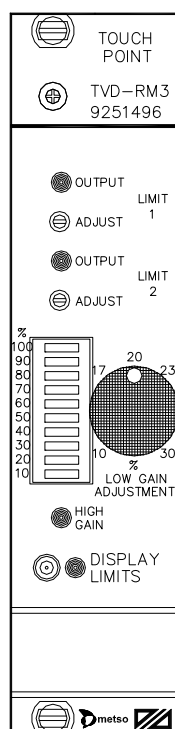


dametric 

## TVD – RM3

VAL0123117 / SKC9251496

### TOUCH POINT VIBRATION MONITOR



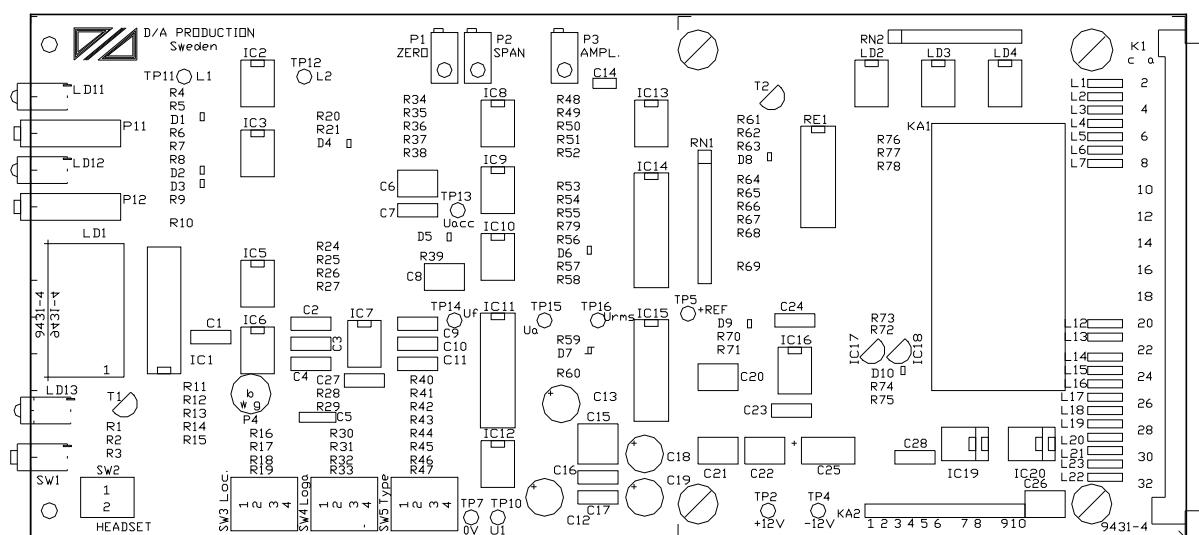
FOR THE RMS-EX SYSTEM  
USERS MANUAL

Valmet 

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## 1 LOCATION OF COMPONENTS



## 2 DESCRIPTION OF OPERATION

The TVD-RM3 unit measures the wide frequency vibration signals induced when the refiner plates touches during rotation in the idling mode, and the production mode.

The unit monitors a low impedance piezo-electric accelerometer-transducer. Both the TVD-T2 (0.2-40kHz) and the TVD-T2S (0.2-10kHz) can be connected to the unit

The accelerometer is fed with a constant current excitation, and returns a superimposed voltage signal proportional to the acceleration amplitude. The frequency is in the range of 1 to 50.000 Hz.

The monitor includes following functions:

- An adjustable ac-voltage amplifier for absolute calibration of the unit.
- An average ac to dc-converter to measure the vibration amplitude.
- Internal zero and span level-adjustments to 1V (0%) and 5V (100%).
- Isolated 4-20 mA output current.
- A 10 led-bar display for quick on board signal read-out.
- An analogue output intended for headset.
- A 1-5 V voltage output for RMS enhanced display unit (LDU-RM1, DCU-RM1 or DCU-RM2).
- A dipswitch to set the frequency of a 2-pole low-pass active filter. This is needed to adapt the unit to the different types of transducers, TVD-T2 or TVD-T2S.
- An attenuator to compensate for alternate locations of the transducer.
- An attenuator and a high pass filter for the low gain mode during production.
- A one-turn panel mounted potentiometer for production gain adjustment.
- A transducer check circuit which detects open-loop and short-circuit input. Any fault deactivates the limit-outputs and generates a 125 % signal amplitude both on the display and the current output.
- Two limit circuits, which compares the signal to two limit values. The limits are adjustable from 0 to 100% of the signal amplitude. Each limit-output is active when the signal is lower than the adjusted limit value, and is indicated by the front panel led's. A not active output initiates a 2 % hysteresis before returning to active. The output is optic-isolated from the unit, and drives a P-channel power transistor. The transistor is connected to the +rail of the system power supply.
- A RMS-system interface which permits readouts of the measured level and the adjusted limit-values to the LDU-RM1 unit or the DCU-RM1 unit.
- A dc/dc power unit, which converts and isolates the 24 Vdc system power supply to the internal +12V and -12V dc-voltages.

## 3 TECHNICAL SPECIFICATION

|                                |                                                                                                    |
|--------------------------------|----------------------------------------------------------------------------------------------------|
| Article no:                    | TVD-RM3 / VAL0123117 / SKC9251496                                                                  |
| Power supply:                  | +24 Vdc, $\pm 10\%$ , max 0.19 A                                                                   |
| Internal supply:               | $\pm 12$ Vdc, isolated from the power supply                                                       |
| Board dimension:               | L=220 mm, W=100 mm, T=30 mm (6 HE)                                                                 |
| Panel adjustments:             | LIMIT - 1, LIMIT - 2: 15-turn potentiometers<br>Production sensitivity 1-turn potentiometer        |
| Panel indicators:              | LIMIT OUTPUT-1, LIMIT OUTPUT-2: green led's<br>HIGH GAIN: yellow led<br>SIGNAL: 10 led bar-display |
| Panel switch:                  | DISPLAY LIMITS: push-button switch                                                                 |
| Transducer type:               | TVD-T1,-T2,-T2S, piezo-electric accelerometer                                                      |
| Transducer excitation:         | 10 mA constant current, U=20 Vdc                                                                   |
| Short circuit trip resistance: | 315 $\Omega$                                                                                       |
| Open loop trip resistance:     | 2.95 k $\Omega$                                                                                    |

|                             |                                                                                                                   |
|-----------------------------|-------------------------------------------------------------------------------------------------------------------|
| Amplifier input impedance:  | 50 k $\Omega$                                                                                                     |
| AC-signal amplification:    | 0.1 - 20, internally adjustable                                                                                   |
| Transducer type filter:     | Active low pass, 12 dB/octave, BW=300 Hz to 10....40 kHz, set by dip-switch                                       |
| Transducer location atten.: | 4-pole dip-switch; 20...100 % sensitivity of full span                                                            |
| Low gain adjustment:        | Front panel pot.: 10....30 % of High gain level                                                                   |
| Low gain filter:            | Passive high pass 6dB/octave adjustable: 0.3...19 kHz, set by dip-switch                                          |
| Amplitude measurement:      | Average ac to dc converter                                                                                        |
| Internal zero level:        | +1.0 V $\pm$ 0.5 %                                                                                                |
| Internal full-span level:   | +5.0 V $\pm$ 0.5 %                                                                                                |
| External digital outputs:   | Optic isolated P-channel FET transistor connected to positive rail of the rms system voltage. Max. current, 0.1 A |
| DO+TVD1                     | Digital output LIMIT 1 to PLC                                                                                     |
| DO+TVD2                     | Digital output LIMIT 2 to PLC                                                                                     |
|                             | The limits are activated when the TVD value is lower than the adjusted limit.                                     |
|                             | It is no hysteresis when changing from the active to the inactive state.                                          |
|                             | It is 2 % hysteresis when changing from the inactive to the active state.                                         |
|                             | The led in the front of the unit indicates an activated output.                                                   |
| Analog output 1:            | Galvanically isolated current, 4-20 mA, $\pm$ 1 %, (daughter board).                                              |
|                             | Load: 0 - 800 $\Omega$ , Isolation voltage: max 500V                                                              |
| Analog output 2:            | Voltage output for headset                                                                                        |
| Analog output 3:            | Not used                                                                                                          |
| RMS-unit interface:         | Yes                                                                                                               |

## 4 SETTINGS

### 4.1 Transducer Location setting

This attenuator is to be adjusted depending of the placement of the transducer on the refiner. It is also dependent of which type of sensor being used, type of refiner and the rotation speed. The correct setting has to be established upon testing, but until then, the marked settings can serve as guidelines. 66% is the default setting.

| SW3 /1 | /2  | /3  | /4  | % sensitivity |                                 |
|--------|-----|-----|-----|---------------|---------------------------------|
| off    | off | off | off | 100           |                                 |
| on     | off | off | off | 75            |                                 |
| off    | on  | off | off | 66            | TVD-T2 on the plate-holder bolt |
| off    | off | on  | off | 50            | TVD-T2S on the Conflo           |
| off    | off | off | on  | 33            |                                 |
| on     | on  | on  | on  | 20            | TVD-T2S on the RGP              |

### 4.2 Low Gain panel adjustment

The digital input, DI+LOGA, is set high during production, and will activate an attenuator in the unit. A NOT activated input is indicated by a led i the panel front, marked "High Gain". The attenuation is adjusted with a 1-turn potentiometer in the front of the unit, and can be set between 10 and 30% of the High gain sensitivity.

### 4.3 Low Gain filter setting

The digital input, DI+LOGA, will also activate a high pass filter in the unit. The high pass filter can be set in the range of 0.5 to 19 kHz, and is used to reduce the low frequency signals during production. A higher set frequency will increase the attenuation, which is added to the attenuation of the panel adjustment, see above. The setting has to be established upon testing, and is dependent of the type of the plates and the rotation speed.

The lower frequency of the high pass filter is set according to the table below.

| SW4 /1 | /2  | /3  | /4  | Low frequency in kHz |                 |
|--------|-----|-----|-----|----------------------|-----------------|
| off    | off | off | off | 0.5                  |                 |
| on     | off | off | off | 2                    |                 |
| off    | on  | off | off | 4                    | Default setting |
| off    | off | on  | off | 6                    |                 |
| off    | off | off | on  | 8                    |                 |
| on     | off | off | on  | 10                   |                 |
| off    | on  | off | on  | 12                   |                 |
| off    | off | on  | on  | 14                   |                 |
| on     | off | on  | on  | 16                   |                 |
| off    | on  | on  | on  | 18                   |                 |
| on     | on  | on  | on  | 19                   |                 |

Suggested settings together with the transducer type setting are shown in graph 4.6.1 and 4.6.2.

### 4.4 Transducer Type setting

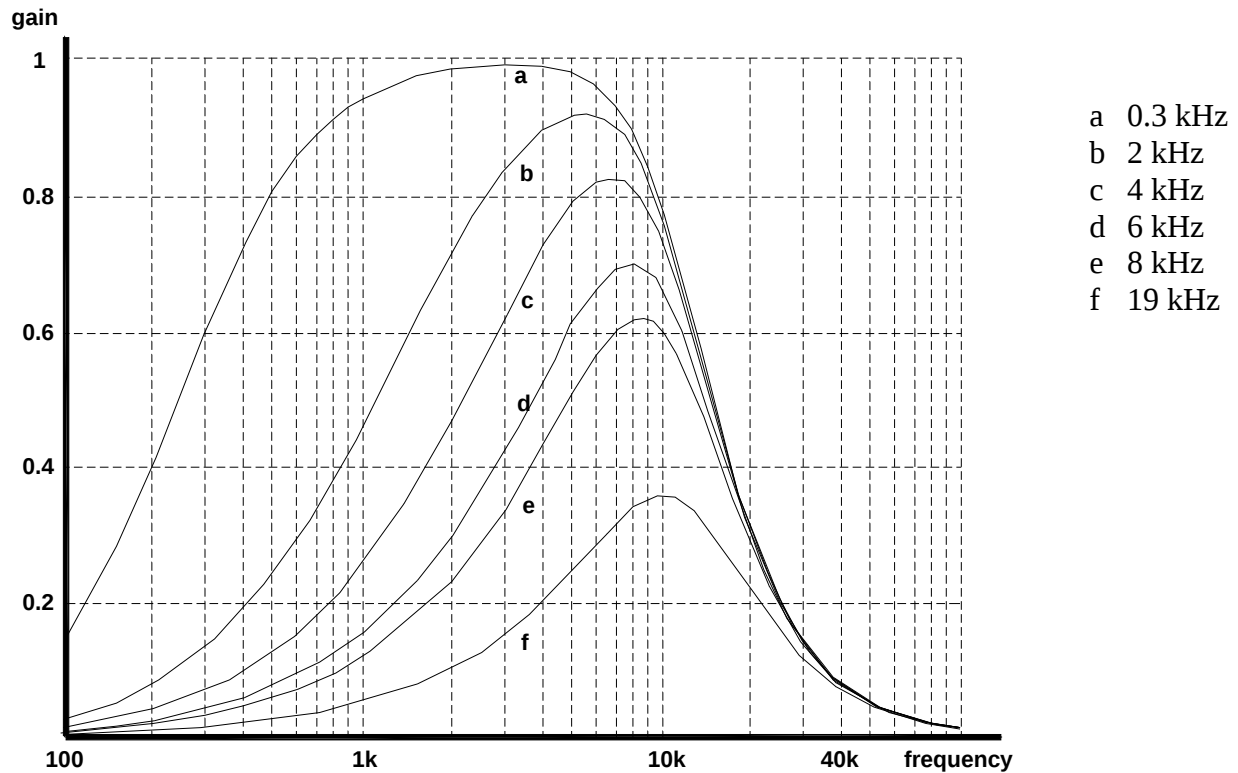
The 2-pole low-pass filter must be set according to the transducer.

| SW5 /1 | /2  | /3  | /4  | Type      | kHz |                 |
|--------|-----|-----|-----|-----------|-----|-----------------|
| off    | off | off | off | TVD-T2S   | 10  | Default setting |
| on     | on  | off | off |           | 15  |                 |
| off    | off | on  | on  |           | 35  |                 |
| on     | on  | on  | on  | TVD-T1,T2 | 40  |                 |

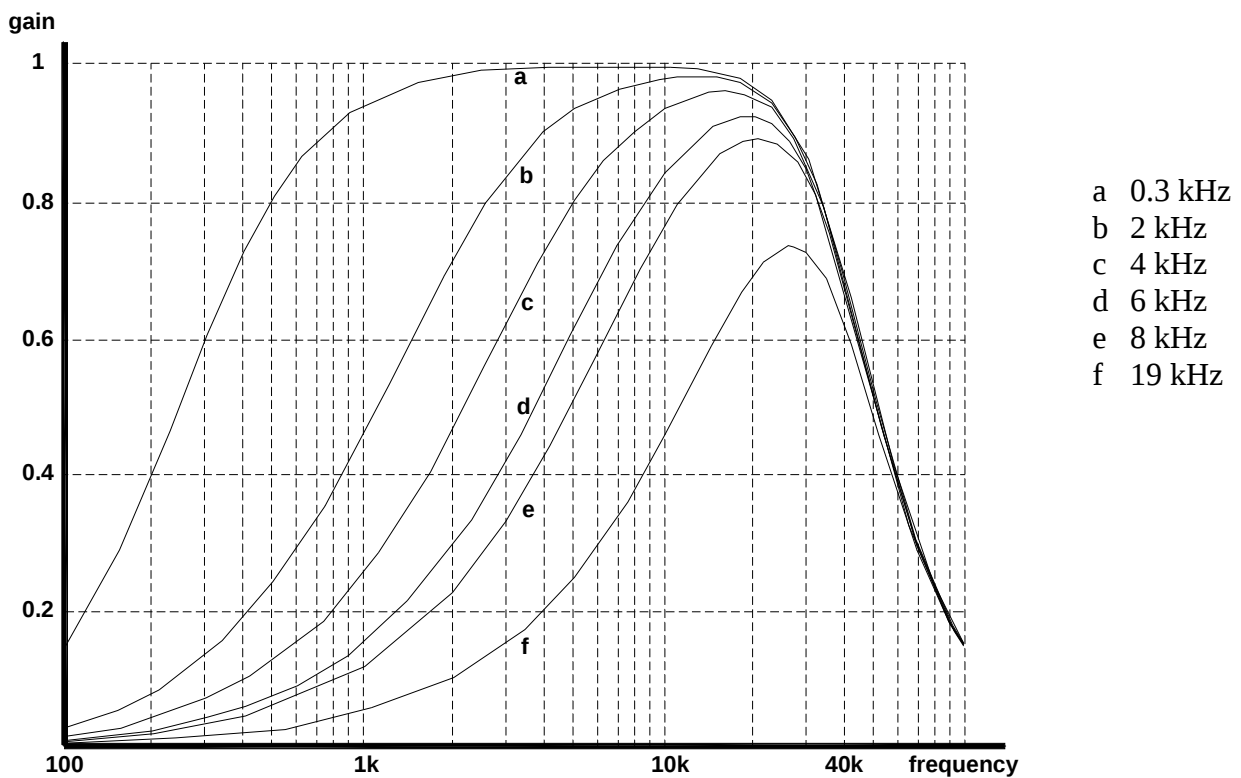
### 4.5 Headset volume

| SW2 /1 | /2  | volume |                 |
|--------|-----|--------|-----------------|
| off    | off | max    | Default setting |
| on     | off | 67 %   |                 |
| off    | on  | 33 %   |                 |
| on     | on  | 25 %   |                 |

## 4.6 Low gain filter response with 10 kHz transducer type setting (TVD-T2S)



## 4.7 Low gain filter response with 40 kHz transducer type setting (TVD-T1/2)



## 5 ADJUSTMENTS

The adjustment of the alarm limits is done on this unit, but the reading of the limits must be done on the indicator unit (LDU-RM1, DCU-RM1 or DCU-RM2) of the RMS-system.

For adjustments, see the chapter CAL-EX for the LDU-RM1 unit, CAL-SD for the DCU-RM1 unit, or CAL-CD for the DCU-RM2 unit.

## 6 CALIBRATION

This calibration is done by the supplier, and is usually not necessary after delivery.

If necessary, however, this must be done by qualified personnel only.

The potentiometers are located on the upper part of the board, and are reached from the top.

The DIP-switches SW 3 and 4 should be set to the OFF and the SW 5 should be set to ON position during the calibration.

### 6.1 Zero

- Connect the transducer without any vibration signal applied.
- Connect a DVM (+ to TP10, - to TP7) to the board.
- Adjust the potentiometer P1 (ZERO), until the DVM reads  $+1.0 \pm 0.005$  Vdc.

### 6.2 Internal span-level

- Disconnect the accelerometer transducer.
- Connect an ac-signal across a 2.2 k $\Omega$  resistor at the transducer input.  
Amplitude = 100 mVrms, Frequency = 5000 Hz.
- Connect a DVM (+ to TP14, - to TP7) to the board.
- Adjust the potentiometer P3 (S-SPAN), until the DVM reads  $400 \pm 5$  mVrms.

### 6.3 Span

- Disconnect the accelerometer transducer.
- Connect an ac-signal across a 2.2 k $\Omega$  resistor at the transducer input.  
Amplitude = 100 mV rms, Frequency= 5000 Hz.
- Connect a DVM (+ to TP10, - to TP7) to the board.
- Adjust the potentiometer P2 (SPAN), until the DVM reads  $+5.0 \pm 0.005$  Vdc.

### 6.4 Finish

- Set the DIP-switches SW3, SW4 and SW5 to the original setting.

## 7 CONTACT

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