

# Solar GI

## Technical specifications

### Software

- UES manometry
- Esophageal body manometry
- LES manometry
- Sphincter of Oddi
- Antroduodenal / small bowel manometry
- Colon manometry
- Anorectal manometry
- Biofeedback
- High Resolution Manometry (HRM)
- High Resolution Impedance Manometry (HRIM)
- Video GI
- 3D-Vector Volume Plots (3D-VVP)
- Patient database program
- Language: Chinese, Czech, Danish, Dutch, English, French, German, Greek, Hebrew, Italian, Japanese, Korean, Norwegian, Russian, Spanish, Swedish, Taiwanese, Turkish
- Hardware test program (diagnostics)
- Virtual Instructor Program (VIP)



### Channels

- 1..36 pressure channels
- Swallow and respiration channel
- Multiple standard EMG channels
- High frequency EMG channels
- Neuro stimulation
- EGG
- Impedance
- pH ISFET, antimony, glass

### Solar Safety module

- Class I equipment
- Degree of protection: IPX1
- Standard for the Solar trolley, optional for the Solar Compact (pole Mk III)
- 115 or 230 Volt
- 50 / 60 Hz
- 600 VA continuous, 800 VA peak
- 6 AC-outlets
- 1 protective earth and 3 potential equalization connections/plugs
- System isolation switch (general on/off)

- Medical grade thermal protected safety transformer (4000 V insulation). UL listed EL 544, E 123838
- Detachable IEC power cords
- Fuse 2 x 5A @ 230V or 2 x 10A @ 115V (slow blow, ceramic)

### Solar U2M module

- Class II equipment
- Degree of protection: IPX1
- 5 MMS ports
- USB communication with PC
- Green LED: power indicator on front
- U2M Medical grade power supply (Friwo 7362M/15). Wall cube model, with 'ROW' plug also configurable as desktop model
- Input voltage: 100 - 240 Vac
- Input current: 0.7 A
- Input frequency: 50 - 60 Hz
- Mains plug: EURO, UK, USA/Japan, Australia, ROW (determined by ordering)
- Output voltage: 15 V  $\pm$ 10 % (current limited)
- Output current: 2A continuous

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- DC cord length: 4 meter
- Dimensions: (l x w x h) without clamp 135 x 67 x 40 mm (without mains plug)
- Weight: 278 gram (no clamp)
- Safety standards: Fulfills class II SELV for IEC60601-1, UL2601, VDE
- Leakage current: <10 mA

## **Infrared receiver**

- For RC-1000 and RC-1100 remote control
- USB connector

## **Remote control**

- Infra red (wireless)
- 26 keys and 1 Shift key
- 2 AA sized 1.5 Volt batteries
- RC-1100 for gastro-intestinal investigations
- RC-1000 for urodynamic investigations

## **Combination Interface Module**

- Applied part: type BF
- Degree of protection: IPX1
- Input for: pressures, EMG (optional), Swallow and respiration (optional)

### *Pressures*

- Input for solid state (micro-tip), air charged transducers/catheters, water transducers/catheters
- Measured channels Pves, Pabd, and Pura
- Calculated channels Pdet and Pclose
- 2, 3 or 5 Lemo 4 receptacles for solid state catheters and Sensoror/Memscap transducers
- 2, 3 or 4 BD-receptacles for DT-XX
- Lemo 14 receptacle for solid state catheters (maximum 5 pressures)
- Pressure range: -600 to +1400 cmH<sub>2</sub>O
- Bandwidth: 0 - 60 Hz (at 200 Hz sampling)
- Excitation voltage: 2.5V
- Pressure transducer sensitivity: 5uV/V/mmHg
- Resolution: 0.1 cmH<sub>2</sub>O
- Accuracy: < 1% relative to software zero pressure
- Input impedance: 10 M  $\Omega$
- Noise (0.1 - 10Hz): < 0.15 cmH<sub>2</sub>O
- Drift: < 0.2 cmH<sub>2</sub>O / °C
- Holders for DT-XX/DT-NN/TNF-R and Sensoror (Memscap) pressure transducers
- Receptacles: B-D
- Receptacles: Lemo 4 female (type EPG.0B.304)
- Receptacle Lemo 14 female (type EPG.1B.314.NLN)

### *EMG / Swallow*

- Combined input for swallow detection and EMG
- Balanced capacitively coupled input
- Input range:  $\pm 30$  mV
- Resolution:
  - 0.1 uV for scale settings  $\leq 1$  mV
  - 1 uV for scale setting  $> 1$  mV
- Bandwidth: 20 Hz – 10 kHz
- EMG processing average rectified value
- Time constant of averaging filter 1/sample rate (100, 50, 20, 10 or 5 msec)
- Notch filter: 50 Hz or 60 Hz
- Noise level: < 1.2 uVrms, input referred with shorted inputs
- Common mode rejection ratio: > 120 dB @ 50/60 Hz
- Update rate: 22.05 kHz (sample rate is 1.4 MHz)
- Input impedance:
  - 2 G  $\Omega$  differential mode
  - 10 G  $\Omega$  / 4 pF common mode
- Isolation Mode Rejection Ratio: > 160 dB
- Receptacle:
  - 5p DIN connector
  - 1.5 mm touch-proof connector(s) (green) for common electrode

### *Respiration*

- Two 1.5 mm touch-proof connectors
- Dedicated input for respiration belt

## **Multiple Pressure channel Interface**

- Type BF applied part
- IPX1
- Connectors (12 inputs) for BD TNF-R transducers
- Pressure range -600 to +1400 cmH<sub>2</sub>O
- Bandwidth 0 - 60 Hz (at 200 Hz sampling)
- Excitation voltage 2.5V
- Pressure transducer sensitivity 5uV/V/mmHg
- Resolution 0.1 cmH<sub>2</sub>O
- Accuracy < 1% relative to software zero pressure
- Input impedance 10 M  $\Omega$
- Noise (0.1 - 10Hz) < 0.15 cmH<sub>2</sub>O
- Drift < 0.2 cmH<sub>2</sub>O/°C
- Holders for DT-XX/DT-NN/TNF-R pressure transducers (stainless steel)
- Dimensions 385 x 65 x 90 mm (w x d x h)
- Weight approximately 900 gram
- For HRM measurements in combination with the MMS Solar perfusion pump (up to 24 channels)
- For impedance see the Solar CIM-AUX module and the Solar CIM-AUX HRM module

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## **MM Solar Perfusion Pump**

For more information see the document: MMS Solar Perfusion Pump Technical specifications

### **Bluetooth puller (Mk III)**

#### *General*

- Applied part: type B
- Degree of protection enclosure: IP32
- Technology: stepper motor driven toothed profile
- Dimensions: 90 x 110 mm (d x w), without guider or slide
- Dimensions arm sections: 490 mm x 490 mm (380 mm x 490 mm 1<sup>st</sup> type)
- Weight: approximately 1kg (including batteries, no slider/guider and no arm)
- Enclosure material: Aluminum, clear anodized, POM
- Mounting possibilities on spring balanced arm
- Stroke depending on slider length, 150 mm or 400 mm
- Speed: up to 1500 mm/min
- Initial backlash:  $\leq 1$  mm
- Movement accuracy:  $\pm 1$  mm or  $\pm 1\%$
- Maximum pulling force: 7,5 - 10 N, magnetically coupled, limited torque
- Automatic return to starting position

#### *Batteries*

- Type: 4x AA NiMH in integrated battery compartment
- Battery capacity: 2500mAh, approximately 5 hours continuous operation (depending on usage and battery type)
- Energy after low battery indication:  $\geq 5$  minutes with good batteries
- Battery lifetime: exp. 1000 cycles ( $\geq 2$  year, depending on usage and battery type)
- During charging the temperature of the batteries will rise

#### *Power supply (charger)*

- Type Friwo 7355M/8, 15W, medical grade
- Isolation class: Class II
- Output voltage 7,5 Vdc (SELV)
- Mains voltage 100 – 240Vac, 50/60Hz
- DC cable length 2m

#### *Wireless connection*

- Technology: Bluetooth
- Range: 50 meter (free air, good conditions)
- Bluetooth master: computer

#### *Slider*

- Material: Aluminum, T-shape, clear anodized
- Length: 305 mm (150 mm stroke), 555 mm (400 mm stroke)
- Clamping material: stainless steel and silicone tube
- Disk material: Silicone.
- Integrated magnet for end detection

#### *Guider*

- Material: Aluminum, 6 mm rod, clear anodized
- Catheter guide: POM, Stainless Steel mounting pin
- Length: 305 mm (for 150 mm stroke), 555 mm (for 400 mm stroke)
- Disk material: Silicone

### **Wired puller (Mk II)**

- Applied part: type B
- Degree of protection enclosure: IPX1
- Technology: DC motor driven spindle
- Dimensions: 630 x 25 x 80 mm (l x h x w), without spindle
- Weight: approximately 1,5 kg, without spindle
- Enclosure material: Anodized aluminum, stainless steel and POM (Polyoxymethylene)
- Mounting possibilities: on table, rail (25x10), wheelbase, pole
- Stroke: depending on spindle length, 150 or 400 mm
- Speed: 10 - 180 mm/min
- Accuracy:  $\pm 2\%$
- Automatic return to starting position

### **Solar CIM-AUX HRM module**

- Type BF applied part
- IPX1
- For solid state catheters (HRM + impedance)
- For water perfused catheters (impedance only); see also the CIM-AUX module

#### *HRM (High Resolution Manometry)*

- Maximum 36 pressure channels
- Maximum 3 ISFET pH channels with external reference (optional)
- Receptacle Lemo 8

#### *Impedance*

- Maximum 12 channels (13 impedance rings)
- Range 0 – 10 k $\Omega$
- Sensitivity: 5 $\Omega$ /bit
- Sample rate  $\leq 100$  Hz/channel
- Excitation current 25  $\mu$ Arms
- Receptacle Lemo 14

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## **Solar Neuro module**

For more information see the document: Solar Neuro module Technical specifications.

## **Solar EGG module**

For more information see the document: Solar EGG module Technical specifications.

## **Solar CIM-AUX module**

For more information see the document: Solar CIM-AUX module Technical specifications.

## **Solar trolley**

- Four 12,5 cm (5") wheels, 2 with brakes
- Retractable keyboard and mouse pad
- PC shelf
- 1 universal accessory rail
- Integrated video signal connection
- Integrated cable ducts
- Extra accessory rail (option)
- Retractable printer shelf (option)
- 2 Blue side shields (option)
- PC rear cable cover (option)
- PC-anti-theft provisions (option)
- Net Trolley size (hxwxd) 94 x 55,5 x 58 cm = 37 x 22 x 23"
- Gross Trolley Silver size (hxwxd) 134 x 67,5 x 60 cm = 52.8 x 26.6 x 23.6"
- Maximum printer size (hxwxd) 30 x 45 x 46 cm = 11.8 x 17.7 x 18.1". Note: optional printer reduces height by 9 cm / 3.6".
- Maximum PC size (hxwxd) 17 x 47 x 48 cm = 6.6 x 18.5 x 18.9"
- Weight (without modules and cables) 23.6 kg

## **Solar pole (Mk III)**

### *H-shape wheelbase*

- Material: steel, powder coated
- Dimensions: 450 x 480 x 120 mm (lxwxh)
- Weight: approximately 10 kg
- Wheels:
  - 65 mm diameter
  - 2 breaks and 2 conducting

## *Pole*

- Length: 130 cm (2 x 65 cm = 130 cm = 51").
- Diameter: 38 mm (1,5")
- Material: Stainless Steel
- Weight: approximately 3 kg
- Extension with two or four hooks (optional)

## **Recommended computer requirements**

- Processor Core 2 Duo
- Clock speed 2.0 GHz
- Internal memory 1.0 Gb
- Operating system Windows XP
- Hard disk 80 Gb (Video system 160 Gb)
- CD-RW / DVD-RW
- Soundcard / speakers
- USB ports 6 to 8 (Solar U2M module, Solar infrared receiver, MMS USB protection key, MMS Bluetooth dongle, printer, memory stick, keyboard, mouse)
- 17 inch colour monitor
- 2 button mouse

## **Site requirements**

- Operating and storage temperature between +15 °C and +35 °C (+59 °F to +95 °F)
- Humidity between 45% and 75%, non-condensing

## **Classification / approval**

- IEC 60601-1
- Class I powered
- CE (93/42/EEC), MDD (Medical Device Directive)

## **Amendments**

All specifications are issued subject to change without prior notice.

Your official MMS distributor



Medical Measurement Systems b.v.  
PO Box 580  
7500 AN Enschede  
The Netherlands  
T +31-53-4803700  
F +31-53-4803701  
E info@mmsinternational.com  
I www.mmsinternational.com

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MMS USA, Inc.  
383 Central Ave, Suite LL40  
Dover, NH 0380  
USA  
T 800-236-9310/603-750-0037  
F 603-750-3155  
E sales@mmsusa.net  
I www.mmsusa.net