



# Axial-flow full cone nozzles

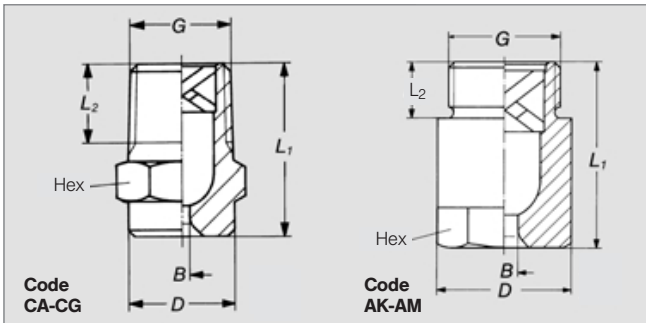
## Series 460 / 461



**Very uniform spray pattern.  
Large free cross-sections,  
due to optimized  
x-style swirl insert.**

Applications:

Cleaning and washing process, cooling of gaseous fluids and solids, surface spraying, spraying onto mats in air washers, improving of chemical reactions. Large free cross-sections, due to optimized x-style swirl insert.



| Code      | G        | Dimensions [mm] |                |      | Hex | Weight Brass |
|-----------|----------|-----------------|----------------|------|-----|--------------|
|           |          | L <sub>1</sub>  | L <sub>2</sub> | D    |     |              |
| <b>CA</b> | 1/8 BSPT | 18,0            | 6,5            | 10,0 | 11  | 15 g         |
| <b>CC</b> | 1/4 BSPT | 22,0            | 10,0           | 13,0 | 14  | 17 g         |
| <b>CE</b> | 3/8 BSPT | 24,5            | 10,0           | 16,0 | 17  | 30 g         |
| CE        | 1/8 BSPT | 30,0            | 10,0           | 16,0 | 17  | 50 g         |
| <b>CG</b> | 1/2 BSPT | 32,5            | 13,0           | 21,0 | 22  | 67 g         |
| CG        | 1/2 BSPT | 43,5            | 13,0           | 21,0 | 22  | 85 g         |
| <b>AK</b> | 3/4 BSPP | 42,0            | 15,0           | 32,0 | 27  | 170 g        |
| AK        | 3/4 BSPP | 50,0            | 15,0           | 32,0 | 27  | 200 g        |
| <b>AM</b> | 1 BSPP   | 56,0            | 17,0           | 40,0 | 36  | 360 g        |

Subject to technical modifications.

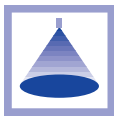
| Spray angle | Ordering no. |              |      |          |          |          |          |          |        |      | B Ø [mm] | E Ø [mm] | ṽ [l/min] |       |       |       |       |       |       | Spray diameter D at p=2 bar<br><br>H = 200 mm    H = 500 mm |     |
|-------------|--------------|--------------|------|----------|----------|----------|----------|----------|--------|------|----------|----------|-----------|-------|-------|-------|-------|-------|-------|---|-----|
|             | Type         | Material-no. |      |          | Code     |          |          |          |        |      |          |          | p [bar]   |       |       |       |       |       |       |   |     |
|             |              | 17           | 30   | 5E       | 17       | 30       | 5E       | 17       | 30     | 5E   |          |          | 17        | 30    | 5E    | 17    | 30    | 5E    |       |   |     |
|             | 1.4571/316SS | Brass        | PVDF | 1/6 BSPT | 1/4 BSPT | 3/8 BSPT | 1/2 BSPT | 3/4 BSPP | 1 BSPP | 0,5  |          |          | 1,0       | 2,0   | 3,0   | 5,0   | 10,0  |       |       |   |     |
| 45°         | 460.403      | ○            | ○    | -        | CA       | -        | -        | -        | -      | -    | 1,20     | 0,85     | 0,57      | 0,76  | 1,00  | 0,30  | 1,18  | 1,44  | 1,90  | 160   | 400 |
|             | 460.523      | ○            | ○    | -        | CA       | -        | -        | -        | -      | -    | 1,50     | 1,35     | 1,15      | 1,52  | 2,00  | 0,60  | 2,35  | 2,89  | 3,81  | 160   | 400 |
|             | 460.603      | ○            | ○    | -        | -        | CC       | CE       | -        | -      | -    | 1,90     | 1,80     | 1,81      | 2,39  | 3,15  | 0,95  | 3,70  | 4,54  | 6,00  | 160   | 400 |
|             | 460.643      | ○            | ○    | -        | -        | CC       | CE       | -        | -      | -    | 2,15     | 2,00     | 2,30      | 3,03  | 4,00  | 1,20  | 4,70  | 5,77  | 7,61  | 160   | 400 |
|             | 460.683      | -            | ○    | -        | -        | CC       | CE       | -        | -      | -    | 2,40     | 2,00     | 2,87      | 3,79  | 5,00  | 1,50  | 5,88  | 7,21  | 9,52  | 160   | 400 |
|             | 460.703      | -            | ○    | -        | -        | -        | CE       | -        | -      | -    | 2,55     | 2,20     | 3,22      | 4,24  | 5,60  | 1,68  | 6,59  | 8,08  | 10,66 | 160   | 400 |
|             | 460.723      | ○            | ○    | -        | -        | -        | CE       | CG       | -      | -    | 2,70     | 2,35     | 3,62      | 4,77  | 6,30  | 1,89  | 7,41  | 9,09  | 11,99 | 160   | 400 |
|             | 460.783      | -            | ○    | -        | -        | -        | -        | CG       | -      | -    | 3,20     | 3,20     | 5,17      | 6,82  | 9,00  | 2,70  | 10,58 | 12,98 | 17,12 | 160   | 400 |
|             | 460.843      | -            | ○    | -        | -        | -        | -        | CG       | -      | -    | 3,80     | 3,70     | 7,18      | 9,47  | 12,50 | 3,75  | 14,70 | 18,03 | 23,80 | 160   | 400 |
| 60°         | 460.404      | ○            | ○    | -        | CA       | -        | -        | -        | -      | -    | 1,20     | 0,85     | 0,57      | 0,76  | 1,00  | 0,30  | 1,18  | 1,44  | 1,90  | 220   | 560 |
|             | 460.444      | ○            | -    | -        | CA       | -        | -        | -        | -      | -    | 1,30     | 1,05     | 0,72      | 0,95  | 1,25  | 0,38  | 1,47  | 1,80  | 2,38  | 220   | 560 |
|             | 460.484      | ○            | ○    | -        | CA       | -        | -        | -        | -      | -    | 1,45     | 1,15     | 0,92      | 1,21  | 1,60  | 0,48  | 1,88  | 2,31  | 3,05  | 220   | 560 |
|             | 460.524      | ○            | ○    | -        | CA       | -        | -        | -        | -      | -    | 1,60     | 1,20     | 1,15      | 1,52  | 2,00  | 0,60  | 2,35  | 2,89  | 3,81  | 220   | 560 |
|             | 460.604      | ○            | ○    | -        | CA       | -        | CE       | -        | -      | -    | 2,05     | 1,40     | 1,81      | 2,39  | 3,15  | 0,95  | 3,70  | 4,54  | 6,00  | 220   | 560 |
|             | 460.644      | ○            | ○    | ○        | -        | CC       | CE       | -        | -      | -    | 2,40     | 1,90     | 2,30      | 3,03  | 4,00  | 1,20  | 4,70  | 5,77  | 7,61  | 220   | 560 |
|             | 460.684      | ○            | ○    | -        | -        | CC       | CE       | -        | -      | -    | 2,60     | 2,00     | 2,87      | 3,79  | 5,00  | 1,50  | 5,88  | 7,21  | 9,52  | 220   | 560 |
|             | 460.724      | ○            | ○    | -        | -        | CC       | CE       | -        | -      | -    | 2,90     | 2,00     | 3,62      | 4,77  | 6,30  | 1,89  | 7,41  | 9,09  | 11,99 | 220   | 560 |
|             | 460.764      | ○            | ○    | -        | -        | -        | CE       | -        | -      | -    | 3,25     | 2,85     | 4,59      | 6,06  | 8,00  | 2,40  | 9,41  | 11,54 | 15,22 | 220   | 560 |
|             | 460.804      | ○            | ○    | -        | -        | -        | CE       | -        | -      | -    | 3,60     | 2,95     | 5,74      | 7,58  | 10,00 | 3,00  | 11,76 | 14,43 | 19,04 | 220   | 560 |
|             | 460.844      | ○            | ○    | -        | -        | -        | -        | CG       | -      | -    | 4,00     | 3,30     | 7,18      | 9,47  | 12,50 | 3,75  | 14,70 | 18,03 | 23,80 | 220   | 560 |
|             | 460.884      | ○            | ○    | -        | -        | -        | -        | CG       | -      | -    | 4,50     | 3,70     | 9,19      | 12,13 | 16,00 | 4,80  | 18,82 | 23,08 | 30,46 | 220   | 560 |
|             | 460.924      | ○            | ○    | -        | -        | -        | -        | -        | AK     | -    | 5,20     | 4,50     | 11,49     | 15,16 | 20,00 | 6,01  | 23,52 | 28,85 | 38,07 | 220   | 560 |
|             | 460.964      | ○            | ○    | ○        | -        | -        | -        | -        | AK     | -    | 5,80     | 4,90     | 14,36     | 18,95 | 25,00 | 7,51  | 29,40 | 36,07 | 47,59 | 220   | 560 |
|             | 461.044      | ○            | ○    | -        | -        | -        | -        | -        | -      | AM   | 7,20     | 5,40     | 22,97     | 30,31 | 40,00 | 12,01 | 47,04 | 57,71 | 76,15 | 220   | 560 |
|             | 461.084      | ○            | ○    | -        | -        | -        | -        | -        | AM     | 8,60 | 6,50     | 28,72    | 37,89     | 50,00 | 15,02 | 58,80 | 72,14 | 95,18 | 220   | 560   |     |

B = bore diameter · E = narrow free cross section

Continued on next page.

Conversion formula for the above series:  $\dot{V}_2 = \dot{V}_1 * \left(\frac{p_2}{p_1}\right)^{0,4}$  (≤ 10 bar)





# Axial-flow full cone nozzles

## Series 460 / 461



| A<br>Spray angle | Ordering no. |                    |             |            |          |          |          |          |          |        | B<br>Ø [mm] | E<br>Ø [mm] | V̇ [l/min] |       |       |                         |        |        |        | Spray diameter D at p=2 bar |             |     |      |
|------------------|--------------|--------------------|-------------|------------|----------|----------|----------|----------|----------|--------|-------------|-------------|------------|-------|-------|-------------------------|--------|--------|--------|-----------------------------|-------------|-----|------|
|                  | Type         | Material-no.       |             |            | Code     |          |          |          |          |        |             |             | p [bar]    |       |       |                         |        |        |        | H<br>200 mm                 | H<br>500 mm |     |      |
|                  |              | 17<br>1.4571/316SS | 30<br>Brass | 5E<br>PVDF | 1/8 BSPT | 1/4 BSPT | 3/8 BSPT | 1/2 BSPT | 3/4 BSPT | 1 BSPP |             |             | 0,5        | 1,0   | 2,0   | [US gal./min] at 40 psi |        |        | 3,0    |                             |             | 5,0 | 10,0 |
|                  |              |                    |             |            |          |          |          |          |          |        |             |             |            |       |       | 0,5                     | 1,0    | 2,0    |        |                             |             |     |      |
| 90°              | 460.326      | -                  | -           | ○          | CA       | -        | -        | -        | -        | -      | 0,80        | 0,55        | 0,23       | 0,30  | 0,40  | 0,12                    | 0,47   | 0,58   | 0,76   | 380                         | 860         |     |      |
|                  | 460.406      | ○                  | ○           | ○          | CA       | -        | -        | -        | -        | -      | 1,20        | 0,85        | 0,57       | 0,76  | 1,00  | 0,30                    | 1,18   | 1,44   | 1,90   | 380                         | 860         |     |      |
|                  | 460.446      | -                  | -           | -          | CA       | -        | -        | -        | -        | -      | 1,30        | 1,00        | 0,72       | 0,95  | 1,25  | 0,38                    | 1,47   | 1,80   | 2,38   | 380                         | 860         |     |      |
|                  | 460.486      | ○                  | ○           | ○          | CA       | -        | -        | -        | -        | -      | 1,45        | 1,20        | 0,92       | 1,21  | 1,60  | 0,48                    | 1,88   | 2,31   | 3,05   | 380                         | 860         |     |      |
|                  | 460.526      | ○                  | ○           | ○          | CA       | -        | -        | -        | -        | -      | 1,65        | 1,30        | 1,15       | 1,52  | 2,00  | 0,60                    | 2,35   | 2,89   | 3,81   | 380                         | 860         |     |      |
|                  | 460.566      | ○                  | ○           | -          | CA       | -        | -        | -        | -        | -      | 1,85        | 1,30        | 1,44       | 1,89  | 2,50  | 0,75                    | 2,94   | 3,61   | 4,76   | 380                         | 860         |     |      |
|                  | 460.606      | ○                  | ○           | ○          | CA       | -        | CE       | -        | -        | -      | 2,05        | 1,45        | 1,81       | 2,39  | 3,15  | 0,95                    | 3,70   | 4,54   | 6,00   | 380                         | 860         |     |      |
|                  | 460.646      | ○                  | ○           | ○          | -        | CC       | CE       | -        | -        | -      | 2,30        | 1,80        | 2,30       | 3,03  | 4,00  | 1,20                    | 4,70   | 5,77   | 7,61   | 390                         | 960         |     |      |
|                  | 460.686      | ○                  | ○           | -          | -        | CC       | CE       | -        | -        | -      | 2,60        | 1,80        | 2,87       | 3,79  | 5,00  | 1,50                    | 5,88   | 7,21   | 9,52   | 390                         | 960         |     |      |
|                  | 460.726      | ○                  | ○           | ○*         | -        | CC       | CE       | -        | -        | -      | 2,95        | 2,00        | 3,62       | 4,77  | 6,30  | 1,89                    | 7,41   | 9,09   | 11,99  | 390                         | 960         |     |      |
|                  | 460.746      | -                  | -           | ○          | -        | -        | CE       | -        | -        | -      | 3,30        | 1,90        | 4,08       | 5,38  | 7,10  | 2,13                    | 8,35   | 10,24  | 13,52  | 390                         | 960         |     |      |
|                  | 460.766      | ○                  | ○           | ○          | -        | -        | CE       | -        | -        | -      | 3,30        | 2,40        | 4,59       | 6,06  | 8,00  | 2,40                    | 9,41   | 11,54  | 15,22  | 390                         | 960         |     |      |
|                  | 460.806      | ○                  | ○           | ○          | -        | -        | CE       | -        | -        | -      | 3,70        | 2,70        | 5,74       | 7,58  | 10,00 | 3,00                    | 11,76  | 14,43  | 19,04  | 390                         | 960         |     |      |
|                  | 460.846      | ○                  | ○           | ○          | -        | -        | CE       | -        | -        | -      | 4,05        | 3,20        | 7,18       | 9,47  | 12,50 | 3,75                    | 14,70  | 18,03  | 23,80  | 390                         | 960         |     |      |
|                  | 460.886      | ○                  | ○           | ○          | -        | -        | -        | CG       | -        | -      | 4,70        | 3,10        | 9,19       | 12,13 | 16,00 | 4,80                    | 18,82  | 23,08  | 30,46  | 390                         | 960         |     |      |
|                  | 460.926      | ○                  | ○           | -          | -        | -        | -        | CG       | -        | -      | 5,20        | 3,80        | 11,49      | 15,16 | 20,00 | 6,01                    | 23,52  | 28,85  | 38,07  | 390                         | 960         |     |      |
|                  | 460.966      | ○                  | ○           | ○          | -        | -        | -        | CG       | AK       | -      | 5,80        | 3,80        | 14,36      | 18,95 | 25,00 | 7,51                    | 29,40  | 36,07  | 47,59  | 390                         | 960         |     |      |
|                  | 461.006      | ○                  | -           | -          | -        | -        | -        | CG       | AK       | -      | 6,40        | 3,80        | 18,09      | 23,87 | 31,50 | 9,46                    | 37,05  | 45,45  | 59,97  | 390                         | 960         |     |      |
|                  | 461.046      | ○                  | ○           | ⊗          | -        | -        | -        | -        | AK       | -      | 7,20        | 5,30        | 22,97      | 30,31 | 40,00 | 12,01                   | 47,04  | 57,71  | 76,15  | 390                         | 960         |     |      |
|                  | 461.086      | ○***               | ○           | -          | -        | -        | -        | -        | -        | AM     | 8,20        | 5,30        | 28,72      | 37,89 | 50,00 | 15,02                   | 58,80  | 72,14  | 95,18  | 390                         | 960         |     |      |
| 461.126          | ○            | ○                  | -           | -          | -        | -        | -        | -        | AM       | 9,30   | 6,50        | 36,18       | 47,75      | 63,00 | 18,92 | 74,09                   | 90,89  | 119,93 | 390    | 960                         |             |     |      |
| 461.146          | ○            | -                  | ○           | -          | -        | -        | -        | -        | AM       | 9,90   | 6,70        | 40,78       | 53,81      | 71,00 | 21,32 | 83,50                   | 102,43 | 135,16 | 390    | 960                         |             |     |      |
| 120°             | 460.368      | ○                  | ○           | -          | CA       | -        | -        | -        | -        | -      | 0,95        | 0,70        | 0,36       | 0,48  | 0,63  | 0,19                    | 0,74   | 0,91   | 1,20   | 680                         | 1220        |     |      |
|                  | 460.408      | ○                  | ○           | ○          | CA       | -        | -        | -        | -        | -      | 1,20        | 0,85        | 0,57       | 0,76  | 1,00  | 0,30                    | 1,18   | 1,44   | 1,90   | 680                         | 1220        |     |      |
|                  | 460.448      | ○                  | ○           | -          | CA       | -        | -        | -        | -        | -      | 1,30        | 0,90        | 0,72       | 0,95  | 1,25  | 0,38                    | 1,47   | 1,80   | 2,38   | 680                         | 1220        |     |      |
|                  | 460.488      | ○                  | ○           | ○          | CA       | -        | -        | -        | -        | -      | 1,50        | 1,00        | 0,92       | 1,21  | 1,60  | 0,48                    | 1,88   | 2,31   | 3,05   | 680                         | 1220        |     |      |
|                  | 460.528      | ○                  | ○           | ○          | CA       | -        | -        | -        | -        | -      | 1,65        | 1,20        | 1,15       | 1,52  | 2,00  | 0,60                    | 2,35   | 2,89   | 3,81   | 680                         | 1220        |     |      |
|                  | 460.568      | ○                  | ○           | -          | CA       | -        | -        | -        | -        | -      | 1,90        | 1,35        | 1,44       | 1,89  | 2,50  | 0,75                    | 2,94   | 3,61   | 4,76   | 680                         | 1220        |     |      |
|                  | 460.608      | ○                  | ○           | ○          | CA       | -        | -        | -        | -        | -      | 2,10        | 1,40        | 1,81       | 2,39  | 3,15  | 0,95                    | 3,70   | 4,54   | 6,00   | 680                         | 1220        |     |      |
|                  | 460.648      | ○                  | ○           | ○          | -        | CC       | CE       | -        | -        | -      | 2,45        | 1,60        | 2,30       | 3,03  | 4,00  | 1,20                    | 4,70   | 5,77   | 7,61   | 680                         | 1330        |     |      |
|                  | 460.688      | ○                  | ○           | -          | -        | CC       | CE       | -        | -        | -      | 2,75        | 1,80        | 2,87       | 3,79  | 5,00  | 1,50                    | 5,88   | 7,21   | 9,52   | 680                         | 1330        |     |      |
|                  | 460.728      | ○                  | ○           | ○*         | -        | CC       | CE       | -        | -        | -      | 3,10        | 1,90        | 3,62       | 4,77  | 6,30  | 1,89                    | 7,41   | 9,09   | 11,99  | 680                         | 1330        |     |      |
|                  | 460.748      | -                  | -           | ○          | -        | -        | CE       | -        | -        | -      | 3,30        | 1,90        | 4,08       | 5,38  | 7,10  | 2,13                    | 8,35   | 10,24  | 13,52  | 680                         | 1330        |     |      |
|                  | 460.768      | ○                  | ○           | ○          | -        | -        | CE       | -        | -        | -      | 3,50        | 1,90        | 4,59       | 6,44  | 8,00  | 2,40                    | 9,41   | 11,54  | 15,22  | 680                         | 1330        |     |      |
|                  | 460.808      | ○                  | ○           | ○          | -        | -        | CE       | -        | -        | -      | 3,80        | 2,40        | 5,74       | 7,58  | 10,00 | 3,00                    | 11,76  | 14,43  | 19,04  | 680                         | 1330        |     |      |
|                  | 460.848      | ○                  | ○           | ○          | -        | -        | CE       | -        | -        | -      | 4,20        | 2,70        | 7,18       | 9,47  | 12,50 | 3,75                    | 14,70  | 18,03  | 23,80  | 680                         | 1330        |     |      |
|                  | 460.888      | ○**                | ○           | ○          | -        | -        | CE       | CG       | -        | -      | 4,60        | 3,10        | 9,19       | 12,13 | 16,00 | 4,80                    | 18,82  | 23,08  | 30,46  | 680                         | 1330        |     |      |
|                  | 460.928      | ○                  | ○           | -          | -        | -        | -        | CG       | -        | -      | 5,30        | 3,30        | 11,49      | 15,16 | 20,00 | 6,01                    | 23,52  | 28,85  | 38,07  | 680                         | 1330        |     |      |
|                  | 460.968      | ○                  | ○           | ○**        | -        | -        | -        | CG       | AK       | -      | 5,90        | 4,10        | 14,36      | 18,95 | 25,00 | 7,51                    | 29,40  | 36,07  | 47,59  | 680                         | 1330        |     |      |
|                  | 461.048      | ○                  | ○           | ⊗          | -        | -        | -        | -        | AK       | -      | 7,60        | 4,90        | 22,97      | 30,31 | 40,00 | 12,01                   | 47,04  | 57,71  | 76,15  | 680                         | 1330        |     |      |
|                  | 461.128      | ○                  | ○           | -          | -        | -        | -        | -        | -        | AM     | 9,60        | 6,60        | 36,18      | 47,75 | 63,00 | 18,92                   | 74,09  | 90,89  | 119,93 | 680                         | 1330        |     |      |
|                  | 461.148      | ○                  | -           | -          | -        | -        | -        | -        | -        | AM     | 10,00       | 6,60        | 40,78      | 53,81 | 71,00 | 21,32                   | 83,50  | 102,43 | 135,16 | 680                         | 1330        |     |      |

- B = bore diameter · E = narrowest free cross section
- ⊗ Material PP (Material no. 53), connection 3/4 BSPT (Code CK)
- \* Only available with code CE
- \*\* Only available with code CG
- \*\*\* Only available with code AM

The folded page at the end of the catalogue will give you a survey on the various assembly possibilities. For complete assembly accessories, please refer to „Accessories“.

**Example**    Type    +    Material no.    +    Code    =    Ordering no.  
**for ordering:** 460.326 + 5E                    +    CA                    =    460.326.5E.CA



Conversion formula for the above series:  $\dot{V}_2 = \dot{V}_1 * \left(\frac{p_2}{p_1}\right)^{0,4}$  (≤ 10 bar)