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## TECHNICAL SPECIFICATIONS FOR **XR 2/50 DW** AND **TSXR 2/50 DW** FLOW SORT X-RAY DIAMOND RECOVERY MACHINES



## GENERAL

Our x-ray diamond recovery machines are based on x-ray induced luminescence of diamonds.

Although this basic principle goes back to the 1930s and became popular in South Africa in the early 70s FLOW has pioneered and introduced much advancement in this technology.

FLOW SORT 'XR' diamond recovery machines are designed to sort WET or DRY diamondiferous material, under virtually any conditions. This is the 'work-horse' in the FLOW SORT sorting machine stable.

Our sorters are equally suitable for 'fixed' installations and for 'mobile' plants be it on terra firma or on board a 'marine' diamond-mining vessel.

Since its launch in 1993, FLOW has sold over 560 units to diamond miners and diggers all over the world.

It is our sorter's robustness, reliability, high recovery efficiency, easy operation and low maintenance, as well as our uncompromising after-sales service that earned our products acceptance in the market place.

Today's 3<sup>rd</sup> generation of our XR and TSXR sorter models incorporate features such as a fully automatic calibration system with long term sorting parameter stability control (ACCS).

An automatic tracer dispenser (ATD) with automatic tracer recovery (ATR) system makes the operation of these machines truly "hands-off".

An optical scanning system specifically designed for the recovery of low luminescent diamonds is available as an optional extra. It can be retrofitted on all our XR and TSXR sorter models.

## FLOW SORT MODELS & CONFIGURATIONS

Our sorters are available in two basic models. **SINGLE STAGE MODELS** coded as XR 2/50 DW and **TWIN-STAGE MODELS (double pass sorters)** coded as TSXR 2/50 DW.

Both XR and TSXR sorters are available as standard (STD) as well as marine (SEA) models. In their basic configuration these machines are set up as 2 channel primary sorting machines with 100 mm fixed channel width. Material flow is automatically limited to a single layer.

Both models can also be configured as re-concentration machines. (Suffix 'REC')

'REC' machines are configured to treat concentrate of several primary sorter models.

These are two channels sorters with adjustable channel width. Feed pattern is an automatically controlled "near pearl-string-formation".

'2/50' denotes that these machines are designed to treat diamondiferous material ranging in size from 2.0mm up to 50.0mm provided that the feed material is split into individual size groups with a minimum to maximum particle size ratio not exceeding 3 to 1.

'DW' indicates that these machines can sort either dry or wet material.

**ALSO NOTE THAT:**

Two 'XR' models can be transformed into a 'TSXR' model!

Any 'TSXR' model can be converted into two individual 'XR' machines!

Any primary 'STD' or 'SEA' models can be changed into re-concentration 'REC' machines and vice versa!

'STD' machines can be converted into 'SEA' (marine mining) sorters!

Any FLOW SORT 'XR' or 'TSXR' model, right back to the sorter with serial No. 001, can be upgraded to conform to our latest sorter version.

All but one FLOW machine, which got shot-up in Angola, are still operational today!

**ELECTRIC SUPPLY SPECIFICATION:**

**Standard XR:** 380 Volt (+/- 10%), 50 Hz, 3 Phase + Neutral, + Earth.  
Power consumption approx. 3kVA.

**Standard TSXR:** 380 Volt (+/- 10%), 50 Hz, 3 Phase + Neutral, + Earth.  
Power consumption approx. 4kVA.

Other Electrical Supply Specifications can be accommodated on request.

Flow Sort lightning and surge protection units, as well as phase failure detection, and voltage stabilizer units, available as optional extra, are specifically designed for FLOW SORT products.

**WATER SUPPLY SPECIFICATION:**

**QUALITY:** Water supply must be filtered through a 100 Micron filter.

**PRESSURE:** Recommended water supply pressure is 600kPa.  
(minimum of 400kPa and maximum 800kPa)

**TEMPERATURE:** MIN: +2.5°C MAX: +30°C

**CONSUMPTION for XR-:** Typically 15 liters / min.

**CONSUMPTION for TSXR-:** Typically 25 liters / min.

Note that water consumption (flow rate) largely depends on feed-rate, material size and type of material to be sorted.

**SORTER OPERATING TEMPERATURE RANGE:**

**SORTER:** MIN: +2.5°C MAX: +45°C  
RELATIVE HUMIDITY: 95% non-condensing

**CONTROL PANEL:** MIN: -5°C MAX: +45°C  
RELATIVE HUMIDITY: 95% non-condensing

**SORTER INSTALLATION PLATFORMS SHOULD BE ISOLATED FROM HEAVY VIBRATING MACHINERY SUCH AS SIZING-SCREENS, CRUSHERS ETC.**

**FEED MATERIAL SPECIFICATIONS:**

**MODELS XR 2/50 DW & TSXR 2/50 DW**

**Min SIZE for XR- & TSXR- 2/50DW:** **There is no minimum size limit!**  
Recommended minimum is **2 mm**.

**Max SIZE for XR- & TSXR- 2/50DW:** Recommended maximum is **42 mm**.  
Absolute maximum particle size is 50mm  
**(No particle dimension may exceed 50 mm).**

**PARTICLE SIZE RATIO:**

For maximum recovery efficiency we recommend a particle size ratio of **2:1** for material below 4mm and up to **3:1** for material above 4mm.

**RECOMMENDED SIZE FRACTIONS (SIZE SPLITS):**

**NOTE: FLOW SORT OFFERS A PROFESSIONAL CONSULTING SERVICE TO ADVISE ON OPTIMAL SIZE SPLITS FOR SPECIFIC APPLICATIONS.**

**TYPICAL SPLITS for XR-2/50 DW & TSXR- 2/50 DW are:**

**4 fractions:** + 2mm - 4mm, + 4mm - 10mm, + 10mm - 22mm, + 22mm - 42mm

**3 fractions:** +2mm – 5mm, +5mm – 12mm, +12mm – 32mm

**FEED MATERIAL PRESENTED TO THE SORTERS MAY BE WET OR DRY. IT IS HOWEVER IMPORTANT THAT THE MATERIAL IS 'CLEAN' i.e. FREE OF CLAY, SLIME, VEGETATION OR OTHER FOREIGN OBJECTS.**

**IT IS ALSO OF IMPORTANCE THAT THE MATERIAL TO BE SORTED MUST BE APPROPRIATELY SIZED AND FREE OF UNDERSIZED AS WELL AS OVERSIZED MATERIAL.**

**FLOW SORT CONCENTRATE BINS:**

**AS AN OPTIONAL EXTRA FLOW SORT SUPPLIES SPECIAL HIGH SECURITY CONCENTRATE BINS THAT FIT DIRECTLY ONTO THE SORTERS CONCENTRATE OUTLETS.**

**For details refer to the specific FLOW CONCENTRATE BIN BROCHURE / SPECIFICATION.**

**FEED RATE SPECIFICATIONS:**

(FOR PRIMARY FEED and RE-CON MODELS **XR-2/50 DW-REC** & **TSXR-2/50 DW-REC**)

Sorter feed rate per hour 'FR' is computed by using the following approximations:

For primary recovery: **FR (in kg/h) = 150 \* d (in mm) \* SF \* s.g.**

For re-concentration: **FR (in kg/h) = 20 x d (in mm) x SF x s.g.**

**d** = AVERAGE PARTICLE DIAMETER (IN A GIVEN SIZE FRACTION) in **mm**

**150** = SORTER CONSTANT for primary recovery machines

**20** = SORTER CONSTANT for re-concentration machines

**SF** = 'SHAPE FACTOR' = the particle volume expressed as a portion of the volume of a sphere with '**d**'. (i.e. 60% of volume of a sphere results in a 'SHAPE FACTOR' = 0.6)

**s.g.** = AVERAGE SPECIFIC GRAVITY OF FEED MATERIAL (g/cm<sup>3</sup>)

**Primary Recovery XR- and TSXR- machine feed rate for 'NORMAL' shaped material (SF ± 0.6) with S.G. ± 2.7. Sorter capacity (kg/hour) is approx equal to 230 times the value of d (mm) FR ≈ 230 x d**

**Re-concentration XR- and TSXR- machine feed rate for 'NORMAL' shaped material (SF ± 0.6) with S.G. ± 2.7. Sorter capacity (kg/hour) is approx equal to 32 times the value of d (mm) FR ≈ 32 x d**

**YIELD:**

**YIELD of primary recovery machines:**

The sorters produce concentrate equivalent to approximately **12x FRx10<sup>-6</sup>** per ejection  
**(0.0012% of FR)**

**YIELD of re-concentration machines:**

The sorters produce concentrate equivalent to approximately **12x FRx10<sup>-6</sup>** per ejection  
**(0.0012% of FR)**

## **RECOVERY EFFICIENCY:**

Theoretical diamond recovery efficiency figures depend on many factors such as feed rate, feed material particle size ratio and feed material temperature, cleanliness of feed material, colour, impurities and nitrogen content of diamonds etc.

In practice however, with over 550 FLOW SORT machines operating around the world, we are proud to say, that we never encountered a case where actual diamond recovery efficiency of a properly set-up and maintained sorter was below 98 percent. When diamond recovery efficiency is based on value rather than number, diamond recovery efficiency figures run very close to 100 percent!

**FLOW ELECTRONICS OFFERS A DIAMOND LUMINESCENCE EVALUATION SERVICE, GEARED TO DETERMINE PRECISELY WHAT RECOVERY EFFICIENCY CAN BE EXPECTED IN SPECIFIC SORTER APPLICATIONS.**

## **SORTER DIMENSIONS:**

For actual machine dimensions refer to General Arrangement drawing No's:

**XR-GA-04.dwg** and **TSXR-GA-04.dwg** respectively. Available on request.

### **TRANSPORT CRATE DIMENSIONS AND WEIGHTS FOR XR-DW SORTERS:**

Crate for sorter	1 off	500mm long x 800mm wide x 1650mm high x 600kg.
Crate for control panel	1 off	1400mm long x 690mm wide x 550mm high x 100kg

### **TRANSPORT CRATE DIMENSIONS AND WEIGHTS FOR TSXR-DW SORTERS:**

Crate for sorter	2 off	500mm long x 800mm wide x 1650mm high x 600kg.
Crate for control panel	2 off	1400mm long x 690mm wide x 550mm high x 100kg
Pallet for sub-frames	1 off	1470mm long x 1170mm wide x 750mm high x 50kg

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LEADERS IN DIAMOND RECOVERY TECHNOLOGY