# TEC

# **Product data sheet Emotron**

## Variable speed drive VFX48-365-54/ 160KW/ 380-480V

## **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 fulfilled with 80 m motor cable (IP2Y= 25m).
- 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 (not IP2Y).
- Marine (DNV-GL & BV) approved version available (not IP2Y, IP2x).
- Integrated vector braking ensures quick and controlled stops, increasing productivity and safety.
- Built-in brake chopper is standard for IP2Y models and available as option for all other.
- 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.

#### **GENERAL SPECIFICATION**

| Component name                               | VFX48-365-54                      |
|----------------------------------------------|-----------------------------------|
| Suitable Motor Capacity Capacity(KW)         | 160                               |
| Rated Output Current(A)                      | 292                               |
| Maximum Output Current(A)                    | 438                               |
| Input Voltage Range(V)                       | Three-phase 230~480V, 50/60Hz     |
| Allowable Voltage Fluctuation                | -15%~ +10%                        |
| Output Voltage range(V)                      | Three-phase 0~480V                |
| Mains Frequency (Hz)                         | 45 to 65                          |
| Output Switching Frequency (kHz)             | 3                                 |
| Input Power Factor (%)                       | 0.95                              |
| Environmental conditions                     |                                   |
| Nominal ambient temperature                  | 0°C - 40°C (32°F- 104°F)          |
| Atmospheric pressure                         | 86–106 kPa ( 12.5 - 15.4 PSI)     |
| Relative humidity according to IEC 60721-3-3 | Class 3K4, 595% and no condensing |



# **Product data sheet**

| Commonant name                            | No electrically conductive dust allowed. Cooling air must be clean and free from corrosive materi-als. Chemical gases, class 3C2 (coated boards 3C3). Solid particles, class 3S2. |
|-------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Component name                            | VFX48-2K5-54                                                                                                                                                                      |
| Vibrations                                | According to IEC 60068-2-6, Sinusoidal vibrations:                                                                                                                                |
|                                           | 10 <f<57 (0.00295="" 0.075="" ft)<="" hz,="" mm="" td=""></f<57>                                                                                                                  |
|                                           | 57 <f<150 (0,035="" 1g="" hz,="" oz)<="" td=""></f<150>                                                                                                                           |
|                                           |                                                                                                                                                                                   |
| Altitude                                  | 0-1000 m (0 - 3280 ft) with derating 1%/100 m (328 ft) of rated current                                                                                                           |
| Storage temperature                       | -20 to +60 °C (-4 to + 140 °F)                                                                                                                                                    |
| Storage atmospheric pressure              | 86–106 kPa (12.5 - 15.4 PSI)                                                                                                                                                      |
| Storage relative humidity according       | Class 1K4, max. 95% and no condensing and no formation of ice.                                                                                                                    |
| to IEC60721-3-1                           | , a sala sa ga a sa                                                                                                                              |
|                                           |                                                                                                                                                                                   |
| Basic I/O Data                            |                                                                                                                                                                                   |
| Control signal inputs: Analogue (differen | ntial). 4 channels                                                                                                                                                                |
| Analogue voltage/current                  | 0-±10 V/0-20 mA via switch                                                                                                                                                        |
| Max. input voltage                        | +30 V                                                                                                                                                                             |
| Input impedance                           | 20 kΩ (voltage), 250 Ω (current)                                                                                                                                                  |
| Resolution                                | 11 bits + sign                                                                                                                                                                    |
| Hardware accuracy                         | 0.5% type + 1 ½ LSB fsd                                                                                                                                                           |
| Non-linearity                             | 1½ LSB                                                                                                                                                                            |
| Digital inputs: 8 channels                | 172 L3D                                                                                                                                                                           |
|                                           | High > 0 VDC Love 4 VDC                                                                                                                                                           |
| Input voltage                             | High >9 VDC, Low<4 VDC<br>+30 VDC                                                                                                                                                 |
| Max. input voltage                        |                                                                                                                                                                                   |
| Input impedance                           | <3.3 VDC: 4.7 kΩ , ≥3.3 VDC: 3.6 kΩ                                                                                                                                               |
| Signal delay                              | ≤8 ms                                                                                                                                                                             |
| Control signal outputs: Analogue, 2 char  |                                                                                                                                                                                   |
| Output voltage/current                    | 0-10 V/0-20 mA via software setting                                                                                                                                               |
| Max. output voltage                       | +15 V @5 mA cont.                                                                                                                                                                 |
| Short-circuit current (∞)                 | +15 mA (voltage) +140 mA (current)                                                                                                                                                |
| Output impedance                          | $10 \Omega$ (voltage)                                                                                                                                                             |
| Resolution                                | 10 bit                                                                                                                                                                            |
| Maximum load impedance for current        | 500 Ω                                                                                                                                                                             |
| Hardware accuracy                         | 1.9% type fsd (voltage), 2.4% type fsd (current)                                                                                                                                  |
| Offset                                    | 3 LSB                                                                                                                                                                             |
| Non-linearity                             | 2 LSB                                                                                                                                                                             |
| Digital outputs: 2 channels               |                                                                                                                                                                                   |
| Output voltage                            | High>20 VDC @50 mA, >23 VDC open<br>Low<1 VDC @50 mA                                                                                                                              |
| Short-circuit current (∞)                 | 100 mA max (together with +24 VDC)                                                                                                                                                |
| Relays, 3pcs                              |                                                                                                                                                                                   |
| Contacts                                  | 0.1 2.4/11 250.1/4.0                                                                                                                                                              |
|                                           | 0.1 – 2 A/Umax 250 VAC or 42 VDC                                                                                                                                                  |
|                                           | 0.1 - 2 A/Umax 250 VAC or 42 VDC                                                                                                                                                  |
| Reference voltages<br>+10 VDC             | +10 VDC @10 mA short-circuit current +30 mA max                                                                                                                                   |

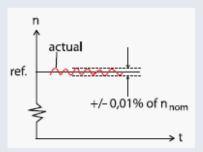


| +24 VDC | +24 VDC short-circuit current +100 mA max (together with |
|---------|----------------------------------------------------------|
|         | Digital Outputs)                                         |

#### **PERFORMANCE**



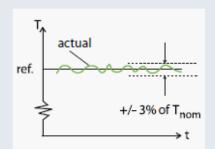
Speed control static accuracy (linearity):



 $\begin{aligned} &\text{Closed loop} = 0.01\% \text{ of } n_{\text{nom}}. \\ &\text{Open loop} = 0.1\% \text{ of } n_{\text{nom}}. \end{aligned}$ 

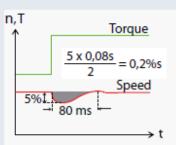
### Control performance for Emotron VFX 2.0 (Torque)

Torque control static accuracy (linearity):

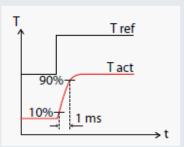


Closed loop: <3% of T<sub>nom</sub>
Open loop: <3% for speeds 10 - 100% of rated, and <10% at zero speed (% of n<sub>nom</sub>).

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.





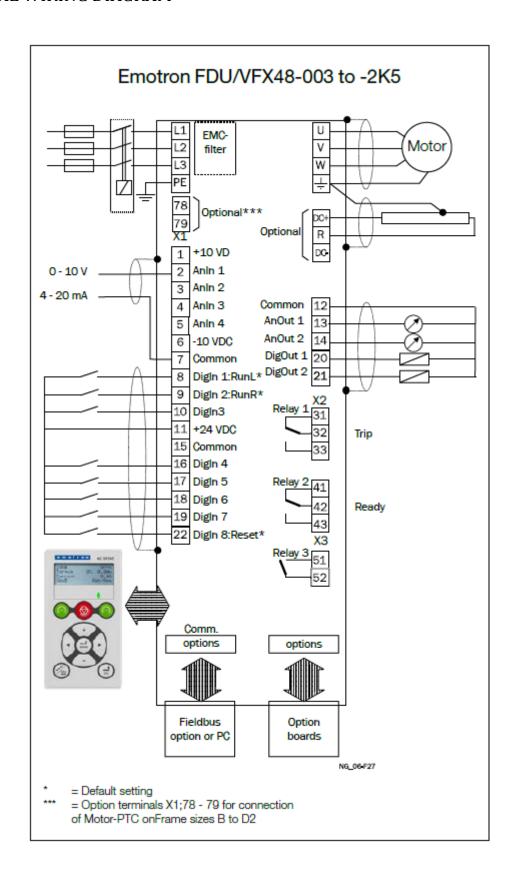
# Control performance for Emotron FDU 2.0 (V/Hz)

Speed control accuracy = approximately 1% of nnom (slip frequency). Torque accuracy = approximately 5% of Tnom (20 - 100% speed).





#### GENERAL WIRING DIAGRAM







| X1 | Name:   | Function (Default):    |
|----|---------|------------------------|
| 1  | +10V    | +10 VDC Supply voltage |
| 2  | AnIn 1  | Speed reference        |
| 3  | AnIn 2  | Not Used               |
| 4  | AnIn 3  | Not Used               |
| 5  | AnIn 4  | Not Used               |
| 6  | -10V    | -10VDC Supply voltage  |
| 7  | Common  | Signal ground          |
| 8  | DigIn 1 | RunL                   |
| 9  | DigIn 2 | RunR                   |
| 10 | DigIn 3 | Not Used               |
| 11 | +24VDC  | +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:    |                                                                                                                                                            |
| 31 | N/C 1    | Relay 1 Output= Trip.                                                                                                                                      |
| 32 | COM 1    | Active when the AC drive is                                                                                                                                |
| 33 | N/O 1    | in a Trip condition. The N/C is opened when the relay is active (valid for all relays). The N/O is closed when the relay is active (valid for all relays). |
| 41 | N/C 2    | Relay 2 Output= Ready.                                                                                                                                     |
| 42 | COM 2    | Active when the AC drive is                                                                                                                                |
| 43 | N/0 2    | ready to start.                                                                                                                                            |
| Х3 | Name:    | Function (Default):                                                                                                                                        |
| 51 | COM 3    | Relay 3 Output= Not used.                                                                                                                                  |
| 52 | N/0 3    |                                                                                                                                                            |

## **DRIVE DIMENSIONS**

(Hx Wx D): preliminary 1395x 345x 365 (mm).

