Instrumentation Ltd

Series 2255 Tank Monitor

Installation, Configuration and Operation

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Production, Sales & Service

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The Minder 2250 Family offer comprehensive display and control facilities for all liquid storage tanks. Full details of the facilities offered are given in the **SETUP MODE** section, briefly though the options include :-

- Full compensation of any tank shape
- Special computational functions for Specific Gravity calculation / correction, and / or pressurised tanks.
- Up to 4 output relays for control or alarm purposes.
- Isolated & scaled 4-20mA signal retransmission.
- Serial / Multidrop communication to other devices - covered by addendum to standard manual.

Information is displayed in 2 ways, a 6 Digit LED shows current contents and alarm messages, while a 2 line 16 character LCD shows tank name, units of measure, and operational status. Five front panel buttons control unit operation, their actual function will depend upon the units mode, i.e. **RUN MODE** or **SETUP MODE**. Actual operation is consistent throughout all facilities. The Left/Right arrows are used to move the cursor to highlight the parameter of interest, the Up/Down arrows change the value, and the Enter button selects / stores the value. When changes are made, the unit will prompt "Save changes Y/N ?" before modifying its stored parameters.

RUN MODE

This is the usual condition of the unit where it is monitoring and displaying the tank content. Button functions are as follows :-

FC This switches the LCD between a display of Tank Name and Units (the default), and a Bargraph and % full indication. While the button is held the **F**ree **C**apacity of the tank is shown.

SP Shows the current settings of the units **S**et**P**oints. Also allows an operator to make changes to these

settings if this facility has been enabled in **SETUP** mode. Refer to **SETUP** mode for details of the settings available.

SG Shows the current value of **S**pecific **G**ravity the unit is using. This may either be a value manually entered by the user, an active input value, or a value derived by calculations performed by the unit. Refer to SETUP mode for details of these options.

ACK Where **S**et**P**oints have been configured as alarms this button **ACK**nowledges any active alarms. Active alarms set the relay and are announced on the unit as a "HiALRM" or "LoALRM" display on the LED alternating with the normal content display, and details of which setpoint has activated on the LCD. Acknowledging an alarm causes the relay to reset to its default condition and clears the LED message. The LCD message will continue until the Setpoint's clear condition is met. Note that when a Setpoint has been configured as a Control function the LCD will indicate an active condition, but the LED message does not appear and the ACK button has no effect.

ENTER The function of the enter key will vary depending upon the current mode.

It will be noted that the **FC** and **SG** keys have a common symbol above them. Pressing both keys simultaneously will toggle the LED between Bright and Dim display. The **SP** and **ACK** buttons also have a common symbol and pressing these together will toggle the LCD backlight on & off.

SETUP MODE

Although its facilities are comprehensive the menu structure of the 2250 means setup is straightforward. Wherever possible the unit has been preprogrammed with all valid choices for a particular

parameter and selection is simply a matter of scrolling to the desired value and pressing **ENTER** to store.

To access **SETUP MODE** the **ENTER** button must be pressed and held for 5 seconds. The word SETUP will be displayed on the LED and the prompt “enter password” shown on the LCD. Key in the level 2 password (default 4321) and press **ENTER** to arrive at the main menu.

N.B. When a configurable parameter is being displayed the LCD will have an asterisk (*) showing. In this case the **UP** arrow will be used to increase the selected parameter, otherwise the **UP** arrow will “step up” the menu structure. The **ENTER** key has the effect of selecting a highlighted menu option, or storing a configurable parameter (when the asterisk is showing) and “stepping up” the menu structure.
Before exiting SETUP MODE the unit will prompt “Save Changes Y/N ?” where any have been made. If changes are saved the unit will write the new values to its memory and perform a soft reboot to restart using the new data.

Note that some of the parameters detailed may be blocked or not available depending upon the initial purchase specification of the unit.

Fig. 1 Page 17 gives a tabular representation of the complete menu structure. Using the code above each option, a full description of the function will be found below.

1 & 1A) SETPTS SP1 TO SP4

Enables all Setpoint parameters to be set. The setpoint to be changed should be selected first, the configurable options are the same for all 4.

1B) Level Set the trigger point between 0 to 100.00 % of the parameter being monitored.

1C) Type Set as Alarm which can be acknowledged & canceled, and Control which cannot.

1D) Opratn Make on Rising value, make on Falling value or make on a deviation up or down from the trigger point

1E) Hyst Enter the difference required between the trigger and reset points as a % of the parameter being monitored.

1F) Dbnce Enter the time in seconds the Setpoint conditions must be met for before it triggers.

1G) Status RO - Read Only, use this to review the status of the setpoint, possibilities are Inactive, Active and Un-Acknowledged, Active and Acknowledged.

1H) Flsafe Enter the state in which the output relay associated with the Setpoint should be held when the setpoint is inactive. Choices are Normally Energised or Normally De-Energised.

1J) Input Select which parameter the Setpoint is monitoring. Choose from Level, Volume, Top Pressure, or S.G. Note that the last 2 options are only available if the units Function is set for the appropriate Multi input formula (see under 10A - Func)

2) RUN MC

Enables or disables an operator from making changes to parameters while in RUN MODE.

2A) Dimmer Enables or disables the run mode Dimmer function.

2B) Setpts Enables or disables the operator from changing Setpoint parameters in run mode. The third option "Enabled with Password" will mean the user is prompted for the level 1 password (see 8A) before any changes can be made.

3) S.G.

The menu option that appears will depend upon the function selected (see 10A).

3A) User For 'Single' and 'Opt A' functions, key in a value between 0.5000 and 3.000.

3B) Input Used with functions B and AB no user input is possible as the limits of SG value are set elsewhere.

3C) Derived Used with function D only. A minimum "default " SG value must be keyed in for use when the unit cannot derive an SG value (refer to Function D description for more information)

4 & 4A) INPUT IP1 TO IP3

These parameters are used to scale the input signal(s), converting the raw 4-20mA input into meaningful volumetric parameters for display & control. Access to IP 2 will only be possible when the function (see 10A) is set to Opt A, Opt B, or Opt D. Likewise access to IP3 is only possible when the function is set for Opt AB. Section 10A also details for which application each of the functions is used. The calculations given in the following sections are all that are actually required to configure the unit, but PSM will be pleased to advise on particular applications and provide relevant sample calculations. As the name & effect of these parameters vary, all possibilities are detailed under each function.

For **SINGLE** function only IP1 is used, with configuration parameters as follows :-

4B) Zero Used to correct the sensor fitting position relative to the tank baseline. The value is entered as a % (valid limits +/- 100.00) calculated as :-

$$\frac{\textbf{Transmitter fitting height}}{\textbf{Total tank depth}} \textbf{ X 100}$$

4C) Range Used to correct for any difference in the transmitter's calibrated range and the actual tank depth. The value entered as a % (valid limits 1 to 150.00) calculated as :-

$$\frac{\textbf{Total tank depth}}{\textbf{Transmitter set range}} \textbf{ X 100}$$

4D) Scale Used to correct for a non linear relationship between tank level and volume. The default settings are for a linear tank. Up to 20 points can be entered with % tank level being entered first, and % tank volume second, in pairs. The unit performs a linear interpolation between the entered points so where possible they should be concentrated in the most non-linear areas. Points should increase step by step and the last two should be 100% level and 100% volume. It is not necessary to enter all 20 points, as soon as 100% is entered for both Level & Volume the unit will "close" the table

4E) Min Not used for IP1

4F) Max Not used for IP1

4G) Name A free format field which allows the entry of the tank name which will be displayed. Name can be up to 16 characters including spaces.

4H) E.Unit - A free format field which allows the entry of the Engineering Unit which will be displayed. The unit can be up to 8 characters including spaces.

4J) Cpcity - Enter tank capacity, valid values are in the range 1.0000 to 999999.

N.B. IP1 is used in all other functions, and is set as detailed above in all cases.

For **function A** IP2 has the following configuration parameters:-

4B) Zero This parameter can be used to correct a zero offset error in the pressure transmitter. In practice though the transmitter should be zero checked at 4mA and the factor set at 0.00

4C) Ratio This parameter is used to bring the sensitivity of the level transmitter and the top pressure transmitter to parity, since it is quite likely that the top pressure transmitter will be of a lower range. The factor is entered as a % (in the range 1 to 100.00) and calculated as :-

$$\frac{\textbf{Set range of Input 2 sensor}}{\textbf{Set range of Input 1 sensor}} \textbf{ X 100}$$

4D) Scale This parameter can be used to correct for non linearity errors of the top pressure sensor. It is however more likely that it will be left at its default linear settings.

4E) Min This parameter is not used, any values entered will not have any effect.

4F) Max This parameter is not used, any values entered will not have any effect.

For **function B** IP2 has the following configuration parameters

4B) Zero Normally set at 0.00. Refer to PSM before making any changes.

4C) Range Normally set at 100.00. Refer to PSM before making any changes.

4D) Scale Normally left as default, i.e. linear relationship. For temperature inputs however where correction is being made according to API or similar tables where the relationship between temperature and Density is non linear over the range of interest correction may be made.

4E) Min Enter the S.G. value represented by the minimum input signal.

4F) Max Enter the S.G. value represented by the maximum input signal.

N.B. Normally when the input is directly related to density the minimum value will be at 4mA and maximum at 20mA, conversely when the input is from a temperature sensor it is likely the reverse will be the case.

For **function D** IP2 has the following configuration parameters

4B) Zero Normally set at 0.00. Refer to PSM before using other settings.

4C) Match Used to match the sensitivity of the two level transmitters. the factor is entered as a percentage and calculated as :-

$$\frac{\text{Set range of Input 2 sensor}}{\text{Set range of Input 1 sensor}} \times 100$$

4D) Scale Normally left at default linear relationship. Refer to PSM before using other settings

4E) Min This parameter is not used, any values entered will not have any effect.

4F) Distnc This parameter identifies the mounting distance between the 2 transmitters. It is entered as a % (in the range 1 to 100.00) and calculated as :-

$$\frac{\textbf{Distance from Sensor 1 to sensor 2}}{\textbf{Set range of sensor 1}} \textbf{ X 100}$$

N.B. sensor 1 is the lower sensor (IP1)

For **function AB** IP2 and IP3 have the following configuration parameters

FOR IP2

4B) Zero This parameter can be used to correct a zero offset error in the pressure transmitter. In practice though the transmitter should be zero checked at 4mA and the factor set at 0.00

4C) Ratio This parameter is used to bring the sensitivity of the level transmitter and the top pressure transmitter to parity, since it is quite likely that the top pressure transmitter will be of a lower range. The factor is entered as a % (in the range 1 to 100.00) and calculated as :-

$$\frac{\textbf{Set range of Input 2 sensor}}{\textbf{Set range of Input 1 sensor}} \textbf{ X 100}$$

4D) Scale This parameter can be used to correct for non linearity errors of the top pressure sensor. It is

however more likely that it will be left at its default linear settings.

4E) Min This parameter is not used, any values entered will not have any effect.

4F) Max This parameter is not used, any values entered will not have any effect.

FOR IP3

4B) Zero Normally set at 0.00. Refer to PSM before making any changes.

4C) Range Normally set at 100.00. Refer to PSM before making any changes.

4D) Scale Normally left as default, i.e. linear relationship. For temperature inputs however where correction is being made according to API or similar tables where the relationship between temperature and Density is non linear over the range of interest correction may be made.

4E) Min Enter the S.G. value represented by the minimum input signal.

4F) Max Enter the S.G. value represented by the maximum input signal.

N.B. Normally when the input is directly related to density the minimum value will be at 4mA and maximum at 20mA, conversely when the input is from a temperature sensor it is likely the reverse will be the case.

5) RESET

Allows quick resetting of the various input scaling parameters to their default values. A confirmation prompt will appear.

6) OUTPUT

These parameters are used to define the operation of the 4-20mA output signal (if fitted).

6A) Zero This enables a suppression or elevation of the 4mA point. The value is entered as a % of 4-20mA. for example a value of 25% would mean the signal offset was 4mA. giving 8mA as a start point.

6B) Span This factor is entered in % and is used as a multiplier. For example a span factor of 50% would mean that the output was at 100% when the monitored parameter is at 50%

6C) Invert When Yes is selected the output signal is inverted i.e. when the monitored parameter is at its minimum the output is at maximum and vice versa.

6D) Type This defines which parameter the output reacts to.

7) FILTER

Enter a value between 1 & 99. The higher the value the slower the response time of the unit. This "smoothes" the display for tanks where the liquid level is not steady. For most applications a value between 5 & 10 is appropriate.

8) PASSWD

Restricts access to configuration facilities. A value of 0000 disables the protection.

8A) Level 1 This password, when enabled (see **2 RUN MC**) restricts access to RUN MODE changes to Setpoint values and S.G. The default value is 1234

8B) Level 2 This password is required to enter the SETUP MODE. Any changes made must be carefully noted, as, without the password, access will not be possible. The default value is 4321.

9) IDENT

Where a unit is connected and communicating to others via its RS485 serial port it requires a unique ident code. Set a number between 1 & 99.

10) PSMCFG

These parameters are **READ ONLY.** They identify the factory setup and unique calibration of each device. In the event of a problem with the unit, PSM may request this data to assist in fault finding.

10A) Func This parameter defines the basic function of the unit. There are 5 options as follows:-

SINGLE This function uses only IP1 which monitors the liquid level transmitter signal. It is for ventilated tank applications where the S.G. value is manually keyed in by the user.

Opt A This function uses IP1 as above and IP2 to read the output of a Pressure transmitter mounted on top of the tank. It is for pressurised tank applications where S.G. value is manually keyed in.

Opt B This function uses IP1 as above and IP2 to read the output of a transmitter directly measuring either the liquid density, or the liquid temperature where the actual density of the liquid can be calculated from it. It is used on ventilated tanks where automatic S. G. correction is required.

Opt D This function uses IP1 as above and IP2 to monitor the output of a second liquid level transmitter mounted some way above the first. The unit calculates the actual liquid density based on a comparison of the value of both level transmitters. A default value is programmed (see 3C) for when the upper level transmitter is not covered by the liquid and the formula cannot work.
This is used on ventilated tanks.

Opt AB This function uses IP1 as above, IP2 to monitor a top mounted pressure transmitter, and IP3 to monitor an S.G. or temperature transmitter (as Opt B). For use on pressurised tanks where the S.G. is also an active input.

10B) An Cal This parameter details the A to D calibration values which have been stored for each analogue input and the 4-20mA output.

10C) Serial This parameter holds the units unique Serial Number. Where the unit was originally factory configured for the application advising PSM of this number will mean the original information can be retrieved from records.

10D) Anlg-O This will advise if the 4-20mA analogue output has been factory enabled.

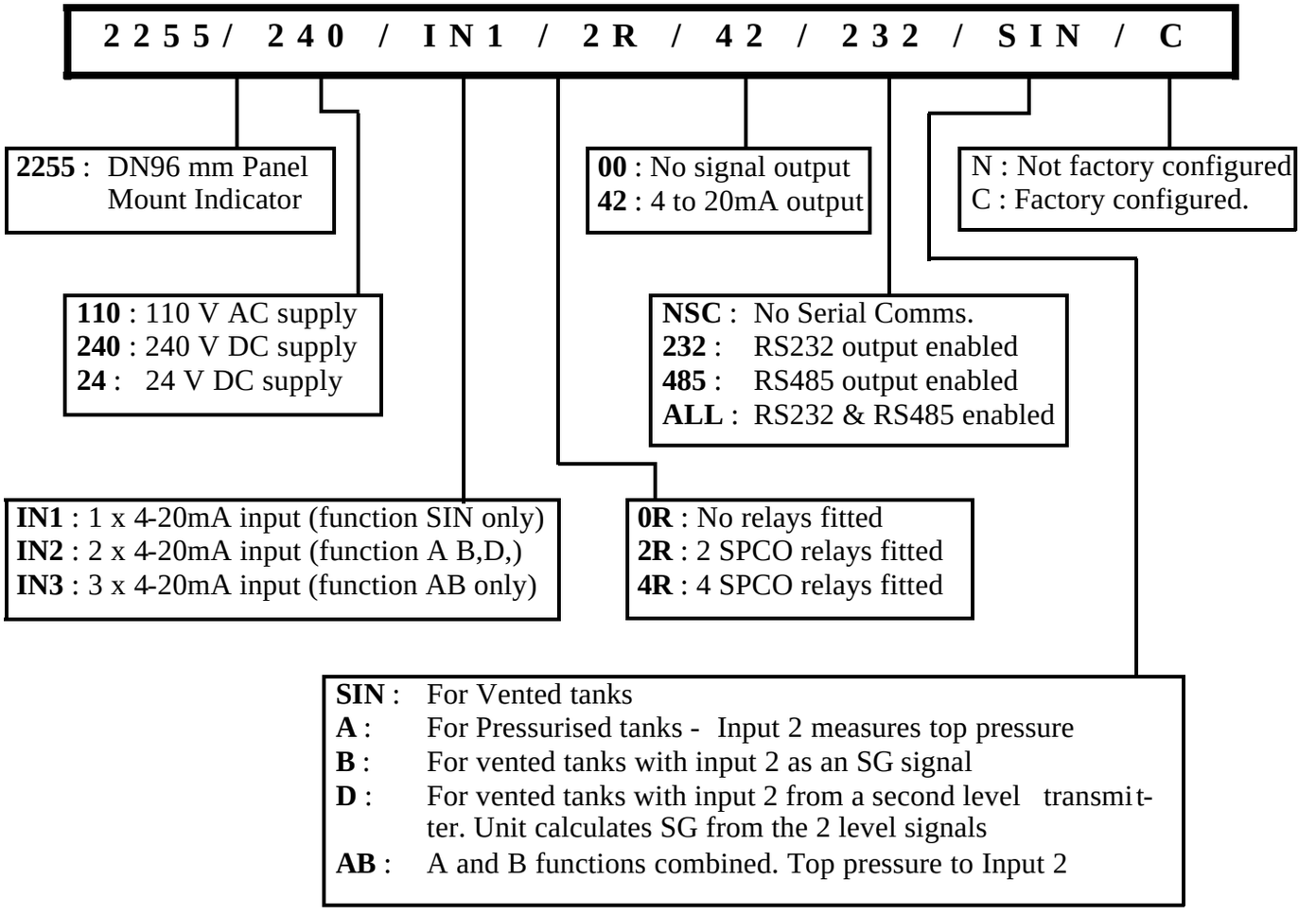
10E) SP E/D SP1-SP4 This advises which of the Setpoints have been factory enabled.

10F) Passwd This leads to factory level calibration only. No user changes are possible.

DIAGNOSTICS

To assist in initial setting up of the unit it encorporates a “virtual mA meter”. When in **RUN MODE** simultaneously pressing SP & SG buttons will switch the LCD display to show the mA signal it is seeing on each of its inputs (if enabled). Pressing SP & SG together for a second time reverts to the normal display.

Model Code



MINDER 2250 MENU STRUCTURE

1 SETPTS
- 1A **SP1-SP4**
- 1B **Level** — % value
- 1C **Type** — Alarm / Control
- 1D **Opratn** — MOR / MOF / DEV
- 1E **Hyst** — % Value
- 1F **Dbnce** — In secs
- 1G **Status-RO** — Inactive / Active/notack / Active/ack
- 1H **Flsafe** — N.Enrg / N.DeEnrg

2 RUN MC
- 2A **Dimmer** — Enable / Disable
- 2B **Setpts** — Enable / Enable+PW / Disable
- 1J **Input** — Level / Volume / Top Pr** / S.G.**

3 S.G.
- 3A **User** — Value from 0.5000 to 3.0000
- 3B **Input** — automatic
- 3C **Derived** — Enter Default Value

4 INPUT
- 4A **IP1-IP3**
- 4B **Zero*** — % value
- 4C **Range*** — % value
- 4D **Scale*** — Look up
- 4E **Min*** — Value
- 4F **Max*** — Value
- 4G **Name*** — Enter text
- 4H **E.Unit*** — Enter text
- 4J **Cpcity*** — max 6 digit

5 RESET — Are you sure ? Y / N

6 OUTPUT
- 6A **Zero** — % value
- 6B **Span** — % value
- 6C **Invert** — Y/N
- 6D **Type** — Level / Volume / Top Pr** / S.G.**

7 FILTER — Enter Numeric Value

8 PASSWD
- 8A **Level 1** — std.=1234
- 8B **Level 2** — std.=4321

9 IDENT — Value 1-99

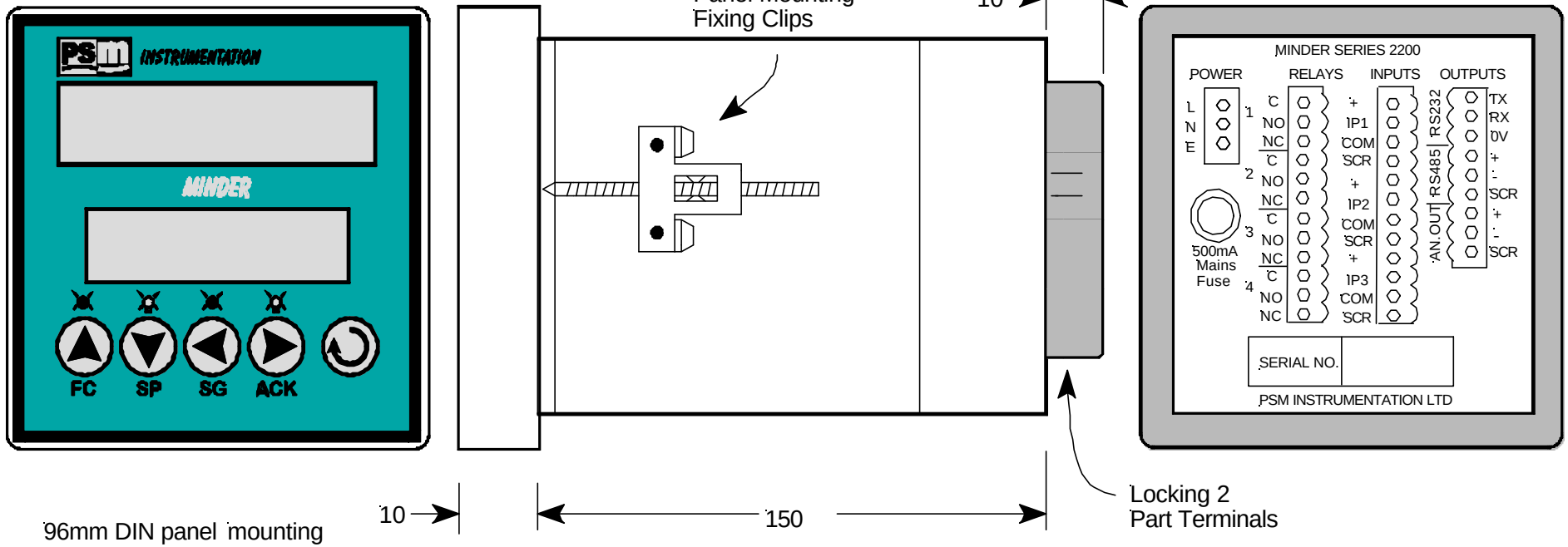
10 PSMCFG
- 10A **Func** — Single / Opt A / Opt B / Opt D / Opt AB
- 10B **An Cal** — IP1 / IP2 / IP3 / An-Op
- 10C **Serial** — 8 digit no.
- 10D **Anlg-O** — Enabled / Disabled
- 10E **SP E/D SP1-SP4** — Enabled / Disabled
- 10F **Passwd** — No entry

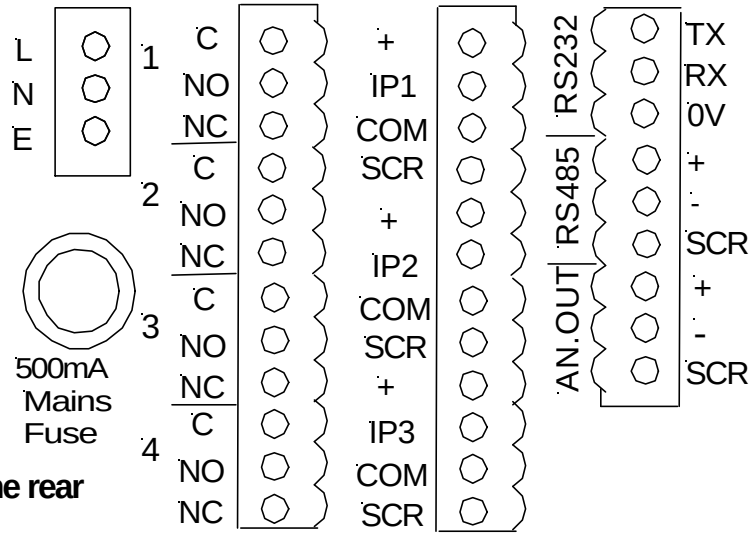
* Titles are for input 1 only. Input 2 & 3 titles will vary depending on function (10A) in use

** Only if Multi input unit

PW= Password

(RO) = Read only





MAINS SUPPLY CONNECTION

Observe the power supply voltage label on the rear panel before connection the mains supply

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