**Sun Protection Systems (External Blinds with Flat Slats and Cord Guides)**

**Upper Rail**

The upper rail is an extruded aluminium U-profile, size 65.8 x 51mm, with fixing points at the top and mounted as clip assembly in stainless steel mounting supports. The profile must be installed to open downward in order to allow access to the drive unit for inspection and servicing of parts such as electric motor, lifting bands, and turning bearings without having to take down the upper rail. The electric motor must be screwed to the upper rail. The drive shaft must comprise a square aluminium size of 12 x 12mm.

For the defined tension of the guide rope, the cable carriers must be integrated with double spring system on the outer edge of the upper rail. The encapsulated lifting band and turning bearings are to be fixed securely in the upper rail with snap-in locks and are made of high-quality plastic, are self-lubricating, weather-resistant, and maintenance-free. Through the friction spring system with integrated constraint, the slats cannot twist independently even through wind force.

**Slats**

The slats made of a special aluminium alloy are 80mm wide, 0.45mm thick, concave-convex, flanged, and coated on both sides. The slat must have IX nominal value of 0.011cm. For reasons of visual appearance, the lifting bands and guide cords together with the blind guide are attached to the slat edge. For a Venetian blind of 1360mm, the maximum distance apart of the lifting bands must be 1287mm. For other blind dimensions, the bearing spacing is accordingly reduced. The external lifting bands must have a space of 36mm to the edge. For slat widths of 1100mm to 1359mm, a central function cord must be provided. Each slat is fixed to the upper side guide cord cross pieces in a horseshoe-shaped special punch hole. The position of the special punch hole in closed slat position must be located in the upper shaded area in order to reduce light penetration. A slat closing angle of approx. 75 degrees must be possible. The slat punch holes for insertion of the guide rope (space to edge: 18mm) must be arranged eccentrically. Punch holes for the guide ropes and lifting bands are provided as weather-resistant and ultraviolet-resistant, flat plastic grommets in polyamide (material PA 6).

**Guide Cord**

The guide cord in 100 % polyester yarn with double crosspieces and tear resistance of 500 N per frame is weather and ultraviolet-resistant, shrink and stretch-resistant.

**Lifting Band**

The lifting band in 100 % Polyester with tear resitance of 600 N is weather and ultraviolet-resistant, shrink and stretch-resistant, break and buckle-proof.

**Lower Rail**

The flat lower rail in extruded aluminium profile, 80mm wide and 16mm high, is closed on both sides with plastic end caps. The fixing head with turn-latch mechanism for guide cords and lifting band must serve as mechanical safety for the end caps. For weighted lower rails the weights must be positioned and fixed through the end cap.

**Blind Guide**

The blind is guided by polyamide-clad stainless steel ropes (rope material 1.4401, rope twist 7x7, minimum breaking load 2.25 kN, sheath material PA 12) with diameter 2.7 mm. The tensioning of the cable must be by means of a cable carrier installed in the upper rail and with integrated dual spring system. With the 2 pressure springs of the cable carrier it must be possible to set spring tension of 150 N - 260 N. The spring rate must be C=13 N/mm, with deflection of ca. 12mm and serves tolerance compensation. The spring tension must be adjustable according to the time of year in first installation. The lower tension of the guide cable must be enabled by means of clamping angles in the extruded aluminium profile. For side tension, adapters in extruded aluminium profiles must be used. The wire cable is fixed by means of a flat rope tension screw (stainless steel 1.4401).

**Fixing to Windows and Window Façades**

Holders and consoles provided by the system must be used for fixing the sun protection blinds to the window elements, incl. sealing units (e.g. sealing ring). Suitability of the fixing devices must be agreed and approved on the part of the Contractor at his own responsibility with the system supplier of the window constructions or transom-mullion constructions.

Fixing to Windows

Fixing the guide cable must be carried out via clamping brackets in extruded aluminium profiles which are attached to the frame by means of a concealed screw fitting using a suitable mounting set.

Fixing to Window Façade

Fixing the guide cable must be carried out via clamping brackets in extruded aluminium profiles which are attached to the sub-assembly. Brackets must be fixed to the façade using a tested system-mounting plate.

**Drive**

The drive unit comprises a maintenance-free 230 V electric motor with integrated planetary gears, comfort end-setting and temperature monitor installed in the upper rail. The upper and lower end positions are adjustable. In addition, an end-switch sensor switches off the motor. The complete drive unit has VDE, CE approval, and EMV radio suppression seal.

**Operation**

The louver blind is pulled down with closed slats and pulled up again with opened slats. Electric drive for lifting, lowering, and turning is by means of standard UP or AP switch or a higher–level control (central operation, wind monitor, sun monitor, timer, automatic turning). When the upper or lower end position is reached, the end switch integrated in the drive unit automatically switches the motor off.

**Colours and Surfaces**

The upper rail is mill-finished; the lower rail cord tension and adapter are powder-coated. Guide cord, lifting band, lower rail, end caps, and plastic grommets are in black; the blind guide rope has a black sheath.

Slat colour: RAL as chosen by the Principal

Rope clamping bracket: RAL as chosen by the Principal

Lower rail: RAL as chosen by the Principal

Blind finish: RAL as chosen by the Principal

**Side Guide**

Side guide operation is by means of plastic sheathed stainless steel cables which are fixed with angle brackets and mounting plates on the façade mullions or window profiles.

**Blinds**

Corner-trim model in U-Form, incl. fixing with corner consoles and mounting plates.

**Operation**

Operation by means of on site switches.

Offer: Make/Type: '.........................'

**System Description Sun Protection Controls**

For the controls, a modular, expanded system with a central unit, detached motor-control devices with local operation and sensors are to be provided. The sun protection control shall be carried out as loop system. Controls have a 24 V direct current and for power supply a 230 V alternating current. As the drive motors cannot be operated parallel, then for this reason per drive a motor control unit is necessary. The central control unit: micro-processor control four up to 4 channels (groups, façades). Each channel must have a potential-free contact set as out-portal and pre-equipped with programmable control programmes for canopies, façade awnings, blinds, shutters, windows, and ventilation. Windows and ventilation systems must be individually controllable. For each channel a separate evaluation of wind, sun, rain, smoke, internal temperature, external temperature, humidity, and insulation must be possible according to the setting. The central control unit has an internal clock with DCF77 radio-controlled connection. The set parameters and status can be read off on a 2-digit alphanumerical display. Via an optional Interface and server software there must be operation of the central unit via a company network (TCP/IP) and also via Internet. The CAN sensor interface is laid out for the connection of 6 keys, 4 message outputs, 2 analogue sensor inputs for photos or temperature sensors and 2 wind transmitters. The outputs and also the sensors must be able to be incorporated in the 4-channel central. Moreover, each sensor interface has its own ID and channel number. The sensors are scalable. The outputs can be modified. Scaling of sensor interface can be undertaken via a PC with Windows. The sensor values are sent cyclically or related to events on the CAN-Bus. The 4-channel central unit then evaluates these accordingly. Several CAN interfaces can be connected at one central unit and the inputs and outputs thus duplicated. In addition, it is also possible via a PC interface that functions can be evaluated or controlled via TCP/IP-protocol via a network or the Internet. The following automatic functions are carried out with the appropriate sensors:

- Individual control

- Controls per room

- Controls per floor

- Product pre-selection

- Duration

- Turning times

- Wind monitoring

- Rain monitoring

- Time controls (clock control)

- Automatic ON/OFF via timing device

- Internal/external temperature automated systems

- Sun automation,

- Twilight automation

- Moisture automation

- Ice warning

- Smoke warning, window and ventilation control

- Blocking of groups

- Independence of groups

- Settings are password-protected

**Motor Control Unit**

The motor control unit is controlled with 24 V low voltage. It must be possible that by unclamping individual control leads the room controls can be extended or converted back to individual controls. A separate terminal must be provided for each lead. Further, in order to ensure quick, rational, and cost-effective connection and installation, the motor control unit must be equipped with spring-loaded terminals. This type of terminal also prevents loose contacts. In order to avoid sticking of the relay in direct switching of the direction of travel between individual and central commands, the motor control unit must generate a time delay between commands. For the power supply for the drive the motor control unit must be fed with a separate 230 V-power conductor line. Through fine wire fuse in the 230 V part, wiring protection for the drive shall be ensured.

**Storey Control Distributor**

The storey control distributor with integrated power supply 230 V-AC/24 V-DC for the control of 75- piece motor units type break and time consistency. For the control of groups or façades by means of a tableau or central processing. Operation is by key touch as for time logics. An automatic turning angle can also be programmed per output via the CPU and also activated in group switching. The terminal shall be set up for all input and output leads. The control system must enable the following functions: individual controls: each sun protection motor is controlled on site via operation element.

Room controls: Several motors in one room are controlled jointly via one operation element.

Façade controls: All sun protection devices of a façade or group are joined at one common operation point. The façades or groups can be operated on all floors at the operating console.

**Turning Automation**

After the central command has been executed, then for blinds an appropriately selected slat turn angle is automated. The slat angle must be adjustable month per month per façade or group, for optimum sun protection at various times of the year.

**Clock Controls**

The timing clock controls the blinds separately according to the façades or assemblies. Diverse values can be programmed for weekends (Sat., Sun).

**Automatic Timing**

The automatic timer switches on and off the photo and temperature controls for the respective façades or assemblies e.g. on at 6.00 a.m. for automatic operation until 9 p.m.

**Photo-Navigation**

Once the automatic clock has released the photo cell, photo controls automatically open the sun protection device to position according to the light levels affecting the system of the façade or assembly. On a cloudy day, there is a „high command“.

**Wind Warning System**

In order to protect the plant from storm damage, the whole control system takes precedence over the wind warning system (top priority).

**Wind direction**

In the case of gusts of wind to a high building, only those systems are in operation which are in wind direction. Other systems serve to provide shade to the room.

**Ice monitoring**

If the outside temperature falls below +1 C in conjunction with rain, a high command is triggered. Operation on site is possible when the outside temperature rises above +3 C again.

**Electric Plans**

On the awarding of the contract the Contractor shall make available free of charge the wiring and voltage drop diagrams. The wiring diagram must include the number of leads, number and cross section of wires together with details of supply feed to the control devices. A complete set of plans and the operating instructions shall be delivered with the control devices.

**Contractor Performance, Electric**

Complete cable laying according to the specifications of the Contractor

**Façade / Sun Protection**

Delivery, installation, and connection of the operating keys. Testing the lead network according to VDE regulations (German Electricians’ Association). Joint commissioning with the Contractor for façade/sun protection. Connection of transmitter units to the site lightning protection. Electric connection of all components

**Contractor Work Façade**

Holes are drilled through the façade for motor connection leads. Mounting or pulling through of leads. Sealing of bore holes.

**Contractor Work Sun Protection**

Compilation of all plan documents. Delivery and assembly of all control components, except operating keys. Supply of flexible motor connection lead with attached plug coupling to the Contractor façade. Commissioning of electrics together with the Contractor.

Quotation manufacturer/type:'.........................'