

# Halton TSR/TSS

Swirl Diffuser



- Radial horizontal air supply
- Air velocity is effectively reduced due to high mixing effect
- Circular duct connection with gasket
- All sizes available as an adapted version for installation in a modular 600x600 mm suspended ceiling (TSS)

## Accessories

- Balancing plenum with measurement and adjustment functions
- Mounting bracket for plenum installation

## MATERIAL AND FINISHING

| PART                        | MATERIAL                     | NOTE                      |
|-----------------------------|------------------------------|---------------------------|
| Casing                      | Steel                        |                           |
| Front vane panel            | Steel                        |                           |
| Coupling sleeve with gasket | Galvanised steel             | Gasket of rubber compound |
| Mounting bracket            | Galvanized steel             |                           |
| Finishing                   | Epoxy painted White RAL 9010 | Special colours available |

## ACCESSORIES

| ACCESSORY        | CODE | DESCRIPTION  |
|------------------|------|--|
| Balancing plenum | TRI  | For balancing, equalising the airflow and attenuating the duct noise |
| Mounting bracket | BR   | Bracket for plenum installation                                      |

## QUICK SELECTION

| qv                     | Pa                | 120 | 240 | 360 | 480 | 600 | 720 | 960 | 1200 | 1440 | 1800 | 2160 | 2640 | 3120 |
|------------------------|-------------------|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|
|                        | l/s               | 10  | 20  | 30  | 40  | 50  | 60  | 80  | 100  | 120  | 150  | 180  | 220  | 260  |
|                        | m <sup>3</sup> /h | 36  | 72  | 108 | 144 | 180 | 216 | 288 | 360  | 432  | 540  | 648  | 792  | 936  |
| TSR/A-125<br>TSS/A-125 | LpA               | 15  | 27  | 38  | 46  |     |     |     |      |      |      |      |      |      |
|                        | ΔPst              | 7   | 27  | 60  | 106 |     |     |     |      |      |      |      |      |      |
|                        | ΔPtot             | 7   | 28  | 63  | 113 |     |     |     |      |      |      |      |      |      |
|                        | Ld                | 1,4 | 2,0 | 2,6 | 3,4 |     |     |     |      |      |      |      |      |      |
|                        | Lmin              | -   | -   | -   | -   |     |     |     |      |      |      |      |      |      |
|                        | L0.2              | 1,5 | 2,1 | 3,0 | 4,0 |     |     |     |      |      |      |      |      |      |
| TSR/A-160<br>TSS/A-160 | LpA               |     | 21  | 26  | 32  | 39  | 44  |     |      |      |      |      |      |      |
|                        | ΔPst              |     | 9   | 20  | 36  | 56  | 81  |     |      |      |      |      |      |      |
|                        | ΔPtot             |     | 10  | 22  | 38  | 60  | 86  |     |      |      |      |      |      |      |
|                        | Ld                |     | 1,8 | 2,2 | 2,6 | 3,0 | 3,4 |     |      |      |      |      |      |      |
|                        | Lmin              |     | -   | -   | -   | -   | -   |     |      |      |      |      |      |      |
|                        | L0.2              |     | 2,0 | 2,3 | 3,0 | 3,8 | 4,4 |     |      |      |      |      |      |      |
| TSR/A-200<br>TSS/A-200 | LpA               |     |     | 22  | 24  | 27  | 31  | 38  | 45   |      |      |      |      |      |
|                        | ΔPst              |     |     | 7   | 13  | 20  | 29  | 52  | 81   |      |      |      |      |      |
|                        | ΔPtot             |     |     | 8   | 14  | 22  | 31  | 56  | 87   |      |      |      |      |      |
|                        | Ld                |     |     | 1,8 | 2,2 | 2,4 | 2,8 | 3,4 | 4,0  |      |      |      |      |      |
|                        | Lmin              |     |     | -   | -   | -   | -   | -   | -    |      |      |      |      |      |
|                        | L0.2              |     |     | 2,0 | 2,3 | 2,8 | 3,4 | 4,8 | 6,0  |      |      |      |      |      |
| TSR/A-250<br>TSS/A-250 | LpA               |     |     |     |     |     | 23  | 28  | 33   | 38   | 45   |      |      |      |
|                        | ΔPst              |     |     |     |     |     | 10  | 18  | 29   | 41   | 65   |      |      |      |
|                        | ΔPtot             |     |     |     |     |     | 11  | 20  | 31   | 45   | 70   |      |      |      |
|                        | Ld                |     |     |     |     |     | 2,2 | 2,8 | 3,2  | 3,4  | 4,2  |      |      |      |
|                        | Lmin              |     |     |     |     |     | -   | -   | -    | -    | -    |      |      |      |
|                        | L0.2              |     |     |     |     |     | 2,4 | 3,4 | 4,6  | 5,8  | 7,4  |      |      |      |
| TSR/A-315<br>TSS/A-315 | LpA               |     |     |     |     |     |     |     | 21   | 25   | 31   | 36   | 42   | 48   |
|                        | ΔPst              |     |     |     |     |     |     |     | 12   | 18   | 28   | 40   | 59   | 83   |
|                        | ΔPtot             |     |     |     |     |     |     |     | 13   | 19   | 30   | 43   | 64   | 90   |
|                        | Ld                |     |     |     |     |     |     |     | 2,4  | 2,6  | 3,0  | 3,4  | 4,0  | 4,4  |
|                        | Lmin              |     |     |     |     |     |     |     | -    | -    | -    | -    | 1,0  | 1,0  |
|                        | L0.2              |     |     |     |     |     |     |     | 3,4  | 4,0  | 4,6  | 5,6  | 6,8  | 8,0  |

LpA values presented with room attenuation 4 dB (red 10m<sup>2</sup> - sab). When using room attenuation 8 dB (red 25m<sup>2</sup> - sab):  
LpA - 4dB.

Pa Supply air cooling capacity, W  
LpA A-weighted sound pressure level, reduced by total equivalent absorption surface of 10m<sup>2</sup>, dB(A) red 10m<sup>2</sup> - sab  
ΔPst Static pressure drop, Pa

ΔPtot Total pressure drop, Pa  
Ld Distance from the supply unit, at which air jet detaches from ceiling, m  
Lmin Minimum distance between central lines of two supply units, m (V3 = 0,25m/s at 1.8m height)  
L0.2 Isothermal throw length, m when residual velocity of supply air jet 0,2 m/s  
Room temperature (Tr) = 24 °C  
Supply air temperature (Ta) = 14 °C  
Room height = 2,8 m

## DIMENSIONS

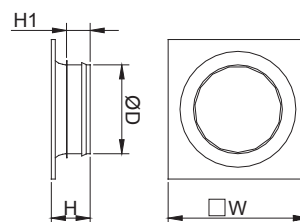
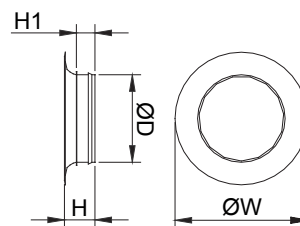
### TSR

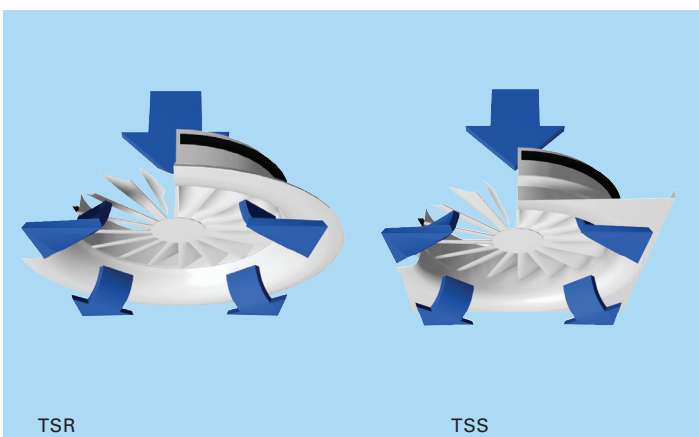
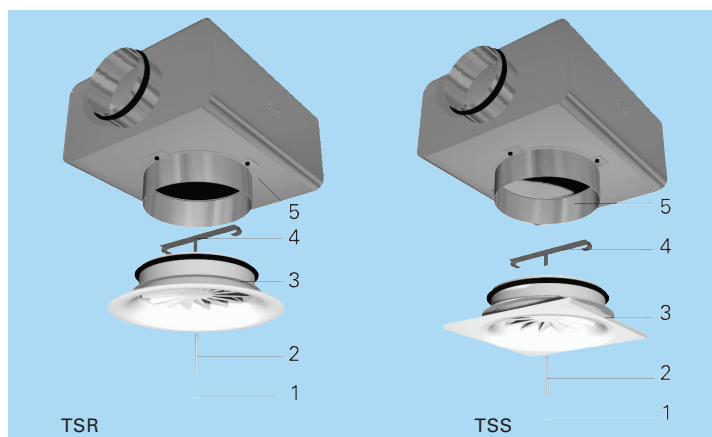
| NS  | ØW  | H  | H1 | ØD  |
|-----|-----|----|----|-----|
| 125 | 200 | 56 | 28 | 123 |
| 160 | 250 | 66 | 35 | 158 |
| 200 | 300 | 75 | 43 | 198 |
| 250 | 350 | 75 | 43 | 248 |
| 315 | 450 | 90 | 50 | 313 |

### TSS

| NS  | W   | H  | H1 | ØD  |
|-----|-----|----|----|-----|
| 125 | 198 | 56 | 28 | 123 |
| 160 | 248 | 66 | 53 | 158 |
| 200 | 248 | 75 | 43 | 198 |
| 250 | 298 | 75 | 43 | 248 |
| 315 | 398 | 90 | 50 | 313 |

The dimension W for TSS/B all sizes in suspended ceiling installation is 595 mm.





## Installation

### CODE DESCRIPTION

|   |                      |
|---|----------------------|
| 1 | Plastic plug         |
| 2 | Central fixing screw |
| 3 | Tsr diffuser         |
| 4 | Mounting bracket     |
| 5 | Tri plenum           |

The diffuser is connected either directly to the duct by screwing or riveting, or alternatively to the TRI balancing plenum.

The recommended minimum safety distance upstream of the diffuser is 3xD.

### Installation with plenum TRI

The mounting bracket should be used for installing TSR/TSS to TRI plenum to allow easy diffuser removal.

The collar of TRI plenum can be installed either internally in the plenum or externally on the bottom of the plenum. The height of the unit for the external installation is presented in the table below. When the collar is installed internally, the total height H is reduced by 60 mm.

The technical performance for the combination of supply air diffuser and TRI plenum is presented separately for the two different installations. See HIT Design software.

### PRODUCT MODELS

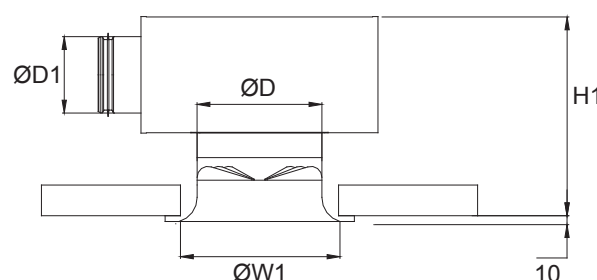
| CODE  | DESCRIPTION                        |
|-------|------------------------------------|
| TSR/A | Standard model                     |
| TSR/B | Model with suspended ceiling panel |

## Function

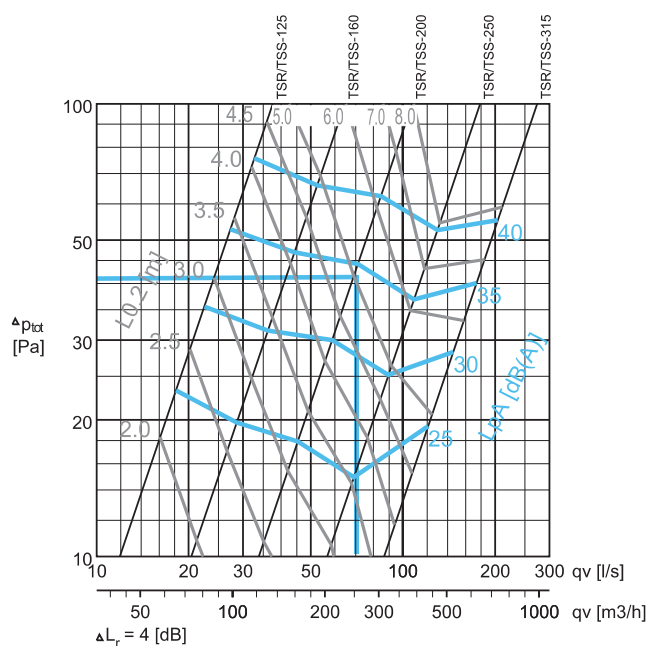
Horizontal radial swirl jet is supplied into the space through the profiled spiral blades of the diffuser.

Supply air jet velocity is efficiently reduced due to the high mixing effect.

| TSR (d) | D   | TRI         | H       | A   |
|---------|-----|-------------|---------|-----|
| 125     | 100 | TRI-100-125 | 246-276 | 170 |
| 125     | 125 | TRI-125-125 | 276-306 | 170 |
| 160     | 125 | TRI-125-160 | 276-305 | 210 |
| 160     | 160 | TRI-160-160 | 316-346 | 210 |
| 200     | 160 | TRI-160-200 | 316-346 | 250 |
| 200     | 200 | TRI-200-200 | 366-396 | 250 |
| 250     | 250 | TRI-250-250 | 366-396 | 300 |
| 250     | 250 | TRI-250-250 | 430-460 | 300 |
| 315     | 250 | TRI-250-315 | 430-460 | 390 |
| 315     | 315 | TRI-315-315 | 476-506 | 390 |



## Pressure drop, throw pattern and sound data



Selection example :

Requirements :  $q_v = 70$  l/s  
 $L_{pA} \leq 35$  dB(A)  
 $L_{0,2} < 2$  m

Selection : TSR / TSS-200  
 $L_{pA} = 34$  dB(A)  
 $L_{0,2} < 5$  m  
 $\Delta P_{tot} = 43$  Pa

## SOUND LEVEL DATA

|             | $q_v$ |                     | $\Delta P_{st}$<br>(Pa) | $\Delta P_{tot}$<br>(Pa) | F (Hz) |    |     |     |     |      |      | L <sub>pA</sub> | NR | NC |
|-------------|-------|---------------------|-------------------------|--------------------------|--------|----|-----|-----|-----|------|------|-----------------|----|----|
|             | (l/s) | (m <sup>3</sup> /h) |                         |                          |        | 63 | 125 | 250 | 500 | 1000 | 2000 |                 |    |    |
| TSR/TSS-125 | 18    | 65                  | 22                      | 23                       | 44     | 26 | 26  | 30  | 22  | 9    | 3    | 25              | 22 | 21 |
|             | 22    | 79                  | 34                      | 36                       | 45     | 32 | 31  | 35  | 29  | 18   | 3    | 30              | 27 | 25 |
|             | 27    | 97                  | 50                      | 53                       | 46     | 37 | 35  | 39  | 35  | 27   | 14   | 35              | 31 | 30 |
|             | 33    | 119                 | 71                      | 76                       | 47     | 42 | 38  | 42  | 41  | 34   | 24   | 40              | 37 | 36 |
| TSR/TSS-160 | 29    | 104                 | 19                      | 20                       | 50     | 30 | 30  | 28  | 18  | 4    | 3    | 25              | 20 | 18 |
|             | 36    | 130                 | 30                      | 31                       | 51     | 35 | 34  | 34  | 26  | 15   | 3    | 30              | 26 | 25 |
|             | 44    | 158                 | 44                      | 47                       | 51     | 40 | 38  | 39  | 33  | 24   | 10   | 35              | 32 | 30 |
|             | 52    | 187                 | 62                      | 66                       | 52     | 43 | 42  | 44  | 39  | 32   | 19   | 40              | 36 | 35 |
| TSR/TSS-200 | 45    | 162                 | 17                      | 18                       | 52     | 31 | 26  | 27  | 19  | 6    | 3    | 25              | 18 | 16 |
|             | 59    | 212                 | 28                      | 30                       | 53     | 38 | 33  | 33  | 27  | 18   | 3    | 30              | 25 | 24 |
|             | 71    | 256                 | 41                      | 44                       | 53     | 44 | 39  | 38  | 33  | 26   | 14   | 35              | 30 | 29 |
|             | 85    | 306                 | 58                      | 62                       | 54     | 48 | 43  | 43  | 39  | 34   | 24   | 40              | 35 | 34 |
| TSR/TSS-250 | 69    | 248                 | 14                      | 15                       | 51     | 32 | 29  | 27  | 18  | 3    | 3    | 25              | 19 | 17 |
|             | 90    | 324                 | 23                      | 25                       | 52     | 38 | 35  | 34  | 27  | 15   | 3    | 30              | 26 | 24 |
|             | 109   | 392                 | 34                      | 37                       | 52     | 42 | 39  | 38  | 33  | 25   | 13   | 35              | 31 | 29 |
|             | 130   | 468                 | 48                      | 53                       | 53     | 46 | 43  | 43  | 39  | 33   | 24   | 40              | 35 | 34 |
| TSR/TSS-315 | 121   | 436                 | 18                      | 19                       | 49     | 35 | 30  | 28  | 20  | 5    | 3    | 25              | 20 | 18 |
|             | 146   | 526                 | 26                      | 28                       | 51     | 40 | 35  | 33  | 27  | 14   | 3    | 30              | 25 | 23 |
|             | 174   | 626                 | 37                      | 40                       | 53     | 45 | 40  | 38  | 33  | 23   | 9    | 35              | 30 | 29 |
|             | 204   | 734                 | 51                      | 55                       | 54     | 49 | 45  | 42  | 39  | 31   | 18   | 40              | 35 | 34 |

L<sub>pA</sub> values presented with room attenuation 4 dB (red 10m<sup>2</sup> - sab). When using room attenuation 8 dB (red 25m<sup>2</sup> - sab): L<sub>pA</sub> - 4dB.  
 NR/NC noise criteria

## Adjustment

The TSR/TSS itself has no means for airflow adjustment.

In order to enable airflow adjustment and measurement of airflow rate it is recommended to connect the diffuser to the TRI balancing plenum. The supply flow rate is determined by using the measurement and adjustment module MSM. Detach the diffuser and pass the tubes and control spindle through the blades of the diffuser and replace the diffuser. Measure the differential pressure with a manometer. The flow rate is calculated using the formula below.

$$q_v = k * \sqrt{\Delta p_m}$$

Adjust the airflow rate by rotating the control spindle until the desired setting is achieved. Lock the damper position with a screw.

Replace the tubes and spindle into the plenum.

K-factor for installations with different safety distances (D= duct diameter)

| TRI | > 8 x D | min 3 x D |
|-----|---------|-----------|
| 125 | 9.9     | 12.6      |
| 160 | 16.9    | 21.9      |
| 200 | 28.3    | 31.0      |
| 250 | 47.9    | 51.5      |
| 315 | 78.6    | -         |

## Servicing

Wipe the diffuser with a damp cloth.

### Option with balancing plenum

Detach the diffuser from the retaining mounting bracket. Remove the measurement and adjustment module by gently pulling the shaft (NB not the control spindle or measurement tubes!).

Wipe the parts with a damp cloth, instead of immersing in water.

Remount the measurement and adjustment module by pushing in the shaft until the unit meets the stopper. Replace the diffuser.

### Suggested specifications

The diffuser shall be made of epoxy-painted steel with a white (RAL 9010) standard colour.

The swirl diffuser has fixed spiral blades ensuring a high mixing rate.

### Alternative 1; no balancing plenum

The diffuser shall have an aluminium casing with a steel front vane panel and a spigot with integral gasket for connection to the circular duct.

### Alternative 2; option with balancing plenum

The diffuser shall be connected with a mounting bracket to a balancing plenum equipped with a measurement and adjustment module.

The diffuser shall be detachable to provide access to the measurement and adjustment module in the plenum.

The balancing plenum shall have a spigot with integral gasket for airtight duct connection.

The balancing plenum shall comprise sound attenuation material made of polyester fibre with a washable surface.

## Product code

TSR/S-D

TSS/S-D

S = Model

- A Standard
- B Model adapted to be fixed on a staff ceiling
- C Model adapted to be fixed on a staff ceiling (TSS)

D = Diameter of duct connection

125, 160, 200, 250, 315

Specifics and accessories

CO = Colour

W White

Code example

TSR/A-125, CO=W

Sub products

TRI Plenum (Diffusers)