



Technical Catalogue

AC Drives



Emotron VFX/FDU 2.0
0.55 - 3000 kW, 230 - 690 V
Protection class: IP20, IP21 and IP54

Emotron VFX 2.0 / High dynamics for demanding applications



The Emotron VFX 2.0 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

- Robust and certified IP54 metal construction as standard offers cost-efficient installation close to the application.
- All drive sizes are delivered with a built-in Category C3 EMC-filter as standard. C3 requirements are fulfilled with 80 m motor cable.
- Direct torque control reacts extremely quickly and eliminates disturbances due to abrupt load changes.
- Soft starts minimize start currents and full motor overload capacity is available from standstill.
- UL (UL 840) and marine (DNV) approved version available.
- Integrated vector braking ensures quick and controlled stops, increasing productivity and safety.
- Built-in brake chopper option.
- Speed controlled fans assures less noise, a more even drive temperature and higher drive efficiency.
- Module fuses included as standard for sizes above 300 A at 480 V and above 250 A at 690 V.
- 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 and Turkish.
- 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.



UL 840



GOST R



Emotron VFX 2.0 - IP54 version (Model 48-300 and up also available as IP20)
 Typical motor power at mains voltage 400 V and 460 V

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 @ 400V [kW]	Power @ 460V [hp]	Rated current [A]	Power @ 400V [kW]	Power @ 460V [hp]	Rated current [A]		
VFX48-003	3.8	0.75	1	2.5	0.55	1	2.0	B	IP 54 wall mounted
VFX48-004	6.0	1.5	2	4.0	1.1	1.5	3.2		
VFX48-006	9.0	2.2	3	6.0	1.5	2	4.8		
VFX48-008	11.3	3	3	7.5	2.2	3	6.0		
VFX48-010	14.3	4	5	9.5	3	3	7.6		
VFX48-013	19.5	5.5	7.5	13.0	4	5	10.4		
VFX48-018	27.0	7.5	10	18.0	5.5	7.5	14.4		
VFX48-026	39	11	15	26	7.5	10	21	C	
VFX48-031	46	15	20	31	11	15	25		
VFX48-037	55	18.5	25	37	15	20	29.6		
VFX48-046	69	22	30	46	18.5	25	37	D	
VFX48-061	92	30	40	61	22	30	49		
VFX48-074	111	37	50	74	30	40	59		
VFX48-090	108	45	60	90	37	50	72	E	
VFX48-109	131	55	75	109	45	60	87		
VFX48-146	175	75	100	146	55	75	117		
VFX48-175	210	90	125	175	75	100	140		
VFX48-210	252	110	150	210	90	125	168	F	
VFX48-228	300	110	200	228	90	150	182		
VFX48-250	300	132	200	250	110	150	200	G (2)	
VFX48-300	360	160	250	300	132	200	240		
VFX48-375	450	200	300	375	160	250	300		
VFX48-430	516	220	350	430	200	250	344		H (2)
VFX48-500	600	250	400	500	220	350	400		
VFX48-600	720	315	500	600	250	400	480		I (3)
VFX48-650	780	355	550	650	315	400	520		
VFX48-750	900	400	600	750	355	500	600		
VFX48-860	1032	450	700	860	400	550	688		J (4)
VFX48-1K0	1200	560	800	1000	450	650	800		
VFX48-1K15	1380	630	900	1150	500	750	920	KA (5)	
VFX48-1K25	1500	710	1000	1250	560	800	1000		
VFX48-1K35	1620	710	1100	1350	600	900	1080	K (6)	
VFX48-1K5	1800	800	1250	1500	630	1000	1200		
VFX48-1K75	2100	900	1500	1750	800	1200	1400	L (7)	
VFX48-2K0	2400	1120	1700	2000	900	1300	1600	M (8)	
VFX48-2K25	2700	1250	1900	2250	1000	1500	1800	N (9)	
VFX48-2K5	3000	1400	2100	2500	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. G(2), indicates number of parallel power modules.

Note: calculate available 230 V motor power by multiplying the 400 V power value (kW) from table above with 0.575 or use motor rated current for drive selection. Example: VFX48-046, 22 kW x 0.575 = 12.6 kW at 230 V

Emotron VFX 2.0 - IP54 version (Model 69-250 and up also available as IP20)
 Typical motor power at mains voltage 525 V

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	3.8	1.1	2.5	1.1	2.0	B	IP54 wall mounted	
VFX52-004	6.0	2.2	4.0	1.5	3.2			
VFX52-006	9.0	3	6.0	2.2	4.8			
VFX52-008	11.3	4	7.5	3	6.0			
VFX52-010	14.3	5.5	9.5	4	7.6			
VFX52-013	19.5	7.5	13.0	5.5	10.4			
VFX52-018	27.0	11	18.0	7.5	14.4			
VFX52-026	39	15	26	11	21	C		
VFX52-031	46	18.5	31	15	25			
VFX52-037	55	22	37	18.5	29.6			
VFX52-046	69	30	46	22	37			
VFX52-061	92	37	61	30	49	D		
VFX52-074	111	45	74	37	59			
VFX69-090	108	55	90	45	72	F69		IP 20 module or IP 54 cabinet
VFX69-109	131	75	109	55	87			
VFX69-146	175	90	146	75	117			
VFX69-175	210	110	175	90	140			
VFX69-200	240	132	200	110	160			
VFX69-250	300	160	250	132	200			
VFX69-300	360	200	300	160	240	H69 (2)		
VFX69-375	450	250	375	200	300			
VFX69-400	480	250	400	220	320			
VFX69-430	516	300	430	250	344	I69 (3)		
VFX69-500	600	315	500	300	400			
VFX69-595	720	400	600	315	480			
VFX69-650	780	450	650	355	520	J69 (4)		
VFX69-720	864	500	720	400	576			
VFX69-800	960	560	800	450	640	KA69 (5) K69 (6) L69 (7) M69 (8) N69 (9) O69 (10) P69 (11) Q69 (12) R69 (13) S69 (14) T69 (15)		
VFX69-995	1200	630	1000	500	800			
VFX69-1K2	1440	800	1200	630	960			
VFX69-1K4	1680	1000	1400	800	1120			
VFX69-1K6	1920	1100	1600	900	1280			
VFX69-1K8	2160	1300	1800	1000	1440			
VFX69-2K0	2400	1400	2000	1100	1600			
VFX69-2K2	2640	1600	2200	1200	1760			
VFX69-2K4	2880	1700	2400	1400	1920			
VFX69-2K6	3120	1900	2600	1500	2080			
VFX69-2K8	3360	2000	2800	1600	2240			
VFX69-3K0	3600	2200	3000	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.

Emotron VFX 2.0 - IP54 version (Model 69-250 and up also available as IP20)
 Typical motor power at mains voltage 575 V and 690 V

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 @ 575V [hp]	Power @ 690V [kW]	Rated current [A]	Power @ 575 V [hp]	Power @ 690V [kW]	Rated current [A]		
VFX69-090	108	75	90	90	60	75	72	F69	IP 54 wall mounted
VFX69-109	131	100	110	109	75	90	87		
VFX69-146	175	125	132	146	100	110	117		
VFX69-175	210	150	160	175	125	132	140		
VFX69-200	240	200	200	200	150	160	160		
VFX69-250	300	250	250	250	200	200	200	H69 (2)	IP 20 module or IP 54 cabinet
VFX69-300	360	300	315	300	250	250	240		
VFX69-375	450	350	355	375	300	315	300		
VFX69-400	480	400	400	400	300	315	320	I69 (3)	
VFX69-430	516	400	450	430	350	315	344		
VFX69-500	600	500	500	500	400	355	400		
VFX69-595	720	600	600	600	500	450	480	J69 (4)	
VFX69-650	780	650	630	650	550	500	520		
VFX69-720	864	750	710	720	600	560	576		
VFX69-800	960	850	800	800	650	630	640	KA69 (5)	
VFX69-905	1080	950	900	900	750	710	720		
VFX69-995	1200	1000	1000	1000	850	800	800		
VFX69-1K2	1440	1200	1200	1200	1000	900	960	K69 (6)	
VFX69-1K4	1680	1500	1400	1400	1200	1120	1120	L69 (7)	
VFX69-1K6	1920	1700	1600	1600	1300	1250	1280	M69 (8)	
VFX69-1K8	2160	1900	1800	1800	1500	1400	1440	N69 (9)	
VFX69-2K0	2400	2100	2000	2000	1700	1600	1600	O69 (10)	
VFX69-2K2	2640	2300	2200	2200	1800	1700	1760	P69 (11)	
VFX69-2K4	2880	2500	2400	2400	2000	1900	1920	Q69 (12)	
VFX69-2K6	3120	2700	2600	2600	2200	2000	2080	R69 (13)	
VFX69-2K8	3360	3000	2800	2800	2400	2200	2240	S69 (14)	
VFX69-3K0	3600	3200	3000	3000	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.

Emotron FDU 2.0 / Secure the flow and save energy



The Emotron FDU 2.0 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

- Robust and certified IP54 metal construction as standard offers cost-efficient installation close to the application.
- All drive sizes are delivered with built-in Category C3 EMC-filter as standard. C3 requirements are fulfilled 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.
- Speed controlled fans assures less noise, a more even drive temperature and higher efficiency.
- Module fuses included as standard for sizes above 300 A at 480 V and above 250 A at 690 V.
- 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 and Turkish.
- Operation parameters can be set in your process units, for example m³/min. and bar.
- Removable control panel with own memory means it is easy to transfer or copy settings.
- UL (UL 840) and marine (DNV) approved standard drive.
- Liquid cooled version available for sizes above 90 A.



UL 840



GOST R



Emotron FDU 2.0 - IP54 version (Model 48-300 and up also available as IP20)

Typical motor power at mains voltage 400 V and 460 V

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 @ 400V [kW]	Power @ 460V [hp]	Rated current [A]	Power @ 400V [kW]	Power @ 460V [hp]	Rated current [A]		
FDU48-003	3.0	0.75	1	2.5	0.55	1	2.0	B	IP 54 wall mounted
FDU48-004	4.8	1.5	2	4.0	1.1	1.5	3.2		
FDU48-006	7.2	2.2	3	6.0	1.5	2	4.8		
FDU48-008	9.0	3	3	7.5	2.2	3	6.0		
FDU48-010	11.4	4	5	9.5	3	3	7.6		
FDU48-013	15.6	5.5	7.5	13.0	4	5	10.4		
FDU48-018	21.6	7.5	10	18.0	5.5	7.5	14.4		
FDU48-026	31	11	15	26	7.5	10	21	C	
FDU48-031	37	15	20	31	11	15	25		
FDU48-037	44	18.5	25	37	15	20	29.6		
FDU48-046	55	22	30	46	18.5	25	37		
FDU48-061	73	30	40	61	22	30	49	D	
FDU48-074	89	37	50	74	30	40	59		
FDU48-090	108	45	60	90	37	50	72	E	
FDU48-109	131	55	75	109	45	60	87		
FDU48-146	175	75	100	146	55	75	117		
FDU48-175	210	90	125	175	75	100	140		
FDU48-210	252	110	150	210	90	125	168	F	
FDU48-228	300	110	200	228	90	150	182		
FDU48-250	300	132	200	250	110	150	200		
FDU48-300	360	160	250	300	132	200	240	G (2)	
FDU48-375	450	200	300	375	160	250	300		
FDU48-430	516	220	350	430	200	250	344	H (2)	
FDU48-500	600	250	400	500	220	350	400		
FDU48-600	720	315	500	600	250	400	480	I (3)	
FDU48-650	780	355	550	650	315	400	520		
FDU48-750	900	400	600	750	355	500	600		
FDU48-860	1032	450	700	860	400	550	688	J (4)	
FDU48-1K0	1200	560	800	1000	450	650	800		
FDU48-1K15	1380	630	900	1150	500	750	920	KA (5)	
FDU48-1K25	1500	710	1000	1250	560	800	1000		
FDU48-1K35	1620	710	1100	1350	600	900	1080	K (6)	
FDU48-1K5	1800	800	1250	1500	630	1000	1200		
FDU48-1K75	2100	900	1500	1750	800	1200	1400	L (7)	
FDU48-2K0	2400	1120	1700	2000	900	1300	1600	M (8)	
FDU48-2K25	2700	1250	1900	2250	1000	1500	1800	N (9)	
FDU48-2K5	3000	1400	2100	2500	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. H69(2), indicates number of parallel power modules.

Note: calculate available 230 V motor power by multiplying the 400 V power value (kW) from table above with 0.575 or use motor rated current for drive selection. Example: FDU48-046, 22 kW x 0.575 = 12.6 kW at 230 V

Emotron FDU 2.0 - IP54 version (Model 69-250 and up also available as IP20)
Typical motor power at mains voltage 525 V

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]		
FDU52-003	3.0	1.1	2.5	1.1	2.0	B	IP 54 wall mounted
FDU52-004	4.8	2.2	4.0	1.5	3.2		
FDU52-006	7.2	3	6.0	2.2	4.8		
FDU52-008	9.0	4	7.5	3	6.0		
FDU52-010	11.4	5.5	9.5	4	7.6		
FDU52-013	15.6	7.5	13.0	5.5	10.4		
FDU52-018	21.6	11	18.0	7.5	14.4		
FDU52-026	31	15	26	11	21	C	
FDU52-031	37	18.5	31	15	25		
FDU52-037	44	22	37	18.5	29.6		
FDU52-046	55	30	46	22	37		
FDU52-061	73	37	61	30	49	D	
FDU52-074	89	45	74	37	59		
FDU69-090	108	55	90	45	72	F69	
FDU69-109	131	75	109	55	87		
FDU69-146	175	90	146	75	117		
FDU69-175	210	110	175	90	140		
FDU69-200	240	132	200	110	160		
FDU69-250	300	160	250	132	200	H69 (2)	
FDU69-300	360	200	300	160	240		
FDU69-375	450	250	375	200	300		
FDU69-400	480	250	400	220	320	I69 (3)	
FDU69-430	516	300	430	250	344		
FDU69-500	600	315	500	300	400		
FDU69-595	720	400	600	315	480	J69 (4)	
FDU69-650	780	450	650	355	520		
FDU69-720	864	500	720	400	576		
FDU69-800	960	560	800	450	640	KA69 (5)	
FDU69-995	1200	630	1000	500	800		
FDU69-1K2	1440	800	1200	630	960		
FDU69-1K4	1680	1000	1400	800	1120	L69 (7)	
FDU69-1K6	1920	1100	1600	900	1280		
FDU69-1K8	2160	1300	1800	1000	1440	N69 (9)	
FDU69-2K0	2400	1400	2000	1100	1600		
FDU69-2K2	2640	1600	2200	1200	1760	O69 (10)	
FDU69-2K4	2880	1700	2400	1400	1920		
FDU69-2K6	3120	1900	2600	1500	2080	R69 (13)	
FDU69-2K8	3360	2000	2800	1600	2240		
FDU69-3K0	3600	2200	3000	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.

Emotron FDU 2.0 - IP54 version (Model 69-250 and up also available as IP20)
 Typical motor power at mains voltage 575 V and 690 V

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 @ 575V [hp]	Power @ 690V [kW]	Rated current [A]	Power @ 575V [hp]	Power @ 690V [kW]	Rated current [A]		
FDU69-090	108	75	90	90	60	75	72	F69	IP 54 wall mounted
FDU69-109	131	100	110	109	75	90	87		
FDU69-146	175	125	132	146	100	110	117		
FDU69-175	210	150	160	175	125	132	140		
FDU69-200	240	200	200	200	150	160	160		
FDU69-250	300	250	250	250	200	200	200	H69 (2)	IP 20 module or IP 54 cabinet
FDU69-300	360	300	315	300	250	250	240		
FDU69-375	450	350	355	375	300	315	300		
FDU69-400	480	400	400	400	300	315	320	I69 (3)	
FDU69-430	516	400	450	430	350	315	344		
FDU69-500	600	500	500	500	400	355	400		
FDU69-595	720	600	600	600	500	450	480	J69 (4)	
FDU69-650	780	650	630	650	550	500	520		
FDU69-720	864	750	710	720	600	560	576		
FDU69-800	960	850	800	800	650	630	640	KA69 (5)	
FDU69-905	1080	950	900	900	750	710	720		
FDU69-995	1200	1000	1000	1000	850	800	800		
FDU69-1K2	1440	1200	1200	1200	1000	900	960	K69 (6)	
FDU69-1K4	1680	1500	1400	1400	1200	1120	1120	L69 (7)	
FDU69-1K6	1920	1700	1600	1600	1300	1250	1280	M69 (8)	
FDU69-1K8	2160	1900	1800	1800	1500	1400	1440	N69 (9)	
FDU69-2K0	2400	2100	2000	2000	1700	1600	1600	O69 (10)	
FDU69-2K2	2640	2300	2200	2200	1800	1700	1760	P69 (11)	
FDU69-2K4	2880	2500	2400	2400	2000	1900	1920	Q69 (12)	
FDU69-2K6	3120	2700	2600	2600	2200	2000	2080	R69 (13)	
FDU69-2K8	3360	3000	2800	2800	2400	2200	2240	S69 (14)	
FDU69-3K0	3600	3200	3000	3000	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.

IP20/21 version of Emotron VFX 2.0 and FDU 2.0



The Emotron VFX/FDU drives are also available as IP20 and IP21 versions, in four different frame sizes.

All having the same well proven features as the rest of the Emotron FDU 2.0 and VFX 2.0 family.

Main features

- Robust and compact mechanical design with easy connections
- Built in DC-choke for reduced harmonics and max voltage utilization
- Integrated EMC filter Category C3 as standard
- Speed controlled fans for extended equipment lifetime
- Built in brake chopper option

Emotron VFX 2.0 and FDU 2.0 - IP20/21 version Typical motor power at mains voltage 400 V and 460 V

Model	Max. output current [A]*		Normal duty (120%, 1 min every 10 min)			Heavy duty (150%, 1 min every 10 min)			Frame size
	VFX	FDU	Power @ 400V [kW]	Power @460V [hp]	Rated current [A]	Power @ 400V [kW]	Power @460V [hp]	Rated current [A]	
48-025	38	30	11	15	25	7,5	10	20	C2
48-030	45	36	15	20	30	11	15	24	
48-036	54	43	18.5	25	36	15	20	29	
48-045	68	54	22	30	45	18,5	25	36	
48-060	90	72	30	40	60	22	30	48	D2
48-072	108	86	37	50	72	30	40	58	
48-088	132	106	45	60	88	37	50	70	
48-106	127	127	55	75	106	45	60	85	E2
48-142	170	170	75	100	142	55	75	114	
48-171	205	205	90	125	171	75	100	137	
48-205	246	246	110	150	205	90	125	164	F2
48-244	293	293	132	200	244	110	150	195	

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

Photo gallery



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



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



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



VFX/FDU48: Model 090 - 175 (E)



VFX/FDU48: Model 210 - 250 (F)
VFX/FDU69: Model 090 - 200 (F69)



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



VFX/FDU48: Model 300 - 500 (G and H)
VFX/FDU69: Model 250 - 400 (H69)



VFX/FDU48: Model 600 - 750 (I)
VFX/FDU69: Model 430 - 595 (I69)

VFX/FDU48 - IP20/21 version:



VFX/FDU48: Model 025 - 045 (C2)
IP20 version

VFX/FDU48: Model 060 - 088 (D2)
IP21 version

General specifications for Emotron VFX/FDU 2.0

General

Mains voltage: *	VFX/FDU48 VFX/FDU52 VFX/FDU69	230-480 V** +10%/-15% (-10% at 230 V) 440-525 V** +10%/-15% 500-690 V** +10%/-15%
Mains frequency		45 to 65 Hz
Input total power factor		0.95
Output voltage		0–Mains supply voltage:
Output frequency		0–400 Hz
Output switching frequency		3 kHz (FDU adjustable 1.5-6 kHz)
Efficiency at nominal load		97% for models 003 to 018 98% for models 025 to 3K0

* 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
Atmospheric pressure	86–106 kPa
Relative humidity, non-condensing	0–90%
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: 10<f<57 Hz, 0.075 mm, 57<f<150 Hz, 1g Frame sizes B to D2: IEC 60721-3-3 3M4 (2 - 9 Hz, 3.0mm and 9 - 20Hz, acc. 1g (10m/s ²))
Altitude	0–1000 m 480V AC drives, with derating 1%/100 m of rated current up to 4000 m 690V AC drives, with derating 1%/100 m of rated current up to 2000 m Coated boards required for 2000 - 4000m.

Parameter	Storage condition
Temperature	-20 to +60 °C
Atmospheric pressure	86 –106 kPa
Relative humidity, non-condensing	0 – 90%

Operation at higher temperatures

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

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

Table 1 shows ambient temperatures as well as derating for higher temperatures.

Table 1 Ambient temperature and derating 400–690 V types

Model	Frame size	IP20/IP21		IP54	
		Max temp.	Derating: possible	Max temp.	Derating: possible
VFX/FDU**-003 to VFX/FDU**-074	B - D	-	-	40 °C	-2.5%/ °C to max +10 °C (50 °C)
VFX/FDU48-090 to VFX/FDU48-250	E - F	-	-	40 °C	-2.5%/ °C to max +5 °C (45 °C)
VFX/FDU69-090 to VFX/FDU69-200	F69	-	-	40 °C	-2.5%/ °C to max +5 °C (45 °C)
VFX/FDU48-300 to VFX/FDU48-2K5	G - O	40 °C	-2.5%/ °C to max +5 °C (45 °C)	40 °C	-2.5%/ °C to max +5 °C (45 °C)
VFX/FDU69-250 to VFX/FDU69-3K0	H69 - T69	40 °C	-2.5%/ °C to max +5 °C (45 °C)	40 °C	-2.5%/ °C to max +5 °C (45 °C)
VFX/FDU48-025 to VFX/FDU48-244	C2 - F2	40 °C	-1%/ °C to max +15 °C (55 °C)	-	-

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 48-250 are available as wall mounted modules; with the choice of an IP54 version (frame size B to F), and an IP20/21 version (frame size C2 to F2) that is also optimized for cabinet mounting.

Models from 48-300/69-250 and up consist of 2 to 15 paralleled power electronic building blocks (PEBBs), which can be delivered in standard IP54 cabinets, or be wall mounted as a conformity to IP20.

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

Models	Frame size	Dim. H1/H2 x W x D [mm] IP20*	Dim. H1/H2 x W x D [mm] IP21**	Weight [kg] IP20/IP21	Air flow [m ³ /hour]
48-025 to 48-030	C2	446 / 530 x 176 x 266	446 / 539 x 176 x 272	17	120
48-036 to 48-045					170
48-060 to 48-088	D2	545 / 630 x 220 x 282	545 / 639 x 220 x 282	30	170
48-106 to 48-171	E2	952 / 952 x 275 x 313		53	510
48-205 and 48-244	F2	952 / 952 x 335 x 313		68	800

H1 = Enclosure height

H2 = Total height including cable interface

* without top cover

** with top cover

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

Models (48- or 52-)	Frame size	Dim. H x W x D [mm] IP20 ¹	Dim. H x W x D [mm] IP54	Weight [kg] IP20 ¹ /IP54	Air flow [m ³ /hour]
003 to 018	B	n/a	350(416)x 203 x 200	- /12.5	75
026 to 031	C	n/a	440(512)x178x292	- /24	120
037 to 046	C	n/a	440(512)x178x292	- /24	170
061 to 074	D	n/a	545(590) x 220 x 295	- /32	170
090 to 109	E	n/a	950 x 285 x 314	- /56	510
146 to 175	E	n/a	950 x 285 x 314	- /60	510
210 to 250	F	n/a	950 x 345 x 314	- /74	800
300 to 375	G (2xE)	1036 x 500 x 390	2250 x 600 x 600	140/350	1020
430 to 500	H (2xF)	1036 x 500 x 450	2250 x 600 x 600	170/380	1600
600 to 750	I (3xF)	1036 x 730 x 450	2250x 900 x 600	248/506	2400
860 to 1K0	J (2xH)	1036 x 1100 x 450	2250 x 1200 x 600	340/697	3200
1K15 to 1K25	KA (H+I)	1036 x 1365 x 450	2250 x 1500 x 600	418/838	4000
1K35 to 1K5	K (2xI)	1036 x 1630 x 450	2250 x 1800 x 600	496/987	4800
1K75	L (2xH+I)	1036 x 2000 x 450	2250 x 2100 x 600	588/1190	5600
2K0	M(H+2xI)	1036 x 2230 x 450	2250 x 2400 x 600	666/1323	6400
2K25	N (3xI)	1036 x 2530 x 450	2250 x 2700 x 600	744/1518	7200
2K5	O (2xH+2xI)	1036 x 2830 x 450	2250 x 3000 x 600	836/1772	8000

1) IP20 module for cabinet mounting.

n/a = not applicable

Mechanical specifications for models VFX/FDU69 - IP54 version

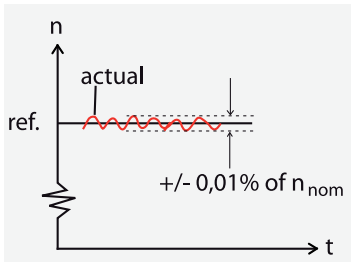
Models (69-)	Frame size	Dim. H x W x D [mm] IP20 ¹	Dim. H x W x D [mm] IP54	Weight [kg] IP20 ¹ /IP54	Air flow [m ³ /hour]
090 to 200	F69	n/a	1090 x 345 x 314	- /77	800
250 to 400	H69 (2xF69)	1176 x 500 x 450	2250 x 600 x 600	176/399	1600
430 to 595	I69 (3xF69)	1176 x 730 x 450	2250 x 900 x 600	257/563	2400
650 to 800	J69 (2xH69)	1176 x 1100 x 450	2250 x 1200 x 600	352/773	3200
905 to 995	KA69 (H69+I69)	1176 x 1365 x 450	2250 x 1500 x 600	433/937	4000
1K2	K69 (2xI69)	1176 x 1630 x 450	2250 x 1800 x 600	514/1100	4800
1K4	L69 (2xH69+I69)	1176 x 2000 x 450	2250 x 2100 x 600	609/1311	5600
1K6	M69 (H69+2xI69)	1176 x 2230 x 450	2250 x 2400 x 600	690/1481	6400
1K8	N69 (3xI69)	1176 x 2530 x 450	2250 x 2700 x 600	771/1651	7200
2K0	O69 (2xH69+2xI69)	1176 x 2830 x 450	2250 x 3000 x 600	866/1849	8000
2K2	P69 (H69+3xI69)	1176 x 3130 x 450	2250 x 3300 x 600	947/2050	8800
2K4	Q69 (4xI69)	1176 x 3430 x 450	2250 x 3600 x 600	1028/2214	9600
2K6	R69 (2xH69+3xI69)	1176 x 3730 x 450	2250 x 3900 x 600	1123/2423	10400
2K8	S69 (H69+4xI69)	1176 x 4030 x 450	2250 x 4200 x 600	1204/2613	11200
3K0	T69 (5xI69)	1176 x 4330 x 450	2250 x 4500 x 600	1285/2777	12000

1) IP20 module for cabinet mounting.

n/a = not applicable

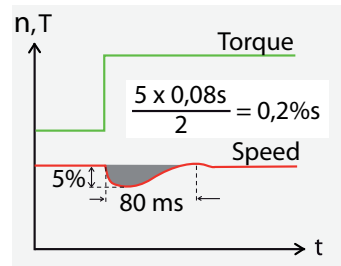
Control performance for Emotron VFX 2.0 (Speed)

Speed control static accuracy (linearity):



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

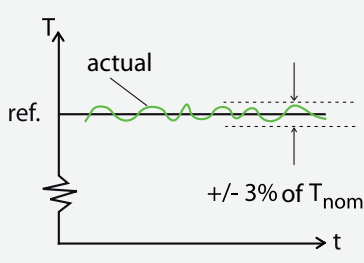
Speed Control dynamic accuracy (impact drop):



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

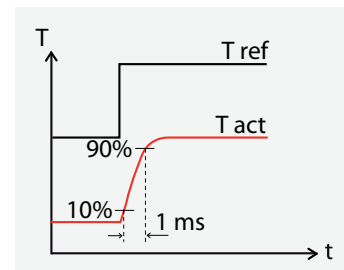
Control performance for Emotron VFX 2.0 (Torque)

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}).

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 n_{nom}
(slip frequency).

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

Basic I/O data

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

See “User interface data” on page 20 for connection data and default settings.

Fuses, cable dimensions and glands according IEC ratings

Use mains fuses of type gL/gG conforming to IEC 269 or circuit breaker with similar characteristics. Check the equipment first before installing the glands. In due time only metric glands will be used.

Max. fuse = maximum fuse value that still protects the AC drive and upholds warranty.

NOTE: The dimensions of fuse and cable cross-section are dependent on the application and must be determined in accordance with local regulations.

NOTE: The dimensions of the power terminals used in models 48-300/69-250 to 3K0 can differ depending on customer specification.

VFX/FDU model	Nominal input current [A]	Maximum value fuse [A]	Maximum cable cross section range supported [mm ²]			Clamping range glands [mm]	
			Mains /motor	Brake	PE	Mains/motor	Brake
**-.003	2.2	4	0.5 - 10		1.5 - 16	M32 opening M20 +reducer (6-12)	M25 opening M20 + reducer (6-12)
**-.004	3.5	4					
**-.006	5.2	6					
**-.008	6.9	8					
**-.010	8.7	10					
**-.013	11.3	16					
**-.018	15.6	20	2.5 - 16 stranded wire 2,5 - 25 solid wire		6 - 35	M32 (12-20) /M32 opening M25+reducer (10-14)	M25 (10-14)
**-.026	22	25					
**-.031	26	35					
**-.037	31	35					
**-.046	38	50	10 - 35 stranded wire 10 - 50 solid wire			M32 (15-21)	M25
**-.061	52	63					
**-.074	64	80					
**-.090	78	100	16-95	16 - 95	16 - 95 (16 - 70) ¹	VFX/FDU48: Ø17-42 cable flexible leadthrough or M50 opening.	VFX/FDU48: Ø11-32 cable flexible leadthrough or M40 opening.
**-.109	94	100					
**-.146	126	160	35-150	16 - 95	35 - 150 (16-70) ¹	VFX/FDU69: Ø23-55 Cable flexible lead-through or M63 opening.	VFX/FDU69: Ø17-42 cable flexible leadthrough or M50 opening.
**-.175	152	160					
69-200	173	200					
48-210	182	200	VFX/FDU48: 35-250	VFX/FDU48: 35-150	VFX/FDU48: 35-250 (95-185) ¹	Ø23-55 cable flexible leadthrough or M63 opening.	Ø17-42 cable flexible leadthrough or M50 opening.
48-228	197	250					
48-250	216	250					
69-250	216	250	VFX/FDU48: (2x) 35-240 VFX/FDU69: (2x) 35-150		frame	-	-
**-.300	260	300					
**-.375	324	355					
69-400	346	400	VFX/FDU48: (2x) 35-240 VFX/FDU69: (3x) 35-150		frame	-	-
**-.430	372	400					
**-.500	432	500					
69-595	520	630	VFX/FDU48: (3x) 35-240 VFX/FDU69: (4x) 35-150		frame	-	-
48-600	520	630					
**-.650	562	630					
69-720	624	710					
48-750	648	710					
69-800	693	800	VFX/FDU48: (4x) 35-240 VFX/FDU69: (5x) 35-150		frame	-	-
48-860	744	800					
69-905	795	900					
69-995	864	1000					
48-1K0	864	1000	VFX/FDU48: (5x) 35-240 VFX/FDU69: (6x) 35-240		frame	-	-
48-1K15	996	1000					
69-1K2	1037	1250					
48-1K25	1083	1250	VFX/FDU48: (6x) 35-240 VFX/FDU69: (7x) 35-240		frame	-	-
48-1K35	1169	1250					
69-1K4	1212	1250					
48-1K5	1296	1500					

For larger sizes please contact CG Drives & Automation

1) Values are valid when brake chopper electronics are built in.

IP20 /21

VFX/FDU model	Nominal input current [A]	Maximum value fuse [A]	Maximum cable cross section range supported [mm ²]			Cable clamp range [mm]	
			Mains / motor	Brake	PE	Mains / motor	Brake
48-025	22	25	4 - 25		Screw size M6	12 - 16	
48-030	26	35				16 - 20	
48-036	31	35				20 - 24	
48-045	38	50				24 - 28	
48-060	52	63	10 - 70		Screw size M6	24 - 28	20 - 24
48-072	64	80				28 - 32	24 - 28
48-088	78	100				32 - 36	28 - 32
48-106	94	100	13 - 150	13 - 125	13 - 125 (16 - 70) ¹	32 - 36	28 - 32
48-142	126	160				13 - 150 (16-70) ¹	36 - 40
48-171	152	160			13 - 150 (16-70) ¹	40 - 44	36 - 40
48-205	182	200	21 - 250	13 - 150	21 - 250 (95-185) ¹	44 - 48	40 - 44
48-244	216	250				48 - 52 / 52 - 56	44 - 48

1) Values are valid when brake chopper electronics are built in



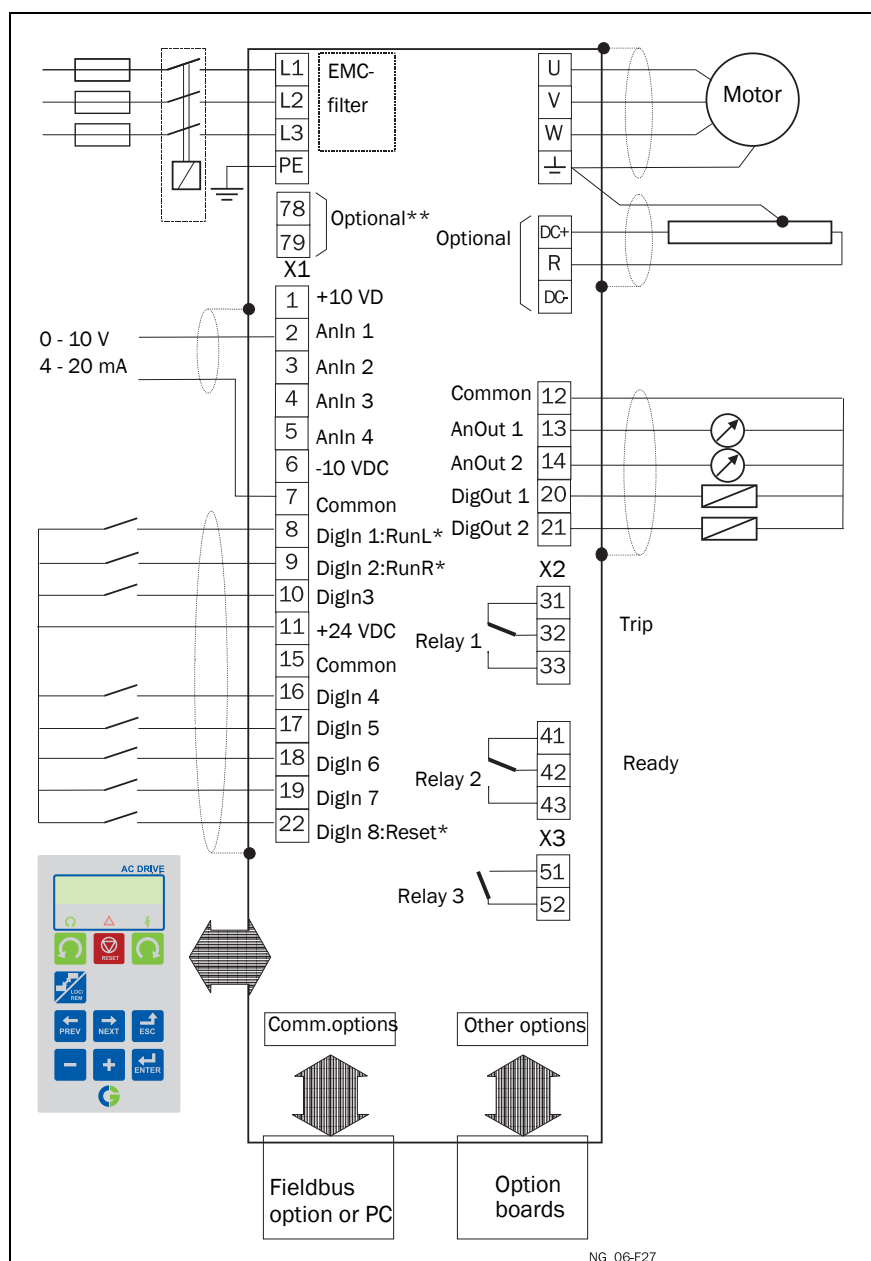
Fuses and cable dimensions according NEMA ratings

Model	Input current [Arms]	Mains input fuses		Cable cross section range supported
		UL Class J TD (A)	Ferraz-Shawmut type	Mains and motor
VFX/FDU48-003	2.2	6	AJT6	AWG 20 - AWG 6
VFX/FDU48-004	3.5	6	AJT6	
VFX/FDU48-006	5.2	6	AJT6	
VFX/FDU48-008	6.9	10	AJT10	
VFX/FDU48-010	8.7	10	AJT10	
VFX/FDU48-013	11.3	15	AJT15	
VFX/FDU48-018	16	20	AJT20	AWG 12 - AWG 4
VFX/FDU48-026	22	25	AJT25	
VFX/FDU48-031	26	30	AJT30	
VFX/FDU48-037	31	35	AJT35	
VFX/FDU48-046	38	45	AJT45	
VFX/FDU48-061	52	60	AJT60	AWG 12 - AWG 4
VFX/FDU48-074	65	80	AJT80	AWG 10- AWG 0
VFX/FDU48-090	78	100	AJT100	AWG 4 - AWG 3/0
VFX/FDU48-109	94	110	AJT110	
VFX/FDU48-146	126	150	AJT150	AWG 1 - AWG 3/0 AWG 4/0 - 300 kcmil
VFX/FDU48-175	152	175	AJT175	
VFX/FDU48-210	182	200	AJT200	AWG 3/0 - 400 kcmil
VFX/FDU48-228	197	250	AJT250	
VFX/FDU48-250	216	250	AJT250	
VFX/FDU48-300	260	300	AJT300	2 x AWG 4/0 - 2 x 300 kcmil
VFX/FDU48-375	324	350	AJT350	
VFX/FDU48-430	372	400	AJT400	2 x AWG 3/0 - 2 x 400 kcmil
VFX/FDU48-500	432	500	AJT500	
VFX/FDU48-600	520	600	AJT600	3 x AWG 4/0 - 3 x 300 kcmil
VFX/FDU48-650	562	600	AJT600	
VFX/FDU48-750	648	700	A4BQ700	
VFX/FDU48-860	744	800	A4BQ800	4 x AWG 4/0 - 4 x 300 kcmil
VFX/FDU48-1K0	864	1000	A4BQ1000	
VFX/FDU48-1K25	1037	1200	A4BQ1200	6 x AWG 4/0 - 6 x 300 kcmil
VFX/FDU48-1K5	1296	1500	A4BQ1500	

Model	Input current [Arms]	Mains input fuses		Cable cross section range supported
		UL Class J TD (A)	Ferraz-Shawmut type	Mains and motor
IP20/21				
VFX/FDU48-025	22	25	AJT25	AWG 12 - AWG 4
VFX/FDU48-030	26	30	AJT30	
VFX/FDU48-036	31	35	AJT35	
VFX/FDU48-045	38	45	AJT45	
VFX/FDU48-060	52	60	AJT60	AWG 8 - AWG 2/0
VFX/FDU48-072	64	80	AJT80	
VFX/FDU48-088	78	100	AJT100	
VFX/FDU48-106	94	110	AJT110	AWG 6 - 300 kcmil
VFX/FDU48-142	126	150	AJT150	
VFX/FDU48-171	152	175	AJT175	
VFX/FDU48-205	182	200	AJT200	AWG 4 - 500 kcmil
VFX/FDU48-244	216	250	AJT250	



User interface data



* = Default selection

** = Optional terminals X1: 78 - 79 for connection of Motor-PTC on Frame sizes B to D2.

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
20	DigOut 1	Ready
21	DigOut 2	Brake/No trip
22	DigIn 8	Reset
X2		
31	N/C 1	Relay 1 output=Trip Active when the AC drive is in a TRIP condition. N/C is opened when the relay is active (valid for all relays) 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 Active when the AC drive is ready to start
42	COM 2	
43	N/O 2	
X3		
51	COM 3	Relay 3 Output=Not used
52	N/O 3	

All inputs and outputs are programmable.

Control panel

A detachable multi-language control panel is included as standard.

Following languages are supported in the control panel:

English, Swedish, Dutch, German, French, Spanish, Russian, Italian, Czech and Turkish.

Standard options for Emotron VFX/FDU 2.0

Support for 3 option boards plus 1 communication option.

I/O board



3 extra relay outputs (230 V_{AC}/5 A NO/NC). 3 extra 24 V /3.2 k Ω (AC or DC) differential digital inputs, all programmable. Inputs providing 50 V_{AC/DC} isolation between channels.

Maximum 3 I/O boards can be built-in per AC drive.

Part no. 01-3876-01

Encoder board



Differential encoder input suitable for 5 V (TTL) or 24 V (HTL) incremental encoders, range 5-16384 pulses/revolution. Inputs min 9 k Ω . Max frequency = 100 kHz. For single

ended or differential type of encoders (A/B, A'/B'). Selectable encoder supply voltage output 5 V_{DC} or 24 V_{DC}.

Part no. 01-3876-03

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.

Part no. 01-3876-08

CRIO board (VFX)

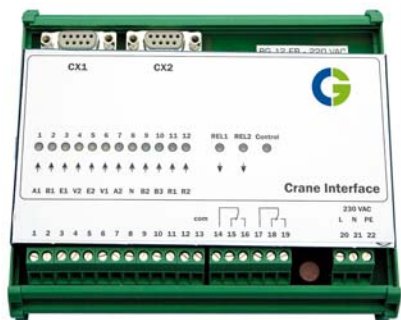


Crane option board to control hoist or travel motions. Inputs for joystick control: supporting 4-step, motor potentiometer or analog reference joystick types. Inputs for slow down and end limits switches (2+2). All 12 digital inputs 24 V/5 k Ω (8 - 24V) DC.

2 relay outputs 250 V/2A_{AC}, for mechanical brake and load deviation protection. Load dependent field weakening operation of hoists also supported.

Part no. 01-3876-07

Crane interface (VFX)



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

- For DIN-rail mounting.
- HxWxD = 125 x 150 x 50 mm

- Available for 230 V/27 k Ω (120 - 250V) AC or 24 V/2.7 k Ω (15 - 36 V) DC input signals.
- LED indications for all inputs and outputs.

Part no. 590059 (230 V_{AC})
590060 (24 V_{DC})

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.

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

Part no. 01-3876-05

Fieldbus - DeviceNet



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

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

Part no. 01-3876-06

Ethernet - Modbus/TCP



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

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

Part no. 01-3876-09

Ethernet - EtherCAT®



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

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

Part no. 01-3876-10

Ethernet - Profinet IO 1-port



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

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

Part no. 01-3876-11

Ethernet - Profinet IO 2-port



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

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

Part no. 01-3876-12

RS232/RS485 isolated

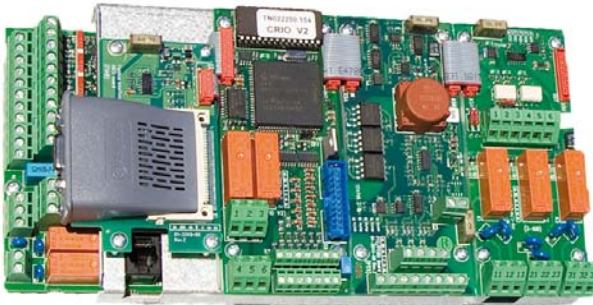


Isolated RS232/RS485 serial communication board. For Modbus/RTU communication protocol. Baud rates: 2400 - 38400 bits/s supported.

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

Part no. 01-3876-04

Coated boards



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

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. 01-3957-21 (Size B)
01-3957-31 (Size C/C2)
01-3957-01 (Size D/D2 and up)

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. 01-3957-20 (Size B)
01-3957-30 (Size C/C2)
01-3957-00 (Size D/D2 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. 01-5039-00 (complete with cable)

Note: When ordering please specify which type of AC drive that will be connected, for delivery of the correct cable kit:
A: For VFX/FDU Standard drives
B: For CDU/CDX Motor mounted drives
C: For VFX/FDU and CDU/CDX drives

Glands for 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.

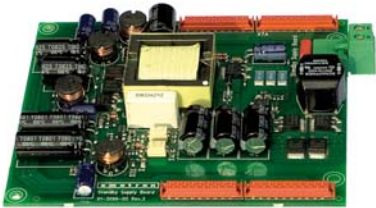
EmoSoftCom



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.

Factory mounted options for Emotron VFX/FDU 2.0

Standby power supply



Built-in standby power supply board. To be connected to external 24 V AC/DC supply voltage.

If the main power is switched off, the control board, control panel and the connected options, for example

fieldbus communication, will continue to operate.

Part no: 01-3954-00
Part no: 01-3954-50 (coated)

Safe stop



Safe stop for size B to D2
(uses 1 of the 3 option positions)



Safe stop for size E, E2 and up

Extra built-in inputs and outputs for emergency stop circuit, conforming with the norms EN-IEC 62061:2005 SIL2 and EN-ISO 13849-1:2006.

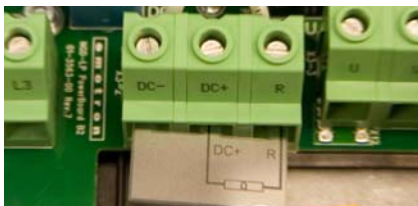
Blank control panel



Blank panel instead of control panel (to maintain IP54).

Indication LED's for Power, Run and Trip available.

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. This option can not be after mounted. The brake resistor must be mounted outside the AC drive.

(See page 29 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.

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.

Extended options for Emotron VFX/FDU 2.0

Extended EMC filter 90-650A



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
VFX/FDU48-090	3F480-100.230	325x150x107	7.1	IP20 ¹
VFX/FDU48-109	3F480-125.230	345x175x127	10	IP20 ¹
VFX/FDU48-146	3F480-150.230	375x175x135	10	IP20 ¹
VFX/FDU48-175	3F480-180.230	490x170x158	13.5	IP00 ²
VFX/FDU48-210	3F480-220.230	490x170x158	13.5	IP00 ²
VFX/FDU48-250	3F480-250.230	490x230x158	18.2	IP00 ²
VFX/FDU48-300	3F480300.230	490x230x158	18.2	IP00 ²
VFX/FDU48-375	3F480-400.230	580x230x158	22	IP00 ²
VFX/FDU48-430	3F480-500.230	630x345x158	37.5	IP00 ²
VFX/FDU48-500	3F480-500.230	630x345x158	37.5	IP00 ²
VFX/FDU48-600	3F480-600.230	660x375x187	42	IP00 ²
VFX/FDU48-650	3F480-700.230	865x345x157	42	IP00 ²

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). For further advice when to use output options see filter selection guide, page 30

Nominal current (I_N) A/Phase	L [mH]	Weight [kg]	Dimensions HxWxD [mm]	Part no.
2.8	1.5	0.6	60x78x95	473160 00
4.4	1	0.6	60x78x95	473161 00
6.6	0.65	0.6	60x78x95	473162 00
11	0.4	1	65x96x105	473163 00
14.3	0.3	1	65x96x105	473164 00
18.2	0.25	1.2	74x96x105	473165 00
26.4	0.175	1.2	74x96x105	473166 00
32	0.15	1.7	84x125x140	473167 00
65	0.1	4	105x155x205	473168 00
90	0.1	8.4	120x90x235	473169 00
146	0.05	10.2	140x190x260	473170 00
175	0.05	13.4	160x210x180	473171 00
275	0.032	18.4	170x230x200	473172 00
320	0.025	18.9	170x230x200	473173 00
410	0.021	22.6	180x240x210	473174 00

Overshoot clamp



Together with the output choke, the overshoot clamp restricts the voltage and the dV/dt on the motor winding. 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 G and up)

NOTE: AC drive, frame sizes B up to F(69), must be ordered including the option DC+/DC-connections.

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.

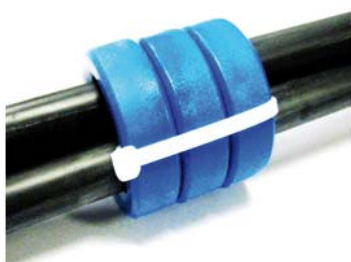
Voltage drop approximately 25 V at rated current, 50 Hz.

Overload: 110% for 5 min, 150% for 2 min or 200% for 30 s.

For further information see filter selection guide, page 30

Filter type 3AFS400-	Protection class	Power [kW]	Nom. current (I_N) A/Phase	Power loss [W]	Weight [kg]	Dimensions 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 are to be routed through common mode filter rings. These filters can also be used to reduce EMC emissions in supply cables.

Part no. 052213

(size G - T69 require one Common mode filter per PEBB).

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	60	40	25	6	IP54	IP23
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

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 G - 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

Filters	Common mode filter	Output choke	Output choke & overshoot clamp	Sine wave filter	All-pole sine wave filter
Phenomenon					
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 effective	Limited effect	Limited effect	Effective	Very effective

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

Filters	Common mode filter	Output choke	Output choke & overshoot clamp	Sine wave filter	All-pole sine wave filter
Situation					
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

Filters	Common mode filter	Output choke	Output choke & overshoot clamp	Sine wave filter	All-pole sine wave filter
Situation					
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.

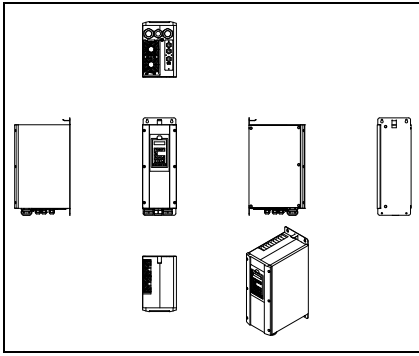
Voltage drop over the complete system must be less than 10% of the main supply.

Sine wave filters are only for use with Emotron FDU.

* 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.cgglobal.com or www.emotron.com for direct access to all CAD documents.

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- Technical support from qualified technicians. In most markets we offer a 24-hour call service.
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- 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.

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