QDRIVE 3L-NPC

Medium Voltage
High Dynamics Drives

DANIELI AUTOMATION

DANIELI AUTOMATION MV QDRIVES HIGH PERFORMANCES & BIG FLEXIBILITY

Danieli Automation QDrive 3L-NPC, modular design and sturdy construction, internal arcing proof, to better meet customer's requirement. The system is designed aiming to reliable operations, with simplified maintenance due to the wheeled power modules for easy servicing, with state of the art control structure and user friendly interface.

QDrive 3L-NPC

Danieli Automation MV QDrive 3L-NPC are high performances water cooled vector controlled drives, in three level Neutral Point Clamped (NPC) topology. Active Front End (AFE) line fully regenerative converter allows optimal network impact. This solution is the perfect choice as AC/DC converters & multi-drive DC link inverters arrangement. QDrives are designed for demanding metals rolling mill applications, with Field Oriented Control (FOC) for synchronous and induction motors, developed with focus on high flexibility, operability and maintenance.

QDrive 3L-NPC meet the following requirements:
> High dynamic performances
> High power rating at low frequencies
> Line power factor = almost 1.0 (AFE version)
> Four-quadrant operation (AFE version)

The line side and motor-side converters use IGBT modules or IGCT disk power semiconductors, the converters ratings range from 4 MVA up to 30 MVA. Main applications are machines and plants in metal and in the process industry.

Main features
> Ready-to-connect cabinet unit
> Design focused on easy maintenance and quick power module replacement (wheeled power modules allow very fast substitution without any special tool or lifting device)
> Four-quadrant operation as standard configuration
> Fully-digital vector closed-loop control, for synchronous and induction motors
> High control accuracy and dynamic response
> Extremely low line harmonics spectrum (with AFE)
> Optimum interaction with automation overriding control system
> Simple and fast commissioning
> Simple operator control and monitoring
> Inbuilt Remote Teleservice
> Extremely reliable in operation and almost maintenance-free
> Interchangeable modules, usable on both AFE or INVERTER unit
> Long-life MV capacitor units

QDRIVE 3L-NPC Technical Data

Drives typical configuration	Single Drive unit with single AFE Single Drive unit with single DFE with braking unit Single Drive unit with double inverter and double AFE (12 p) Multiple Drives with single AFE Multiple Drives with double AFE (12 p) Double drive units with double inverters and AFE Other configurations upon request IGCT and IGBT modules could be used in the above configurations
Typical overall dimensions & weight *(with external WCU, internal MCS and without output reactors. With integrated WCU, add 1,450 mm to line-up width and 1,100 kg as weight)* (*) External resistors box	**Drive unit** — **Width x depth x height (mm)** — **Weight (kg)** Single Drive unit / single AFE (IGCT type) — 6,950 x 1,650 x 2,385 — 9,630 Single Drive unit / single DFE / braking unit (IGCT type) (*) — 6,250 x 1,650 x 2,385 — 7,830 Single Drive unit / double inverter / double AFE (IGCT type) — 11,550 x 1,650 x 2,385 — 16,630 Multiple Drives unit — According to specific configuration
Motor type	Induction or separately DC excited synchronous motor
Output reactor	Included as default for each inverter unit
Output isolator	Included as default for each inverter unit
Input power factor	Depends on cabinet arrangement & line converter configuration (AFE, DFE, 6 or 12 pulses) and network data Typical value of input displ. factor with AFE: approx 1 (AFE) or approx 0.95 (DFE)
Auxiliary voltage range	380...480 Vac 50 or 60 Hz
External cooling water operating range	10 ... 32 °C
Water cooling unit capacity & power losses to air	According to drive configuration requirements
Cabinet standard protection degree	IP32 (others upon request)
Drive switchboard cabinet rated voltage class	3.6 kV
Drive switchboard cabinet short circuit certified withstanding	31.5 kA for 1 s, 78.75 kA peak, withstanding tested according to EN62271-200
Applicable standard	IEC 60146 - IEC 61800-3/4/5 - IEC 60204-11 - EN 62271-200 - EU directives for Low Voltage and EMC

QDRIVE 3L-NPC Power Module technical data

Power module and Device type	Phase module - IGCT				Three phase inverter - IGBT		
Power module	10 MVA	11 MVA	12 MVA	15 MVA	4 MVA	4.8 MVA	7 MVA
Output voltage range	0...3300 Vac rms				0...3300 Vac rms		
Output frequency range	2...75 Hz without derating				2...90 Hz without derating		
Rated continuous current (A, rms)	1400	1500	1500	1400	480	580	800
Maximum overload output current (A, rms)	1750	1890	2000	2500	730	880	1280
Base continuous current (A, rms) to apply max overload for 60 seconds (every 600 seconds)	1360	1450	1435	1218	445	540	730

QDRIVE Optional System Components

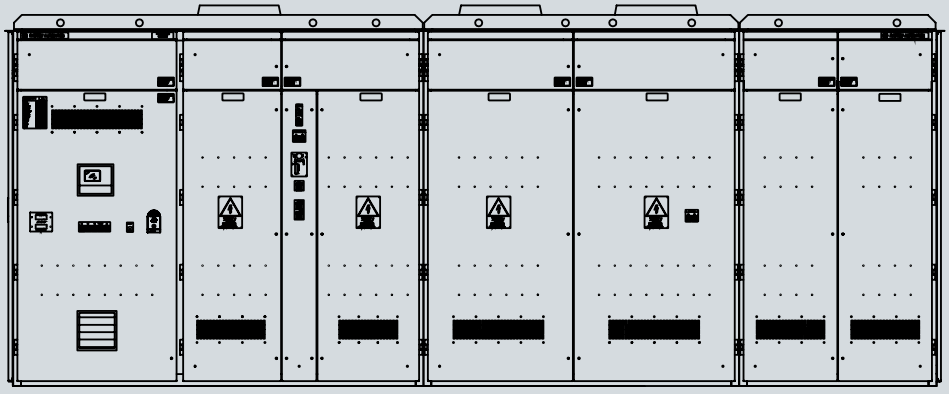
EXC	Field Exciter Cabinet for DC excited Synchronous motor
MCS	Auxiliary system motors control & starters cabinet
UPS	UPS for control unit

QDRIVE 3L-NPC

Cabinet layout

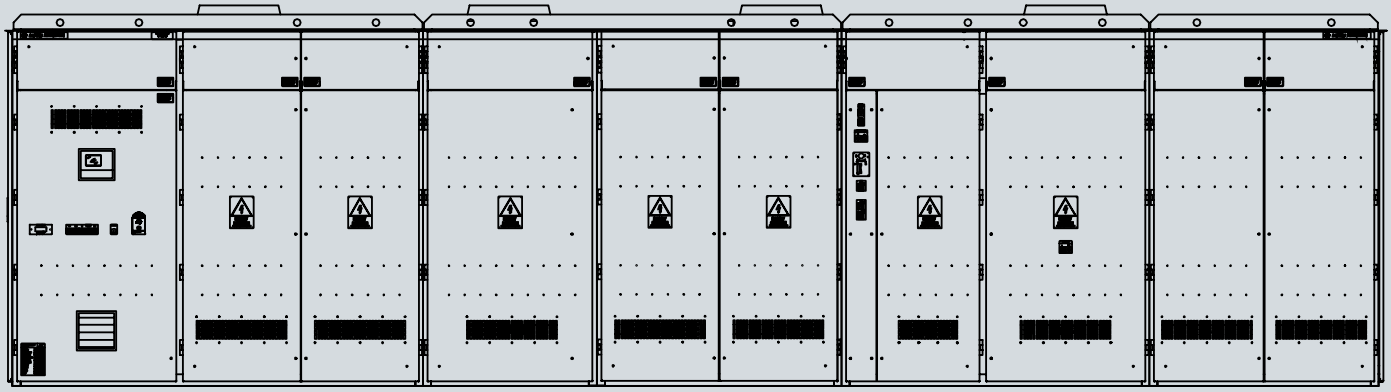
Typical single drive arrangement

IGBT VERSION



DFE TERMINAL UNIT | DFE UNIT | CROWBAR UNIT | INVERTER UNIT | INVERTER TERMINAL UNIT | COOLING WATER UNIT

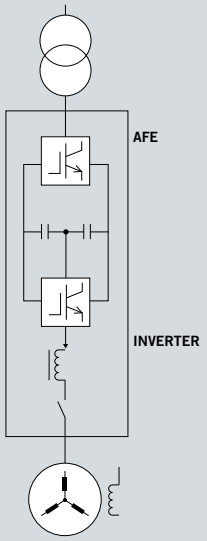
IGCT VERSION



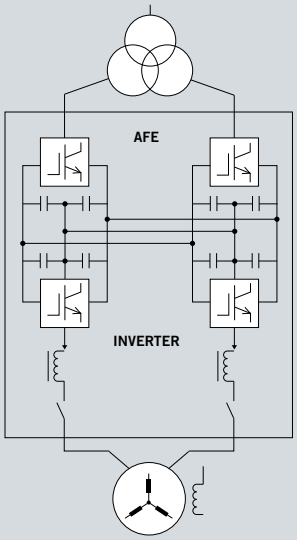
AFE TERMINAL UNIT | AFE UNIT | CAPACITOR UNIT | INVERTER UNIT | CROWBAR SECTION | INVERTER TERMINAL UNIT | COOLING WATER UNIT

QDRIVE 3L-NPC

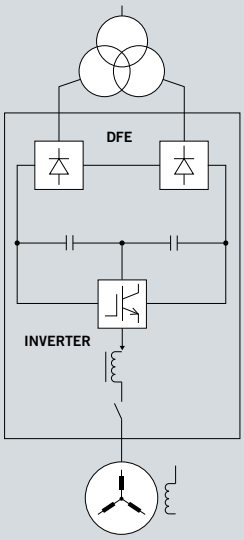
Power part configurations & control architecture



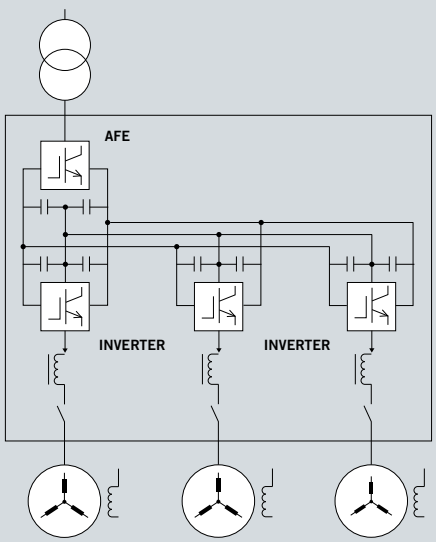
Single Unit arrangement with Active Front End (AFE)



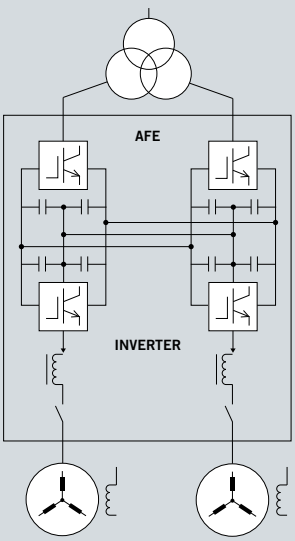
Double Unit arrangement with Active Front End (AFE)



Single Unit arrangement with Diode Front End (DFE)

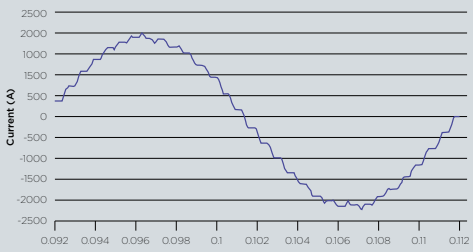


Single unit arrangement with single AFE and multiple inverters

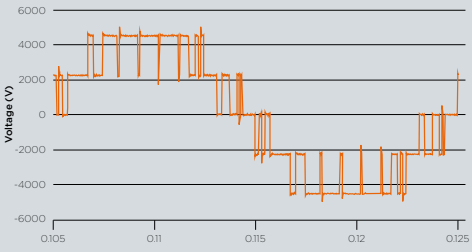


Double unit arrangement with double AFE and multiple inverters

(Inverter Terminal Unit with Output Reactor and Output Switch are optional)



Phase current waveform

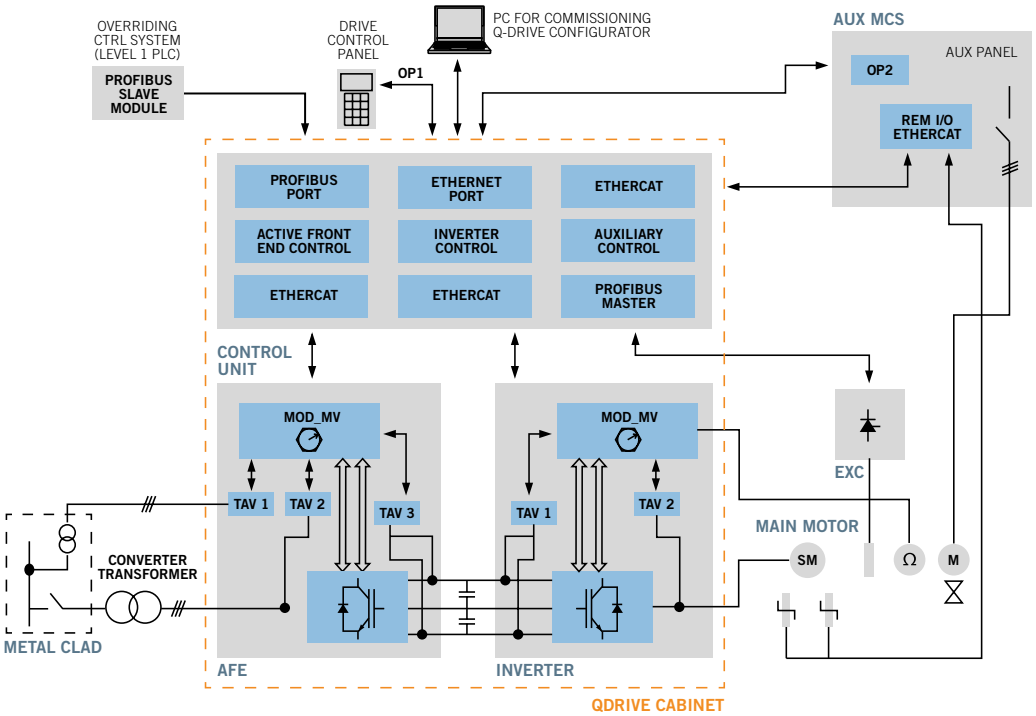


Phase to phase voltage waveform

Control architecture
The control structure is based on a powerful, state-of-the-art Danieli Automation Process Automation Controller (DA-PAC), that communicates with power part (modulator boards) with Ethercat optical fiber hi-speed link to ensure control trouble-free operation in the worst EMI environment.
The control unit handles the drive system and its auxiliary system, monitoring the transformer, the converter power part and the motor, for safe operation and troubleshooting.
The control system software is written in CoDeSys, a powerful IDE IEC – 61131-3 compliant, that is an industrial standard for automation and real-time fast control system.
The controller could be interfaced with any overriding control system using any type of fieldbus.

The powerful multi-core processing unit Process Automation Controller allows also the implementation of the logics and sequences needed for the control of the Auxiliary Systems.

The controller is equipped with remote access facility to allow remote teleservice, fast troubleshooting and effective system monitoring, via internet world's wide web.



QDRIVE 3L-NPC control architecture

QDRIVE 3L-NPC

Maintenance

Simple and fast maintenance is a key factor for reliable equipments. The design of the power modules, realized with wheeled frames, allows a fast and easy replacement in about 30 minutes. Moreover, special tools or lifting device are not necessary for modules substitution.
Anyhow, maintenance trolley and power module handling frame are included in the supply.


A
P


DANIELI AUTOMATION

MV Drive system supervision

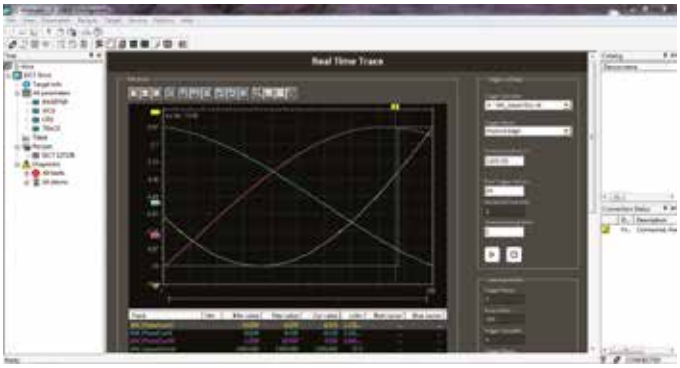
OP Operator Panels

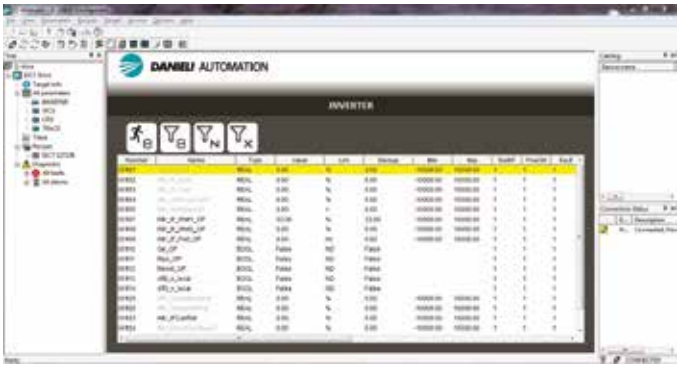
> Operator panel

> Drive system supervisor panels

> PC commissioning tools

Converters Operator Panel (OP) and Drive system supervisor panel
The MV drive system is equipped with two operator panels (colour touch panels), one for AFE and Inverter parametrization (OP1, located on the control unit door), while the other is for the complete drive system monitoring and it is normally located on auxiliary MCS cabinet door (OP2). Through the panels it is possible to perform extensive drives units and systems components parametrization, monitoring, servicing and troubleshooting.





Powerful PC commissioning tool for AFE & inverter
The drive control unit could be easily interfaced to a PC, using Ethernet with a simple patch cable.
Danieli Automation has developed a powerful software tool application - QDrive Configuration Tool - that allows drive parametrisation, tuning, accurate and fast signal tracing, saving-retrieving drives parameters and advanced troubleshooting.


DANIELI AUTOMATION
DANIELI AUTOMATION
QDRIVE MVWL
Status
Parameters
Diagnostic
Settings
Backup
Password
Operation
STATUS
WATCH 1
WATCH 2
MAIN READY
HDPC
DRIVE STATUS
EMERGENCY
DIAGNOSTIC
READY TO SWITCH ON
READY TO RUN
READY TO REFERENCE
Alarms
Faults
READY TO SWITCH ON
ETHERNET

Auxiliaries cabinets

> EXC

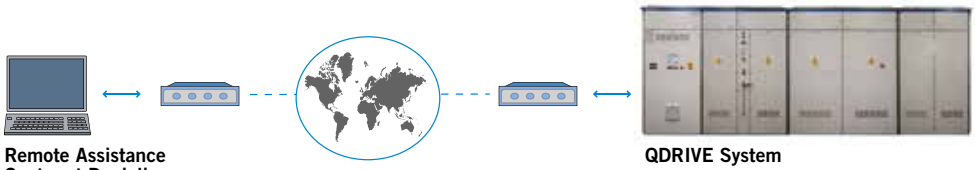
> AUX MCS

Auxiliary cabinets designed for QDrive are based on the well-proven Danieli Automation low-voltage power switchboards standard design.

EXC - Field Exciter converter cabinet for synchronous motor DC excitation
The unit includes market-type LV AC/DC compact converter with protection crowbar.
The cabinet has incoming line circuit breaker and it is controlled from QDrive Control unit through Internal Profibus network.

AUX_MCS - Auxiliary system motors control starter cabinet
This unit includes all the needed power starters and feeders for the MV drive system, UPS for control unit and Drive system supervision panel (OP2).
All contained in a DA standard cabinet type.

Remote Teleservice



Remote Assistance Center at Danieli Headquarters

QDRIVE System

Danieli Automation provides Remote Teleservice, a flexible and effective service solution to reduce assistance costs and optimize intervention time.
The Teleservice is designed to allow the connection of QDrive control unit with the remote assistance stations located at Danieli headquarters in Italy, to allow the troubleshooting and monitoring of the QDrive system.
Teleservice assures a remote non-stop service and a reliable support for a quick solution of unexpected malfunctions, with the following benefits:
> Immediate intervention of a specialist at any time.
> Limits or avoids the specialist's travelling time and costs.
> Increase the power of the internal team by accessing a virtually unlimited remote resource for problem solving.

Fields of application

- > Fast finishing blocks
- > Flat product rolling mill stands
- > Flat product large coilers
- > Large fans and compressors
- > Reversible stands for bloom and slab mills
- > Large shears
- > Pipe piercing mills


CRANES
DANIELI
DANIELI
DANIELI


DANIELI AUTOMATION

HEADQUARTERS

DANIELI
Via Nazionale, 41
33042 Buttrio (UD) Italy
Phone +39 0432 195 8111
Fax +39 0432 195 82 89
www.danieli.com
info@danieli.com

DANIELI AUTOMATION
Via Bonaldo Stringher, 4
33042 Buttrio (UD) Italy
Phone +39 0432 518 111
Fax +39 0432 673 177
www.dca.it
info@dca.it

DANIELI WORLDWIDE

ARGENTINA
Yerba Buena T4107GRS,
Tucumán
Tel. (54) 9351 5514390
service.argentina@danieli.com

AUSTRIA
Max Planck Strasse, 5
A - 9100 Völkermarkt
Tel. (43) 4232.51440.6101
info@austria.danieli.com

BRAZIL
Rod. Raimundo Antunes Soares, 2289
CEP 18115-120 Votorantim São Paulo
Tel. (55) 11.39953150
info@brazil.danieli.com

CHINA
Room 2580, 25th floor
37 Maizidian street
Chaoyang District, Beijing
Phone (86) 0512 52267086
infodia@danieli.com

CROATIA
Vinez 601,
Labin 52220
Tel. (385) 52 884 130
info.hr@systec.danieli.com

EGYPT
Millennium Building, No.69, Sect 1
5th Settlement 11835 New Cairo
Tel. (202) 2.8133698
info@egypt.danieli.com

FRANCE
Tours Mercuriales
40 Rue Jean Jaurès
F-93176 Bagnolet Cedex
Tel. (33) 1.49722269
info@danieli-rotelec.fr

GERMANY
Schifferstrasse 166
D-47059 Duisburg
Tel. (49) 203.98567000
info@germany.danieli.com

INDIA
Technopolis Building
Plot 4, Block - BP, 5th Floor
Wing - B, Sector - V, Salt Lake
700 091 Kolkata - West Bengal
Phone (91) 33.39847777
info@india.danieli.com

INDONESIA
Office 8 Building, 17th Floor SCBD Lot
28 Jl. Jenderal Sudirman Kav. 52-53
12190 Jakarta
Tel. (62) 21.29333750
service.indonesia@danieli.com

JAPAN
42F, Yokohama Landmark Tower
2-2-1, Minatomirai, Nishi-ku
Yokohama-City 20-8142
Tel. (81) 45.651.7077
info@japan.danieli.com

KOREA
602 6th Fl., Yeondang Bldg., 439
Teheran-Ro, Gangnam-Gu,
06158 Seoul
Tel. (82) 2.5626622
info@korea.danieli.com

KSA
Silver Tower 6th floor
P.O. Box 4867
Al-Khobar 31952
Tel. (966) 3.8993145
info@ksa.danieli.com

MEXICO
C. Padre Mier 1545, Of. 502,
Obispado, 64040 Monterrey,
Nuevo Leon
+52 81.83781056
info@mexico.danieli.com

SPAIN
Poligono Sondikalde
Calle Portu Bidea, 2
48150 Sondika - Vizcaya
Tel. (34) 94.4872800
info@spain.danieli.com

SWEDEN
Nya Ågatan, 23
SE-77782 Smedjebacken
Tel. (46) 240.668500
mh@morgardshammar.se

TAIWAN
26F-1, No. 31
Hai-Bian Road
Kaohsiung City, Taiwan 802
Tel. (886) 7.3358655
info@taiwan.danieli.com

THAILAND
Land Plot N. K11
The Eastern Seaboard Ind. Estate
Tambol Pluakdaeng, Amphur
Pluakdaeng, 21140 Rayong
Tel. (66) 38.929000
info@thailand.danieli.com

THE NETHERLANDS
Rooswijkweg 291, 1951
ME Velsen-Noord
Tel. (31) (0) 251.500500
info@danieli-corus.com

TURKEY
1. OSB Istiklal Mahallesi
1. Cadde No. 15
Beykoy - Duzce
Tel. (90) 3805537110
info@turkey.danieli.com

UAE
Late Ahmed Masaood building
Office 1102, 11th floor Nadja Street,
Abu Dhabi
Tel. (971) 0 6749 619
service.uae@danieli.com

UKRAINE
Glinky Street 2, Office 301
49000 Dnipropetrovs'k
Tel. (380) 56.7904301
info@ukraine.danieli.com

UNITED KINGDOM
4 Ignite, Magna Way
Rotherham S60 1FD
Tel. (44) 1709.724300
info@uk.danieli.com

USA
600 Cranberry Woods Drive
Suite 200
Cranberry Township, PA 16066
Tel. (1) 724.7785400
info@usa.danieli.com

USA
114 Chesser Crane Road
Chelsea, AL 35043
Phone (1) 205.6787451
info@usa.danieli.com

VIETNAM
Lot A4b Industrial Park
Tan Thuan EPZ (E-Office Park)
Tan Thuan Dong Ward, District 7
Ho Chi Minh City
Tel. (84) 28.37929400
info@vietnam.danieli.com

DA-23-GE-CA-171.1