CONTROL TECHNIQUES

DFS SERIES

READY TO USE, FAST TURNAROUND

HIGH POWER FREESTANDING DRIVES

DRIVE OBSESSED

FREE STANDING DRIVES

DFS SERIES

DFS SERIES

PRE-ENGINEERED ENCLOSED DRIVES

Efficient System Build.

Designing and building a high power drive cubicle takes immense engineering knowhow. Most people don't have that expertise in-house. But we do. And we've put it all into our DFS freestanding drives.

The DFS Drive is a pre-assembled, ready to install drive enclosure system designed for higher power applications, providing a robust, serviceable AC drive solution for reliable motor control and optimal efficiency.

DFS SERIES KEY HIGHLIGHTS

Ready-to-ship | Ready-to-use

- Industry standard integratable enclosures (Rittal) (for dimensions see pages 7-8)
- Includes line input reactor, Molded Case Circuit Breaker (MCCB), easy to service UL fuses & mounting plate, conformal coated AC drive, output reactor*, and door mounted data port.

  *Option on DFS1
- Drive models include: Unidrive M600, M700, M701, M702, as well as the F600 Pump, and H300 HVAC models
- Pre-installed available options include:
  - Harmonic and EMC filters
  - Broad suite of door controls
  - Additional terminal rails
- Configuration options including isolated incomer section, interior lighting, provisioning for top or bottom entry, and additional bays for customer controls
- See page 18 for full list of options
- Chassis interior rail-system allows easy & secure front access to service drive

Fast turnaround

- Factory stocked units available for 1 business day emergency shipment
- Factory stocked 460 V units available:
  - 175 HP HD/200 HP ND
  - 250 HP HD/300 HP ND
  - 350 HP HD/400 HP ND
- Best-in-class lead-times up to 1,250 HP
- Up to 800 HP in as little as 5 days;
  - 1,250 HP in as little as 10 days
- Contact your local Control Techniques' distributor for fast & easy quoting of DFS configurations

Easy set-up

- All DFS enclosures are factory tested prior to shipment
- Standard door-mounted data port for easy PC connectivity to drive
- Easy-to-use Connect PC tool for optimized commissioning
  - Full parameter management features including easy cloning
  - Guided setup wizard for drive-motor pairing & auto-tuning
  - Real time visualization and manipulation of drive control system with dynamic logic diagrams

ENERGY EFFICIENT

HIGH POWER APPLICATIONS

Fans & pumps

- 1 – 'Easy, Guided Pump Setup Wizard in Connect PC Tool'
- Low Load Power Saving
- Demand-based sleep mode
- Cascade and Multi-leader control modes for parallel pump systems
- No-flow detection
- Over-cycling protection
- Pipe fill
- Level switch control
- Cleaning / de-ragging
- Dynamic V/Hz, optimizing to the variable torque load
- Sleep/wake functions & Standby power mode
- Variable speed heatsink cooling fan
- Catch-a-spinning load, for smooth transition when starting a rotating or windmilling load like an axial fan blade or blower wheel
- Skip-Frequencies feature allows easy avoidance of resonate equipment frequencies, which may cause high levels of vibration
- Torque mode for better control of applications using a blower wheel
- Trip less over voltage control, limiting the amount of regenerative power based on the system losses without the need to add a dynamic braking resistor
- DC Injection & Dynamic Braking
- On-board dual PID functions
- Real Time Clock
- Analog & Digital IO control
- Fieldbus communications, (EtherNet/IP, PROFINET, Modbus TCP/IP, EtherCAT, PROFIBUS, DeviceNet, Modbus RTU)
- Onboard user logic functions
- Onboard PLC user program area
- Second processor support, (PLC option)

Fans & pumps cont.

Protection

- Over Voltage, Instananeious over current, Control & power over temp, supply & motor phase loss, Control (communications) trips.
- Simplex & Multiplex constant pressure control
- Duty Assist: Duty drive with fix speed starter Assist
- Pump anti-ragging control

Compressors

- Onboard PLC & PID functionalities for advanced control without the cost and footprint of an external controller
- Increased energy efficiency and optimal control for increased Coefficient of Performance (CoP)
- Improve power factor (>0.95) and reduce motor starting current by a factor of 8:1 to further reduce power demand from your utility
- On-board kWh energy, run-time and running cost meters help document and capture energy savings

General Automation

- Maximum control for conveyors with S-ramp acceleration/ deceleration profiling and automated load control
- Efficient control of mixer and extruder applications with up to 200% overload
- Precise speed & current control for rapid dynamic response in extruder applications
- Closed-loop control for cranes and hoists for precision accuracy
- High reliability and control for crushers and impact loads
- Quick and easy retrofits for web handling applications such as unwind, rewind and nip control applications
- An additional bay can be included for third-party input/ output provisioning for easy retrofitting across applications

CAN-DO DRIVES

Courtesy of Steven Engineering, Inc - (800) 258-9200 - sales@steveneng.com - www.stevenengineering.com

DFS SERIES

MAINTAIN PLANT UPTIME

with high reliability, easy maintenance and fast service support.

Rugged, reliable drive systems

- Highly robust enclosures with ingress protection options to meet the needs of the application
  i. UL Type 12 (IP54) as standard
  ii. UL Type 3R (Rated to 50°C ambient)
- Chassis interior rail-system allows easy & secure front access to service drive
- Enclosure temperature control via intelligent fan system
- High quality auxiliary components sourced from leading automation industry vendors
- Built with stringent quality controls with full traceability and rigorous testing gives our plant ISO-9001 accreditation

Optimum local service support to minimize downtime

- Control Techniques is active in 70 countries, offering local support through experienced factory technical & field services, including an extensive network of Certified Partners
- **Factory Flat-Rate Startup service packages** are available, offering efficient commissioning of the drive system to keep your project on-time and on-budget
- Comprehensive online support & complimentary user-friendly drive commissioning and diagnostic Connect software, including a guided drive setup wizard.

FREE DOWNLOAD

Diagnostic Tool

Quickly resolve any error codes that the drive displays. To download our Diagnostics Tool app: visit: **www.ctdrives.com/moblie-apps**

FREE DOWNLOAD

Drive set-up

Easy Drive Setup using our complimentary Connect commissioning software, including a guided setup wizard: **www.ctdrives.com/connect**

2 YEAR FREE WARRANTY

Free 2 year warranty

All of our components come with a 2-year warranty for peace of mind. Warranty terms and conditions apply.

Download support

To gain access to a comprehensive collection of manuals available for download visit **www.ctdrives.com/DFS-manuals** or scan the **QR code.**

c UL us

Each enclosure is UL marked.

MAXIMUM VERSATILITY

VARIANTS FOR EVERY APPLICATION

DFS is available with a control stage to suit any application:

- Ultimate motor control of precision AC Induction, high-efficiency Permanent Magnet, or high dynamic Servo Motors.
- DFS supports the latest high-efficiency motors to maximize return on investment and minimize impact on the environment.

Select from: Unidrive M700, M701, M702 or Pump Drive F600 control

	**M700**	**Ethernet**	High Performance PM and IM Control. ■ Multi-protocol Ethernet communications ■ 1 x STO certified to SIL3/PLe ■ Analog and digital I/O ■ Advanced Motion Controller and optional Machine Controller
	**M701**	**Unidrive SP replacement**	High Performance PM and IM Control. ■ Modbus RTU over RS485 communications ■ 1 x STO certified to SIL3/PLe ■ Analog and digital I/O ■ Advanced Motion Controller and optional Machine Controller
	**M702**	**Safety enhanced**	High Performance PM and IM Control. ■ Multi-protocol Ethernet communications ■ 2 x STO certified to SIL3/PLe ■ Digital I/O onboard, analog I/O option available ■ Advanced Motion Controller and optional Machine Controller
	**F600**	**Pump & Process**	Optimum energy efficiency for fan, pump and compressor applications. Pump Drive F600 works with permanent magnet or induction motors to deliver the most efficient performance and highest energy savings for fan, pump and compressor applications.

Please refer to the individual product brochures for full information

Output frequency

DFS drives have a maximum output frequency of 599 Hz and are, therefore, not subject to special export controls. High-frequency drives are available on request.

DFS1

Door-mounted LCD keypad

MCCB (Molded Case Circuit Breaker)

Optional cylinder lock with key, or padlockable handle

Door fan (filtered)

Plinth: 4 in standard
(8 in optional)

*Shown: UL Type 12 construction with drive heatsink thru-panel mounted.
UL Type 1 construction available, totally enclosed drive design within enclosure, with roof fan.

Optional Incomer Bay, isolating drive section from circuit breaker, not shown.

Roof vent (outlet)

UL semi-conductor fuses

AC input circuit breaker (MCCB)

Motor connections & brake terminal

Drive control terminals

Control transformer

Plinth: 4 in standard (8 in optional)

DFS2

Door-mounted LCD keypad

MCCB (Molded Case Circuit Breaker)

Optional cylinder lock with key, or padlockable handle

UL Type 12 roof vents (filtered)

UL Type 3R option

UL semi-conductor fuses

Incomer bay isolation barrier

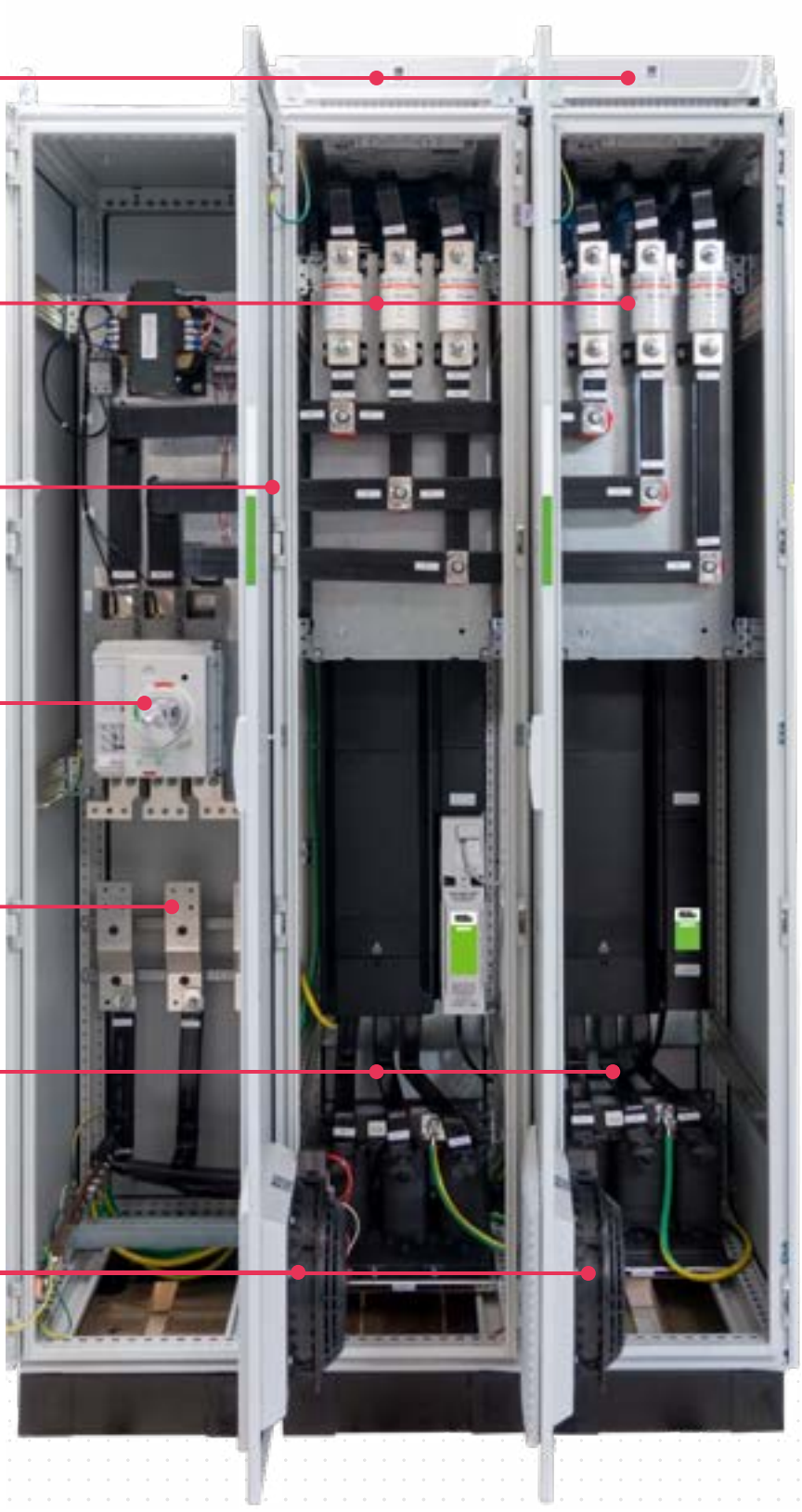
AC input circuit breaker (MCCB)

Motor connections

Output sharing choke

UL Type 12 door fans (filtered)

UL Type 3R option



DFS SERIES
DIMENSIONS

	Dimensions
A	UL Type 12 up to 7 in (180 mm)
B	89 in (2,260 mm)
C	3.94 in (100 mm) or 7.87 in (200 mm)
D	UL Type 12 – 23.62 in (600 mm)
E	DFS1 – 15.75 in (400 mm) DFS2L, M, N – 47.25 in (1,200 mm) DFS2Q - 55.12 in (1,400 mm) DFS3 70.87 (1,800 mm)

NOTE: For UL Type 3R (NEMA3R) dimensions, consult factory. Overall dimensions similar to UL Type 12 layout.

DFS SERIES
ORDERING GUIDE

Order Code

Digit:	1 2 3 4	5	6 7 8	9	10	11	12	13	14	15
	Drive Range		Format	Drive Specification					Primary Cubicle Options	
	MXXX	-	DFS	1	X	X	A	N	M	X

Drive Range:
M600
M700
M701
M702
F600 Pump Drive

Drive Switching Frequency options available: 2 kHz, 3 kHz, 4 kHz, 6 kHz, 8 kHz, 16 kHz

Freestanding Drive

DFS Range

Current rating step

Supply voltage:
4 = 460 V; 5 = 575 V

World region:
A = Americas

Input circuit:
N = Rectifier Single 6 pulse
R = Regen Active-Front-End (AFE)

Input switch:
M = Molded Case Circuit Breaker (MCCB, 35 kA)

Enclosure Rating:
B = UL Type 12 (NEMA12) Air Cooled
C = UL Type 3R (NEMA3R) Air Cooled

NOTE: Contact your local distributor to configure factory options

Options:

Feature	Description
Enclosure rating	UL Type 12 (NEMA12) UL Type 3R (NEMA3R)
Environmental	UL Type 12: 40°C (104°F) Ambient Temperature Rating UL Type 3R: 50°C (122°F) Ambient Temperature Standard (Anti-Condensation Heaters included) Anti-Condensation Heaters
Supply	Molded Case Circuit Breaker (MCCB) 35 kA* Molded Case Circuit Breaker 65 kA* Molded Case Circuit Breaker 100 kA* MCCB Shunt Trip 110 V MCCB Under Voltage Trip 110 V MCCB Auxiliary Contacts Harmonic Filters Input Contactor Incomer Bay (DFS1 Only - Isolated MCCB & Fuses, supports top or bottom cable supply)
Door Controls	Remote Mounted Keypad (Standard) Start & Stop Pushbuttons Running & Power-On Lamps Fault/Reset Pushbutton & Lamp Auto/Manual Selector Switch Speed Potentiometer Ethernet/110 Vac Outlet Emergency Stop (Standard or w/ relay) Power / Energy Meter 180 degree hinged doors Locks: Barrel Type (Standard), Key, or Padlockable HMI
Motor	dV/dt Protection Brake Control Motor Blower Starter
Enclosure Configuration Options	MOV protection for use on un-earthed supplies Removal of internal EMC filter for use on un-earthed supplies 24 Vdc External Supply (maintains control of drive with isolator open) Additional terminal rail for customer control connections 110 Vac Control Interface (24 Vdc Standard) Interior Lighting 4'' Plinth-base (Standard), 8'' Plinth-base (Optional) Additional Enclosure Bay with backplate (15.75'')
Freight & Packaging	Expedited Shipping Additional Crating Options

*Dependent on DFS frame and voltage ratings

Drive selection for 460 VAC

with standard primary enclosure options including isolater MCCB, UL fusing, keypad and door mounted data port

40°C (104°F) Ambient | UL TYPE 12 | UL TYPE 3R†				
460 VAC +/-10% | 60 Hz				
Order Code (Short)	Normal Duty 2 kHz 110 % Rated Current		Heavy Duty 3 kHz Open Loop = 150 % Rotor Flux Control = 170 %	
	xxxx = F600, M600, M700, M701, M702			
	Motor Shaft Power	Max Cont. Current	Motor Shaft Power	Max Cont. Current
	HP*	Amps	HP*	Amps
xxxx-DFS1G4AN	125	155	100	134
xxxx-DFS1H4AN	150	184	125	157
xxxx-DFS1J4AN	175	221	150	180
xxxx-DFS1K4AN	200	266	175	211
xxxx-DFS1L4AN	250	320	200	270
xxxx-DFS1M4AN	300	361	250	307
xxxx-DFS1N4AN	350	437	300	377
xxxx-DFS1P4AN	400	487	350	415
xxxx-DFS1Q4AN	450	507	350	415
xxxx-DFS2L4AN	500	608	450	513
xxxx-DFS2M4AN	600	686	500	583
xxxx-DFS2N4AN	700	830	600	716
xxxx-DFS2Q4AN	850	963	700	789
xxxx-DFS3N4AN	1000	1245	900	1075
xxxx-DFS3P4AN	1150	1388	1000	1185
xxxx-DFS3Q4AN	1250	1445	1000	1185

†UL TYPE 3R available up to 450 HP ND (350 HP HD)

50°C (122°F) Ambient | UL TYPE 12 | UL TYPE 3R‡				
460 VAC +/-10% | 60 Hz				
Order Code (Short)	Normal Duty 2 kHz 110 % Rated Current		Heavy Duty 3 kHz Open Loop = 150 % Rotor Flux Control = 170 %	
	xxxx = F600, M600, M700, M701, M702			
	Motor Shaft Power	Max Cont. Current	Motor Shaft Power	Max Cont. Current
	HP*	Amps	HP*	Amps
xxxx-DFS1G4AN	125	155	100	134
xxxx-DFS1H4AN	150	184	125	146
xxxx-DFS1J4AN	175	221	150	180
xxxx-DFS1K4AN	200	253	150	193
xxxx-DFS1L4AN	250	320	200	270
xxxx-DFS1M4AN	300	343	225	282
xxxx-DFS1N4AN	350	437	300	377
xxxx-DFS1P4AN	400	462	325	380
xxxx-DFS2L4AN	500	608	450	513
xxxx-DFS2M4AN	550	651	475	535
xxxx-DFS2N4AN	700	830	600	716
xxxx-DFS2Q4AN	800	878	650	722
xxxx-DFS3N4AN	1000	1245	900	1074
xxxx-DFS3P4AN	1100	1316	950	1083

‡UL TYPE 3R available up to 400 HP ND (325 HP HD)

*Horsepower ratings reflect typical 4-pole 60 Hz motor.
For correct drive selection, use motor nameplate Amps

Drive selection for 575 VAC

with standard primary enclosure options including isolater MCCB, UL fusing, keypad and door mounted data port

40°C (104°F) Ambient | UL TYPE 12 | UL TYPE 3R†				
575 VAC +/-10% | 60 Hz				
Order Code (Short)	Normal Duty 2 kHz 110 % Rated Current		Heavy Duty 3 kHz Open Loop = 150 % Rotor Flux Control = 170 %	
	xxxx = F600, M600, M700, M701, M702			
	Motor Shaft Power	Max Cont. Current	Motor Shaft Power	Max Cont. Current
	HP*	Amps	HP*	Amps
xxxx-DFS1B5AN	75	86	60	63
xxxx-DFS1C5AN	100	108	75	86
xxxx-DFS1D5AN	125	125	100	104
xxxx-DFS1E5AN	150	150	125	131
xxxx-DFS1F5AN	200	200	150	152
xxxx-DFS1G5AN	200	200	175	190
xxxx-DFS1H5AN	250	248	200	200
xxxx-DFS1J5AN	300	288	225	221
xxxx-DFS1K5AN	350	315	225	221
xxxx-DFS2F5AN	375	380	300	288
xxxx-DFS2G5AN	375	380	350	361
xxxx-DFS2H5AN	500	471	375	380
xxxx-DFS2K5AN	600	598	450	419
xxxx-DFS3H5AN	700	706	600	570
xxxx-DFS3J5AN	800	820	650	629
xxxx-DFS3K5AN	900	897	650	629

†UL TYPE 3R available up to 350 HP ND (250 HP HD)

50°C (122°F) Ambient | UL TYPE 12 | UL TYPE 3R‡				
575 VAC +/-10% | 60 Hz				
Order Code (Short)	Normal Duty 2 kHz 110 % Rated Current		Heavy Duty 3 kHz Open Loop = 150 % Rotor Flux Control = 170 %	
	xxxx = F600, M600, M700, M701, M702			
	Motor Shaft Power	Max Cont. Current	Motor Shaft Power	Max Cont. Current
	HP*	Amps	HP*	Amps
xxxx-DFS1B5AN	75	86	60	63
xxxx-DFS1C5AN	100	104	75	86
xxxx-DFS1D5AN	125	125	100	104
xxxx-DFS1E5AN	150	150	125	131
xxxx-DFS1F5AN	200	200	150	150
xxxx-DFS1G5AN	200	200	175	190
xxxx-DFS1H5AN	225	226	200	200
xxxx-DFS1J5AN	250	262	200	200
xxxx-DFS1K5AN	300	296	200	200
xxxx-DFS2F5AN	375	380	275	285
xxxx-DFS2G5AN	375	380	350	361
xxxx-DFS2H5AN	450	429	375	380
xxxx-DFS2K5AN	550	562	375	380
xxxx-DFS3H5AN	650	644	600	570
xxxx-DFS3J5AN	750	746	600	570
xxxx-DFS3K5AN	850	843	600	570

‡UL TYPE 3R available up to 300 HP ND (200 HP HD)

*Horsepower ratings reflect typical 4-pole 60 Hz motor.
For correct drive selection, use motor nameplate Amps

DRIVE OBSESSED

CONTROL TECHNIQUES

Control Techniques has been designing and manufacturing the best variable speed drives in the world since 1973.

Our customers reward our commitment to building drives that outperform the market. They trust us to deliver on time every time with our trademark outstanding service.

More than 45 years later, we're still in pursuit of the best motor control, reliability and energy efficiency you can build into a drive. That's what we promise to deliver, today and always.

1.4K+
Employees

70
Countries

#1 FOR ADVANCED MOTOR AND DRIVE TECHNOLOGY

Nidec

Nidec Corporation is a global manufacturer of electric motors and drives.

Nidec was set up in 1973. The company made small precision AC motors and had four employees. Today, it's a global corporation that develops, builds and installs cutting-edge drives, motors and control systems in over 70 countries with a workforce of more than 110,000.

You'll find its innovations in thousands of industrial plants, IoT products, home appliances, cars, robotics, mobile phones, haptic devices, medical apparatus and IT equipment all over the world.

109K	$14.6B	70+	330+
Employees	Group Sales	Countries	Companies

CONTROL TECHNIQUES

CONTROL TECHNIQUES IS YOUR GLOBAL DRIVES SPECIALIST.

With operations in over 70 countries, we're open for business wherever you are in the world.

For more information, or to find your local drive centre representatives, visit:

www.controltechniques.com

Connect with us

THE AUTOMATION ENGINEER

Control Techniques Americas. Registered Office: 7078 Shady Oak Road Eden Prairie, MN 55344-3505 USA
+1 800 893-2321

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Nidec
All for dreams