers if used and manipulated in a non-compliant way by unqualified personnel.

This device must be handled by qualified personnel according to the technical requirements and the above-mentioned safety instructions. This is also true when using Portable Sensor Display accessories.



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# PREFACE

## PURPOSE OF THIS MANUAL

This manual contains all the information required for the setup, connection and general use of Magtrol's PSD - Portable Sensor Display. To achieve maximum capability and ensure proper use, please read this manual in its entirety before operating the unit. Keep the manual in a safe place for quick reference whenever a question should arise.

## WHO SHOULD USE THIS MANUAL

This user manual is written for operators using a Portable Sensor Display as part of a system measuring load, force or torque. The operator is assumed to have the necessary technical knowledge in electronics and mechanical engineering enabling him to connect and use the PSD - Portable Sensor Display without risk.

## MANUAL ORGANIZATION

This section gives an overview of the structure of the manual and the information contained within it. Some information has been deliberately repeated in different sections of the document to minimize cross-referencing and to facilitate understanding through reiteration.

The structure of the manual is as follows:

- Chapter 1: **INTRODUCTION** - Contains the technical data sheets for Magtrol's PSD Portable Sensor Display, which describe the units and provide detailed technical characteristics.
- Chapter 2: **INSTALLATION / CONFIGURATION** - Provides information needed for the setup of the PSD Portable Sensor Display in a test system, and their integration with Magtrol sensors.
- Chapter 3: **OPERATIONS** - Information on various keypad functions, on the setup diagram and its parameters definition, as well as on the calibration method with reference load.
- Chapter 4: **PSD SOFTWARE** - Information to configure the PSD by means of the PSD Software
- Chapter 5: **TROUBLESHOOTING** - Provides solutions to common problems encountered during configuration and running of the Portable Sensor Display.
- Chapter 6: **MAINTENANCE, REPAIR & CALIBRATION** - Provides information on maintenance, repair and calibration procedures, should the need arise.
- Chapter 7: **SERVICES INFORMATION** - Information, contacts and addresses relative for repair and/or calibration.

## SEMANTICS

In this manual, different terminologies may be used to speak about the «PSD Portable Sensor Display». The primary purpose is to make this user manual useful and easy to read.

Below you will find different terminology used such as: «Portable Sensor Display», «Portable Display», «Device», «Measuring Unit», «Measuring Equipment» or «Measuring Instrument»; all are synonyms.

In this manual it is also possible that we talk about MAGTROL products that are related to PSD. In this case, all products are presented under the common Magtrol's name. In particular, we may use terminology such as: «HRLXXX Series», «MB-02 Series» or «RT Series». These are product-specific abbreviations; please refer to the product-specific datasheets for more information.

The term «Series» stands for all the products of the series (e.g. HRLSeries refers to the whole range of HRL-Anchor Load Cells product).

## CONVENTIONS USED IN THIS MANUAL

The following symbols and type styles may be used in this manual to highlight certain parts of the text:



**NOTICE**

INDICATES INFORMATION CONSIDERED IMPORTANT BUT NOT HAZARD RELATED.

THIS IS INTENDED TO DRAW THE OPERATOR'S ATTENTION TO COMPLEMENTARY INFORMATION OR ADVICE RELATING TO THE SUBJECT BEING TREATED. IT INTRODUCES INFORMATION ENABLING THE CORRECT AND OPTIMAL FUNCTION OF THE PRODUCT.



**CAUTION**

INDICATES A HAZARDOUS SITUATION THAT, IF NOT AVOIDED, COULD RESULT IN MINOR OR MODERATE INJURY.

THIS IS ALSO USED TO DRAW THE OPERATOR'S ATTENTION TO INFORMATION, DIRECTIVES, PROCEDURES, ETC. WHICH, IF IGNORED, MAY RESULT IN DAMAGE TO THE MATERIAL BEING USED. THE ASSOCIATED TEXT DESCRIBES THE NECESSARY PRECAUTIONS TO TAKE AND THE CONSEQUENCES THAT MAY ARISE IF THESE PRECAUTIONS ARE IGNORED.



**WARNING**

INDICATES A HAZARDOUS SITUATION THAT, IF NOT AVOIDED, COULD RESULT IN DEATH OR SERIOUS INJURY.

THIS INTRODUCES DIRECTIVES, PROCEDURES, PRECAUTIONARY MEASURES, ETC. WHICH MUST BE EXECUTED OR FOLLOWED WITH THE UTMOST CARE AND ATTENTION, OTHERWISE THE PERSONAL SAFETY OF THE OPERATOR OR THIRD PARTY MAY BE AT RISK. THE READER MUST ABSOLUTELY TAKE NOTE OF THE ACCOMPANYING TEXT, AND ACT UPON IT, BEFORE PROCEEDING FURTHER.



**DANGER**

INDICATES A HAZARDOUS SITUATION THAT, IF NOT AVOIDED, WILL RESULT IN DEATH OR SERIOUS INJURY. THE SIGNAL WORD «DANGER» IS TO BE LIMITED TO THE MOST EXTREME SITUATIONS.

THIS INTRODUCES DIRECTIVES, PROCEDURES, PRECAUTIONARY MEASURES, ETC. WHICH MUST BE EXECUTED OR FOLLOWED WITH THE UTMOST CARE AND ATTENTION, OTHERWISE THE PERSONAL SAFETY OF THE OPERATOR OR THIRD PARTY MAY BE AT RISK. THE READER MUST ABSOLUTELY TAKE NOTE OF THE ACCOMPANYING TEXT, AND ACT UPON IT, BEFORE PROCEEDING FURTHER.

The safety symbol may subsequently vary depending on the source of the hazard. Below are examples:



Various safety pictograms according to ISO 7010



# 1. INTRODUCTION

## 1.1 GENERAL INFORMATION

The PSD - Portable Sensor Display - displays forces, loads or torque sensors with strain gauge technology. **It must not be used as the only device for safety relevant measurements.**

The Magtrol PSD can be easily connected to any Magtrol strain gauge transducers that operates with  $\pm 0.3 \dots 5$  mV/V sensitivity sensors, such as HRL Series (Anchor Load Cells), SG-01 (Cable Sensors), MB-02 Series (Miniature Load Pins), LB Series (Load Measuring Pins) and RT Series (Reaction Torque Sensors).

## 1.2 PRESENTATION

Magtrol's PSD is a compact, self-contained device. It is easily transportable which allows it to be used in various environments. This system is particularly suitable in cases where a fixed installation is difficult or irrelevant, such as:

- maintenance of installation,
- intermittent monitoring
- Laboratory, Research and development,...
- Installation or monitoring in civil engineering,...



Fig.1-1 PSD device presentation

## 1.3 DATASHEET

# PSD

## PORTABLE SENSOR DISPLAY

### FEATURES

- 0.01% Accuracy
- Rigid Versatile Handheld Instrument
- Min.-Max. Value Display (Peak & Valley)
- 16 Programmable Measurement Ranges
- Measuring Rate up to 1600 values per second
- Connection to any type of Strain Gauge Transducers
- USB 2.0 Interface
- Battery-powered or USB-powered Device
- Display Units
- Character Height: 14 mm
- Can be programmed directly on the device or by software (provided).

### DESCRIPTION

The PSD Portable Sensor Display from Magtrol is a very compact, light and easy to use device. This amplifier can process sensor strain gauge signals  $\pm 0.3 \dots 5 \text{ mV/V}$ . High measuring accuracy, paired with fast measuring rates allow an internal resolution of 22 bits at  $2 \text{ mV/V}$ . It also stores the adjustment data, sensor designation and physical unit. Functions, such as TARE, recall of min.-max. value,... are available during the measurement.

The device is powered by 3 AA batteries or via its USB Mini-B port. In order to increase its duration of use, the PSD integrates an automatic standby mode which is activated when the device is not used.

### APPLICATIONS

The PSD Display can be used with many sensors such as force sensors, load cells, torque sensors, anchor sensors or any other type of strain gauge transducers.

This portable measurement and display system is particularly suitable in cases where a fixed installation is difficult or irrelevant, such as:

- Maintenance of installation
- Intermittent monitoring
- Laboratory, Research and development,...
- Installation or monitoring in civil engineering,...



Fig. 1: PSD | Portable Sensor Display

### DIMENSIONS



## SPECIFICATIONS

MEASUREMENT	
Measuring accuracy class	0.01 %
Input Signal Range	±0.3 ... 5 mV/V
Input Impedance Range of Strain Gauge Bridge	> 150 Ω (2 parallel strain gauge full bridge / 350 Ω) up to 2000 Ω
Excitation Voltage (full bridge)	5.0VDC
Relative Linearity Error <sup>a)</sup>	0.0015 %
Noise (at measurement rate) <sup>a)</sup>	0.002 (6.25 Hz) ... 0.04 (1600 Hz)
Temperature Effect (on zero signal) <sup>a)</sup>	0.002 % / 10K

DISPLAY	
Type	5-digit LCD graphic display, 128 x 64 pixel, illuminated
Display Range	±99999
Display Additional Mode	Meas/min/max value, overload, units, charge of battery
Display Rate	3 s
Scaling Point for Linearization	up to 4 points
Internal Resolution <sup>a)</sup>	22 bits
Measuring Rate (average value)	6.25 ... 1600/s
Measured Value Transmission via USB	max. 1400 values/s (with software)
Character height	14 mm

ELECTRICAL CHARACTERISTICS	
Power supply voltage	3.0 - 4.8 VDC (3x AA battery) or powering via USB-port
Operating time with batteries	~40 h

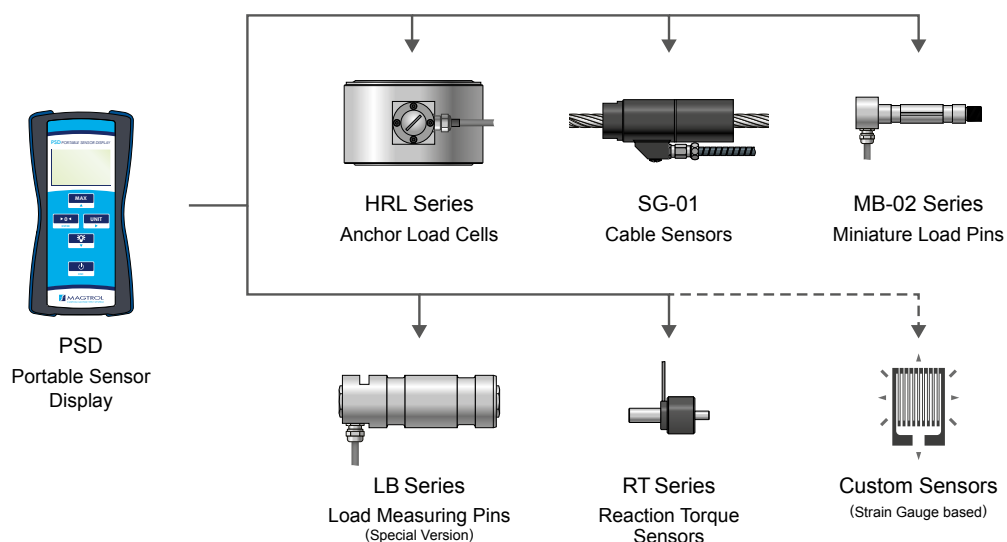
ENVIRONMENT	
Operating temperature range	-10 °C ... +50 °C
Storage temperature range	-20 °C ... +70 °C
Protection class (EN 60529)	IP54 <sup>b)</sup>

ELECTRICAL CHARACTERISTICS & CONNECTICS	
Connectics	6 poles axial connector
USB Interface	USB Mini-B connector
Weight (without batteries)	240 g

a) By or at 2mV/V

b) In use, transducer connected and USB-port closed

## SYSTEM CONFIGURATION



## RELATED PRODUCTS

As presented in «System Configuration», the PSD can be used with many of Magtrol's products, as well as with any third party manufacturer's sensors that base their measurement system on strain gauge technology.

### MB-02 SERIES - MINIATURE LOAD PINS



Fig. 2: MB-02-10-10-2  
Miniature Load Pin

Magtrol MB-02 Series Miniatures Load Measuring Pins are used to measure load and force and provide overload protection. The pins are mounted into machines in place of normal shafts and fitted with strain gauges, allowing them to produce a signal proportional to the measured load.

Manufactured in Switzerland, Magtrol's MB-02 Series Load Pins are rugged with high resistance stainless steel and tight construction. The compact design as well as the high protection class give this sensor an excellent aptitude for the measurement and monitoring of forces and overloads on mechanical compact applications, as well as in hostile environments.

### SG-01 - CABLE SENSOR



Fig. 3: SG-01 | Cable Sensor

The SG-01 cable sensor is designed for providing monitoring of permanent and temporary anchors and allowing continuous load measuring using either a direct or remote reading system.

Its specific design allow to use this sensor in harsh, tropical or harbor environments. The SG-01 cable sensor is particularly suitable for bridge strand and stay cables permanent mounting under hostile environmental conditions.

### RT 200 SERIES REACTION TORQUE SENSOR



Fig. 6: RT200 | Reaction  
Torque Sensor

The RT 200 Series is a compact and maintenance-free Reaction Torque Sensor. Based on strain gauge technology, this reaction torque sensor provides highly accurate torque measurement. It has been specifically designed to perform high-precision static torque measurements with low dynamic rotation (and limited angle) clockwise and counter-clockwise.

Major field applications include testing actuators, valves and fasteners as well as torque control on watch or medical devices, or any other application requiring torque measurement without full rotation.

### HRL SERIES - ANCHOR LOAD CELL



Fig. 4: HRL -4 | 600kN  
with connector and screw cap

HRL Series load cells consist of a high quality stainless steel. This compact load cell is designed specifically for heavy duty use on anchors and civil engineering, with load cells that are available in the range of 600 to 3 700 kN. Special designs are available upon request.

The attached shielded cable includes a water-proof connector with cap. Version without connector are available as an option. Cable lengths are customisable according to the installation requirements; for further information please contact us.

### LB SERIES - LOAD MEASURING PINS

LB Series Load Measuring Pins are used to measure load and force and to provide overload protection. The pins are mounted into machines in place of normal shafts and fitted with strain gauges, allowing them to produce a signal proportional to the measured load. Manufactured in Switzerland, Magtrol's Load Pins are rugged with high resistance stainless steel and tight construction, designed specifically for use in hostile industrial environments.



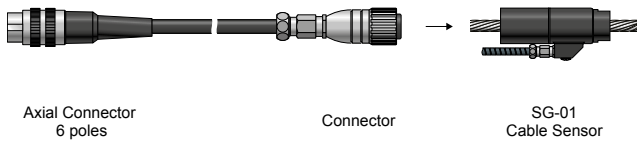
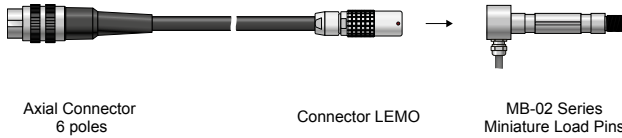
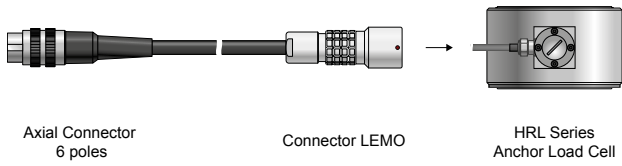
Fig. 5: LB210 & LB217  
Load Measuring Pins

LB Series Load Pins are used for load measuring devices and overload protection on cranes, hoisting gear, elevators, winches, and force measurement for regulation processes in industrial installations and machinery production. Moreover it is an ideally transducer to detect and measure forces in harsh, tropical, offshore, marine and harbor environments.

Further information on related products are available in their specific data sheets. Please visit our website: [www.magtrol.com](http://www.magtrol.com)

## ACCESSORIES

### CONNECTION CABLES



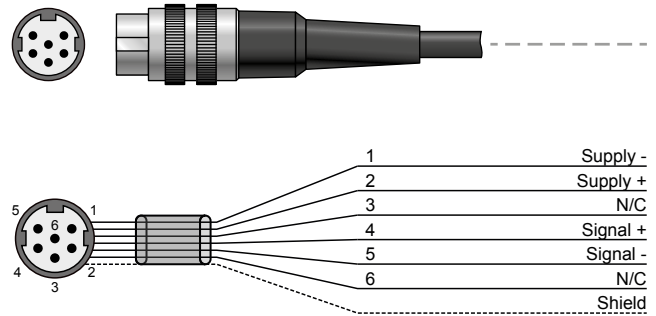
### ORDERING INFORMATION FOR CABLE

ORDERING NUMBER 944-101-000-0 - X

- 1 : Cable for HRL Series
- 2 : Cable for MB-02 Series
- 3 : Cable for SG-01

Example: Connection cable for HRL Series would be ordered as follows: **944-101-000-01X**

### CONNECTOR



Axial Connector (only)

PN 957-11-07-1206

The portable PSD display can be used with many strain gauge bridge sensors. For use with a Magtrol sensor not listed above or for use with any other sensor, please contact our sales representative.

## ORDERING INFORMATION

ORDERING NUMBER 854-100-000-011 -

- blank : Standard version
- C : with calibration

Example: PSD Portable Sensor Display calibrated would be ordered as follows: **854-100-000-011C**.



## 2. INSTALLATION / CONFIGURATION

### 2.1 OPERATIONS

The battery operated device supplies a stabilized excitation voltage for a strain gauge full bridge. A load change exposed to the sensor results to a change of his output signal. The device digitizes the signal and compares it to the ADC-data stored in the ranges memory. The user can store up to 16 ranges. In each of these set of data, the features of a certain sensor and display options can be stored. The setup of ranges and also a load calibration can be carried out also with the PSD Software related to the device.

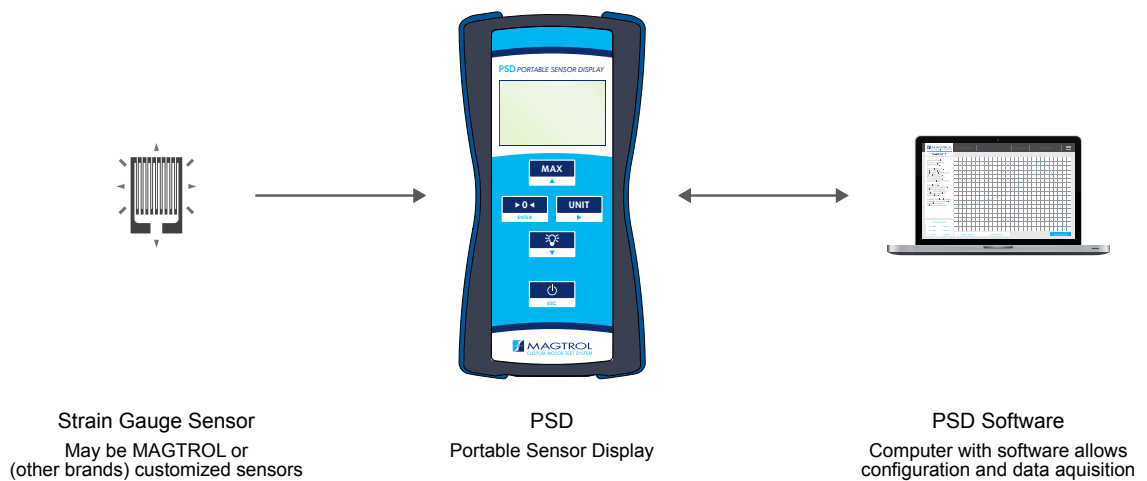


Fig.2-1 Standard configuration for measuring system including PSD

### 2.2 DISPLAY

When switching ON the device, after approximately 2 seconds, the display will show the measure value (here with a sensor HRL-7/1 000kN)

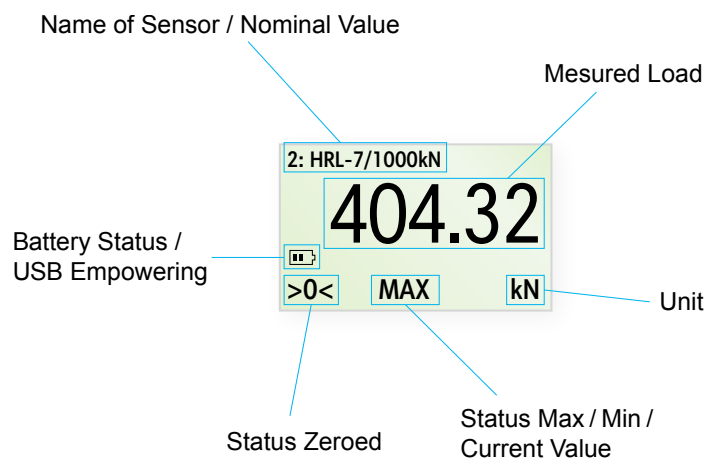


Fig.2-2 General display presentation

## 2.3 POWER SUPPLY

The display can be powered either by:

- 3 batteries AA (HR6 Mignon)
- 3 rechargeable batteries of the same size (1,2V) (not provided by Magtrol)
- USB power supply (battery display indicates full battery)
- USB cable to a powered on PC (battery display indicates USB)

If powering via the USB, the mounted batteries are disconnected automatically. The backlight is switched on permanently. If powered by batteries the device is switched off after 2 hours of operation (default setting).



Fig.2-3 PSD with the battery compartment open

The device will be delivered with batteries mounted. To exchange the batteries open the battery compartment with a Philips screw driver. Remove the batteries if they might not be used for a very long time (e.g. than powering by USB only).

Magtrol does not provide or sell battery chargers, rechargeable batteries or USB power supplies. These can be purchased from the vendor or manufacturer of your choice.



## 2.4 KEYPADS FUNCTIONS

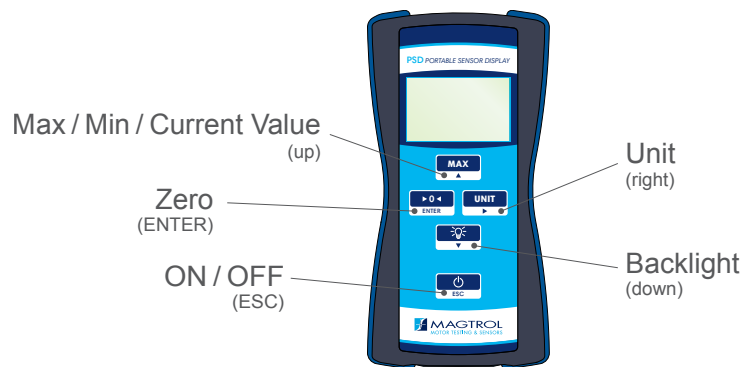


Fig.2-4 PSD - Keypads localisation

### 2.4.1 KEYPADS MAIN FUNCTION

KEYS	NAME	FUNCTION
	Max / Min / Current Value	To switch between the display of Max / Min / Current Value
	Zero	To switch between net and gross value To set display (Max / Min / Current Value) to zero
	Unit	Scroll between units (if available)
	Backlight	
	ON / OFF <sup>a)</sup>	
	Ranges	Scroll to next range (if available)
	Gross / Net	Toggle between not zeroed and zeroed display

a) Press for 1 second

### 2.4.2 ADDITIONAL INFORMATION

- Max / Min / Current Value** When using tension transducers, tension can be defined as positive direction of force. To do this set the sensitivity value negative (e.g. -2 mV/V).
- Zero** The zero value will be deleted when leaving a range. To store pre-loads permanently use the function «ZeroLoad Cal». The function is disabled when the unit «mV/V» is active.
- Auto-Tare** When the device is switched ON, the display is set to zero. Pressing the ZERO key will switch between net and gross value in the display.  
The Auto-Tare-Function can be turned off by using the PSD Software.
- Unit** Scroll between units that have been enabled in Ranges. If there is only one unit enabled the key has no function. In case the value to be displayed exceeds the possible range, the device switches to the next possible unit (e.g. 99 999 g + 15 g = 100.01 kg).  
If the value to be displayed is falling, there will be no switching back into the initial unit.
- Backlight** The duration can be adjusted in «Device setup».

## 2.5 CONNECTION TO MAGTROL PRODUCTS

### 2.5.1 CONNECTION OF HRL SERIES - ANCHOR LOAD CELLS TO PSD

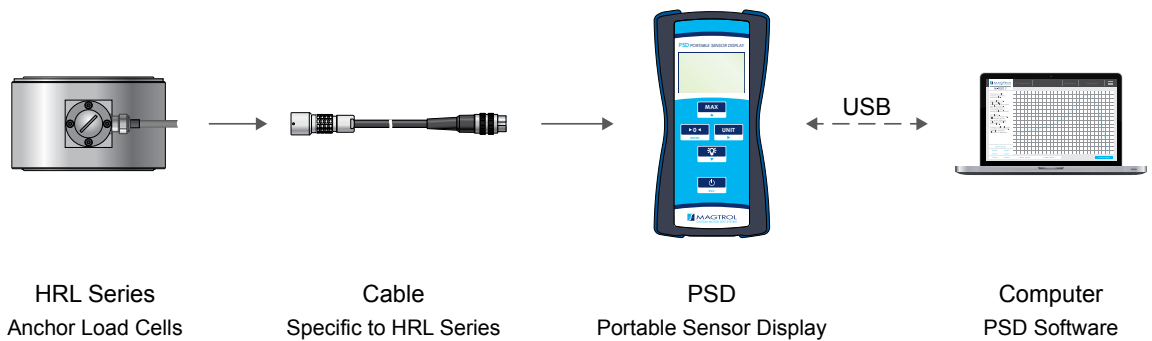


Fig.2-5 Connect HRL Series to PSD Display

HRL Series Anchor Load Cells it can be connected to the PSD by the means of a dedicated cable.

ORDERING NUMBER      PN 944-101-000-01X

### 2.5.2 CONNECTION OF MB-02 SERIES - MINITAURE LOAD PIN TO PSD

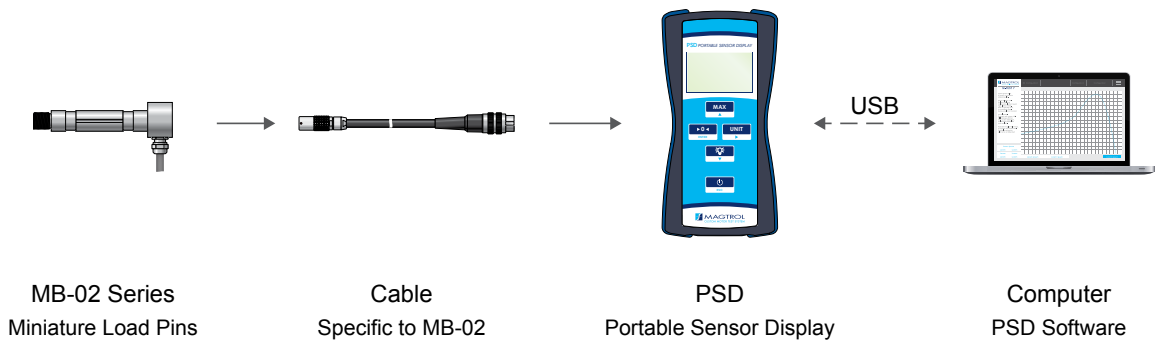


Fig.2-6 Connect MB-02 Series to PSD Display

MB-02 Miniature Load Measuring Pin it can be connected to the PSD by the means of a dedicated cable.

ORDERING NUMBER      PN 944-101-000-02X

### 2.5.3 CONNECTION OF SG-01 - CABLE SENSOR TO PSD

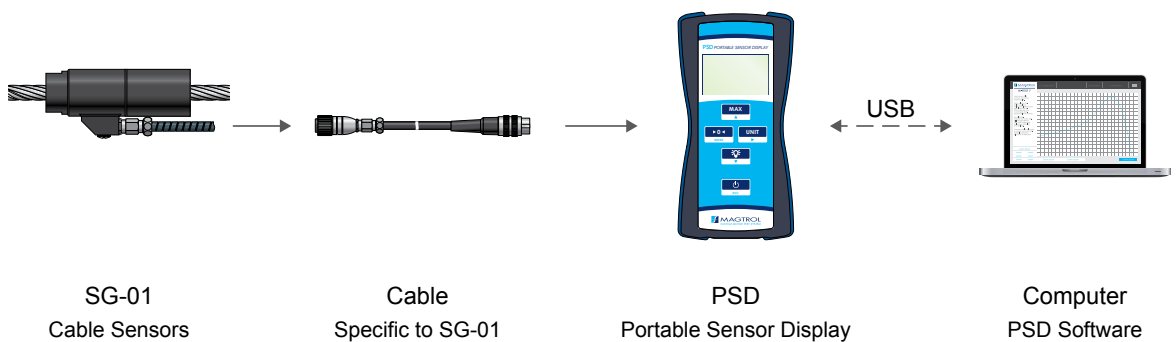


Fig.2-7 Connect SG-01 Series to PSD Display

SG-01 Cable Sensor it can be connected to the PSD by the means of a dedicated cable.

ORDERING NUMBER      PN 944-101-000-03X

### 2.5.4 CONNECTION OF LB SERIES - LOAD MEASURING PIN TO PSD

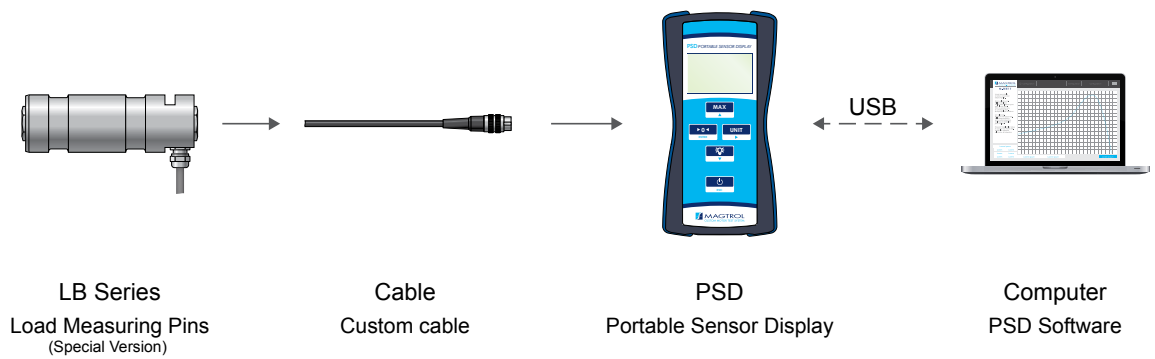


Fig.2-8 Connect LB Series to PSD Display



**CAUTION**

THE LOAD MEASURING PIN MUST BE A SPECIAL VERSION. PLEASE CONTACT OUR TECHNICAL DEPARTMENT FOR MORE INFORMATION

An LB Series sensor can be connected to the PSD. Due to the specificity of this sensor the connection will be done by means of a custom cable.

On request, Magtrol can supply this cable, which will be perfectly configured for the sensor and your installation.

You can also manufacture the cable yourself, at your own risk and without guarantee. To do this, Magtrol offers the necessary connector to connect to the PSD; the connection diagram is explained *see section 2.7 - Sensor Plug Pin Assignment*.

### 2.5.5 CONNECTION OF RT SERIES - REACTION TORQUE SENSOR TO PSD

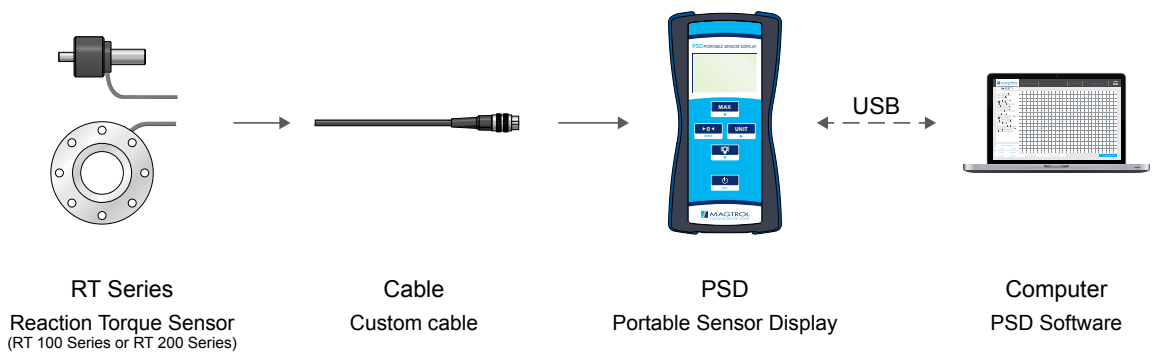


Fig.2-9 Connect RT Series to PSD Display

While not part of Magtrol's Load-Force-Weight product line, the RT Series Reaction Torque Sensors are developed with strain gauge technology, so it is possible to use the PSD with them.

Due to the specificity of this sensor the connection will be done by means of a custom cable. On request, Magtrol can supply this cable, which will be perfectly configured for the sensor and your installation.

You can also manufacture the cable yourself, at your own risk and without guarantee. To do this, Magtrol offers the necessary connector to connect to the PSD; the connection diagram is explained *see section 2.7 - Sensor Plug Pin Assignment*.

## 2.6 CONNECTION OF CUSTOM SENSORS TO PSD

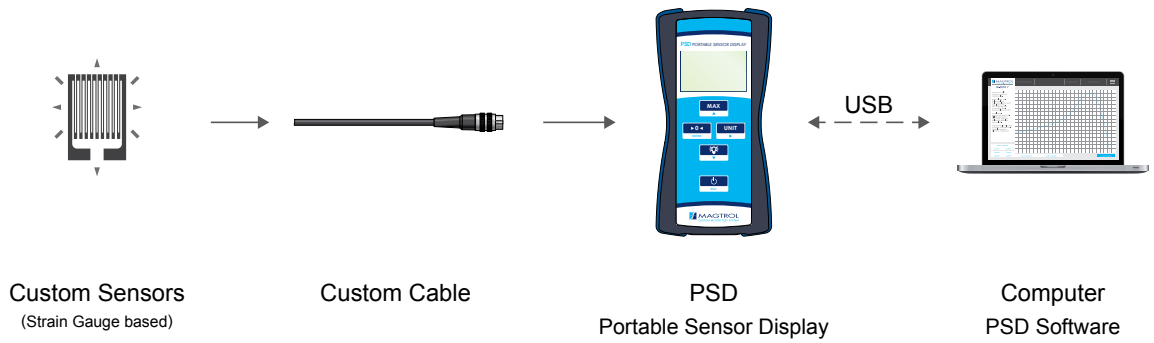


Fig.2-10 Connect Custom Sensors to PSD Display



**CAUTION**

THE CUSTOM SENSOR MUST BE BASED ON STRAIN GAUGE TECHNOLOGY

If you are not sure what technology your sensor uses, if it is not one of the sensors listed above or if your sensor does not seem to perfectly match the technical specifications supported by the PSD device, please contact our technical department so that they can provide you with the best information regarding your system.

On request, Magtrol can supply this cable, which will be perfectly configured for the sensor and your installation.

You can also manufacture the cable yourself, at your own risk and without guarantee. To do this, Magtrol offers the necessary connector to connect to the PSD; the connection diagram is explained *see section 2.7 - Sensor Plug Pin Assignment*.

## 2.7 SENSOR PLUG PIN ASSIGNMENT

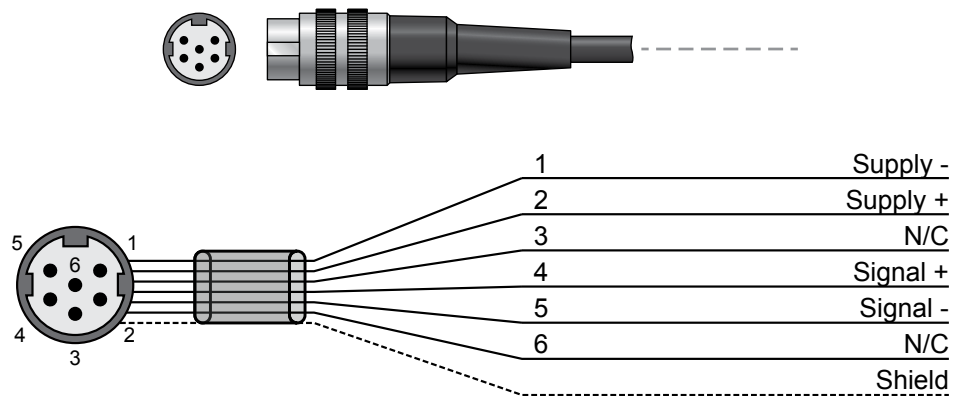


Fig.2-11 Wiring diagram

ORDERING NUMBER

PN 957-11-07-1206








## 3. OPERATIONS

### 3.1 SETTING UP RANGES

#### 3.1.1 GENERAL INFORMATION



A range (channel) is stored as a set of parameter per sensor. It can be identified by a name displayed on top of the display. There is no connection between two ranges. If more then one range is defined the user needs to choose the range related to the used sensor. Up to 16 ranges can be stored in the device memory.

#### 3.1.2 KEYPAD FUNCTIONS FOR SETTING UP

KEYS	NAME	FUNCTION
 + 	Setup <sup>a)</sup>	To switch between the display of Max/Min/Current Value
	▲ Up	To switch between net and gross value To set display (max/min/current value) to zero
	ENTER	Scroll between units (if available)
	► Right	
	▼ Down	
	ESCAPE	Scroll to next range (if available)

a) Press long

#### 3.1.3 CREATE /EDIT A MEASURING RANGE

1. Press  +  simultaneously to get into the setup mode. Press **ENTER** to proceed to Ranges. Use the arrow keys ▲▼► and ENTER to input the password (default: «0000»).
2. Move the Cursor to «Create a new range» and press **ENTER** or choose an existing range. Use the keys ▲▼ to move to the parameter you want to edit and press **ENTER** to get to the editing mode.



#### NOTICE

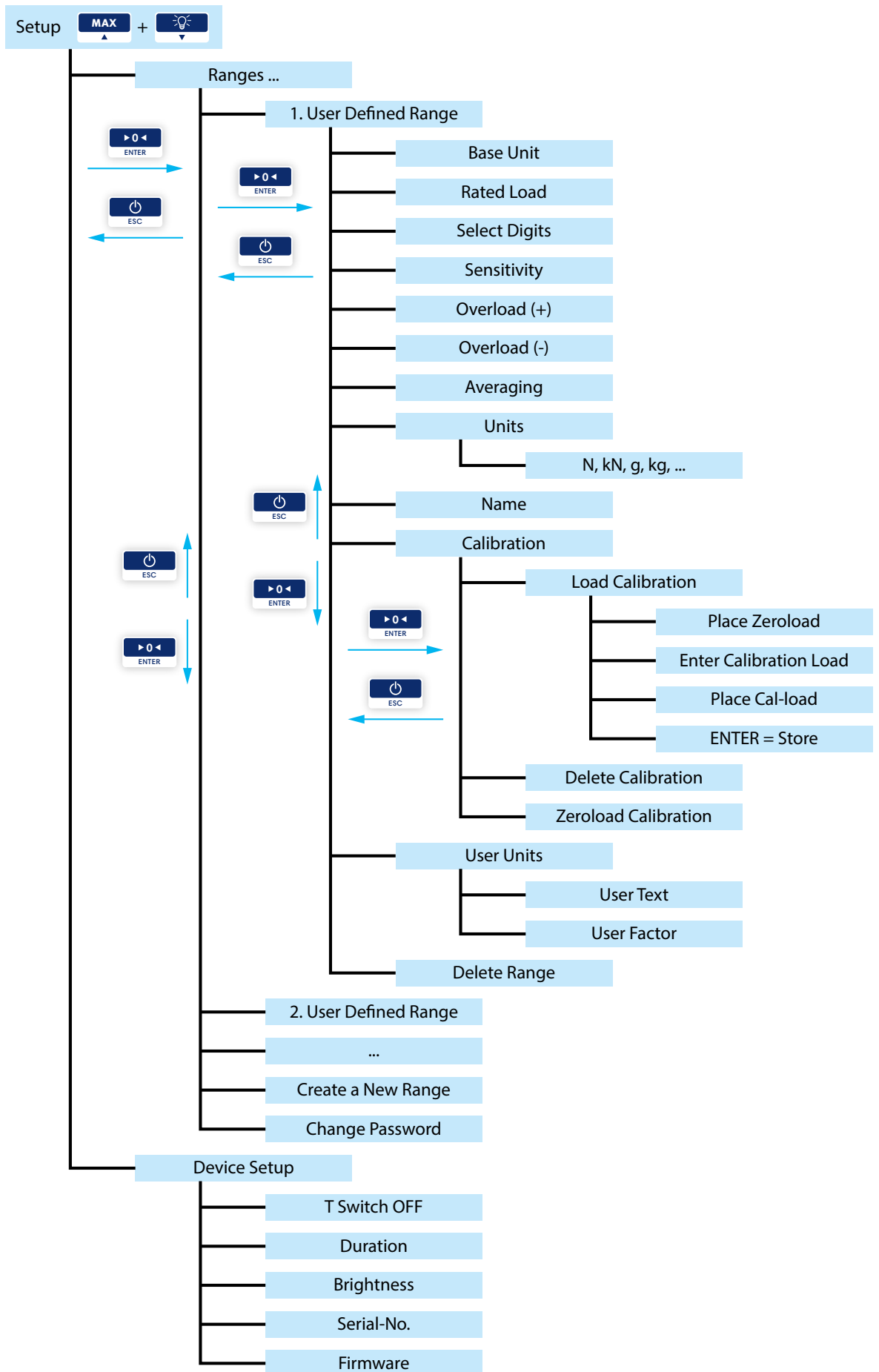
There is always one current range. In the list of ranges it is marked with two # (e.g. #CustomRange#).



#### NOTICE

The range used for the latest measuring is the current range.

### 3.1.4 SETUP DIAGRAM



### 3.1.5 PARAMETERS

NAME	DESCRIPTION																														
Base unit <sup>a)</sup>	<p>This unit is used for calibration. When choosing another unit in measuring mode the value displayed will be computed from the base unit value. The display of the base unit may be deactivated.</p> <p>Range of values:</p> <table> <tr> <td>N</td> <td>Newton</td> <td></td> </tr> <tr> <td>kN</td> <td>kiloNewton</td> <td>(1 kN = 1 000 N)</td> </tr> <tr> <td>g</td> <td>gram</td> <td>(1 g = 0.009807 N)</td> </tr> <tr> <td>kg</td> <td>kilogram</td> <td>(1 kg = 9.807 N)</td> </tr> <tr> <td>t</td> <td>ton</td> <td>(1 t = 9 807 N)</td> </tr> <tr> <td>lbf</td> <td>pound-force (English)</td> <td>(1 lbf = 4.448221615 N)</td> </tr> <tr> <td>oz</td> <td>ounce</td> <td>(1 oz = 0.278013851 N)</td> </tr> <tr> <td>to</td> <td>long ton (Imperial)</td> <td>(1 to = 9 964 N = 1 016 kg)</td> </tr> <tr> <td>mV/V</td> <td>Signal of a Strain Gauge</td> <td></td> </tr> <tr> <td>Unit</td> <td>User Defined Unit</td> <td></td> </tr> </table>	N	Newton		kN	kiloNewton	(1 kN = 1 000 N)	g	gram	(1 g = 0.009807 N)	kg	kilogram	(1 kg = 9.807 N)	t	ton	(1 t = 9 807 N)	lbf	pound-force (English)	(1 lbf = 4.448221615 N)	oz	ounce	(1 oz = 0.278013851 N)	to	long ton (Imperial)	(1 to = 9 964 N = 1 016 kg)	mV/V	Signal of a Strain Gauge		Unit	User Defined Unit	
N	Newton																														
kN	kiloNewton	(1 kN = 1 000 N)																													
g	gram	(1 g = 0.009807 N)																													
kg	kilogram	(1 kg = 9.807 N)																													
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oz	ounce	(1 oz = 0.278013851 N)																													
to	long ton (Imperial)	(1 to = 9 964 N = 1 016 kg)																													
mV/V	Signal of a Strain Gauge																														
Unit	User Defined Unit																														
Rated Load	<b>Nominal load</b> of the sensor in the base unit. Only integer values can be put in																														
Select digits	<b>Resolution</b> of display or decimal places range of values 10 ... 99 999 steps																														
Sensitivity	<p><b>Output at rated load.</b></p> <p>This value will be overwritten by a more correct value acquired during calibration by load. If a calibration exists this value cannot be edited.</p> <p>Range of values: 0.3 ... 5 mV/V (default: 2 mV/V)</p>																														
Overload (+)	<p><b>Overload warning</b> in positive force direction in percent of the rated load refers to the gross value.</p> <p>The warning «Overload» will be displayed if the measured force exceeds the defined overload limit in positive force direction</p> <p>Range of values: 0 ... 999% (default: 120 %)</p>																														
Overload (-)	<p><b>Overload warning</b> in negative force direction in percent of the rated load refers to the gross value.</p> <p>The warning «Underload» will be displayed if the measured force exceeds the defined Overload (-) limit in negative force direction</p> <p>Range of values: 0 ... -999% (default: -120%)</p>																														
Averaging	<p><b>Output values per second</b></p> <p>The ADC takes 3200 samples/second. A moving average filter reduces the number of values and improves the accuracy. Use a low value for static measurements and a high value for dynamic measurements. A high value improves the quality of the Min/max value display but also allows more noise and distortions and therefore might lead to a unsteady display. Changing Average has no effect to Sensitivity.</p> <p>Range of values: 6,25; 12,5; 25; 50; 100; 200; 400; 800; 1600 / s (default: 50/s)</p>																														
Units	<p><b>List of enabled units</b></p> <p>defines the units that can be chosen by the user:</p> <p><b>NO</b> means unit is not accessible by the user</p> <p><b>YES</b> means unit is accessible by the user</p> <p>Values: see base unit (default = only base unit = YES)</p>																														
Name	<p><b>Name/Description</b> of the measuring range</p> <p>This text is displayed in the head of the display to allow easy assignment of the sensor to a measuring range</p> <p>Values: text, 22 characters (default: ##, sequential number of range)</p>																														
User unit	<p>Characterization of a user defined unit:</p> <p>User text: displayed symbol or text of the unit Values: text, 4 characters (default: «Unit»)</p> <p>User factor: conversion factor of the user unit 1 x base unit = user factor x user unit Values: 0 ... 9999 in steps of 0.001... (default: 1.0)</p>																														

Delete Range	Deletes the measuring range (possible only if no calibration exists on this range and the range to be deleted is not the only range)
Conversion of units	Units will be converted according to the SI-system. Please note that when converting force into weight the gravitational acceleration of 9.8107 m/s <sup>2</sup> (valid for Germany 3) is used. The gravitational acceleration varies according to the position on the globe. To ensure weight display accuracy of better than 0.1 %, a load calibration should be carried out at the production site.
Change password	To define a 4 character password to protect the set up data of this range. Change the password with the keys ▲▼▶. Press ENTER to save the new password. (Default: «0000») (After calibration at the manufacturer site, a password will be applied)

a) The unit mV/V is calibrated at the manufacturer's site. Re-calibration by the use is disabled. When using mV/V as the base unit other units cannot be activated.

### 3.1.6 DEVICE SETUP

T switch off	Auto power off of the device after (1 ... 999) minutes, <b>0 min</b> means the device never switches OFF automatically. (default: 120 min). If the device is powered via the USB the function is changed to standby to keep the current values.
Duration	Automatic switch off of the display backlight (1 ... 239) seconds; <b>0 s</b> means the backlight is never switched off (default: 60 s).
Brightness	Brightness of the display backlight; 10% steps available (default: 80 %)
Serial-No <sup>b)</sup>	Serial number of the device (entered by the manufacturer)
Firmware <sup>b)</sup>	Version of the firmware

b) These parameters are for reading only



### 3.2 CALIBRATION BY LOAD (CALIBRATION)



**CAUTION**













THE FOLLOWING PROCEDURE IS DEDICATED ONLY TO LOAD SENSORS WORKING WITH STRAIN GAUGE TECHNOLOGY.

FOR USE WITH OTHER TYPES OF SENSORS, PLEASE CONTACT OUR TECHNICAL DEPARTMENT TO FIND OUT IF IT IS POSSIBLE TO USE IT WITH A SPECIFIC SENSOR.

The calibration is carried out by means of a known load for the current range. The calibration with a strain gauge simulator is possible too. The calibration always uses the base unit. The first calibration point is zero load, the second point. A former calibration as well as the value Sensitivity will be overwritten by the new calibration. The calibration can be cancelled until the last step to keep the old data.

Calibration means assigning two display values to two sensor signals. All other points will be extrapolated. A calibration of up to five points is possible with the PSD Software.











To enter the «Setup - Mode», press the two keypads  +  simultaneously for longer than 1 second.

DISPLAY	KEYS	FUNCTION	NOTICE
>Calibration<		Open menu	
>Start calib: No< Delete calib: No	  	New calibration	
>Start calib: Yes<		Confirm Start	
Place zeroload, then ENTER		Calibration of zero load: Unload the sensor!	Confirm that the sensor is unloaded
Enter calibration load	   	Input of load display relating to calibration load	Refers to base unit Rated load proposed
Place Ca.-load, then press ENTER		Calibration by load, apply a known load!	Load should be at least 50% and max. 150% of the rated load
ENTER= Store / ESC = Cancel		Confirmation of the calibration	Press ESC to restore old values
>Start calib: No< Delete calib: No		Back to menu "Ranges"	

### 3.2.1 EXAMPLE FOR A LOAD CALIBRATION (5 000g SCALE)









Range setup:

Base Unit: g	Overload (+): +120%	Name: 5 000g
Rated load: 5 000	Underload (-): -10%	Known calibration load: 4 993g
Select Digits: 5 000	Conv. Rate: 6.25	
Sensitivity 2.0000	Used units: g, N	

DISPLAY	KEYS	FUNCTION	NOTICE
>Calibration<		Enter menu	
>Start calib: No< Delete calib: No	    	Start new calibration	
>Start calib: Yes<		Confirm Start	
Place zeroload, then ENTER		Unload the scale	Confirm that the scale is free of load
Enter calibration load: 5000 (Numerical entry: 4993)		Input of load display relating to calibration load	
Place Cal-load, then ENTER		Press key after applied load has settled	
ENTER=Store / ESC = cancel		Confirm calibration	
>Start calib: No< Delete calib: No	   	Back to load display	Test your calibration

### 3.3 DELETE CALIBRATION

To delete a Range, the calibration must be deleted beforehand. After deletion of a calibration, zero and Sensitivity stay unaffected. The unit still displays correctly. Potential calibration point in between zero and related load (linearization points) will be removed.

DISPLAY	KEYS	FUNCTION	NOTICE
>Calibration<		Enter menu	
>Load calib: No< >Delete calib: No<	 		
>Delete calib: No< >Start calib: No<			
>Delete calib: No<	 		
>Delete calib: Yes<		Delete calibration	
>Delete calib: is deleted< >Start calib: No<		Back to menu Ranges	

### 3.4 ZERO LOAD CALIBRATION

To correct a zero deviation of the sensor itself of/or a dead load.



#### CAUTION

THE OVERLOAD INDICATION IS MOVED BY THE SAME OFFSET. THERE IS A RISK OF OVERLOAD WARNING FAILURE.

The «Zero Load Calibration» shifts the zero position of the load curve which slope is defined by Sensitivity. It should be applied after load calibration.

## 4. PSD SOFTWARE

You can load the PSD Software from our website [www.magtrol.com](http://www.magtrol.com) in our support section.

Follow the instructions provided in the installation package to correctly install the software on the machine of your choice. This software is free and does not require a license or other activation key.

However, it may be necessary to install on your computer, the drivers necessary for the proper functioning of the program. These drivers are also available on our website.

## 5. MAINTENANCE, REPAIR & CALIBRATION

### 5.1 MAINTENANCE

Magtrol PSD Portable Sensor Display is virtually maintenance-free. This is due to the proven quality of the components and our long experience in designing sensors and devices for load measurement systems.

Always store your device in a clean, dry and shock-free environment. When you are not using the connections (USB, connector), remember to close the doors to prevent dust or objects from damaging or obstructing the connectors.

In case of prolonged non-use (>1 year), it is recommended to remove the batteries to prevent damage to them.

**CAUTION**

THE USER MUST NOT ATTEMPT TO CHANGE OR REPAIR ANY INTEGRATED COMPONENTS HIMSELF. FOR ALL MAINTENANCE OR REPAIR OPERATIONS, PLEASE RETURN THE DEVICE TO MAGTROL.

SIMILARLY, THE USER SHOULD NOT ATTEMPT TO CARRY OUT REVISIONS OR REPAIRS OF ANY KIND ON THE MECHANICAL OR ELECTRONIC COMPONENTS MAKING UP THE DEVICE. IF A PROBLEM IS SUSPECTED, MAGTROL SHOULD BE CONTACTED SO THAT ARRANGEMENTS CAN BE MADE TO PERFORM ANY REPAIRS IN THE SHORTEST TIME POSSIBLE.

FAILURE TO COMPLY MAY RESULT IN SERIOUS DAMAGE TO THE DEVICE OR MAY INVALIDATE THE WARRANTY.

**NOTICE**

The PSD **housing is sealed**. If there is any evidence that the housing has been opened and unauthorized modifications have been attempted, **the warranty will be invalidated**.

## 5.2 REPAIR

In case of a defect, please see chapter *see chapter SERVICES INFORMATION* of this manual. Whether you are directed to ship your equipment back to MAGTROL INC. in the United States or MAGTROL S.A. in Switzerland, it is very important to include the following information with your return shipment:

1. Model number, part number, serial number, order number and date of acquisition
2. Description of the defect and the conditions in which it appeared
3. Description of the measuring system (drawing, photographs, sketches, etc.)
4. Description of the component of the system (drawing, photographs, sketches, etc.)
5. Description of the intended measurement operation(s)

**CAUTION**

MAINTENANCE MUST BE PERFORMED BY MAGTROL IN ORDER TO GUARANTEE FUTURE MEASURING ACCURACY.

To allow MAGTROL to complete the job in the best possible time, carefully pack the device and follow the procedure outlined *see chapter SERVICES INFORMATION* of this manual.

## 5.3 CALIBRATION

The PSD device does not require a specific calibration. However, Magtrol offers a customized calibration service based on your specific measurement chain, the specific sensors used, etc. Although it is not necessary to calibrate the PSD device, Magtrol recommends that the sensors used with it be calibrated regularly.

To ensure correct operation of the sensor and long-term measurement consistency, it is recommended to calibrate the sensor regularly. Magtrol recommends a factory calibration every 12 months.

Returning the sensor directly to the Magtrol factory is both advantageous and economical. We can guarantee a dedicated calibration for the sensor performed by one of our specialists. In addition, any wear and tear requiring maintenance will be immediately taken care of by our after-sales service team.

## 6. TROUBLESHOOTING



### NOTICE

If none of the following measures show any effect, please contact your Magtrol representative.

PROBLEM	BEHAVIOR	POSSIBLE CAUSES	SOLUTIONS
ADC error	The input signal exceeds the input range of the ADC	No sensor connected	Check the sensor connection
		Damaged sensor cable	Check the sensor cable
		Moisture in or at the sensor connector	Check the connector and clean it if necessary
		Sensor extremely overloaded	Verify the sensor
Overload / Underload	The input signal exceeds the span as defined in Ranges with the parameters Overload (+) and Overload (-)	Sensor overloaded / under loaded	Verify the sensor
Display of current value is flashing	The unit tries to display more than 99999 parts. The decimal point disappears, the last digit is not displayed. Example: value to be displayed: 103.888, actual flashing display: 10388		
(-----)	Current value display shows minus signs only (-----)	The calculation result in incomputable values (mathematic overflow). Sensitivity exceeds the computable range	
		Other causes	see ADC error
Display «USB» not in capital letters		Error in PC connection.	Retry by re-connection the USB-cable

## SERVICES INFORMATION

### RETURNING MAGTROL EQUIPMENT FOR REPAIR AND/OR CALIBRATION

When returning equipment to MAGTROL INC. (United States) or MAGTROL S.A. (Switzerland) for repair and/or calibration, a completed **Return Material Authorization (RMA) form is required.**

Please consult the «Services/Return and Calibration» section on our web site [www.magtrol.com](http://www.magtrol.com), in order to choose the most appropriate recipient for your needs.

Depending on where the equipment is located and which unit(s) will be returned, you will be directed to either ship your equipment back to MAGTROL, Inc. in the United States or MAGTROL S.A. in Switzerland.

### RETURNING EQUIPMENT TO MAGTROL INC. (UNITED STATES)

1. Visit the «Services/Return and Calibration» section of Magtrol's web site [www.magtrol.com](http://www.magtrol.com) to initiate an RMA procedure. Complete the RMA form online and submit.
2. An RMA number will be issued to you via e-mail. Include this number on all return documentation.
3. Ship your equipment to: **MAGTROL, INC.**  
70 Gardenville Parkway  
Buffalo, NY 14224 | USA  
Attn: Repair Department
4. After Magtrol's Repair Department receives and analyzes your equipment, a quotation listing all the necessary parts and labor costs, if any, will be faxed or e-mailed to you.
5. After receiving your repair estimate, provide Magtrol with a P.O. number as soon as possible. A purchase order confirming the cost quoted is required before your equipment can be returned.

### CONTACT FOR AFTER SALES SERVICE AT MAGTROL INC.

After Sales, Repair & Calibration Services

phone +1 716 668 5555 ext. 115

fax +1 716 668 3162

e-mail [service@magtrol.com](mailto:service@magtrol.com)

### RETURNING EQUIPMENT TO MAGTROL S.A. (SWITZERLAND)

1. Visit the «Services/Return and Calibration» section of Magtrol's web site [www.magtrol.com](http://www.magtrol.com) to initiate an RMA procedure; complete the RMA form online and submit.
2. After your request has been reviewed, you will receive an email containing an RMA number and dedicated return instructions including specifics about shipping details. The RMA number will be a Magtrol SA internal repair order (SR-xxxx) reference.

Any **shipment sent without an RMA risks delays and possible rejection**, so please wait until you receive the email with the details you will need to properly return your equipment.

Any **equipment returned for credit must be approved** prior to return and is subject to a re-stocking fee.

### CONTACT FOR AFTER SALES SERVICE AT MAGTROL S.A.

After Sales, Repair & Calibration Services

phone +41 26 407 30 00

fax +41 26 407 30 01

e-mail [repair@magtrol.ch](mailto:repair@magtrol.ch)



## REVISIONS TO THIS MANUAL

The contents of this manual are subject to change without prior notice. The latest updated versions of our manuals are available and downloadable at any time on Magtrol's website [www.magtrol.com](http://www.magtrol.com) in the « SUPPORT » section.

To ensure that you have the latest version, compare the issue date (on the back of this manual) with the last updated document available on our website.

The table of revisions below lists the significant updates that have been made.

### REVISION DATES

DATE	EDITION	CHANGE	SECTION(S)
July 2021	1st Edition - rev. B	Datasheet updated Updated "Services Information" du to application of new RMA	1.3 Services Information
June 2021	1st Edition - rev. A	Initial version	All

[www.magtrol.com](http://www.magtrol.com)

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### Subsidiaries

 Germany, France  
India & China  
 Worldwide Network  
of Sales Agents

