



# TECHNICAL CATALOGUE AC DRIVES



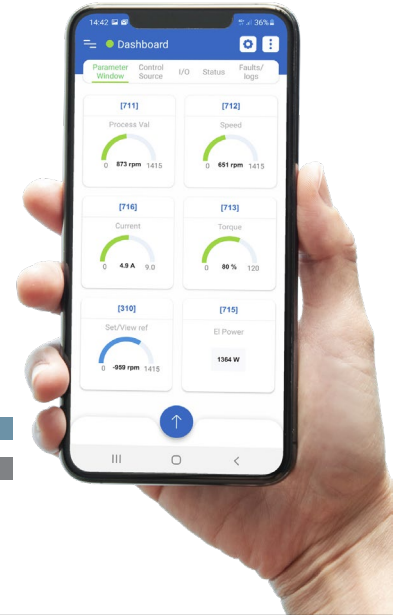
EMOTRON VFX/FDU 2.1  
0.37 - 3000 KW, 230 - 690 V  
IP20, IP21 AND IP54

**emotron**

DEDICATED DRIVE

 | A CG Product

# Optimized operation and full control







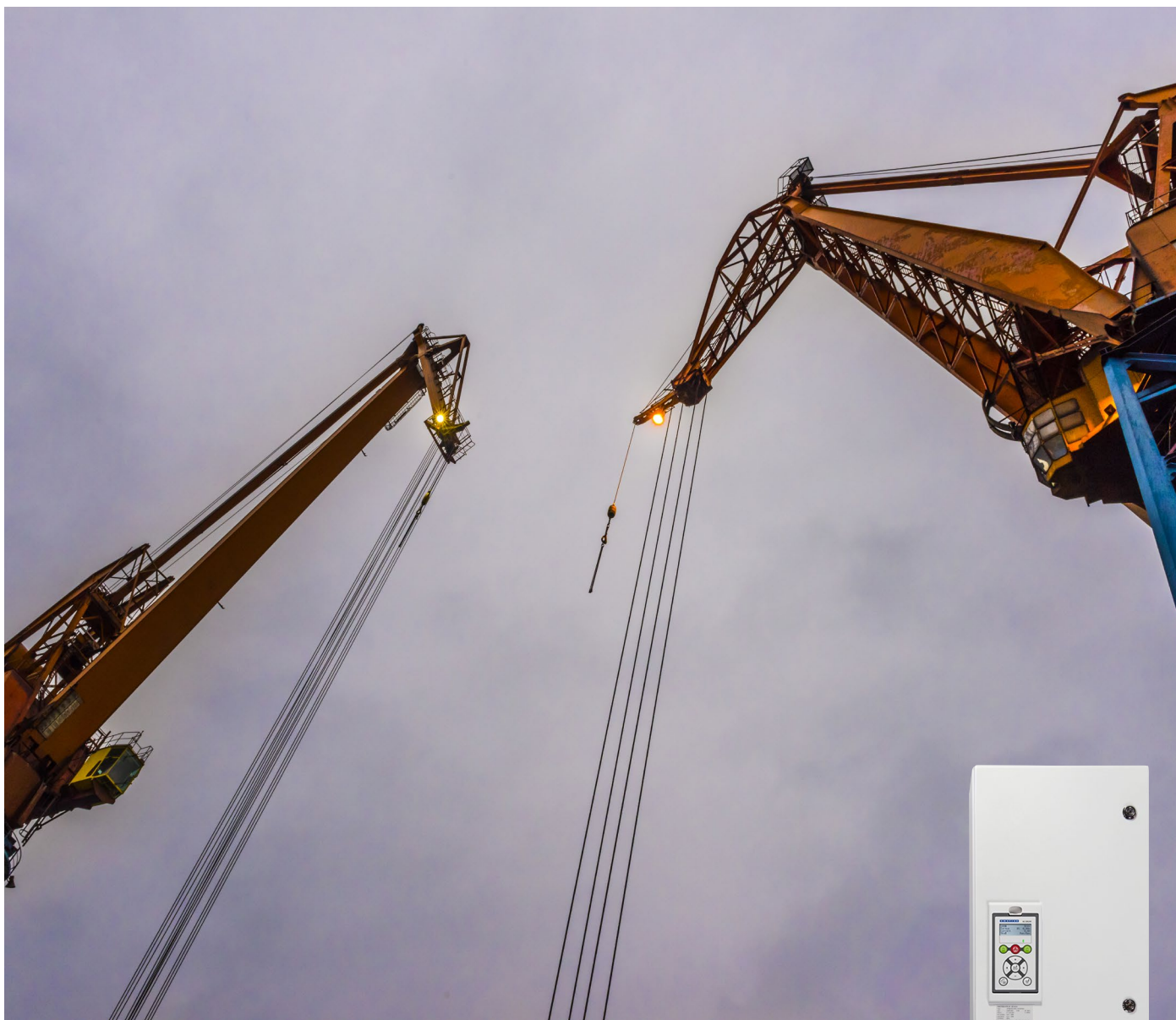
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## General information overview for Emotorn FDU 2.1 and VFX 2.1

| Emotorn FDU 2.1/VFX 2.1                         | IP20/21<br>Frame sizes C2 - FA2/C2(69)-F2(69)   | IP54/20<br>Frame sizes B-H8/C69-T69 |
|---|---|-------------------------------------|
| <b>Power range</b>                              | 5.5 - 200 kW / 7.5 - 250 hp   | 0.37 - 3000 kW / 0.5 - 4000 hp      |
| <b>Voltage range</b>                            | 3 ph, 230 - 690 V   | 3 ph, 230 - 690 V                   |
| <b>IP class</b>                                 | IP20/21   | IP54/20                             |
| <b>Control mode</b>                             | VFX : Direct torque control or V/Hz, FDU: V/Hz  |                                     |
| <b>DC choke</b>                                 | Standard  | Standard                            |
| <b>EMC filter</b>                               | C3 is standard<br>C2 is optional  |                                     |
| <b>Coated boards</b>                            | Standard  | Optional                            |
| <b>Detachable control panel - multilanguage</b> | Standard  | Standard                            |
| <b>Options</b>                                  | Encoder<br>PTC/PT100<br>Extended IO<br>Safe Torque Off (STO)<br>External control panel<br>CRIO (only VFX) |                                     |
| <b>Serial communication option</b>              | RS232/485 (Modbus RTU)  |                                     |
| <b>Communication options</b>                    | DeviceNet, Modbus/TCP, Profibus<br>Profinet IO, EtherNet IP<br>EtherCAT, CANopen                          |                                     |
| <b>Liquid cooling</b>                           | N.a.  | Optional for frame sizes E and up   |
| <b>IP21 top cover</b>                           | Optional  | N.a.                                |

|   |   |                        |
|---|---|------------------------|
| CE certification                        |  | All sizes              |
| UL certification<br>cULus certification |  | UL/cUL approved (480V) |
| Marine certification                    |  | DNV, BV                |
| EAC                                     |  | All sizes              |



## Emotron VFX 2.1 High dynamics for demanding applications

The Emotron VFX 2.1 AC drive optimizes your process and prevents damage and downtime. The combination of direct torque control, accurate speed control, and efficient vector braking makes it the ideal solution for all dynamic and constant torque applications, such as cranes, crushers, mills, mixers, and centrifuges.

### MAIN FEATURES

- NEW - Control panel with Real time clock. Optional Bluetooth communication.
- Available as robust and certified IP54 metal construction or IP20/21 version.
- All drive sizes are delivered with a built-in Category C3 EMC-filter as standard. C3 requirements are tested with 80 m motor cable.
- Direct torque control reacts extremely quickly and eliminates disturbances due to abrupt load changes.
- Load monitor function included as standard.
- UL (UL 840) approved version available.
- Marine (DNV & BV) approved version available (not IP2x).
- Integrated vector braking ensures quick and controlled stops, increasing productivity and safety.
- Built-in brake chopper is available as option for all sizes.
- Temp / Speed controlled fans assures less noise, a more even drive temperature and higher drive efficiency.
- Detachable multi-language control panel included as standard. Following languages are supported in the control panel: English, Swedish, Dutch, German, French, Spanish, Russian, Italian, Czech, Turkish and Polish.
- Operation parameters can be set in your process units, for example m/sec, tons/h or cycles/min.
- Removable control panel with own memory means it is easy to transfer or copy settings.
- Liquid cooled version available for sizes above 90 A.

## Emotron VFX 2.1 - IP54 version

Typical motor power at 3-phase mains voltage 230 V (Model 48-430 and up also available as IP20).

| VFX Model     | Max. output current [A]* | Normal duty<br>(120%, 1 min. every 10 min.) |                   |                   | Heavy duty<br>(150%, 1 min. every 10 min.) |                   |                   | Frame size ** | IP class          |                                |
|---------------|--------------------------|---|-------------------|-------------------|--|-------------------|-------------------|---------------|-------------------|--------------------------------|
|               |                          | Power @ 230V [kW]                           | Power @ 230V [hp] | Rated current [A] | Power @ 230V [kW]                          | Power @ 230V [hp] | Rated current [A] |               |                   |                                |
| VFX48-003-54  | 3.8                      | 0.37  | 0.5               | <b>2.5</b>        | 0.37                                       | 0.5               | 2.0               | B             | IP54 wall mounted |                                |
| VFX48-004-54  | 6.0                      | 0.75  | 1                 | <b>4.0</b>        | 0.55                                       | 0.75              | 3.2               |               |                   |                                |
| VFX48-006-54  | 9.0                      | 1.1   | 1.5               | <b>6.0</b>        | 0.75                                       | 1                 | 4.8               |               |                   |                                |
| VFX48-008-54  | 11.3                     | 1.5   | 2                 | <b>7.5</b>        | 1.1  | 1.5               | 6.0               |               |                   |                                |
| VFX48-010-54  | 14.3                     | 2.2   | 3                 | <b>9.5</b>        | 1.5  | 2                 | 7.6               |               |                   |                                |
| VFX48-013-54  | 19.5                     | 2.2   | 3                 | <b>13.0</b>       | 2.2  | 3                 | 10.4              |               |                   |                                |
| VFX48-018-54  | 27.0                     | 4   | 5                 | <b>18.0</b>       | 3  | 3                 | 14.4              |               |                   |                                |
| VFX48-026-54  | 39                       | 5.5   | 7.5               | <b>26</b>         | 4  | 5                 | 21                | C             |                   |                                |
| VFX48-031-54  | 46                       | 7.5   | 10                | <b>31</b>         | 5.5  | 7.5               | 25                |               |                   |                                |
| VFX48-037-54  | 55                       | 7.5   | 10                | <b>37</b>         | 7.5  | 10                | 29.6              |               |                   |                                |
| VFX48-046-54  | 69                       | 11  | 15                | <b>46</b>         | 7.5  | 10                | 37                |               |                   |                                |
| VFX48-061-54  | 92                       | 15  | 20                | <b>61</b>         | 11   | 15                | 49                | D             |                   |                                |
| VFX48-074-54  | 111                      | 18.5  | 25                | <b>74</b>         | 15   | 20                | 59                | E             |                   |                                |
| VFX48-090-54  | 108                      | 22  | 30                | <b>90</b>         | 18.5                                       | 25                | 72                |               |                   |                                |
| VFX48-109-54  | 131                      | 30  | 40                | <b>109</b>        | 22   | 30                | 87                |               |                   |                                |
| VFX48-146-54  | 175                      | 37  | 50                | <b>146</b>        | 30   | 40                | 117               |               |                   |                                |
| VFX48-175-54  | 210                      | 45  | 60                | <b>175</b>        | 37   | 50                | 140               |               |                   |                                |
| VFX48-210-54  | 252                      | 55  | 75                | <b>210</b>        | 45   | 60                | 168               |               |                   |                                |
| VFX48-250-54  | 300                      | 75  | 100               | <b>250</b>        | 55   | 75                | 200               | F             |                   |                                |
| VFX48-295-54  | 354                      | 90  | 125               | <b>295</b>        | 75   | 100               | 236               |               |                   |                                |
| VFX48-365-54  | 438                      | 110   | 150               | <b>365</b>        | 90   | 125               | 292               | FA            |                   |                                |
| VFX48-430-IP  | 516                      | 110   | 150               | <b>430</b>        | 110  | 125               | 344               | H (2)         |                   | IP20 module or IP54/23 cabinet |
| VFX48-500-IP  | 600                      | 160   | 200               | <b>500</b>        | 110  | 150               | 400               |               |                   |                                |
| VFX48-600-IP  | 720                      | 200   | 250               | <b>600</b>        | 132  | 200               | 480               | I (3)         |                   |                                |
| VFX48-650-IP  | 780                      | 200   | 250               | <b>650</b>        | 160  | 200               | 520               |               |                   |                                |
| VFX48-750-IP  | 900                      | 220   | 300               | <b>750</b>        | 200  | 250               | 600               |               |                   |                                |
| VFX48-860-IP  | 1032                     | 250   | 350               | <b>860</b>        | 220  | 300               | 688               | J (4)         |                   |                                |
| VFX48-1K0-IP  | 1200                     | 300   | 400               | <b>1000</b>       | 250  | 350               | 800               |               |                   |                                |
| VFX48-1K15-IP | 1380                     | 355   | 450               | <b>1150</b>       | 250  | 400               | 920               | KA (5)        |                   |                                |
| VFX48-1K25-IP | 1500                     | 400   | 500               | <b>1250</b>       | 315  | 400               | 1000              |               |                   |                                |
| VFX48-1K35-IP | 1620                     | 400   | 550               | <b>1350</b>       | 355  | 450               | 1080              | K (6)         |                   |                                |
| VFX48-1K5-IP  | 1800                     | 450   | 600               | <b>1500</b>       | 400  | 500               | 1200              |               |                   |                                |
| VFX48-1K75-IP | 2100                     | 560   | 750               | <b>1750</b>       | 450  | 600               | 1400              | L (7)         |                   |                                |
| VFX48-2K0-IP  | 2400                     | 630   | 800               | <b>2000</b>       | 500  | 650               | 1600              | M (8)         |                   |                                |
| VFX48-2K25-IP | 2700                     | 710   | 900               | <b>2250</b>       | 560  | 750               | 1800              | N (9)         |                   |                                |
| VFX48-2K5-IP  | 3000                     | 800   | 1000              | <b>2500</b>       | 630  | 800               | 2000              | O (10)        |                   |                                |

Larger sizes available on request

\* Available for a limited time and as long as drive temperature permits. Rated data at 40 °C ambient temperature

\*\* Number in parenthesis, e.g. H(2), indicates number of parallel power modules.

IP = Available as IP20 module or mounted in IP23 or IP54 cabinet.

## Emotron VFX 2.1 - IP54 version

Typical motor power at 3-phase mains voltage 400 V and 460 V (Model 48-430 and up also available as IP20).

| VFX Model     | Max. output current [A]* | Normal duty<br>(120%, 1 min. every 10 min.) |                   |                   | Heavy duty<br>(150%, 1 min. every 10 min.) |                   |                   | Frame size ** | IP class           |                                |
|---------------|--------------------------|---|-------------------|-------------------|--|-------------------|-------------------|---------------|--------------------|--------------------------------|
|               |                          | Power @ 400V [kW]                           | Power @ 460V [hp] | Rated current [A] | Power @ 400V [kW]                          | Power @ 460V [hp] | Rated current [A] |               |                    |                                |
| VFX48-003-54  | 3.8                      | 0.75  | 1                 | <b>2.5</b>        | 0.55                                       | 1                 | 2.0               | B             | IP 54 wall mounted |                                |
| VFX48-004-54  | 6.0                      | 1.5   | 2                 | <b>4.0</b>        | 1.1  | 1.5               | 3.2               |               |                    |                                |
| VFX48-006-54  | 9.0                      | 2.2   | 3                 | <b>6.0</b>        | 1.5  | 2                 | 4.8               |               |                    |                                |
| VFX48-008-54  | 11.3                     | 3   | 3                 | <b>7.5</b>        | 2.2  | 3                 | 6.0               |               |                    |                                |
| VFX48-010-54  | 14.3                     | 4   | 5                 | <b>9.5</b>        | 3  | 3                 | 7.6               |               |                    |                                |
| VFX48-013-54  | 19.5                     | 5.5   | 7.5               | <b>13.0</b>       | 4  | 5                 | 10.4              |               |                    |                                |
| VFX48-018-54  | 27.0                     | 7.5   | 10                | <b>18.0</b>       | 5.5  | 7.5               | 14.4              |               |                    |                                |
| VFX48-026-54  | 39                       | 11  | 15                | <b>26</b>         | 7.5  | 10                | 21                | C             |                    |                                |
| VFX48-031-54  | 46                       | 15  | 20                | <b>31</b>         | 11   | 15                | 25                |               |                    |                                |
| VFX48-037-54  | 55                       | 18.5  | 25                | <b>37</b>         | 15   | 20                | 29.6              |               |                    |                                |
| VFX48-046-54  | 69                       | 22  | 30                | <b>46</b>         | 18.5                                       | 25                | 37                |               |                    |                                |
| VFX48-061-54  | 92                       | 30  | 40                | <b>61</b>         | 22   | 30                | 49                | D             |                    |                                |
| VFX48-074-54  | 111                      | 37  | 50                | <b>74</b>         | 30   | 40                | 59                | E             |                    |                                |
| VFX48-090-54  | 108                      | 45  | 60                | <b>90</b>         | 37   | 50                | 72                |               |                    |                                |
| VFX48-109-54  | 131                      | 55  | 75                | <b>109</b>        | 45   | 60                | 87                |               |                    |                                |
| VFX48-146-54  | 175                      | 75  | 100               | <b>146</b>        | 55   | 75                | 117               |               |                    |                                |
| VFX48-175-54  | 210                      | 90  | 125               | <b>175</b>        | 75   | 100               | 140               |               |                    |                                |
| VFX48-210-54  | 252                      | 110   | 150               | <b>210</b>        | 90   | 125               | 168               | F             |                    |                                |
| VFX48-250-54  | 300                      | 132   | 200               | <b>250</b>        | 110  | 150               | 200               |               |                    |                                |
| VFX48-295-54  | 354                      | 160   | 250               | <b>295</b>        | 132  | 200               | 236               |               |                    |                                |
| VFX48-365-54  | 438                      | 200   | 300               | <b>365</b>        | 160  | 250               | 292               | FA            |                    |                                |
| VFX48-430-IP  | 516                      | 220   | 350               | <b>430</b>        | 200  | 250               | 344               | H (2)         |                    | IP20 module or IP54/23 cabinet |
| VFX48-500-IP  | 600                      | 250   | 400               | <b>500</b>        | 220  | 350               | 400               | I (3)         |                    |                                |
| VFX48-600-IP  | 720                      | 315   | 500               | <b>600</b>        | 250  | 400               | 480               |               |                    |                                |
| VFX48-650-IP  | 780                      | 355   | 550               | <b>650</b>        | 315  | 400               | 520               |               |                    |                                |
| VFX48-750-IP  | 900                      | 400   | 600               | <b>750</b>        | 355  | 500               | 600               | J (4)         |                    |                                |
| VFX48-860-IP  | 1032                     | 450   | 700               | <b>860</b>        | 400  | 550               | 688               |               |                    |                                |
| VFX48-1K0-IP  | 1200                     | 560   | 800               | <b>1000</b>       | 450  | 650               | 800               | KA (5)        |                    |                                |
| VFX48-1K15-IP | 1380                     | 630   | 900               | <b>1150</b>       | 500  | 750               | 920               |               |                    |                                |
| VFX48-1K25-IP | 1500                     | 710   | 1000              | <b>1250</b>       | 560  | 800               | 1000              | K (6)         |                    |                                |
| VFX48-1K35-IP | 1620                     | 710   | 1100              | <b>1350</b>       | 600  | 900               | 1080              |               |                    |                                |
| VFX48-1K5-IP  | 1800                     | 800   | 1250              | <b>1500</b>       | 630  | 1000              | 1200              | L (7)         |                    |                                |
| VFX48-1K75-IP | 2100                     | 900   | 1500              | <b>1750</b>       | 800  | 1200              | 1400              |               |                    |                                |
| VFX48-2K0-IP  | 2400                     | 1120  | 1700              | <b>2000</b>       | 900  | 1300              | 1600              | M (8)         |                    |                                |
| VFX48-2K25-IP | 2700                     | 1250  | 1900              | <b>2250</b>       | 1000                                       | 1500              | 1800              | N (9)         |                    |                                |
| VFX48-2K5-IP  | 3000                     | 1400  | 2100              | <b>2500</b>       | 1120                                       | 1700              | 2000              | O (10)        |                    |                                |

Larger sizes available on request

\* Available for a limited time and as long as drive temperature permits. Rated data at 40 °C ambient temperature

\*\* Number in parenthesis, e.g. H(2), indicates number of parallel power modules.

IP = Available as IP20 module or mounted in IP23 or IP54 cabinet.

## Emotron VFX 2.1 - IP54 version

Typical motor power at 3-phase mains voltage 525 V Model 69-250 and up also available as IP20).

| VFX Model    | Max. output current [A]* | Normal duty (120%, 1 min. every 10 min.) |                   | Heavy duty (150%, 1 min. every 10 min.) |                   | Frame size ** | IP class          |
|--------------|--------------------------|--|-------------------|---|-------------------|---------------|-------------------|
|              |                          | Power @525 V [kW]                        | Rated current [A] | Power @525 V [kW]                       | Rated current [A] |               |                   |
| VFX52-003-54 | 3.8                      | 1.1                                      | <b>2.5</b>        | 1.1                                     | 2.0               | B             | IP54 wall mounted |
| VFX52-004-54 | 6.0                      | 2.2                                      | <b>4.0</b>        | 1.5                                     | 3.2               |               |                   |
| VFX52-006-54 | 9.0                      | 3  | <b>6.0</b>        | 2.2                                     | 4.8               |               |                   |
| VFX52-008-54 | 11.3                     | 4  | <b>7.5</b>        | 3                                       | 6.0               |               |                   |
| VFX52-010-54 | 14.3                     | 5.5                                      | <b>9.5</b>        | 4                                       | 7.6               |               |                   |
| VFX52-013-54 | 19.5                     | 7.5                                      | <b>13.0</b>       | 5.5                                     | 10.4              |               |                   |
| VFX52-018-54 | 27.0                     | 11                                       | <b>18.0</b>       | 7.5                                     | 14.4              |               |                   |
| VFX52-026-54 | 39                       | 15                                       | <b>26</b>         | 11                                      | 21                | C             |                   |
| VFX52-031-54 | 46                       | 18.5                                     | <b>31</b>         | 15                                      | 25                |               |                   |
| VFX52-037-54 | 55                       | 22                                       | <b>37</b>         | 18.5                                    | 29.6              |               |                   |
| VFX52-046-54 | 69                       | 30                                       | <b>46</b>         | 22                                      | 37                |               |                   |
| VFX52-061-54 | 92                       | 37                                       | <b>61</b>         | 30                                      | 49                | D             |                   |
| VFX52-074-54 | 111                      | 45                                       | <b>74</b>         | 37                                      | 59                |               |                   |
| VFX69-082-54 | 98                       | 55                                       | <b>82</b>         | 45                                      | 66                | F69           |                   |
| VFX69-090-54 | 108                      | 55                                       | <b>90</b>         | 45                                      | 72                |               |                   |
| VFX69-109-54 | 131                      | 75                                       | <b>109</b>        | 55                                      | 87                |               |                   |
| VFX69-146-54 | 175                      | 90                                       | <b>146</b>        | 75                                      | 117               |               |                   |
| VFX69-175-54 | 210                      | 110                                      | <b>175</b>        | 90                                      | 140               |               |                   |
| VFX69-200-54 | 240                      | 132                                      | <b>200</b>        | 110                                     | 160               |               |                   |
| VFX69-250-IP | 300                      | 160                                      | <b>250</b>        | 132                                     | 200               |               |                   |
| VFX69-300-IP | 360                      | 200                                      | <b>300</b>        | 160                                     | 240               |               |                   |
| VFX69-375-IP | 450                      | 250                                      | <b>375</b>        | 200                                     | 300               |               |                   |
| VFX69-400-IP | 480                      | 250                                      | <b>400</b>        | 220                                     | 320               |               |                   |
| VFX69-430-IP | 516                      | 300                                      | <b>430</b>        | 250                                     | 344               | I69 (3)       |                   |
| VFX69-500-IP | 600                      | 315                                      | <b>500</b>        | 300                                     | 400               |               |                   |
| VFX69-595-IP | 720                      | 400                                      | <b>600</b>        | 315                                     | 480               | J69 (4)       |                   |
| VFX69-650-IP | 780                      | 450                                      | <b>650</b>        | 355                                     | 520               |               |                   |
| VFX69-720-IP | 864                      | 500                                      | <b>720</b>        | 400                                     | 576               |               |                   |
| VFX69-800-IP | 960                      | 560                                      | <b>800</b>        | 450                                     | 640               |               |                   |
| VFX69-995-IP | 1200                     | 630                                      | <b>1000</b>       | 500                                     | 800               | KA69 (5)      |                   |
| VFX69-1K2-IP | 1440                     | 800                                      | <b>1200</b>       | 630                                     | 960               |               |                   |
| VFX69-1K4-IP | 1680                     | 1000                                     | <b>1400</b>       | 800                                     | 1120              |               |                   |
| VFX69-1K6-IP | 1920                     | 1100                                     | <b>1600</b>       | 900                                     | 1280              |               |                   |
| VFX69-1K8-IP | 2160                     | 1300                                     | <b>1800</b>       | 1000                                    | 1440              |               |                   |
| VFX69-2K0-IP | 2400                     | 1400                                     | <b>2000</b>       | 1100                                    | 1600              |               |                   |
| VFX69-2K2-IP | 2640                     | 1600                                     | <b>2200</b>       | 1200                                    | 1760              |               |                   |
| VFX69-2K4-IP | 2880                     | 1700                                     | <b>2400</b>       | 1400                                    | 1920              |               |                   |
| VFX69-2K6-IP | 3120                     | 1900                                     | <b>2600</b>       | 1500                                    | 2080              |               |                   |
| VFX69-2K8-IP | 3360                     | 2000                                     | <b>2800</b>       | 1600                                    | 2240              |               |                   |
| VFX69-3K0-IP | 3600                     | 2200                                     | <b>3000</b>       | 1700                                    | 2400              | T69 (15)      |                   |

\* Available for a limited time and as long as drive temperature permits. Rated data at 40 °C ambient temperature.

\*\* Number in parenthesis, e.g. H69 (2), indicates number of parallel power modules.

IP = Available as IP20 module or mounted in IP23 or IP54 cabinet.

## Emotron VFX 2.1 - IP54 version

Typical motor power at 3-phase mains voltage 575 V and 690 V (Model 69-250 and up also available as IP20).

| VFX Model    | Max output current [A]* | Normal duty<br>(120%, 1 min. every 10 min.) |                   |                   | Heavy duty<br>(150%, 1 min. every 10 min.) |                   |                   | Frame size ** | IP class                       |
|--------------|-------------------------|---|-------------------|-------------------|--|-------------------|-------------------|---------------|--------------------------------|
|              |                         | Power @ 575V [hp]                           | Power @ 690V [kW] | Rated current [A] | Power @ 575 V [hp]                         | Power @ 690V [kW] | Rated current [A] |               |                                |
| VFX69-002-54 | 3.2                     | 1.5   | 1.5               | <b>2</b>          | 1  | 0.75              | 1.6               | C69           | IP54 wall-mounted              |
| VFX69-003-54 | 4.8                     | 2   | 2.2               | <b>3</b>          | 1.5  | 1.5               | 2.4               |               |                                |
| VFX69-004-54 | 6.4                     | 3   | 3                 | <b>4</b>          | 2  | 2.2               | 3.2               |               |                                |
| VFX69-006-54 | 9.6                     | 4   | 4                 | <b>6</b>          | 3  | 3                 | 4.8               |               |                                |
| VFX69-008-54 | 12.8                    | 5   | 5.5               | <b>8</b>          | 4  | 4                 | 6.4               |               |                                |
| VFX69-010-54 | 16                      | 7.5   | 7.5               | <b>10</b>         | 5  | 5.5               | 8                 |               |                                |
| VFX69-013-54 | 20.8                    | 10  | 11                | <b>13</b>         | 7.5  | 7.5               | 10.4              |               |                                |
| VFX69-018-54 | 29                      | 15  | 15                | <b>18</b>         | 10   | 11                | 14.4              |               |                                |
| VFX69-021-54 | 34                      | 20  | 18.5              | <b>21</b>         | 15   | 15                | 16.8              |               |                                |
| VFX69-025-54 | 40                      | 25  | 22                | <b>25</b>         | 20   | 18.5              | 20                |               |                                |
| VFX69-033-54 | 53                      | 30  | 30                | <b>33</b>         | 25   | 22                | 26                |               |                                |
| VFX69-042-54 | 67                      | 40  | 37                | <b>42</b>         | 30   | 30                | 34                |               |                                |
| VFX69-050-54 | 80                      | 50  | 45                | <b>50</b>         | 40   | 37                | 40                |               |                                |
| VFX69-058-54 | 93                      | 60  | 55                | <b>58</b>         | 40   | 45                | 46                |               |                                |
| VFX69-082-54 | 98                      | 75  | 75                | <b>82</b>         | 60   | 55                | 66                | F69           |                                |
| VFX69-090-54 | 108                     | 75  | 90                | <b>90</b>         | 60   | 75                | 72                |               |                                |
| VFX69-109-54 | 131                     | 100   | 110               | <b>109</b>        | 75   | 90                | 87                |               |                                |
| VFX69-146-54 | 175                     | 125   | 132               | <b>146</b>        | 100  | 110               | 117               |               |                                |
| VFX69-175-54 | 210                     | 150   | 160               | <b>175</b>        | 125  | 132               | 140               |               |                                |
| VFX69-200-54 | 240                     | 200   | 200               | <b>200</b>        | 150  | 160               | 160               |               |                                |
| VFX69-250-IP | 300                     | 250   | 250               | <b>250</b>        | 200  | 200               | 200               | H69 (2)       |                                |
| VFX69-300-IP | 360                     | 300   | 315               | <b>300</b>        | 250  | 250               | 240               |               |                                |
| VFX69-375-IP | 450                     | 350   | 355               | <b>375</b>        | 300  | 315               | 300               |               |                                |
| VFX69-400-IP | 480                     | 400   | 400               | <b>400</b>        | 300  | 315               | 320               |               |                                |
| VFX69-430-IP | 516                     | 400   | 450               | <b>430</b>        | 350  | 315               | 344               | I69 (3)       |                                |
| VFX69-500-IP | 600                     | 500   | 500               | <b>500</b>        | 400  | 355               | 400               |               |                                |
| VFX69-595-IP | 720                     | 600   | 600               | <b>600</b>        | 500  | 450               | 480               |               |                                |
| VFX69-650-IP | 780                     | 650   | 630               | <b>650</b>        | 550  | 500               | 520               | J69 (4)       |                                |
| VFX69-720-IP | 864                     | 750   | 710               | <b>720</b>        | 600  | 560               | 576               |               |                                |
| VFX69-800-IP | 960                     | 850   | 800               | <b>800</b>        | 650  | 630               | 640               |               |                                |
| VFX69-905-IP | 1080                    | 950   | 900               | <b>900</b>        | 750  | 710               | 720               | KA69 (5)      | IP20 module or IP54/23 cabinet |
| VFX69-995-IP | 1200                    | 1000  | 1000              | <b>1000</b>       | 850  | 800               | 800               |               |                                |
| VFX69-1K2-IP | 1440                    | 1200  | 1200              | <b>1200</b>       | 1000                                       | 900               | 960               | K69 (6)       |                                |
| VFX69-1K4-IP | 1680                    | 1500  | 1400              | <b>1400</b>       | 1200                                       | 1120              | 1120              | L69 (7)       |                                |
| VFX69-1K6-IP | 1920                    | 1700  | 1600              | <b>1600</b>       | 1300                                       | 1250              | 1280              | M69 (8)       |                                |
| VFX69-1K8-IP | 2160                    | 1900  | 1800              | <b>1800</b>       | 1500                                       | 1400              | 1440              | N69 (9)       |                                |
| VFX69-2K0-IP | 2400                    | 2100  | 2000              | <b>2000</b>       | 1700                                       | 1600              | 1600              | O69 (10)      |                                |
| VFX69-2K2-IP | 2640                    | 2300  | 2200              | <b>2200</b>       | 1800                                       | 1700              | 1760              | P69 (11)      |                                |
| VFX69-2K4-IP | 2880                    | 2500  | 2400              | <b>2400</b>       | 2000                                       | 1900              | 1920              | Q69 (12)      |                                |
| VFX69-2K6-IP | 3120                    | 2700  | 2600              | <b>2600</b>       | 2200                                       | 2000              | 2080              | R69 (13)      |                                |
| VFX69-2K8-IP | 3360                    | 3000  | 2800              | <b>2800</b>       | 2400                                       | 2200              | 2240              | S69 (14)      |                                |
| VFX69-3K0-IP | 3600                    | 3200  | 3000              | <b>3000</b>       | 2500                                       | 2400              | 2400              | T69 (15)      |                                |

\* Available for a limited time and as long as drive temperature permits. Rated data at 40 °C ambient temperature

\*\* Number in parenthesis, e.g. H69 (2), indicates number of parallel power modules.

IP = Available as IP20 module or mounted in IP23 or IP54 cabinet.

## Emotron VFX 2.1 - IP20 version

Typical motor power at 3-phase mains voltage 230 V.

| VFX Model           | Max. output current [A]* | Normal duty<br>(120%, 1 min every 10 min) |                  |                   | Heavy duty<br>(150%, 1 min every 10 min) |                  |                   | Frame size |
|---------------------|--------------------------|---|------------------|-------------------|--|------------------|-------------------|------------|
|                     |                          | Power @ 230V [kW]                         | Power @230V [hp] | Rated current [A] | Power @ 230V [kW]                        | Power @230V [hp] | Rated current [A] |            |
| <b>VFX48-025-20</b> | 38                       | 5.5                                       | 7.5              | <b>25</b>         | 4  | 5                | 20                | C2         |
| <b>VFX48-030-20</b> | 45                       | 7.5                                       | 10               | <b>30</b>         | 5.5                                      | 7.5              | 24                |            |
| <b>VFX48-036-20</b> | 54                       | 7.5                                       | 10               | <b>36</b>         | 7.5                                      | 10               | 29                |            |
| <b>VFX48-045-20</b> | 68                       | 11  | 15               | <b>45</b>         | 7.5                                      | 10               | 36                |            |
| <b>VFX48-058-20</b> | 68                       | 15  | 20               | <b>58</b>         | 11                                       | 15               | 46                |            |
| <b>VFX48-060-20</b> | 90                       | 15  | 20               | <b>60</b>         | 11                                       | 15               | 48                | D2         |
| <b>VFX48-072-20</b> | 108                      | 18.5                                      | 25               | <b>72</b>         | 15                                       | 20               | 58                |            |
| <b>VFX48-088-20</b> | 132                      | 22  | 30               | <b>88</b>         | 18.5                                     | 25               | 70                |            |
| <b>VFX48-105-20</b> | 132                      | 30  | 40               | <b>105</b>        | 22                                       | 30               | 84                |            |
| <b>VFX48-142-20</b> | 170                      | 37  | 50               | <b>142</b>        | 30                                       | 40               | 114               | E2         |
| <b>VFX48-171-20</b> | 205                      | 45  | 60               | <b>171</b>        | 37                                       | 50               | 137               |            |
| <b>VFX48-205-20</b> | 246                      | 55  | 75               | <b>205</b>        | 45                                       | 60               | 164               | F2         |
| <b>VFX48-244-20</b> | 293                      | 75  | 100              | <b>244</b>        | 55                                       | 75               | 195               |            |
| <b>VFX48-293-20</b> | 352                      | 90  | 125              | <b>293</b>        | 75                                       | 100              | 235               |            |
| <b>VFX48-365-20</b> | 438                      | 110                                       | 150              | <b>365</b>        | 90                                       | 125              | 292               | FA2        |

\* Available for a limited time and as long as drive temperature permits. Rated data at 40 °C ambient temperature.





## Emotron VFX 2.1 - IP20 version

Typical motor power at 3-phase mains voltage 400 and 460 V.

| VFX Model           | Max. output current [A]* | Normal duty<br>(120%, 1 min every 10 min) |                  |                   | Heavy duty<br>(150%, 1 min every 10 min) |                  |                   | Frame size |
|---------------------|--------------------------|---|------------------|-------------------|--|------------------|-------------------|------------|
|                     |                          | Power @ 400V [kW]                         | Power @460V [hp] | Rated current [A] | Power @ 400V [kW]                        | Power @460V [hp] | Rated current [A] |            |
| <b>VFX48-025-20</b> | 38                       | 11  | 15               | <b>25</b>         | 7.5                                      | 10               | 20                | C2         |
| <b>VFX48-030-20</b> | 45                       | 15  | 20               | <b>30</b>         | 11                                       | 15               | 24                |            |
| <b>VFX48-036-20</b> | 54                       | 18.5                                      | 25               | <b>36</b>         | 15                                       | 20               | 29                |            |
| <b>VFX48-045-20</b> | 68                       | 22  | 30               | <b>45</b>         | 18.5                                     | 25               | 36                |            |
| <b>VFX48-058-20</b> | 68                       | 30  | 40               | <b>58</b>         | 22                                       | 30               | 46                |            |
| <b>VFX48-060-20</b> | 90                       | 30  | 40               | <b>60</b>         | 22                                       | 30               | 48                | D2         |
| <b>VFX48-072-20</b> | 108                      | 37  | 50               | <b>72</b>         | 30                                       | 40               | 58                |            |
| <b>VFX48-088-20</b> | 132                      | 45  | 60               | <b>88</b>         | 37                                       | 50               | 70                |            |
| <b>VFX48-105-20</b> | 132                      | 55  | 75               | <b>105</b>        | 45                                       | 60               | 84                |            |
| <b>VFX48-142-20</b> | 170                      | 75  | 100              | <b>142</b>        | 55                                       | 75               | 114               | E2         |
| <b>VFX48-171-20</b> | 205                      | 90  | 125              | <b>171</b>        | 75                                       | 100              | 137               |            |
| <b>VFX48-205-20</b> | 246                      | 110                                       | 150              | <b>205</b>        | 90                                       | 125              | 164               | F2         |
| <b>VFX48-244-20</b> | 293                      | 132                                       | 200              | <b>244</b>        | 110                                      | 150              | 195               |            |
| <b>VFX48-293-20</b> | 352                      | 160                                       | 250              | <b>293</b>        | 132                                      | 200              | 235               |            |
| <b>VFX48-365-20</b> | 438                      | 200                                       | 300              | <b>365</b>        | 160                                      | 250              | 292               | FA2        |

\* Available for a limited time and as long as drive temperature permits. Rated data at 40 °C ambient temperature.



## Emotron VFX 2.1 - IP20 version

Typical motor power at 3-phase mains voltage 575 V and 690 V.

| VFX Model    | Max. output current [A]* | Normal duty<br>(120%, 1 min. every 10 min.) |                   |                   | Heavy duty<br>(150%, 1 min. every 10 min.) |                   |                   | Frame size |
|--------------|--------------------------|---|-------------------|-------------------|--|-------------------|-------------------|------------|
|              |                          | Power @ 575V [hp]                           | Power @ 690V [kW] | Rated current [A] | Power @ 575 V [hp]                         | Power @ 690V [kW] | Rated current [A] |            |
| VFX69-002-20 | 3.2                      | 1.5   | 1.5               | <b>2</b>          | 1  | 0.75              | 1.6               | C2(69)     |
| VFX69-003-20 | 4.8                      | 2   | 2.2               | <b>3</b>          | 1.5  | 1.5               | 2.4               |            |
| VFX69-004-20 | 6.4                      | 3   | 3                 | <b>4</b>          | 2  | 2.2               | 3.2               |            |
| VFX69-006-20 | 9.6                      | 4   | 4                 | <b>6</b>          | 3  | 3                 | 4.8               |            |
| VFX69-008-20 | 12.8                     | 5   | 5.5               | <b>8</b>          | 4  | 4                 | 6.4               |            |
| VFX69-010-20 | 16                       | 7.5   | 7.5               | <b>10</b>         | 5  | 5.5               | 8                 |            |
| VFX69-013-20 | 20.8                     | 10  | 11                | <b>13</b>         | 7.5  | 7.5               | 10.4              |            |
| VFX69-018-20 | 29                       | 15  | 15                | <b>18</b>         | 10   | 11                | 14.4              |            |
| VFX69-021-20 | 34                       | 20  | 18.5              | <b>21</b>         | 15   | 15                | 16.8              |            |
| VFX69-025-20 | 40                       | 25  | 22                | <b>25</b>         | 20   | 18.5              | 20                |            |
| VFX69-033-20 | 53                       | 30  | 30                | <b>33</b>         | 25   | 22                | 26                | D2(69)     |
| VFX69-042-20 | 67                       | 40  | 37                | <b>42</b>         | 30   | 30                | 34                |            |
| VFX69-050-20 | 80                       | 50  | 45                | <b>50</b>         | 40   | 37                | 40                |            |
| VFX69-058-20 | 93                       | 60  | 55                | <b>58</b>         | 40   | 45                | 46                |            |

\* Available for a limited time and as long as drive temperature permits. Rated data at 40 °C ambient temperature.





## Emotron FDU 2.1 Secure the flow and save energy

The Emotron FDU 2.1 AC drive is specially developed for controlling variable torque loads such as flow and pressure applications. It continuously adapts motor speed to the level required, minimizing energy consumption and wear. A unique monitoring functionality protects your process from damage and unplanned downtime. Typical applications are pumps, fans, compressors, and blowers.

### MAIN FEATURES

- NEW - Control panel with Real time clock. Optional Bluetooth communication.
- Available as robust and certified IP54 metal construction or IP20/21 version.
- All drive sizes are delivered with built-in Category C3 EMC-filter as standard. C3 requirements are tested with 80 m motor cable.
- Soft starts minimize start currents and linear stops prevent water hammer.
- One Emotron FDU can control up to seven pumps/fans without external control systems.
- Energy saving function pauses the motor when it is not required to run to maintain pressure.
- Efficiency is increased by setting the pump to run at full speed at certain intervals to rinse out sludge.
- Temp/Speed controlled fans assures less noise, a more even drive temperature and higher efficiency.
- Load monitor function included as standard.
- Detachable multi-language control panel included as standard. Following languages are supported in the control panel: English, Swedish, Dutch, German, French, Spanish, Russian, Italian, Czech, Turkish and Polish.
- Operation parameters can be set in your process units, for example m<sup>3</sup>/min. and bar.
- Removable control panel with own memory means it is easy to transfer or copy settings.
- UL (UL 840) approved version available.
- Marine (DNV & BV) approved version available (not IP2x).
- Liquid cooled version available for sizes above 90 A.

## Emotron FDU 2.1 - IP54 version

Typical motor power at 3-phase mains voltage 230 V (Model 48-430 and up also available as IP20).

| FDU Model                         | Max. output current [A]* | Normal duty<br>(120%, 1 min. every 10 min.) |                   |                   | Heavy duty<br>(150%, 1 min. every 10 min.) |                   |                   | Frame size ** | IP class                       |  |
|-----------------------------------|--------------------------|---|-------------------|-------------------|--|-------------------|-------------------|---------------|--------------------------------|--|
|                                   |                          | Power @ 230V [kW]                           | Power @ 230V [hp] | Rated current [A] | Power @ 230V [kW]                          | Power @ 230V [hp] | Rated current [A] |               |                                |  |
| <b>FDU48-003-54</b>               | 3.0                      | 0.37  | 0.5               | <b>2.5</b>        | 0.37                                       | 0.5               | 2.0               | B             | IP54 wall mounted              |  |
| <b>FDU48-004-54</b>               | 4.8                      | 0.75  | 1                 | <b>4.0</b>        | 0.55                                       | 0.75              | 3.2               |               |                                |  |
| <b>FDU48-006-54</b>               | 7.2                      | 1.1   | 1.5               | <b>6.0</b>        | 0.75                                       | 1                 | 4.8               |               |                                |  |
| <b>FDU48-008-54</b>               | 9.0                      | 1.5   | 2                 | <b>7.5</b>        | 1.1  | 1.5               | 6.0               |               |                                |  |
| <b>FDU48-010-54</b>               | 11.4                     | 2.2   | 3                 | <b>9.5</b>        | 1.5  | 2                 | 7.6               |               |                                |  |
| <b>FDU48-013-54</b>               | 15.6                     | 2.2   | 3                 | <b>13.0</b>       | 2.2  | 3                 | 10.4              |               |                                |  |
| <b>FDU48-018-54</b>               | 21.6                     | 4   | 5                 | <b>18.0</b>       | 3  | 3                 | 14.4              |               |                                |  |
| <b>FDU48-026-54</b>               | 31                       | 5.5   | 7.5               | <b>26</b>         | 4  | 5                 | 21                | C             |                                |  |
| <b>FDU48-031-54</b>               | 37                       | 7.5   | 10                | <b>31</b>         | 5.5  | 7.5               | 25                |               |                                |  |
| <b>FDU48-037-54</b>               | 44                       | 7.5   | 10                | <b>37</b>         | 7.5  | 10                | 29.6              |               |                                |  |
| <b>FDU48-046-54</b>               | 55                       | 11  | 15                | <b>46</b>         | 7.5  | 10                | 37                |               |                                |  |
| <b>FDU48-061-54</b>               | 73                       | 15  | 20                | <b>61</b>         | 11   | 15                | 49                | D             |                                |  |
| <b>FDU48-074-54</b>               | 89                       | 18.5  | 25                | <b>74</b>         | 15   | 20                | 59                |               |                                |  |
| <b>FDU48-090-54</b>               | 108                      | 22  | 30                | <b>90</b>         | 18.5                                       | 25                | 72                | E             |                                |  |
| <b>FDU48-109-54</b>               | 131                      | 30  | 40                | <b>109</b>        | 22   | 30                | 87                |               |                                |  |
| <b>FDU48-146-54</b>               | 175                      | 37  | 50                | <b>146</b>        | 30   | 40                | 117               |               |                                |  |
| <b>FDU48-175-54</b>               | 210                      | 45  | 60                | <b>175</b>        | 37   | 50                | 140               |               |                                |  |
| <b>FDU48-210-54</b>               | 252                      | 55  | 75                | <b>210</b>        | 45   | 60                | 168               | F             |                                |  |
| <b>FDU48-250-54</b>               | 300                      | 75  | 100               | <b>250</b>        | 55   | 75                | 200               |               |                                |  |
| <b>FDU48-295-54</b>               | 354                      | 90  | 125               | <b>295</b>        | 75   | 100               | 236               |               |                                |  |
| <b>FDU48-365-54</b>               | 438                      | 110   | 150               | <b>365</b>        | 90   | 125               | 292               | FA            |                                |  |
| <b>FDU48-430-IP</b>               | 516                      | 110   | 150               | <b>430</b>        | 110  | 125               | 344               | H (2)         | IP20 module or IP54/23 cabinet |  |
| <b>FDU48-500-IP</b>               | 600                      | 160   | 200               | <b>500</b>        | 110  | 150               | 400               |               |                                |  |
| <b>FDU48-600-IP</b>               | 720                      | 200   | 250               | <b>600</b>        | 132  | 200               | 480               | I (3)         |                                |  |
| <b>FDU48-650-IP</b>               | 780                      | 200   | 250               | <b>650</b>        | 160  | 200               | 520               |               |                                |  |
| <b>FDU48-750-IP</b>               | 900                      | 220   | 300               | <b>750</b>        | 200  | 250               | 600               |               |                                |  |
| <b>FDU48-860-IP</b>               | 1032                     | 250   | 350               | <b>860</b>        | 220  | 300               | 688               | J (4)         |                                |  |
| <b>FDU48-1K0-IP</b>               | 1200                     | 300   | 400               | <b>1000</b>       | 250  | 350               | 800               |               |                                |  |
| <b>FDU48-1K15-IP</b>              | 1380                     | 355   | 450               | <b>1150</b>       | 250  | 400               | 920               | KA (5)        |                                |  |
| <b>FDU48-1K25-IP</b>              | 1500                     | 400   | 500               | <b>1250</b>       | 315  | 400               | 1000              |               |                                |  |
| <b>FDU48-1K35-IP</b>              | 1620                     | 400   | 550               | <b>1350</b>       | 355  | 450               | 1080              | K (6)         |                                |  |
| <b>FDU48-1K5-IP</b>               | 1800                     | 450   | 600               | <b>1500</b>       | 400  | 500               | 1200              |               |                                |  |
| <b>FDU48-1K75-IP</b>              | 2100                     | 560   | 750               | <b>1750</b>       | 450  | 600               | 1400              | L (7)         |                                |  |
| <b>FDU48-2K0-IP</b>               | 2400                     | 630   | 800               | <b>2000</b>       | 500  | 650               | 1600              |               |                                |  |
| <b>FDU48-2K25-IP</b>              | 2700                     | 710   | 900               | <b>2250</b>       | 560  | 750               | 1800              | M (8)         |                                |  |
| <b>FDU48-2K5-IP</b>               | 3000                     | 800   | 1000              | <b>2500</b>       | 630  | 800               | 2000              |               |                                |  |
| Larger sizes available on request |                          |   |                   |                   |  |                   |                   |               |                                |  |

\* Available for a limited time and as long as drive temperature permits. Rated data at 40 °C ambient temperature

\*\* Number in parenthesis, e.g. H(2), indicates number of parallel power modules.

IP = Available as IP20 module or mounted in IP23 or IP54 cabinet.

## Emotron FDU 2.1 - IP54 version

Typical motor power at 3-phase mains voltage 400 V and 460 V (Model 48-430 and up also available as IP20).

| FDU Model            | Max. output current [A]* | Normal duty<br>(120%, 1 min. every 10 min.) |                   |                   | Heavy duty<br>(150%, 1 min. every 10 min.) |                   |                   | Frame size ** | IP class          |                                |
|----------------------|--------------------------|---|-------------------|-------------------|--|-------------------|-------------------|---------------|-------------------|--------------------------------|
|                      |                          | Power @ 400V [kW]                           | Power @ 460V [hp] | Rated current [A] | Power @ 400V [kW]                          | Power @ 460V [hp] | Rated current [A] |               |                   |                                |
| <b>FDU48-003-54</b>  | 3.0                      | 0.75  | 1                 | <b>2.5</b>        | 0.55                                       | 1                 | 2.0               | B             | IP54 wall mounted |                                |
| <b>FDU48-004-54</b>  | 4.8                      | 1.5   | 2                 | <b>4.0</b>        | 1.1  | 1.5               | 3.2               |               |                   |                                |
| <b>FDU48-006-54</b>  | 7.2                      | 2.2   | 3                 | <b>6.0</b>        | 1.5  | 2                 | 4.8               |               |                   |                                |
| <b>FDU48-008-54</b>  | 9.0                      | 3   | 3                 | <b>7.5</b>        | 2.2  | 3                 | 6.0               |               |                   |                                |
| <b>FDU48-010-54</b>  | 11.4                     | 4   | 5                 | <b>9.5</b>        | 3  | 3                 | 7.6               |               |                   |                                |
| <b>FDU48-013-54</b>  | 15.6                     | 5.5   | 7.5               | <b>13.0</b>       | 4  | 5                 | 10.4              |               |                   |                                |
| <b>FDU48-018-54</b>  | 21.6                     | 7.5   | 10                | <b>18.0</b>       | 5.5  | 7.5               | 14.4              |               |                   |                                |
| <b>FDU48-026-54</b>  | 31                       | 11  | 15                | <b>26</b>         | 7.5  | 10                | 21                | C             |                   |                                |
| <b>FDU48-031-54</b>  | 37                       | 15  | 20                | <b>31</b>         | 11   | 15                | 25                |               |                   |                                |
| <b>FDU48-037-54</b>  | 44                       | 18.5  | 25                | <b>37</b>         | 15   | 20                | 29.6              |               |                   |                                |
| <b>FDU48-046-54</b>  | 55                       | 22  | 30                | <b>46</b>         | 18.5                                       | 25                | 37                | D             |                   |                                |
| <b>FDU48-061-54</b>  | 73                       | 30  | 40                | <b>61</b>         | 22   | 30                | 49                |               |                   |                                |
| <b>FDU48-074-54</b>  | 89                       | 37  | 50                | <b>74</b>         | 30   | 40                | 59                | E             |                   |                                |
| <b>FDU48-090-54</b>  | 108                      | 45  | 60                | <b>90</b>         | 37   | 50                | 72                |               |                   |                                |
| <b>FDU48-109-54</b>  | 131                      | 55  | 75                | <b>109</b>        | 45   | 60                | 87                |               |                   |                                |
| <b>FDU48-146-54</b>  | 175                      | 75  | 100               | <b>146</b>        | 55   | 75                | 117               |               |                   |                                |
| <b>FDU48-175-54</b>  | 210                      | 90  | 125               | <b>175</b>        | 75   | 100               | 140               | F             |                   |                                |
| <b>FDU48-210-54</b>  | 252                      | 110   | 150               | <b>210</b>        | 90   | 125               | 168               |               |                   |                                |
| <b>FDU48-250-54</b>  | 300                      | 132   | 200               | <b>250</b>        | 110  | 150               | 200               |               |                   |                                |
| <b>FDU48-295-54</b>  | 354                      | 160   | 250               | <b>295</b>        | 132  | 200               | 236               | FA            |                   |                                |
| <b>FDU48-365-54</b>  | 438                      | 200   | 300               | <b>365</b>        | 160  | 250               | 292               |               |                   |                                |
| <b>FDU48-430-IP</b>  | 516                      | 220   | 350               | <b>430</b>        | 200  | 250               | 344               | H (2)         |                   | IP20 module or IP54/23 cabinet |
| <b>FDU48-500-IP</b>  | 600                      | 250   | 400               | <b>500</b>        | 220  | 350               | 400               | I (3)         |                   |                                |
| <b>FDU48-600-IP</b>  | 720                      | 315   | 500               | <b>600</b>        | 250  | 400               | 480               |               |                   |                                |
| <b>FDU48-650-IP</b>  | 780                      | 355   | 550               | <b>650</b>        | 315  | 400               | 520               |               |                   |                                |
| <b>FDU48-750-IP</b>  | 900                      | 400   | 600               | <b>750</b>        | 355  | 500               | 600               | J (4)         |                   |                                |
| <b>FDU48-860-IP</b>  | 1032                     | 450   | 700               | <b>860</b>        | 400  | 550               | 688               |               |                   |                                |
| <b>FDU48-1K0-IP</b>  | 1200                     | 560   | 800               | <b>1000</b>       | 450  | 650               | 800               | KA (5)        |                   |                                |
| <b>FDU48-1K15-IP</b> | 1380                     | 630   | 900               | <b>1150</b>       | 500  | 750               | 920               |               |                   |                                |
| <b>FDU48-1K25-IP</b> | 1500                     | 710   | 1000              | <b>1250</b>       | 560  | 800               | 1000              | K (6)         |                   |                                |
| <b>FDU48-1K35-IP</b> | 1620                     | 710   | 1100              | <b>1350</b>       | 600  | 900               | 1080              |               |                   |                                |
| <b>FDU48-1K5-IP</b>  | 1800                     | 800   | 1250              | <b>1500</b>       | 630  | 1000              | 1200              | L (7)         |                   |                                |
| <b>FDU48-1K75-IP</b> | 2100                     | 900   | 1500              | <b>1750</b>       | 800  | 1200              | 1400              |               |                   |                                |
| <b>FDU48-2K0-IP</b>  | 2400                     | 1120  | 1700              | <b>2000</b>       | 900  | 1300              | 1600              | M (8)         |                   |                                |
| <b>FDU48-2K25-IP</b> | 2700                     | 1250  | 1900              | <b>2250</b>       | 1000                                       | 1500              | 1800              | N (9)         |                   |                                |
| <b>FDU48-2K5-IP</b>  | 3000                     | 1400  | 2100              | <b>2500</b>       | 1120                                       | 1700              | 2000              | O (10)        |                   |                                |

Larger sizes available on request

\* Available for a limited time and as long as drive temperature permits. Rated data at 40 °C ambient temperature.

\*\* Number in parenthesis, e.g. H(2), indicates number of parallel power modules.

IP = Available as IP20 module or mounted in IP23 or IP54 cabinet.

## Emotron FDU 2.1 - IP54 version

Typical motor power at 3-phase mains voltage 525 V (Model 69-250 and up also available as IP20).

| FDU Model     | Max. output current [A]* | Normal duty<br>(120%, 1 min. every 10 min.) |                   | Heavy duty<br>(150%, 1 min. every 10 min.) |                   | Frame size | IP class          |                                |
|---------------|--------------------------|---|-------------------|--|-------------------|------------|-------------------|--------------------------------|
|               |                          | Power @ 525 V [kW]                          | Rated current [A] | Power @ 525 V [kW]                         | Rated current [A] |            |                   |                                |
| FDU52-003-54  | 3.0                      | 1.1   | <b>2.5</b>        | 1.1  | 2.0               | B          | IP54 wall mounted |                                |
| FDU52-004-54  | 4.8                      | 2.2   | <b>4.0</b>        | 1.5  | 3.2               |            |                   |                                |
| FDU52-006-54  | 7.2                      | 3   | <b>6.0</b>        | 2.2  | 4.8               |            |                   |                                |
| FDU52-008-54  | 9.0                      | 4   | <b>7.5</b>        | 3  | 6.0               |            |                   |                                |
| FDU52-010-54  | 11.4                     | 5.5   | <b>9.5</b>        | 4  | 7.6               |            |                   |                                |
| FDU52-013-54  | 15.6                     | 7.5   | <b>13.0</b>       | 5.5  | 10.4              |            |                   |                                |
| FDU52-018-54  | 21.6                     | 11  | <b>18.0</b>       | 7.5  | 14.4              |            |                   |                                |
| FDU52-026-54  | 31                       | 15  | <b>26</b>         | 11   | 21                | C          |                   |                                |
| FDU52-031-54  | 37                       | 18.5  | <b>31</b>         | 15   | 25                |            |                   |                                |
| FDU52-037-54  | 44                       | 22  | <b>37</b>         | 18.5                                       | 29.6              |            |                   |                                |
| FDU52-046-54  | 55                       | 30  | <b>46</b>         | 22   | 37                |            |                   |                                |
| FDU52-061-54  | 73                       | 37  | <b>61</b>         | 30   | 49                | D          |                   |                                |
| FDU52-074-54  | 89                       | 45  | <b>74</b>         | 37   | 59                |            |                   |                                |
| FDU69-082 -54 | 98                       | 55  | <b>82</b>         | 45   | 66                | F69        |                   |                                |
| FDU69-090 -54 | 108                      | 55  | <b>90</b>         | 45   | 72                |            |                   |                                |
| FDU69-109-54  | 131                      | 75  | <b>109</b>        | 55   | 87                |            |                   |                                |
| FDU69-146-54  | 175                      | 90  | <b>146</b>        | 75   | 117               |            |                   |                                |
| FDU69-175-54  | 210                      | 110   | <b>175</b>        | 90   | 140               |            |                   |                                |
| FDU69-200-54  | 240                      | 132   | <b>200</b>        | 110  | 160               |            |                   |                                |
| FDU69-250-IP  | 300                      | 160   | <b>250</b>        | 132  | 200               | H69 (2)    |                   | IP20 module or IP54/23 cabinet |
| FDU69-300-IP  | 360                      | 200   | <b>300</b>        | 160  | 240               |            |                   |                                |
| FDU69-375-IP  | 450                      | 250   | <b>375</b>        | 200  | 300               |            |                   |                                |
| FDU69-400-IP  | 480                      | 250   | <b>400</b>        | 220  | 320               |            |                   |                                |
| FDU69-430-IP  | 516                      | 300   | <b>430</b>        | 250  | 344               | I69 (3)    |                   |                                |
| FDU69-500-IP  | 600                      | 315   | <b>500</b>        | 300  | 400               |            |                   |                                |
| FDU69-595-IP  | 720                      | 400   | <b>600</b>        | 315  | 480               |            |                   |                                |
| FDU69-650-IP  | 780                      | 450   | <b>650</b>        | 355  | 520               | J69 (4)    |                   |                                |
| FDU69-720-IP  | 864                      | 500   | <b>720</b>        | 400  | 576               |            |                   |                                |
| FDU69-800-IP  | 960                      | 560   | <b>800</b>        | 450  | 640               | KA69 (5)   |                   |                                |
| FDU69-995-IP  | 1200                     | 630   | <b>1000</b>       | 500  | 800               |            |                   |                                |
| FDU69-1K2-IP  | 1440                     | 800   | <b>1200</b>       | 630  | 960               |            |                   |                                |
| FDU69-1K4-IP  | 1680                     | 1000  | <b>1400</b>       | 800  | 1120              |            |                   |                                |
| FDU69-1K6-IP  | 1920                     | 1100  | <b>1600</b>       | 900  | 1280              |            |                   |                                |
| FDU69-1K8-IP  | 2160                     | 1300  | <b>1800</b>       | 1000                                       | 1440              |            |                   |                                |
| FDU69-2K0-IP  | 2400                     | 1400  | <b>2000</b>       | 1100                                       | 1600              |            |                   |                                |
| FDU69-2K2-IP  | 2640                     | 1600  | <b>2200</b>       | 1200                                       | 1760              |            |                   |                                |
| FDU69-2K4-IP  | 2880                     | 1700  | <b>2400</b>       | 1400                                       | 1920              |            |                   |                                |
| FDU69-2K6-IP  | 3120                     | 1900  | <b>2600</b>       | 1500                                       | 2080              |            |                   |                                |
| FDU69-2K8-IP  | 3360                     | 2000  | <b>2800</b>       | 1600                                       | 2240              |            |                   |                                |
| FDU69-3K0-IP  | 3600                     | 2200  | <b>3000</b>       | 1700                                       | 2400              |            |                   |                                |

\* Available for a limited time and as long as drive temperature permits. Rated data at 40 °C ambient temperature.

\*\* Number in parenthesis, e.g. H69(2), indicates number of parallel power modules.

IP = Available as IP20 module or mounted in IP23 or IP54 cabinet.

## Emotron FDU 2.1 - IP54 version

Typical motor power at 3-phase mains voltage 575 V and 690 V (Model 69-250 and up also available as IP20).

| FDU Model    | Max. output current [A]* | Normal duty<br>(120%, 1 min. every 10 min.) |                   |                   | Heavy duty<br>(150%, 1 min. every 10 min.) |                   |                   | Frame size | IP class                       |
|--------------|--------------------------|---|-------------------|-------------------|--|-------------------|-------------------|------------|--------------------------------|
|              |                          | Power @ 575V [hp]                           | Power @ 690V [kW] | Rated current [A] | Power @ 575V [hp]                          | Power @ 690V [kW] | Rated current [A] |            |                                |
| FDU69-002-54 | 3.2                      | 1.5   | 1.5               | <b>2</b>          | 1  | 0.75              | 1.6               | C69        | IP54 wall mounted              |
| FDU69-003-54 | 4.8                      | 2   | 2.2               | <b>3</b>          | 1.5  | 1.5               | 2.4               |            |                                |
| FDU69-004-54 | 6.4                      | 3   | 3                 | <b>4</b>          | 2  | 2.2               | 3.2               |            |                                |
| FDU69-006-54 | 9.6                      | 4   | 4                 | <b>6</b>          | 3  | 3                 | 4.8               |            |                                |
| FDU69-008-54 | 12.8                     | 5   | 5.5               | <b>8</b>          | 4  | 4                 | 6.4               |            |                                |
| FDU69-010-54 | 16                       | 7.5   | 7.5               | <b>10</b>         | 5  | 5.5               | 8                 |            |                                |
| FDU69-013-54 | 20.8                     | 10  | 11                | <b>13</b>         | 7.5  | 7.5               | 10.4              |            |                                |
| FDU69-018-54 | 29                       | 15  | 15                | <b>18</b>         | 10   | 11                | 14.4              |            |                                |
| FDU69-021-54 | 34                       | 20  | 18.5              | <b>21</b>         | 15   | 15                | 16.8              |            |                                |
| FDU69-025-54 | 40                       | 25  | 22                | <b>25</b>         | 20   | 18.5              | 20                |            |                                |
| FDU69-033-54 | 53                       | 30  | 30                | <b>33</b>         | 25   | 22                | 26                | D69        | IP54 wall mounted              |
| FDU69-042-54 | 67                       | 40  | 37                | <b>42</b>         | 30   | 30                | 34                |            |                                |
| FDU69-050-54 | 80                       | 50  | 45                | <b>50</b>         | 40   | 37                | 40                |            |                                |
| FDU69-058-54 | 93                       | 60  | 55                | <b>58</b>         | 40   | 45                | 46                |            |                                |
| FDU69-082-54 | 98                       | 75  | 75                | <b>82</b>         | 60   | 55                | 66                | F69        | IP54 wall mounted              |
| FDU69-090-54 | 108                      | 75  | 90                | <b>90</b>         | 60   | 75                | 72                |            |                                |
| FDU69-109-54 | 131                      | 100   | 110               | <b>109</b>        | 75   | 90                | 87                |            |                                |
| FDU69-146-54 | 175                      | 125   | 132               | <b>146</b>        | 100  | 110               | 117               |            |                                |
| FDU69-175-54 | 210                      | 150   | 160               | <b>175</b>        | 125  | 132               | 140               |            |                                |
| FDU69-200-54 | 240                      | 200   | 200               | <b>200</b>        | 150  | 160               | 160               |            |                                |
| FDU69-250-IP | 300                      | 250   | 250               | <b>250</b>        | 200  | 200               | 200               | H69 (2)    | IP20 module or IP54/23 cabinet |
| FDU69-300-IP | 360                      | 300   | 315               | <b>300</b>        | 250  | 250               | 240               |            |                                |
| FDU69-375-IP | 450                      | 350   | 355               | <b>375</b>        | 300  | 315               | 300               |            |                                |
| FDU69-400-IP | 480                      | 400   | 400               | <b>400</b>        | 300  | 315               | 320               |            |                                |
| FDU69-430-IP | 516                      | 400   | 450               | <b>430</b>        | 350  | 315               | 344               | I69 (3)    | IP20 module or IP54/23 cabinet |
| FDU69-500-IP | 600                      | 500   | 500               | <b>500</b>        | 400  | 355               | 400               |            |                                |
| FDU69-595-IP | 720                      | 600   | 600               | <b>600</b>        | 500  | 450               | 480               |            |                                |
| FDU69-650-IP | 780                      | 650   | 630               | <b>650</b>        | 550  | 500               | 520               | J69 (4)    | IP20 module or IP54/23 cabinet |
| FDU69-720-IP | 864                      | 750   | 710               | <b>720</b>        | 600  | 560               | 576               |            |                                |
| FDU69-800-IP | 960                      | 850   | 800               | <b>800</b>        | 650  | 630               | 640               |            |                                |
| FDU69-905-IP | 1080                     | 950   | 900               | <b>900</b>        | 750  | 710               | 720               | KA69 (5)   | IP20 module or IP54/23 cabinet |
| FDU69-995-IP | 1200                     | 1000  | 1000              | <b>1000</b>       | 850  | 800               | 800               |            |                                |
| FDU69-1K2-IP | 1440                     | 1200  | 1200              | <b>1200</b>       | 1000                                       | 900               | 960               | K69 (6)    | IP20 module or IP54/23 cabinet |
| FDU69-1K4-IP | 1680                     | 1500  | 1400              | <b>1400</b>       | 1200                                       | 1120              | 1120              | L69 (7)    |                                |
| FDU69-1K6-IP | 1920                     | 1700  | 1600              | <b>1600</b>       | 1300                                       | 1250              | 1280              | M69 (8)    |                                |
| FDU69-1K8-IP | 2160                     | 1900  | 1800              | <b>1800</b>       | 1500                                       | 1400              | 1440              | N69 (9)    |                                |
| FDU69-2K0-IP | 2400                     | 2100  | 2000              | <b>2000</b>       | 1700                                       | 1600              | 1600              | O69 (10)   |                                |
| FDU69-2K2-IP | 2640                     | 2300  | 2200              | <b>2200</b>       | 1800                                       | 1700              | 1760              | P69 (11)   |                                |
| FDU69-2K4-IP | 2880                     | 2500  | 2400              | <b>2400</b>       | 2000                                       | 1900              | 1920              | Q69 (12)   |                                |
| FDU69-2K6-IP | 3120                     | 2700  | 2600              | <b>2600</b>       | 2200                                       | 2000              | 2080              | R69 (13)   |                                |
| FDU69-2K8-IP | 3360                     | 3000  | 2800              | <b>2800</b>       | 2400                                       | 2200              | 2240              | S69 (14)   |                                |
| FDU69-3K0-IP | 3600                     | 3200  | 3000              | <b>3000</b>       | 2500                                       | 2400              | 2400              | T69 (15)   |                                |

\* Available for a limited time and as long as drive temperature permits. Rated data at 40 °C ambient temperature.

\*\* Number in parenthesis, e.g. H69 (2), indicates number of parallel power modules.

IP = Available as IP20 module or mounted in IP23 or IP54 cabinet.

## Emotron FDU 2.1 - IP20 version

Typical motor power at 3-phase mains voltage 230 V.

| FDU Model           | Max. output current [A]* | Normal duty<br>(120%, 1 min every 10 min) |                  |                   | Heavy duty<br>(150%, 1 min every 10 min) |                  |                   | Frame size |
|---------------------|--------------------------|---|------------------|-------------------|--|------------------|-------------------|------------|
|                     |                          | Power @ 230V [kW]                         | Power @230V [hp] | Rated current [A] | Power @ 230V [kW]                        | Power @230V [hp] | Rated current [A] |            |
| <b>FDU48-025-20</b> | 30                       | 5.5                                       | 7.5              | <b>25</b>         | 4  | 5                | 20                | C2         |
| <b>FDU48-030-20</b> | 36                       | 7.5                                       | 10               | <b>30</b>         | 5.5                                      | 7.5              | 24                |            |
| <b>FDU48-036-20</b> | 43                       | 7.5                                       | 10               | <b>36</b>         | 7.5                                      | 10               | 29                |            |
| <b>FDU48-045-20</b> | 54                       | 11  | 15               | <b>45</b>         | 7.5                                      | 10               | 36                |            |
| <b>FDU48-058-20</b> | 68                       | 15  | 20               | <b>58</b>         | 11                                       | 15               | 46                |            |
| <b>FDU48-072-20</b> | 86                       | 18.5                                      | 25               | <b>72</b>         | 15                                       | 20               | 58                | D2         |
| <b>FDU48-088-20</b> | 106                      | 22  | 30               | <b>88</b>         | 18.5                                     | 25               | 70                |            |
| <b>FDU48-105-20</b> | 126                      | 30  | 40               | <b>105</b>        | 22                                       | 30               | 84                |            |
| <b>FDU48-142-20</b> | 170                      | 37  | 50               | <b>142</b>        | 30                                       | 40               | 114               | E2         |
| <b>FDU48-171-20</b> | 205                      | 45  | 60               | <b>171</b>        | 37                                       | 50               | 137               |            |
| <b>FDU48-205-20</b> | 246                      | 55  | 75               | <b>205</b>        | 45                                       | 60               | 164               | F2         |
| <b>FDU48-244-20</b> | 293                      | 75  | 100              | <b>244</b>        | 55                                       | 75               | 195               |            |
| <b>FDU48-293-20</b> | 352                      | 90  | 125              | <b>293</b>        | 75                                       | 100              | 235               |            |
| <b>FDU48-365-20</b> | 438                      | 110                                       | 150              | <b>365</b>        | 90                                       | 125              | 292               | FA2        |

\* Available for a limited time and as long as drive temperature permits. Rated data at 40 °C ambient temperature.





## Emotron FDU 2.1 - IP20 version

Typical motor power at 3-phase mains voltage 400 and 460 V.

| FDU Model           | Max. output current [A]* | Normal duty<br>(120%, 1 min every 10 min) |                  |                   | Heavy duty<br>(150%, 1 min every 10 min) |                  |                   | Frame size |
|---------------------|--------------------------|---|------------------|-------------------|--|------------------|-------------------|------------|
|                     |                          | Power @ 400V [kW]                         | Power @460V [hp] | Rated current [A] | Power @ 400V [kW]                        | Power @460V [hp] | Rated current [A] |            |
| <b>FDU48-025-20</b> | 30                       | 11  | 15               | <b>25</b>         | 7.5                                      | 10               | 20                | C2         |
| <b>FDU48-030-20</b> | 36                       | 15  | 20               | <b>30</b>         | 11                                       | 15               | 24                |            |
| <b>FDU48-036-20</b> | 43                       | 18.5                                      | 25               | <b>36</b>         | 15                                       | 20               | 29                |            |
| <b>FDU48-045-20</b> | 54                       | 22  | 30               | <b>45</b>         | 18.5                                     | 25               | 36                |            |
| <b>FDU48-058-20</b> | 68                       | 30  | 40               | <b>58</b>         | 22                                       | 30               | 46                |            |
| <b>FDU48-072-20</b> | 86                       | 37  | 50               | <b>72</b>         | 30                                       | 40               | 58                | D2         |
| <b>FDU48-088-20</b> | 106                      | 45  | 60               | <b>88</b>         | 37                                       | 50               | 70                |            |
| <b>FDU48-105-20</b> | 127                      | 55  | 75               | <b>105</b>        | 45                                       | 60               | 84                |            |
| <b>FDU48-142-20</b> | 170                      | 75  | 100              | <b>142</b>        | 55                                       | 75               | 114               | E2         |
| <b>FDU48-171-20</b> | 205                      | 90  | 125              | <b>171</b>        | 75                                       | 100              | 137               |            |
| <b>FDU48-205-20</b> | 246                      | 110                                       | 150              | <b>205</b>        | 90                                       | 125              | 164               | F2         |
| <b>FDU48-244-20</b> | 293                      | 132                                       | 200              | <b>244</b>        | 110                                      | 150              | 195               |            |
| <b>FDU48-293-20</b> | 352                      | 160                                       | 250              | <b>293</b>        | 132                                      | 200              | 235               |            |
| <b>FDU48-365-20</b> | 438                      | 200                                       | 300              | <b>365</b>        | 160                                      | 250              | 292               | FA2        |

\* Available for a limited time and as long as drive temperature permits. Rated data at 40 °C ambient temperature.



## Emotron FDU 2.1- IP20 version

Typical motor power at 3-phase mains voltage 575 V and 690 V.

| FDU Model           | Max. output current [A]* | Normal duty (120%, 1 min. every 10 min.) |                   |                   | Heavy duty (150%, 1 min. every 10 min.) |                   |                   | Frame size |
|---------------------|--------------------------|--|-------------------|-------------------|---|-------------------|-------------------|------------|
|                     |                          | Power @ 575V [hp]                        | Power @ 690V [kW] | Rated current [A] | Power @ 575 V [hp]                      | Power @ 690V [kW] | Rated current [A] |            |
| <b>FDU69-002-20</b> | 3.2                      | 1.5                                      | 1.5               | <b>2</b>          | 1                                       | 0.75              | 1.6               | C2(69)     |
| <b>FDU69-003-20</b> | 4.8                      | 2  | 2.2               | <b>3</b>          | 1.5                                     | 1.5               | 2.4               |            |
| <b>FDU69-004-20</b> | 6.4                      | 3  | 3                 | <b>4</b>          | 2                                       | 2.2               | 3.2               |            |
| <b>FDU69-006-20</b> | 9.6                      | 4  | 4                 | <b>6</b>          | 3                                       | 3                 | 4.8               |            |
| <b>FDU69-008-20</b> | 12.8                     | 5  | 5.5               | <b>8</b>          | 4                                       | 4                 | 6.4               |            |
| <b>FDU69-010-20</b> | 16                       | 7.5                                      | 7.5               | <b>10</b>         | 5                                       | 5.5               | 8                 |            |
| <b>FDU69-013-20</b> | 20.8                     | 10                                       | 11                | <b>13</b>         | 7.5                                     | 7.5               | 10.4              |            |
| <b>FDU69-018-20</b> | 29                       | 15                                       | 15                | <b>18</b>         | 10                                      | 11                | 14.4              |            |
| <b>FDU69-021-20</b> | 34                       | 20                                       | 18.5              | <b>21</b>         | 15                                      | 15                | 16.8              |            |
| <b>FDU69-025-20</b> | 40                       | 25                                       | 22                | <b>25</b>         | 20                                      | 18.5              | 20                |            |
| <b>FDU69-033-20</b> | 53                       | 30                                       | 30                | <b>33</b>         | 25                                      | 22                | 26                | D2(69)     |
| <b>FDU69-042-20</b> | 67                       | 40                                       | 37                | <b>42</b>         | 30                                      | 30                | 34                |            |
| <b>FDU69-050-20</b> | 80                       | 50                                       | 45                | <b>50</b>         | 40                                      | 37                | 40                |            |
| <b>FDU69-058-20</b> | 93                       | 60                                       | 55                | <b>58</b>         | 40                                      | 45                | 46                |            |

\* Available for a limited time and as long as drive temperature permits. Rated data at 40 °C ambient temperature.



# General specifications

## General specifications for Emotron VFX/FDU 2.1

|                            |                                     |  |
|----------------------------|-------------------------------------|--|
| Mains voltage: *           | VFX/FDU48<br>VFX/FDU52<br>VFX/FDU69 | 3-ph, 230-480 V** +10%/-15% (-10% at 230 V)<br>3-ph, 230-525 V**+10%/-15%<br>3-ph, 400-690 V** +10%/-15% |
| Mains frequency            |                                     | 45 to 65 Hz  |
| Input total power factor   |                                     | 0.95 (IP20/21 & IP54)  |
| Output voltage             |                                     | 0-Mains supply voltage:  |
| Output frequency           |                                     | 0-400 Hz   |
| Output switching frequency |                                     | 3 kHz (48-293/295/365 = 2kHz), FDU adjustable 1.5-6 kHz  |
| Efficiency at nominal load |                                     | 97% for models 002 to 018 (IP20/21 & IP54)<br>98% for models 025 to 3K0 (IP20/21 & IP54)                 |

\* Available for both grounded, corner grounded, and isolated supply (TN and IT nets).

\*\*Nominal voltage selected with parameter.

## Environmental conditions

| Parameter                                    | Normal operation  |
|--|---|
| Nominal ambient temperature                  | 0°C - 40°C (32°F - 104°F). For size C69/D69/C2(69)/D2(69): 0°C - 45°C (32°F - 113°F). With derating max 55°C  |
| Atmospheric pressure                         | 86-106 kPa ( 12.5 - 15.4 PSI)   |
| Relative humidity according to IEC 60721-3-3 | Class 3K4, 5...95% and no condensing  |
| Contamination, according to IEC 60721-3-3    | No electrically conductive dust allowed. Cooling air must be clean and free from corrosive materials. Chemical gases, class 3C2 (coated boards 3C3). Solid particles, class 3S2.  |
| Vibrations                                   | According to IEC 60068-2-6, Sinusoidal vibrations:<br>10<f<57 Hz, 0.075 mm (0.00295 ft)<br>57<f<150 Hz, 1g (0,035 oz)<br>Frame sizes B to D2: IEC 60721-3-3 3M4 (2 - 9 Hz, 3.0mm and 9 - 20Hz, acc. 1g (10m/s <sup>2</sup> ))   |
| Altitude                                     | 0-1000 m (0 - 3280 ft)<br>480V AC drives, with derating 1%/100 m (328 ft) of rated current up to 4000 m (13123 ft)<br>690V AC drives, with derating 1%/100 m (328 ft) of rated current up to 2000 m (6562) ft<br>Coated boards required for 2000 - 4000 m(6562 - 13123 ft). |

| Parameter                                    | Storage condition  |
|--|--|
| Temperature                                  | -20 to +60 °C (-4 to + 140 °F)                                 |
| Atmospheric pressure                         | 86-106 kPa (12.5 - 15.4 PSI)                                   |
| Relative humidity according to IEC 60721-3-1 | Class 1K4, max. 95% and no condensing and no formation of ice. |



VFX/FDU48:  
Model 430-500 (H)

VFX/FDU69:  
Model 250 - 400 (H69)



VFX/FDU48:  
Model 600 - 750 (I)

VFX/FDU69:  
Model 430 - 595 (I69)

## Standards

| Market                | Standard                 | Description   |
|-----------------------|--------------------------|---|
| European              | EMC Directive            | 2014/30/EU  |
|                       | Low Voltage Directive    | 2014/35/EU  |
|                       | WEEE Directive           | 2012/19/EU  |
| All                   | EN 60204-1               | Safety of machinery - Electrical equipment of machines<br>Part 1: General requirements.   |
|                       | EN(IEC)61800-3:2004      | Adjustable speed electrical power drive systems<br>Part 3: EMC requirements and specific test methods.<br>EMC Directive: Declaration of Conformity and CE marking   |
|                       | EN(IEC)61800-5-1 Ed. 2.0 | Adjustable speed electrical power drive systems Part 5-1.<br>Safety requirements - Electrical, thermal and energy.<br>Low Voltage Directive: Declaration of Conformity and CE marking   |
|                       | IEC 60721-3-3            | Classification of environmental conditions. Air quality chemical vapours, unit in operation. Chemical gases 3C2, Solid particles 3S2.<br>Optional with coated boards<br>Unit in operation. Chemical gases Class 3C3, Solid particles 3S2. |
| North & South America | UL508C                   | UL Safety standard for Power Conversion Equipment   |
|                       | USL                      | USL (United States Standards - Listed) complying with the requirements of UL508C Power Conversion Equipment   |
|                       | UL 840                   | UL Safety standard for Power Conversion Equipment.<br>Insulation coordination including clearances and creepage distances for electrical equipment.   |
|                       | CNL                      | CNL (Canadian National Standards - Listed) complying with the requirements of CAN/CSA C22.2 No. 14-10 Industrial Control Equipment.   |
| Russian               | EAC                      | For all sizes.  |

## Operation at higher temperatures

Emotron AC drives are designed for nominal operation at maximum of 40°C ambient temperature.

Frame size C69/D69/C2(69)/D2(69) rated at max 45°C.

However, for most models, it is possible to use the AC drive at higher temperatures with reduced output rating (derating).

## Possible derating

Derating of output current is possible with

-1% / degree Celsius to max +15 °C (max 55 °C for IP54 and IP20/21)

-0.55% / degree Fahrenheit to max +27 °F (max 131 °F for IP54 and IP20/21)

## Dimensions, weights and cooling air flow

The tables below give an overview of the dimensions, weights, and the required air flow for cabinet mounting of the modules.

Drives with model numbers up to 48-365 are available as wall mounted modules; with the choice of an IP54 version (frame size B to FA), and an IP20/21 version (frame size C2 to FA2) that is also optimized for cabinet mounting.

Models from 48-430/69-250 and up consist of 2 to 15 paralleled power electronic building blocks (PEBBs), which can be delivered in standard IP23 or IP54 cabinets, or be cabinet/panel mounted as a conformity to IP20.

## Mechanical specifications for models VFX/FDU48/69 - IP20/21 version

| Models                                 | Frame size | Dim.<br>H1/H2 x W x D<br>mm (in)<br>IP20*           | Dim.<br>H1/H3 x W x D<br>mm (in)<br>IP21**         | Weight<br>kg (Lbs)<br>IP20/IP21 | Air flow<br>m3/hour |
|--|------------|---|--|---------------------------------|---------------------|
| 48-025 to 48-030 /<br>69-002 to 69-013 | C2/C2(69)  | 446 / 536 x 176 x 267<br>(17.2/21.1 x 6.9 x 10.5)   | 438 / 559 x 196 x 282<br>(17.2/22 x 7.7 x 11.1)    | 17 (37.5)                       | 120                 |
| 48-036 to 48-058 /<br>69-018 to 69-025 |            |   |  |                                 | 170                 |
| 48-060 to 48-105 /<br>69-033 to 69-058 | D2/D2(69)  | 545 / 658 x 220 x 291<br>(21.5/25.9 x 8.7 x 11.5)   | 545 / 670 x 240 x 307<br>(21.5/26.4 x 9.5 x 12.1)  | 30 (66)                         | 170                 |
| 48-106 to 48-171                       | E2         | 956 / 956 x 275 x 294<br>(37.6/37.6 x 10.8 x 11.6)  | 956 / 956 x 275 x 323<br>(37.6/37.6 x 10.8 x 12.7) | 53 (117)                        | 510                 |
| 48-205 to 48-293                       | F2         | 956 / 956 x 335 x 294<br>(37.6/37.6 x 13.2 x 11.6)  | 956 / 956 x 335 x 323<br>(37.6/37.6 x 13.2 x 12.7) | 69 (152)                        | 800                 |
| 48-365                                 | FA2        | 1090/ 1250 x 335 x 306<br>(42.9/49.5 x 13.2 x 12.1) |  | 84 (185)                        | 1020                |

H1 = Enclosure height H2 = Total height including cable interface H3 = Total height including top cover \* without top cover \*\* with top cover

## IP20/21 version of Emotron VFX 2.1 and FDU 2.1



Frame size C2/C2(69)  
IP20

Frame size D2/D2(69)  
IP21

Frame size E2  
IP20

Frame size F2  
IP20

Frame size FA2  
IP20

## Mechanical specifications for models VFX/FDU48 and VFX/FDU52 - IP54 version

| Models (48- or 52-) | Frame size  | IP20/21 Dim. H x W x D mm (mm)             | IP54 Dim. H x W x D mm (in)                     | IP20/21 Weight kg (lb) | IP54 Weight kg (lb)      | Air flow m3/hour |
|---------------------|-------------|--|---|------------------------|--------------------------|------------------|
| 003 to 018          | B           | n/a  | 350/416 x 203 x 203<br>(13.8/16.4 x 8 x 7.9)    | -                      | 12.5 (27.6)              | 75               |
| 026 to 031          | C           | n/a  | 440/512 x 178 x 292<br>(17.3/20.2 x 7 x 11.5)   | -                      | 24 (52.9)                | 120              |
| 037 to 046          |             |  |   |                        |                          | 170              |
| 061 to 074          | D           | n/a  | 545/590 x 220 x 295<br>(21.5/23.2 x 8.7 x 11.5) | -                      | 32 (70.6)                | 170              |
| 090 to 109          | E           | n/a  | 950 x 285 x 314<br>(37.4 x 11.2 x 12.4)         | -                      | 56 (123.5)<br>60 (132.3) | 510              |
| 146 to 175          |             |  |   |                        |                          |                  |
| 210 to 295          | F           | n/a  | 950 x 345 x 314<br>(37.4 x 13.6 x 12.4)         | -                      | 75 (165.4)               | 800              |
| 365                 | FA          | n/a  | 1395 x 345 x 365<br>(54.9 x 13.6 x 14.4)        | -                      | 95 (209)                 | 1020             |
| 430 to 500          | H (2xF)     | 1036 x 500 x 450<br>(40.8 x 19.7 x 17.7)   | 2250 x 600 x 600<br>(88.6 x 23.6 x 23.6)        | 170 (374.8)            | 380 (837.8)              | 1600             |
| 600 to 750          | I (3xF)     | 1036 x 730 x 450<br>(40.8 x 28.7 x 17.7)   | 2250 x 900 x 600<br>(88.6 x 35.4 x 23.6)        | 248 (546.7)            | 506 (1116)               | 2400             |
| 860 to 1K0          | J (2xH)     | 1036 x 1100 x 450<br>(40.8 x 43.3 x 17.7)  | 2250 x 1200 x 600<br>(88.6 x 47.2 x 23.6)       | 340 (749.6)            | 697 (1537)               | 3200             |
| 1K15 to 1K25        | KA (H+I)    | 1036 x 1365 x 450<br>(40.8 x 53.7 x 17.7)  | 2250 x 1500 x 600<br>(88.6 x 59.1 x 23.6)       | 418 (921.5)            | 838 (1847)               | 4000             |
| 1K35 to 1K5         | K (2xI)     | 1036 x 1630 x 450<br>(40.8 x 64.2 x 17.7)  | 2250 x 1800 x 600<br>(88.6 x 70.9 x 23.6)       | 496 (1093)             | 987 (2176)               | 4800             |
| 1K75                | L (2xH+I)   | 1036 x 2000 x 450<br>(40.8 x 78.7 x 17.7)  | 2250 x 2100 x 600<br>(88.6 x 82.7 x 23.6)       | 588 (1296)             | 1190 (2624)              | 5600             |
| 2K0                 | M (H+2xI)   | 1036 x 2230 x 450<br>(40.8 x 87.8 x 17.7)  | 2250 x 2400 x 600<br>(88.6 x 94.5 x 23.6)       | 666 (1468)             | 1323 (2917)              | 6400             |
| 2K25                | N (3xI)     | 1036 x 2530 x 450<br>(40.8 x 99.6 x 17.7)  | 2250 x 2700 x 600<br>(88.6 x 106.3 x 23.6)      | 744 (1640)             | 1518 (3347)              | 7200             |
| 2K5                 | O (2xH+2xI) | 1036 x 2830 x 450<br>(40.8 x 111.4 x 17.7) | 2250 x 3000 x 600<br>(88.6 x 118.1 x 23.6)      | 836 (1834)             | 1772 (3907)              | 8000             |

1) IP20 module for cabinet mounting. n/a = not applicable



VFX/FDU48/52: Model 003 - 018 (B)

VFX/FDU48/52: Model 026 - 046 (C)

VFX/FDU48/52: Model 061 - 074 (D)

## Mechanical specifications for models VFX/FDU69 - IP54 version

| Models (69-) | Frame size        | IP20/21 Dim. H x W x D mm (mm)          | IP54 Dim. H x W x D mm (in)                  | IP20/21 Weight kg (lb) | IP54 Weight kg (lb) | Air flow m3/hour |
|--------------|-------------------|---|--|------------------------|---------------------|------------------|
| 002 to 025   | C69               | –                                       | 440/512 x 178 x 314 (17.3/20.2 x 7.0 x 12.3) | –                      | 19.8 (43.6)         | 170              |
| 033 to 058   | D69               | –                                       | 545/590 x 220 x 295 (21.5/23.2 x 8.7 x 11.6) | –                      | 32 (70.5)           | 170              |
| 082 to 200   | F69               | –                                       | 1090 x 345 x 314 (42.9 x 13.6 x 12.4)        | –                      | 77 (169.8)          | 800              |
| 250 to 400   | H69 (2xF69)       | 1176 x 500 x 450 (46.3 x 19.7 x 17.7)   | 2250 x 600 x 600 (88.6 x 23.6 x 23.6)        | 176 (388)              | 399 (879.6)         | 1600             |
| 430 to 595   | I69 (3xF69)       | 1176 x 730 x 450 (46.3 x 28.7 x 17.7)   | 2250 x 900 x 600 (88.6 x 35.4 x 23.6)        | 257 (566.6)            | 563 (1241)          | 2400             |
| 650 to 800   | J69 (2xH69)       | 1176 x 1100 x 450 (46.3 x 43.3 x 17.7)  | 2250 x 1200 x 600 (88.6 x 47.2 x 23.6)       | 352 (776)              | 773 (1704)          | 3200             |
| 905 to 995   | KA69 (H69+I69)    | 1176 x 1365 x 450 (46.3 x 53.7 x 17.7)  | 2250 x 1500 x 600 (88.6 x 59.1 x 23.6)       | 433 (954.6)            | 937 (2066)          | 4000             |
| 1K2          | K69 (2xI69)       | 1176 x 1630 x 450 (46.3 x 64.2 x 17.7)  | 2250 x 1800 x 600 (88.6 x 70.9 x 23.6)       | 514 (1133)             | 1100 (2425)         | 4800             |
| 1K4          | L69 (2xH69+I69)   | 1176 x 2000 x 450 (46.3 x 78.7 x 17.7)  | 2250 x 2100 x 600 (88.6 x 82.7 x 23.6)       | 609 (1343)             | 1311 (2890)         | 5600             |
| 1K6          | M69 (H69+2xI69)   | 1176 x 2230 x 450 (46.3 x 87.8 x 17.7)  | 2250 x 2400 x 600 (88.6 x 94.5 x 23.6)       | 690 (1521)             | 1481 (3265)         | 6400             |
| 1K8          | N69 (3xI69)       | 1176 x 2530 x 450 (46.3 x 99.6 x 17.7)  | 2250 x 2700 x 600 (88.6 x 106.3 x 23.6)      | 771 (1700)             | 1651 (3640)         | 7200             |
| 2K0          | O69 (2xH69+2xI69) | 1176 x 2830 x 450 (46.3 x 111.4 x 17.7) | 2250 x 3000 x 600 (88.6 x 118.1 x 23.6)      | 866 (1909)             | 1849 (4076)         | 8000             |
| 2K2          | P69 (H69+3xI69)   | 1176 x 3130 x 450 (46.3 x 123.2 x 17.7) | 2250 x 3300 x 600 (88.6 x 129.9 x 23.6)      | 947 (2088)             | 2050 (4519)         | 8800             |
| 2K4          | Q69 (4xI69)       | 1176 x 3430 x 450 (46.3 x 135 x 17.7)   | 2250 x 3600 x 600 (88.6 x 141.7 x 23.6)      | 1028 (2266)            | 2214 (4881)         | 9600             |
| 2K6          | R69 (2xH69+3xI69) | 1176 x 3730 x 450 (46.3 x 146.9 x 17.7) | 2250 x 3900 x 600 (88.6 x 153.5 x 23.6)      | 1123 (2476)            | 2423 (5342)         | 10400            |
| 2K8          | S69 (H69+4xI69)   | 1176 x 4030 x 450 (46.3 x 158.7 x 17.7) | 2250 x 4200 x 600 (88.6 x 165.4 x 23.6)      | 1204 (2654)            | 2613 (5761)         | 11200            |
| 3K0          | T69 (5xI69)       | 1176 x 4330 x 450 (46.3 x 170.5 x 17.7) | 2250 x 4500 x 600 (88.6 x 177.2 x 23.6)      | 1285 (2833)            | 2777 (6122)         | 12000            |

1) IP20 module for cabinet mounting.  
n/a = not applicable



VFX/FDU48: Model 090 - 175 (E)



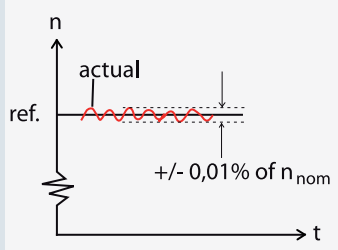
VFX/FDU48: Model 210 - 295 (F)  
VFX/FDU69: Model 082 - 200 (F69)



VFX/FDU48: Model 430 - 500 (H) IP20 module

### Control performance for Emotron VFX 2.1 (Speed)

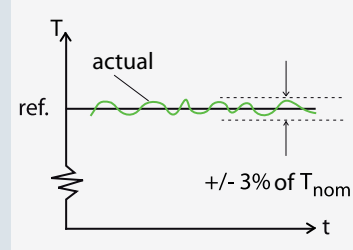
Speed control static accuracy (linearity):



Closed loop = 0.01% of  $n_{nom}$   
Open loop = 0.1% of  $n_{nom}$

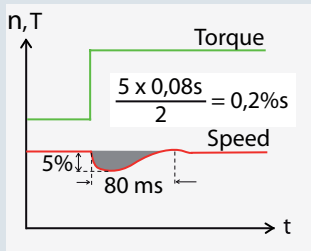
### Control performance for Emotron VFX 2.1 (Torque)

Torque control static accuracy (linearity):



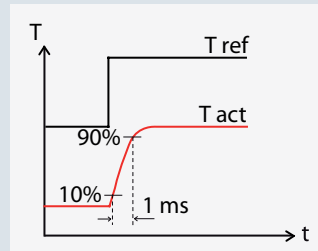
Closed loop: <3% of  $T_{nom}$   
Open loop: <3% for speeds 10 - 100% of rated, and <10% at zero speed (% of  $n_{nom}$ ).

Speed Control dynamic accuracy (impact drop):



Closed loop = 0.2%sec (100% load step)  
Open loop = 0.4%sec (100% load step)

Torque control dynamic accuracy:



Closed and open loop:  
100% torque step rise time = 1 ms.

### Control performance for Emotron FDU 2.1 (V/Hz)

Speed control accuracy = approximately 1% of  $n_{nom}$  (slip frequency).

Torque accuracy = approximately 5% of  $T_{nom}$  (20 - 100% speed).



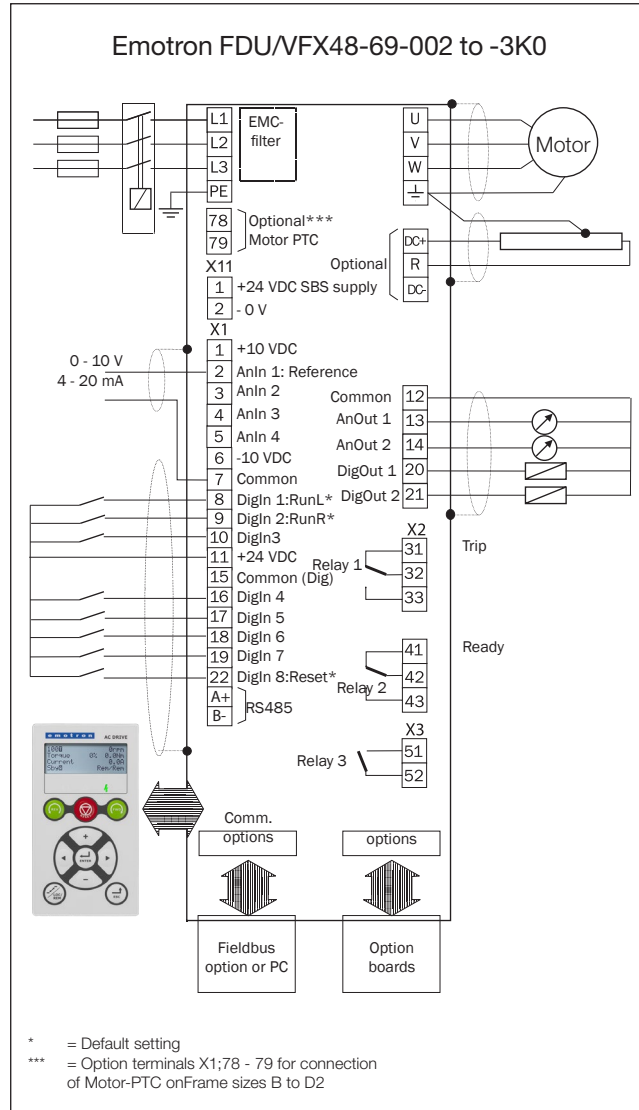
## Basic I/O data

|  |   |
|--|---|
| <b>Control signal inputs:<br/>Analogue (differential), 4 channels</b>  |   |
| Analogue voltage/current<br>Max. input voltage<br>Input impedance  | 0-±10 V/0-20 mA via switch<br>+30 V<br>20 kΩ (voltage)<br>250 Ω (current)   |
| Resolution<br>Hardware accuracy<br>Non-linearity   | 11 bits + sign<br>0.5% type + 1 ½ LSB fsd<br>1½ LSB   |
| <b>Digital: 8 channels</b>   |   |
| Input voltage<br>Max. input voltage<br>Input impedance<br>Signal delay   | High > 9 V <sub>DC</sub> Low < 4 V <sub>DC</sub><br>+30 V <sub>DC</sub><br>< 3.3 V <sub>DC</sub> : 4.7 kΩ, ≥ 3.3 V <sub>DC</sub> : 3.6 kΩ<br>≤ 8 ms   |
| <b>Control signal outputs:<br/>Analogue, 2 channels</b>  |   |
| Output voltage/current<br>Max. output voltage<br>Short-circuit current (∞)<br>Output impedance<br>Resolution<br>Maximum load impedance for current<br>Hardware accuracy<br>Offset<br>Non-linearity | 0-10 V/0-20 mA via software setting<br>+15 V @ 5 mA cont.<br>+15 mA (voltage) + 140 mA (current)<br>10 Ω (voltage)<br>10 bit<br>500 Ω<br>1.9% type fsd (voltage), 2.4% type fsd (current)<br>3 LSB<br>2 LSB |
| <b>Digital, 2 channels</b>   |   |
| Output voltage<br>Short-circuit current (∞)  | High > 20 V <sub>DC</sub> @ 50 mA, > 23 VDC open<br>Low < 1 V <sub>DC</sub> @ 50 mA<br>100 mA max (together with +24 V <sub>DC</sub> )  |
| <b>Relays, 3 pcs</b>   |   |
| Contacts   | 0.1 – 2 A/Umax 250 VAC or 42 V <sub>DC</sub>  |
| <b>Reference voltages</b>  |   |
| +10 V <sub>DC</sub><br>-10 V <sub>DC</sub><br>+24 V <sub>DC</sub>  | +10 V <sub>DC</sub> @ 10 mA short-circuit current + 30 mA max<br>-10 V <sub>DC</sub> @ 10 mA<br>+24 V <sub>DC</sub> short-circuit current + 100 mA max (together with Digital Outputs)                      |

See "User interface data" on page 26 for connection data and default settings



## User interface data



| X1 | Name:   | Function (Default):    |
|----|---------|------------------------|
| 1  | +10 V   | +10 VDC Supply voltage |
| 2  | AnIn1   | Speed reference        |
| 3  | AnIn2   | Not used               |
| 4  | AnIn3   | Not used               |
| 5  | AnIn4   | Not used               |
| 6  | -10 V   | -10VDC Supply voltage  |
| 7  | Common  | Signal ground          |
| 8  | DigIn 1 | RunL                   |
| 9  | DigIn 2 | RunR                   |
| 10 | DigIn 3 | Not used               |
| 11 | +24 V   | +24VDC Supply voltage  |
| 12 | Common  | Signal ground          |
| 13 | AnOut 1 | Min speed to max speed |
| 14 | AnOut 2 | 0 to max torque        |
| 15 | Common  | Signal ground          |
| 16 | DigIn 4 | Not used               |
| 17 | DigIn 5 | Not used               |
| 18 | DigIn 6 | Not used               |
| 19 | DigIn 7 | Not used               |

| X1 | Name:    | Function (Default): |
|----|----------|---------------------|
| 20 | DigOut 1 | Ready               |
| 21 | DigOut 2 | Brake/No trip       |
| 22 | DigIn 8  | Reset               |

| X2 | Name: | Function (Default):   |
|----|-------|---|
| 31 | N/C 1 | Relay 1 output=Trip<br>Active when the AC drive is in a TRIP condition.<br>N/C is opened when the relay is active (valid for all relays)<br>N/O is closed when the relay is active (valid for all relays) |
| 32 | COM 1 |   |
| 33 | N/O 1 |   |
| 41 | N/C 2 | Relay 2 Output=Ready<br>Active when the AC drive is ready to start  |
| 42 | COM 2 |   |
| 43 | N/O 2 |   |

| X3 | Name: | Function (Default):     |
|----|-------|-------------------------|
| 51 | COM 3 | Relay 3 Output=Not used |
| 52 | N/O 3 |                         |

All inputs and outputs are programmable.

# Standard options

For Emotron VFX/FDU 2.1

| STANDARD OPTION               | IP20/21 and IP54/20   |                                  |
|-------------------------------|---|----------------------------------|
|                               | Frame sizes C2 - FA2 and C69 - F69/C2(69) - F2(69)                                    |                                  |
|                               | All boards are coated.<br>Support for 3 option boards<br>and one communication option |                                  |
|                               | Part no.  | Remark                           |
| I/O board                     | 01-3876-01  | Max 3 I/O board                  |
| Encoder board                 | 01-3876-03  | Max 1 Encoder board              |
| PTC/PT100 board               | 01-3876-08  | Max 2 PTC/PT100 board            |
| RS232/485                     | 01-3876-04  |                                  |
| Standby power supply          | Standard built - in input on control board  |                                  |
| Safe Torque Off (STO)         | Available as factory built in option IP54 (IP2x:see price list)                       |                                  |
| CRIO board                    | 01-3876-07  | Only for VFX                     |
| Crane interface               | 590059  | 230 V <sub>AC</sub> Only for VFX |
|                               | 590060  | 24 V <sub>DC</sub> Only for VFX  |
| Fieldbus - Profibus           | 01 - 3876 - 05  |                                  |
| Fieldbus - DeviceNet          | 01 - 3876 - 06  |                                  |
| Fieldbus - CANopen            | 01 - 3876 - 16  |                                  |
| Ethernet - Modbus TCP         | 01 - 3876 - 09  |                                  |
| Ethernet - Modbus/TCP M12     | 01 - 3876 - 14  |                                  |
| Ethernet - EtherCAT®          | 01 - 3876 - 10  |                                  |
| Ethernet - Profinet IO 1-port | 01 - 3876 - 11  |                                  |
| Ethernet - Profinet IO 2-port | 01 - 3876 - 12  |                                  |
| Ethernet - EtherNet IP 2-port | 01 - 3876 - 13  |                                  |

I/O board



3 extra relay outputs (230 VAC/5 A NO/NC). 3 extra 24 V /3.2 kΩ (AC or DC) differential digital inputs, all programmable. Inputs providing 50 VAC/DC isolation between channels. Maximum 3 I/O boards can be built -in per AC drive.

Encoder board



Differential encoder input suitable for 5 V (TTL) or 24 V (HTL) incremental encoders, range 5-16384 pulses/revolution. Inputs min 9 kΩ. Max frequency = 100 kHz. For single ended or differential type of encoders (A/B, A'/B'). Selectable encoder supply voltage output 5 VDC or 24 VDC.

PTC/PT100 board



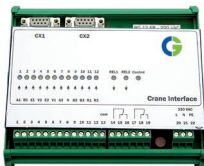
1 PTC isolated input conforming DIN 44081/44082. Max 6 PTC thermistors can be connected in series to PTC input. Also including 3 PT100 inputs, 2/3/4-wire, conforming EN 60751.

CRIO board (VFX)



Crane option board to control hoist or travel motions. Inputs for joystick control: supporting 4-step, motor potentiometer or analog reference joystick types. Inputs for slow down and end limits switches (2+2). All 12 digital inputs 24 V/5 kΩ (8 - 24V) DC. 2 relay outputs 250 V/2AAC, for mechanical brake and load deviation protection. Load dependent field weakening operation of hoists also supported.

Crane interface (VFX)



Isolated I/O interface for control signals between (existing) crane controls and crane option board (CRIO).

- Available for 230 V/27 kΩ (120 - 250V) AC
- 24 V /2.7 kΩ (15 - 36 V) DC input signals.
- LED indications for all inputs and outputs.
- For DIN-rail mounting.
- HxWxD = 125 x 150 x 50 mm

RS232/RS485 isolated



Isolated RS232/RS485 serial communication board. For Modbus/RTU communication protocol.

Baud rates: 2400 - 38400 bits/s supported.

Note: RS485 standard built-in on control board

## Standard options for Emotron VFX/FDU 2.1

### Fieldbus and Ethernet boards

Typical drive response time = 10 ms (not including any ethernet delays).



#### Fieldbus - Profibus

Fieldbus option module for Profibus DP or DP V1 communication. Use 9-pin D-sub connector. Baud rates: 9.6 kbits/s - 12 Mbits/s supported.

#### Fieldbus - DeviceNet

Fieldbus option module for DeviceNet communication. Baud rates: 125 - 500 kbits/s supported.

#### Ethernet - Modbus/TCP

Industrial Ethernet option module for Modbus/TCP protocol. RJ45 type connector. Baud rates: 10 or 100 Mbits/s supported.

#### Ethernet - Modbus/TCP M12

Industrial Ethernet option module for Modbus/TCP protocol. M12 type connectors, 2-port. Baud rates: 10 or 100 Mbits/s supported.

#### Ethernet - Profinet IO 1-port

Industrial Ethernet option module for Profinet IO (RT) protocol. RJ45 type connector. Baud rate: 100 Mbits/s

#### Ethernet - Profinet IO 2-port

Industrial Ethernet option module for Profinet IO (RT) protocol. 2 x RJ45 type connectors. Baud rate: 100 Mbits/s

#### Ethernet - EtherCAT®

Industrial Ethernet option module for EtherCAT protocol. 2 x RJ45 type connectors (IN and OUT). Baud rate: 100 Mbits/s

#### Ethernet - EtherNet IP 2-port

Industrial Ethernet option module for EtherNet IP protocol. 2 x RJ45 type connector. Baud rate: 100 Mbits/s

#### Fieldbus - CANopen

Fieldbus option module for CANopen communication. CANopen certified, compliant with profile DS301 V4.02. Use 9-pin D-sub connector. Baud rates 10 kbit/s - 1 Mbits/s

### Control panel kit, incl. blank panel



External control panel IP54 suitable for mounting on a cabinet door. This option is to be used in combination with an AC drive module ordered with a built-in control panel.

Part no.

01-6878-40 (Size B)

01-6879-40 (Size C)

01-6880-40 (Size D and up)

01-7211-00 (IP2X units. Without PPU)

### Control panel kit, incl. control panel



External control panel IP54 suitable for mounting on a panel door. This option is to be used in combination with an AC drive module ordered with a blank control panel.

Part no.

01-6878-00 Std PPU (Size B)

01-6878-10 PPU w Bluetooth (Size B)

01-6878-20 PPU w Wifi (Size B)

01-6879-00 Std PPU (Size C)

01-6879-10 PPU w Bluetooth (Size C)

01-6879-20 PPU w Wifi (Size C)

01-6880-00 Std PPU (Size D and up)

01-6880-10 PPU w Bluetooth (Size D and up)

01-6880-20 PPU w Wifi (Size D and up)

### Handheld Control Panel HCP 2.0



Handheld control panel with full functionality. Easy to connect to the AC drive for temporary use during e.g. commissioning and service. The HCP 2.0 enables setting of parameters and viewing of actual values and fault logger. It also offers the possibility to copy parameter data from one AC drive to other AC drives. Part no. 01-5039-30 (complete with cable)

## Standard options for Emotron VFX/FDU 2.1

### EmoSoftCom



Connect a PC with a standard RS232 cable under the control panel on the front. EmoSoftCom PC software makes it possible to perform signal recordings and save/load parameter backup data, for example during service & maintenance.

### Glands for IP54 frame sizes B, C and D



Gland kits are available for size B, C, and D. Metal EMC glands are used for motor and brake resistor cables.

| Part No    | Current               | Frame size |
|------------|-----------------------|------------|
| 01-4601-21 | 3 - 6 A (M16 - M20)   | B          |
| 01-4601-22 | 8 - 10 A (M16 - M25)  |            |
| 01-4601-23 | 13 - 18 A (M16 - M32) |            |
| 01-4399-01 | 26 - 31 A (M12 - M32) | C          |
| 01-4399-00 | 37 - 46 A (M12 - M40) |            |
| 01-4833-00 | 61 - 74 A (M20 - M50) | D          |
| 01-7248-00 | 2 - 10A (M20 - M25)   | C69        |
| 01-7248-10 | 13 - 25A (M20 - M32)  |            |
| 01-7247-00 | 33 - 58A (M20 - M40)  | D69        |

### Control panel with Bluetooth or Wifi comm.



New 4-line PPU with Bluetooth or Wifi communication, used with "EmoDrive" commissioning and maintenance App (for iPhone and Android phones).

### Coated boards

All drive boards are also available as coated, recommended e.g. for sewer pump applications (Hydrogen sulphide gases) or installations with occasional high humidity (if machine room installation or tropical climate). IEC60721-3-3 gases class 3C3, solid particles class 3S2



## Factory mounted options for Emotron VFX/FDU 2.1

### Blank control panel



Blank panel instead of control panel (to maintain IP54). Indication LED's for Power, Run and Trip available.

### EMC filter class C2

EMC filter according to EN61800-3:2004 class C2 - 1st environment restricted distribution. For sizes B to D2. Integrated inside the drive module.

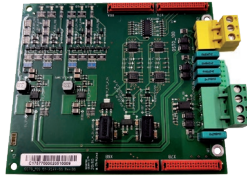
Note: EMC filter according to class C3 - 2nd environment included as standard in all drive units.

### PTC

Factory mounted, isolated motor PTC input conforming to DIN44081/44082.

Available with size B to D2. Use PTC/PT100 option board if additional inputs are needed.

### Option board for safety function Safe Torque Off (STO)



One OSTO\_100 option board for implementing Safe Torque Off functionality in all Emotron FDU/VFX 2.1 frame sizes, mounted underneath Option mounting plate.

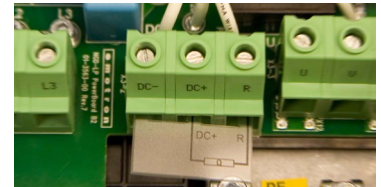
Extra built-in safety inputs (supporting OSSD technology) for activating Safe Torque Off (STO) status, and a STO-status feedback output. Conform to the machine safety norms EN-IEC 61508:2010 / EN-IEC 61205:2005 up to SIL3, and EN-ISO 13849-1:2008 up to PLe category 4.

### Brake chopper

All Emotron VFX/FDU drives can be fitted with an optional built-in brake chopper. Brake choppers are rated for continuous braking at drive rated load (IP20/21 & IP54). This option can not be after mounted. The brake resistor must be mounted outside the AC drive. (See page 33 for Brake resistor option).

### DC+ /DC- connection

DC+/DC- terminals for external connection of the Emotron VFX/FDU drive DC link. This option is required if using the Overshoot clamp.



## Extended options for Emotron VFX/FDU 2.1

### Extended EMC filter 90-660A



EMC filter according to EN61800-3:2004 class C2 - 1st environment, restricted distribution. From frame size E. Rated voltage=480 V, 50/60 Hz. Max. 40 °C ambient temperature.

| Drive model   | Filter type   | Dimensions HxWxD [mm] | Weight [kg] | Enclosure         | Power losses (W) |
|---------------|---------------|-----------------------|-------------|-------------------|------------------|
| VFX/FDU48-090 | 3F480-100.260 | 336x75x200            | 6.2         | IP20 <sup>1</sup> | 29               |
| VFX/FDU48-109 | 3F480-125.260 | 336x75x200            | 6.5         | IP20 <sup>1</sup> | 32               |
| VFX/FDU48-146 | 3F480-150.260 | 380x90x220            | 9.8         | IP20 <sup>1</sup> | 35               |
| VFX/FDU48-175 | 3F480-180.260 | 410x200x120           | 10.9        | IP00 <sup>2</sup> | 11               |
| VFX/FDU48-210 | 3F480-220.260 | 410x200x120           | 10.3        | IP00 <sup>2</sup> | 12               |
| VFX/FDU48-250 | 3F480-250.260 | 410x200x120           | 9.9         | IP00 <sup>2</sup> | 13               |
| VFX/FDU48-300 | 3F480320.260  | 410x200x120           | 10.6        | IP00 <sup>2</sup> | 17               |
| VFX/FDU48-375 | 3F480-400.260 | 480x240x150           | 16.5        | IP00 <sup>2</sup> | 20               |
| VFX/FDU48-430 | 3F480-500.260 | 480x240x150           | 17.2        | IP00 <sup>2</sup> | 27               |
| VFX/FDU48-500 | 3F480-500.260 | 480x240x150           | 17.2        | IP00 <sup>2</sup> | 27               |
| VFX/FDU48-590 | 3F480-630.260 | 480x240x150           | 16.0        | IP00 <sup>2</sup> | 36               |
| VFX/FDU48-660 | 3F480-700.260 | 520x240x180           | 21.6        | IP00 <sup>2</sup> | 42               |

1=Screw terminal (protected)

2=Busbar terminals

### Output choke (dU/dt)

Output chokes (supplied separately) are recommended above app. 100 m cable length for all single drives. Consult your supplier in case of paralleled drives. Due to the switching of output voltage, high capacitive peak currents will run through the parasitic capacitances between the phases and to earth. Screened cables have more parasitic capacitances. Output chokes should be installed as close as possible to the drive output. Output chokes also limits voltage peaks at motor winding.

Rated voltage = 800 V, IP00 units. Suitable for up to IP23 cabinet installation.

Max. 40°C ambient temperature.

Parallel connection of output coils possible if higher current rating required (e.g. one filter per PEBB).



| Nominal current ( $I_N$ ) A/<br>Phase | L [mH] | Weight [kg] | Dimensions HxWxD [mm] | Power losses (W) | Part no.   |
|---------------------------------------|--------|-------------|-----------------------|------------------|------------|
| 2.8                                   | 1.5    | 0.6         | 60x78x95              | 4.5              | 473160 00  |
| 4.4                                   | 1      | 0.6         | 60x78x95              | 5.0              | 473161 00  |
| 6.6                                   | 0.65   | 0.6         | 60x78x95              | 7.0              | 473162 00  |
| 11                                    | 0.4    | 1           | 65x96x105             | 10               | 473163 00  |
| 14.3                                  | 0.3    | 1           | 65x96x105             | 12               | 473164 00  |
| 18.2                                  | 0.25   | 1.2         | 74x96x105             | 14               | 473165 00  |
| 26.4                                  | 0.175  | 1.2         | 74x96x105             | 18               | 473166 00  |
| 32                                    | 0.15   | 1.7         | 84x125x140            | 22               | 473167 00  |
| 65                                    | 0.1    | 4           | 105x155x205           | 48               | 473168 00  |
| 90                                    | 0.1    | 8.4         | 120x90x235            | 78               | 473169 00  |
| 146                                   | 0.05   | 10.2        | 140x190x260           | 84               | 473170 00  |
| 175                                   | 0.05   | 13.4        | 160x210x180           | 114              | 473171 00  |
| 275                                   | 0.032  | 18.4        | 170x230x200           | 104              | 473172 00  |
| 275 (flat mounting)                   | 0.032  | 18.4        | 193x254x162           | 104              | 74052065L2 |
| 320                                   | 0.025  | 18.9        | 170x230x200           | 111              | 473173 00  |
| 410                                   | 0.021  | 22.6        | 180x240x210           | 134              | 473174 00  |

## Overshoot clamp

Together with the output choke, the overshoot clamp limits the voltage to the motor.

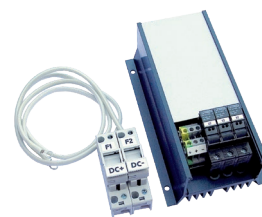
For rated voltages 380 - 690 V.

H x W x D = 250 x 145 x 95 mm

Part no.

052163 (size B-F/F2/F69)

052220 (size H and up)



## Sine wave filter



Only for use with FDU drives. Rated voltage= 400 V  $\pm$ 25%, 50/60 Hz (690 V on request). Max. 40°C ambient temperature. IP20= with enclosure and screw terminals. IP00=no enclosure and busbar connections.

Voltage drop approximately 25 V at rated current, 50 Hz.

Overload: 110% for 5 min, 150% for 2 min or 200% for 30 s. For further information see filter selection guide, page 34

| Filter type<br>3AFS400- | Protection<br>class | Power<br>[kW] | Nom. current<br>(I <sub>N</sub> ) A/Phase | Power loss<br>[W] | Weight<br>[kg] | Dimensions<br>HxWxD [mm] |
|-------------------------|---------------------|---------------|---|-------------------|----------------|--------------------------|
| 002.5                   | IP20                | 0.75          | 2.5                                       | 75                | 5              | 190x165x160              |
| 004                     | IP20                | 1.5           | 4   | 90                | 5              | 190x165x160              |
| 007                     | IP20                | 2.2           | 7   | 125               | 7              | 250x162x162              |
| 010                     | IP20                | 4             | 10  | 165               | 9              | 250x162x162              |
| 013                     | IP20                | 5.5           | 13  | 190               | 12             | 250x162x162              |
| 016                     | IP20                | 7.5           | 16  | 220               | 13             | 300x210x180              |
| 025                     | IP20                | 11            | 25  | 250               | 18             | 300x250x210              |
| 035                     | IP20                | 15            | 35  | 275               | 25             | 300x270x235              |
| 010                     | IP00                | 4             | 10  | 165               | 9              | 195x200x115              |
| 013                     | IP00                | 5.5           | 13  | 190               | 12             | 225x200x115              |
| 016                     | IP00                | 7.5           | 16  | 220               | 13             | 225x240x135              |
| 025                     | IP00                | 11            | 25  | 250               | 18             | 270x250x160              |
| 035                     | IP00                | 15            | 35  | 275               | 25             | 270x250x160              |
| 050                     | IP00                | 22            | 50  | 320               | 45             | 280x300x250              |
| 063                     | IP00                | 30            | 63  | 550               | 49             | 270x300x370              |
| 080                     | IP00                | 37            | 80  | 380               | 65             | 324x360x320              |
| 100                     | IP00                | 45            | 100                                       | 530               | 65             | 324x360x320              |
| 125                     | IP00                | 55            | 125                                       | 650               | 85             | 335x390x320              |
| 150                     | IP00                | 75            | 150                                       | 580               | 119            | 440x480x340              |
| 180                     | IP00                | 90            | 180                                       | 760               | 131            | 440x480x340              |
| 250                     | IP00                | 132           | 250                                       | 600               | 135            | 420x420x390              |
| 300                     | IP00                | 160           | 300                                       | 1000              | 140            | 420x420x390              |
| 400                     | IP00                | 200           | 400                                       | 1100              | 320            | 440x500x400              |
| 500                     | IP00                | 250           | 500                                       | 1250              | 335            | 470x500x400              |

## Common mode filter

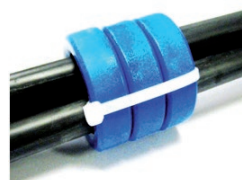
Common mode filters are mainly used to reduce common mode currents in motors (typically used with motors >size 280). Common mode filters can prevent damage of motor bearings.

All three motor phases (without shield) are to be routed through common mode filter rings.

These filters can also be used to reduce EMC emissions in supply cables.

Di = 35mm, Dy = 59mm, L = 55mm, m = 0,35kg.

Part no. 052213 (size H - T69 require one Common mode filter per PEBB).





## Extended options for Emotron VFX/FDU 2.1

### Brake resistors



VPR= Compact – IP54 with 0.75 m shielded cable.

BEGT= Resistor with stainless steel alloy grid – IP20 or IP23 with thermo contact.

For dynamic braking by connection to the drive brake chopper output (optional)

| Type              | Resistor power [kW] in % duty cycle |                               |                 |       |       | Dimensions H x W x D [mm] |                  |
|-------------------|-------------------------------------|-------------------------------|-----------------|-------|-------|---------------------------|------------------|
|                   | 100<br>(>1.5 min)                   | 60<br>(1 min < t<br>≤1.5 min) | 40<br>(≤ 1 min) | 25    | 6     | IP54                      |                  |
| VPR 200-__R       | 0.2                                 |                               | 0.47            | 0.74  | 3.6   | 200x60x31                 | –                |
| VPR 300-__R       | 0.3                                 |                               | 0.705           | 1.11  | 5.4   | 250x60x31                 | –                |
| VPR 400-__R       | 0.4                                 |                               | 0.94            | 1.48  | 7.2   | 301x60x31                 | –                |
| VPR 500-__R       | 0.5                                 |                               | 1.175           | 1.85  | 9.0   | 370x60x31                 | –                |
| DEGT1VPR1000S_R-S | 1                                   |                               | 2.0             | 3.7   | 13.0  | 542x98x170                | –                |
|                   |                                     |                               |                 |       |       | IP20                      | IP23             |
| BEGT 13#05-__R    | 2.5                                 | 3.25                          | 4.25            | 6.25  | 21.0  | 301x483x326               | 500x483x326      |
| BEGT 13#08-__R    | 4.0                                 | 5.2                           | 6.8             | 10.0  | 34.0  | 301x483x326               | 500x483x326      |
| BEGT 13#10-__R    | 5.0                                 | 6.5                           | 8.5             | 12.5  | 42.5  | 301x483x326               | 500x483x326      |
| BEGT 14#15-__R    | 7.5                                 | 9.8                           | 12.7            | 18.7  | 64.0  | 301x483x426               | 500x483x426      |
| BEGT 15#20-__R    | 10.0                                | 13.0                          | 17.0            | 25.0  | 85.0  | 301x483x526               | 500x483x526      |
| BEGT 17#30-__R    | 15.0                                | 19.5                          | 25.5            | 37.5  | 127.0 | 301x483x740               | 500x483x740      |
| BEGT 25#40-__R    | 20.0                                | 26.0                          | 34.0            | 50.0  | 170.0 | 601x484x526               | 800x484x526      |
| BEGT 27#60-__R    | 30.0                                | 39.0                          | 51.0            | 75.0  | 255.0 | 601x484x736               | 800x484x736      |
| BEGT 37#90-__R    | 40.0                                | 52.0                          | 68.0            | 100.0 | 340.0 | 1021x484x736              | 1181x484x736     |
| BEGT 47#120-__R   | 50.0                                | 65.0                          | 85.0            | 125.0 | 425.0 | 1321x483x736              | 301x483x736      |
| 2xBEGT 27#60-__R  | 60.0                                | 78.0                          | 102.0           | 150.0 | 510.0 | 2x(601x484x736)           | 2x(800x484x736)  |
| 2xBEGT 37#78-__R  | 70.0                                | 91.0                          | 119.0           | 175.0 | 600.0 | 2x(1021x484x736)          | 2x(1181x484x736) |
| 2xBEGT 37#90-__R  | 80.0                                | 104.0                         | 136.0           | 200.0 | 680.0 | 2x(1021x484x736)          | 2x(1181x484x736) |
| 2xBEGT 47#120-__R | 100.0                               | 130.0                         | 170.0           | 250.0 | 850.0 | 2x(1321x483x736)          | 2x(1481x483x736) |

# = 2: IP20, example BEGT 13205

# = 4: IP23, example BEGT 13405

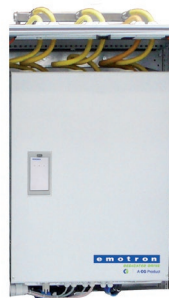
\_\_R: resistance in ohm, example 26R=26 ohm

\_\_R\_: resistance in ohm, example 6R5=6.5 ohm

t : Braking time

### Liquid cooling

Drive modules in frame sizes E - O and F69 - T69 are available in a liquid cooled version. These units are designed for connection to a liquid cooling system, normally a heat exchanger of liquid-liquid or liquid-air type. Heat exchanger is not part of the liquid cooling option. Drive units with parallel power modules (frame size H - T69) are delivered with a dividing unit for connection of the cooling system. The drive units are equipped with rubber hoses with leak-proof quick couplings.



## Filter selection guide

| Phenomenon                   | FILTERS            |                |                                |                  |                           |
|------------------------------|--------------------|----------------|--------------------------------|------------------|---------------------------|
|                              | Common mode filter | Output choke   | Output choke & overshoot clamp | Sine wave filter | All-pole sine wave filter |
| Common mode currents         | Effective          | Limited effect | Limited effect                 | Effective        | Very effective            |
| Bearing currents             | Effective          |                |                                |                  | Very effective            |
| Voltage spikes U-V-W         |                    | Limited effect | Very effective                 | Very effective   | Very effective            |
| Voltage spikes U-PE          |                    | Limited effect | Effective                      | Limited effect   | Very effective            |
| dU/dt                        |                    | Effective      | Effective                      | Very effective   | Very effective            |
| Minimize motor audible noise |                    | Limited effect | Limited effect                 | Effective        | Effective                 |
| EMC conducted emission       | Limited effect     | Limited effect | Limited effect                 | Effective        | Very effective            |

### Recommendations with the different supply voltages up to and including 480 V

| Situation   | FILTERS                |              |                                |                  |                           |
|---|------------------------|--------------|--------------------------------|------------------|---------------------------|
|   | Common mode filter     | Output choke | Output choke & overshoot clamp | Sine wave filter | All-pole sine wave filter |
| Not rated, delicate or difficult positioned motors      | X                      |              |                                | X                |                           |
| Motor in frame size >280                                | X                      |              |                                |                  |                           |
| IEC 60034-17 motor                                      |                        | X            |                                |                  |                           |
| IEC 60034-25 curve A motor                              | Cable lengths 0-100m** |              |                                |                  |                           |
|   | Cable lengths 100-200m |              | X                              |                  |                           |
|   | Cable lengths 200-500m |              |                                | X                |                           |
| Dynamic use with frequently raised DC voltage (braking) |                        |              | X                              |                  |                           |
| Unshielded cables *                                     |                        |              |                                |                  | X                         |

X = advised solution for this setup

### Recommendations with the different supply voltages from 500 V - 690 V

| Situation   | FILTERS                |              |                                |                  |                           |
|---|------------------------|--------------|--------------------------------|------------------|---------------------------|
|   | Common mode filter     | Output choke | Output choke & overshoot clamp | Sine wave filter | All-pole sine wave filter |
| Not rated, delicate or difficult positioned motors      | X                      |              |                                | X                |                           |
| Motor in frame size >280                                | X                      |              |                                |                  |                           |
| 3 kV isolation windings **                              |                        |              |                                |                  |                           |
| IEC 60034-25 curve B motor                              | Cable lengths 0-100m** |              |                                |                  |                           |
|   | Cable lengths 100-200m |              | X                              |                  |                           |
|   | Cable lengths 200-500m |              |                                | X                |                           |
| Dynamic use with frequently raised DC voltage (braking) |                        |              | X                              |                  |                           |
| Unshielded cables *                                     |                        |              |                                |                  | X                         |

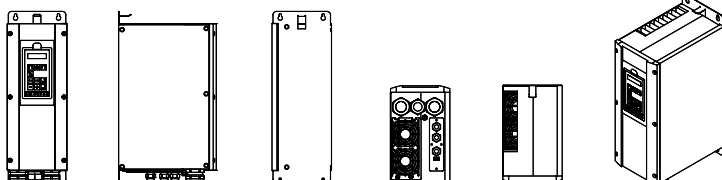
X = advised solution for this setup

### Remarks

Cable lengths should always be as short as possible.  
The table is based on correct EMC wiring with shielded cable and proper EMC installation.  
Voltage drop over the complete system must be less than 10% of the main supply.

Sine wave filters are only for use with V/Hz control mode.  
\* Conducted interference limits on unshielded motor - lines according to EN61800-3, table 16.  
\*\* No marks in a row, means that there is no need to take precautions.

## CAD drawings available on the web



2D and 3D CAD drawings for Emotron AC drives, softstarters and monitors are available via our website. These will assist anyone working with our products, for example, consultants, installers or machine builders. Visit [www.emotron.com](http://www.emotron.com) for direct access to all CAD documents.



## Service and support secure the value of your investment

We provide service and support through all phases of the product life cycle in order to optimize your investment in Emotron products and systems.

### Emotron services

- Consultation and engineering during the planning and conceptual phases of your project.
- Training for you to fully benefit from the Emotron products. Good user knowledge results in reduced operating costs, extended product lifetime and fewer process interruptions.
- Technical support from qualified technicians. In most markets we offer a 24-hour call service.
- Service on site including anything from commissioning to maintenance, fault remedy and repairs.
- Minimized downtime thanks to quick and reliable delivery of spare-parts and replacement equipment.
- Qualified workshop repairs at our repair centres.
- Local and global service and support provided by CG Drives & Automation's technical centres.
- Local and global service and support provided by CG Drives & Automation's authorized service partners with fully trained and certified technicians.

*CG Drives & Automation Sweden AB retains the right to change specifications and illustrations in the text, without prior notification.*

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