Port & Terminal Technology USA 2017

Something NEW for the Crane Retrofit Market

AC and DC Motors Controlled by the SAME Variable Speed Drive

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AC or DC Motors Controlled by the SAME Variable Speed Drive

Jim Gabbard
Sales Manager
Automated Crane Systems
TMEIC Corp

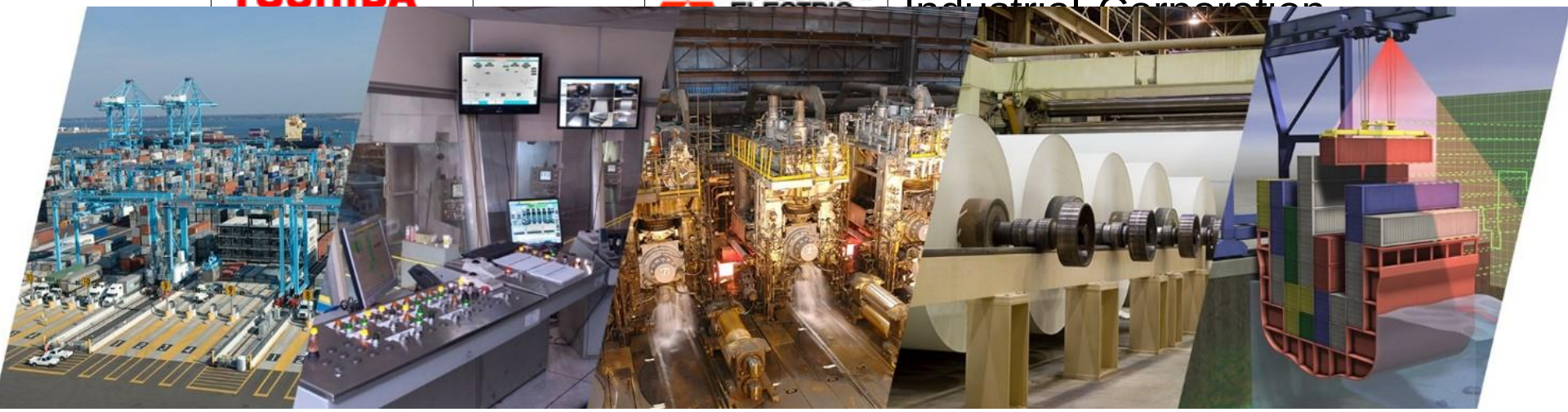
Who is TMEIC?

TMEIC

TOSHIBA

MITSUBISHI

Industrial Corporation

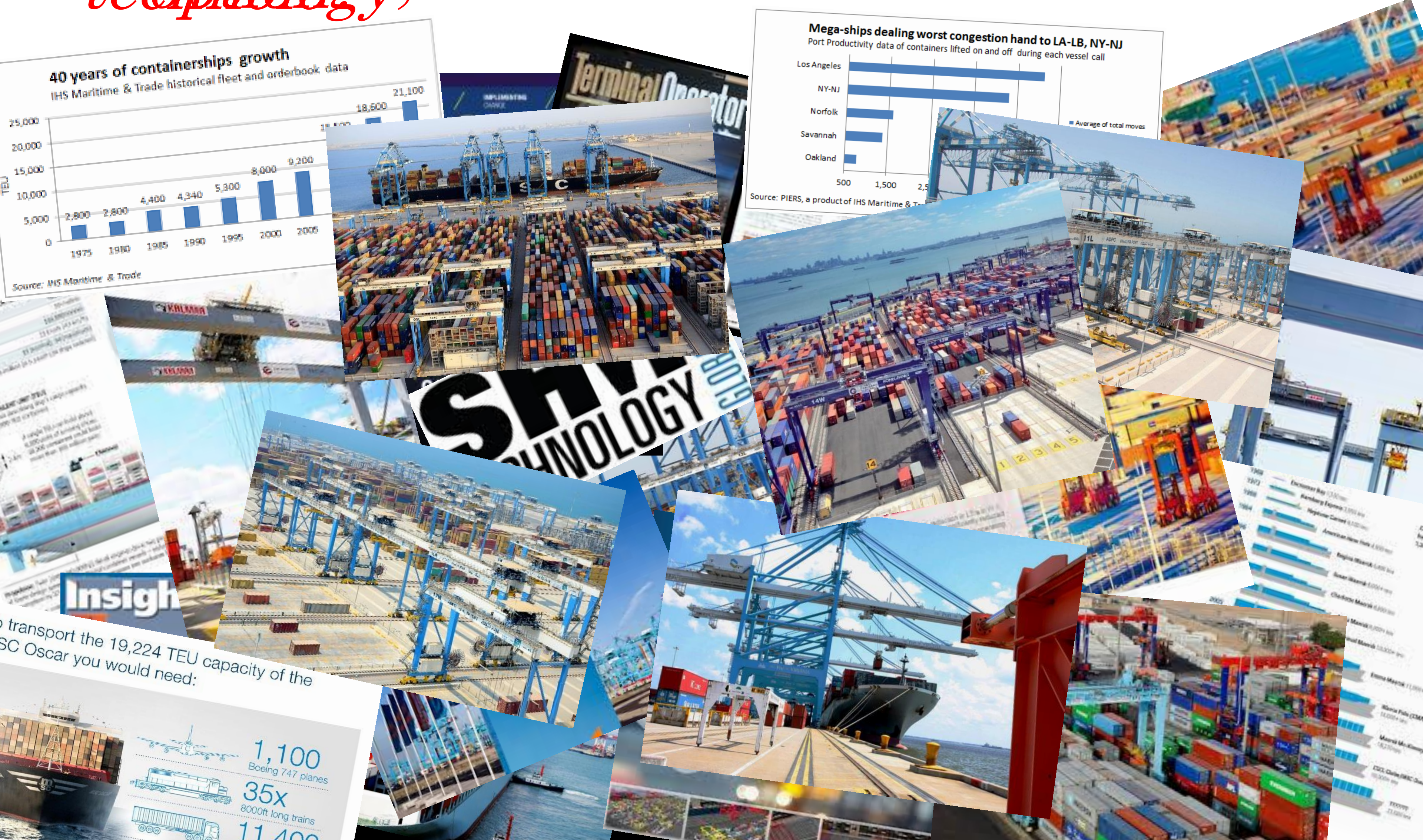


Today, we want the newest technology;

Faster

More Efficient

Greener




VALUE
PRiCE

Experience counts

Long History of SUCCESS

What have been the traditional options ?

DC to DC Retrofits

DC to AC/DC Retr

DC to DFE Retrofits

DC to AC Retrofits

What if we had a 4th option ???

Replace old drives and retain DC motors

Built on the foundation of the
TMdrive 10e2 and TMdrive 10e2 DDC

Quay Cranes

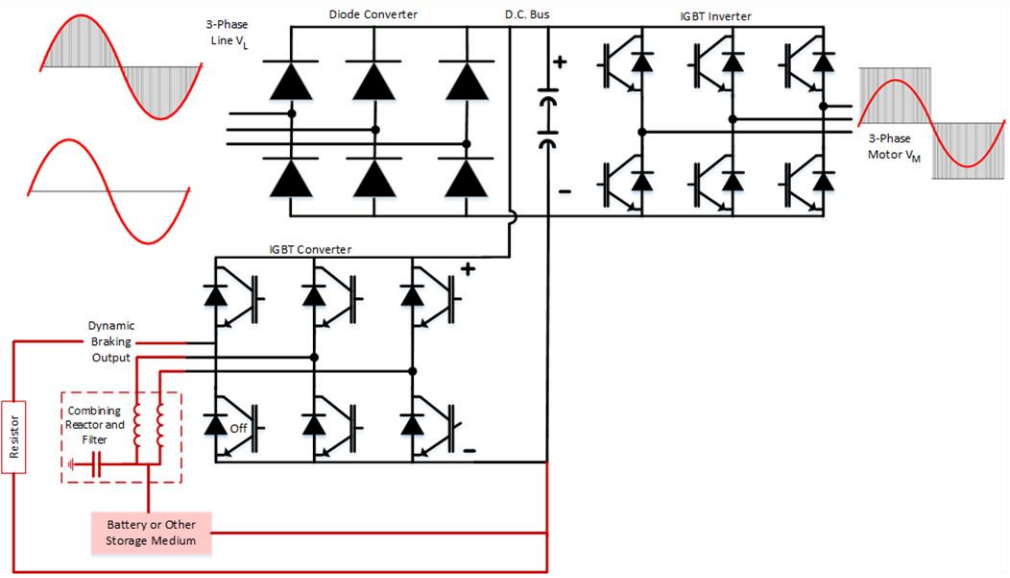
ASCs/RMGs

RTGs

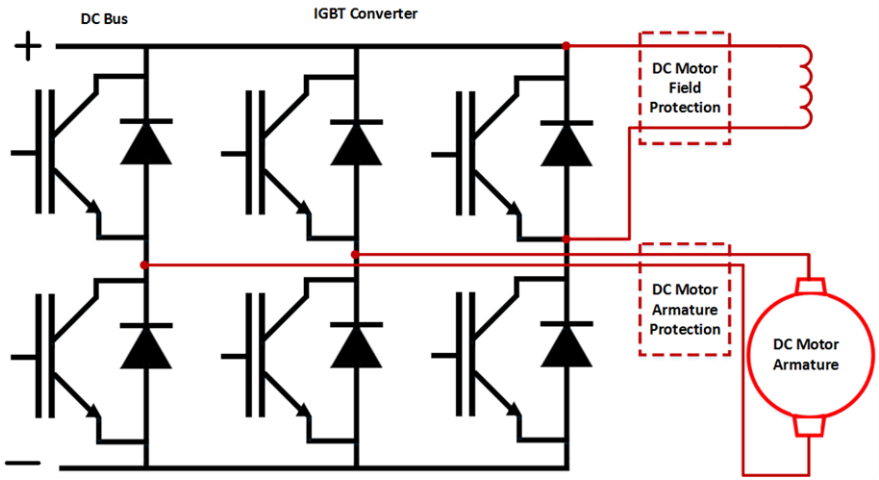
Replace old drives and retain DC motors

Built on the foundation of the TMdrive 10e2 DP

TMdrive 10e2 and TMdrive 10e2 DDC



TMdrive 10e2



TMdrive 10e2 DDC

Replace old drives and retain DC motors

Built on the foundation of the
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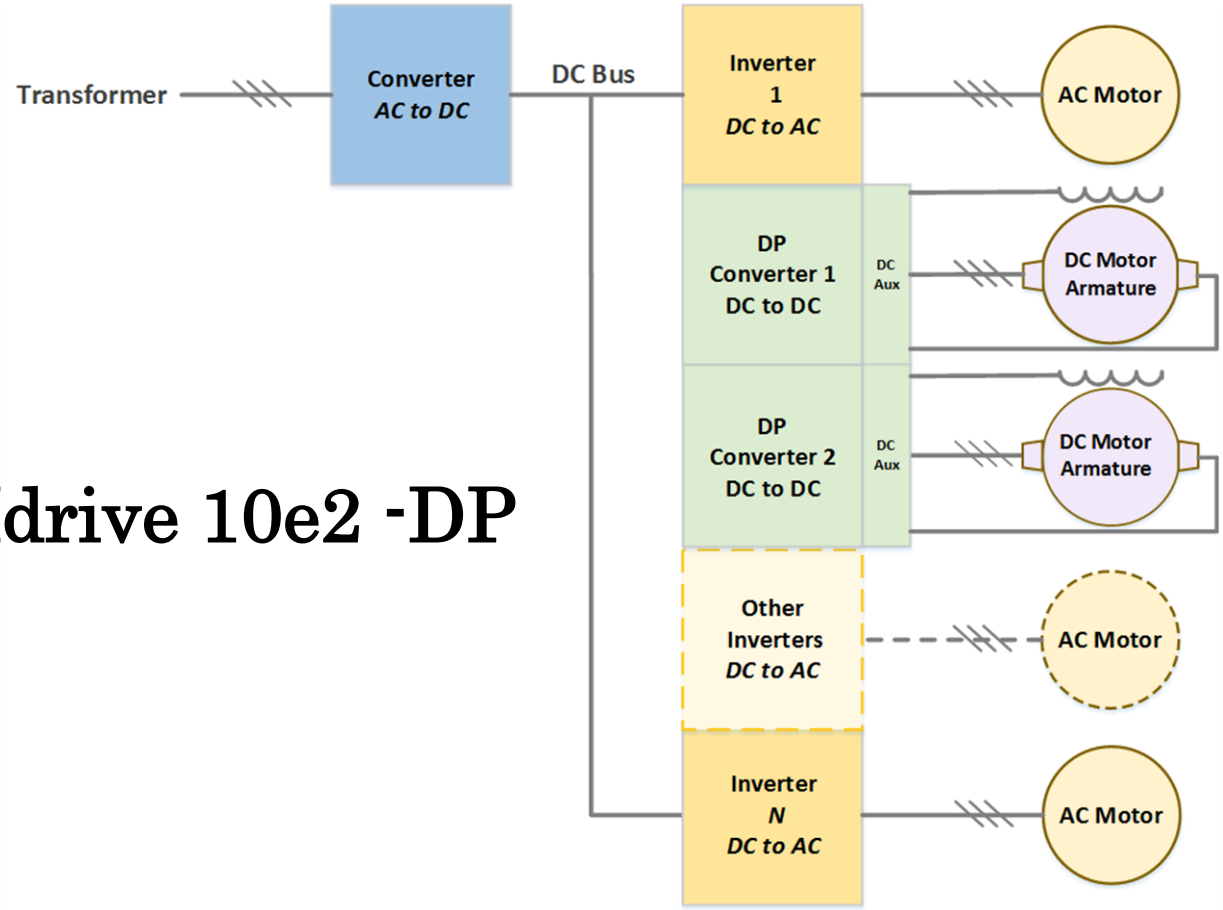
TMdrive 10e2 -DP



Replace old DC drives and retain DC motors

Upgrade to energy efficient AC motors only where necessary

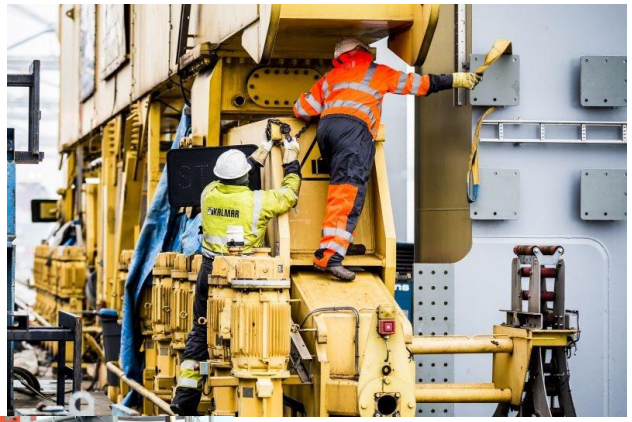
Hoist Motors

Trolley

Replace old DC drives and retain DC motors

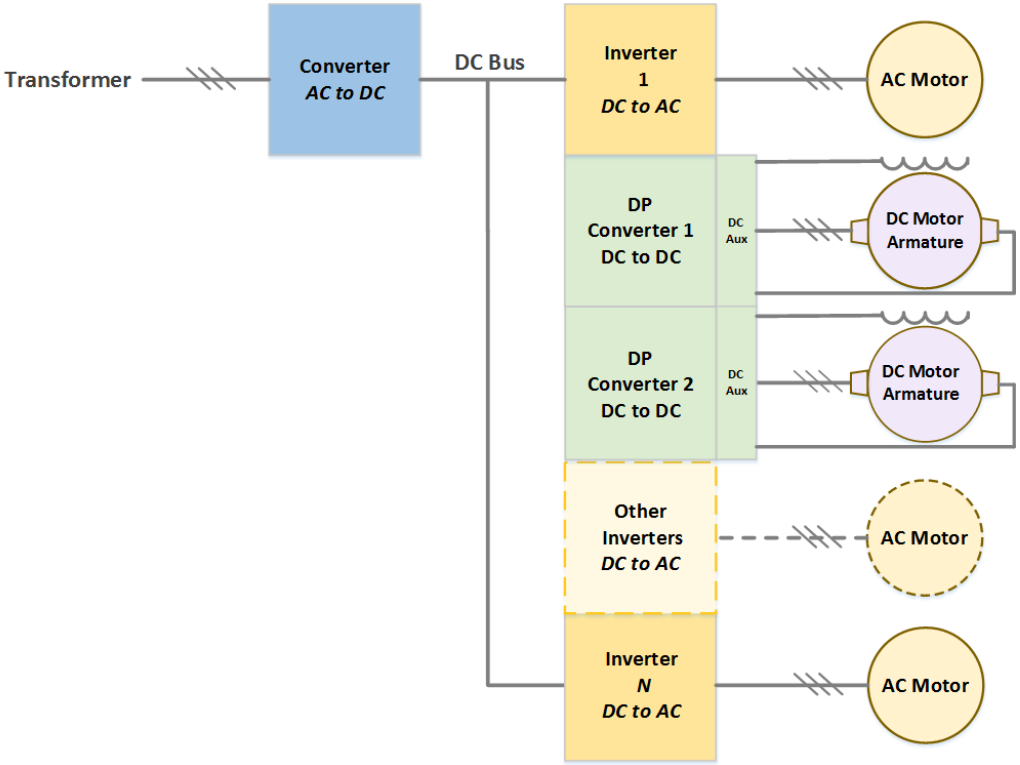
Keep your other existing motors

Boom



Gantry

Replace old DC drives and retain DC motors



AC Motors ONLY where necessary

IGBT Technology near UNITY PF

IEEE 519 Compliance

Upgrade to AC Drive - SIMPLE

DV/DT filter on output side

Commonality of spare Parts

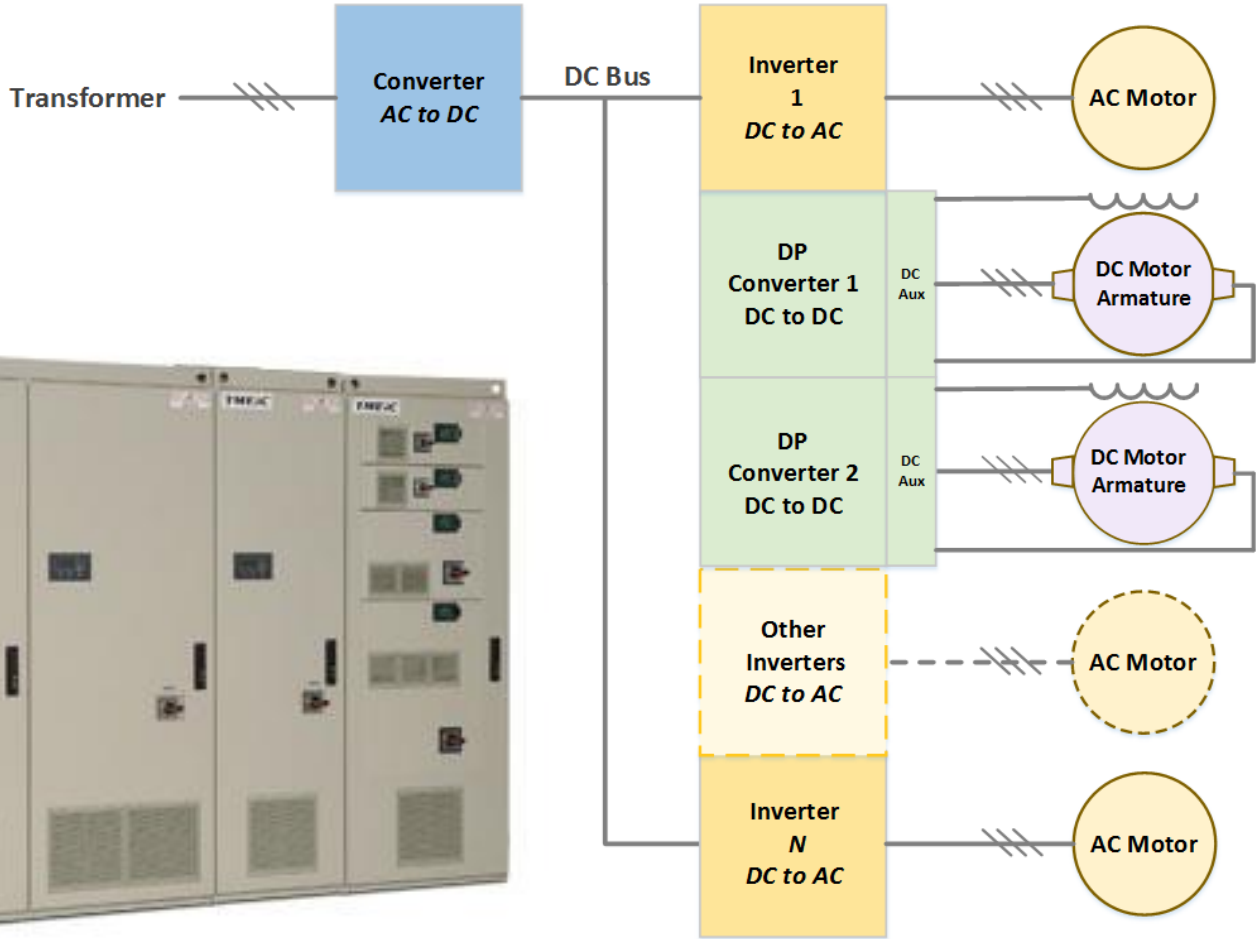
Benefits of TMdrive 10e2

TMdrive -10e2 - DP

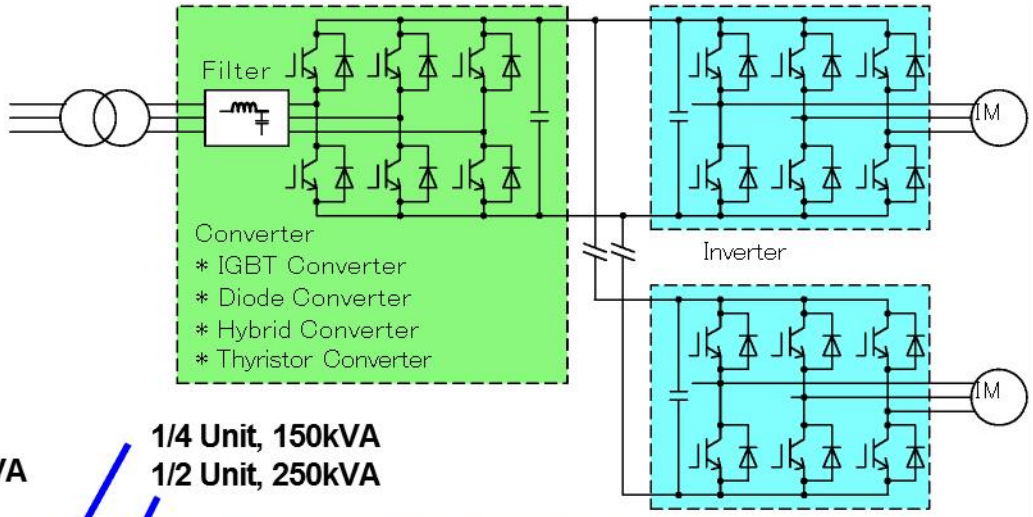
One Drive
So much flexibility

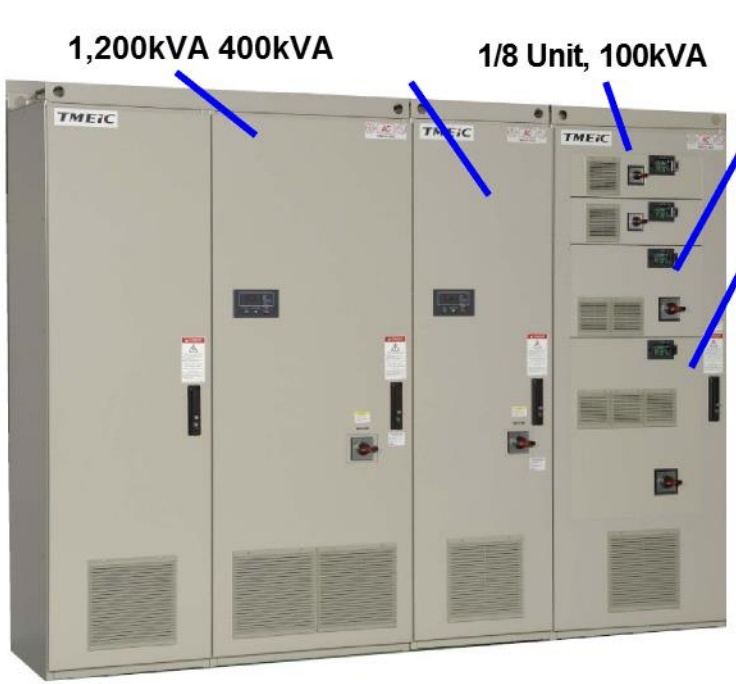
Drive Factory - Fuchu Works, Tokyo, Japan

TMdrive®-10e2 - DP



A typical Line up



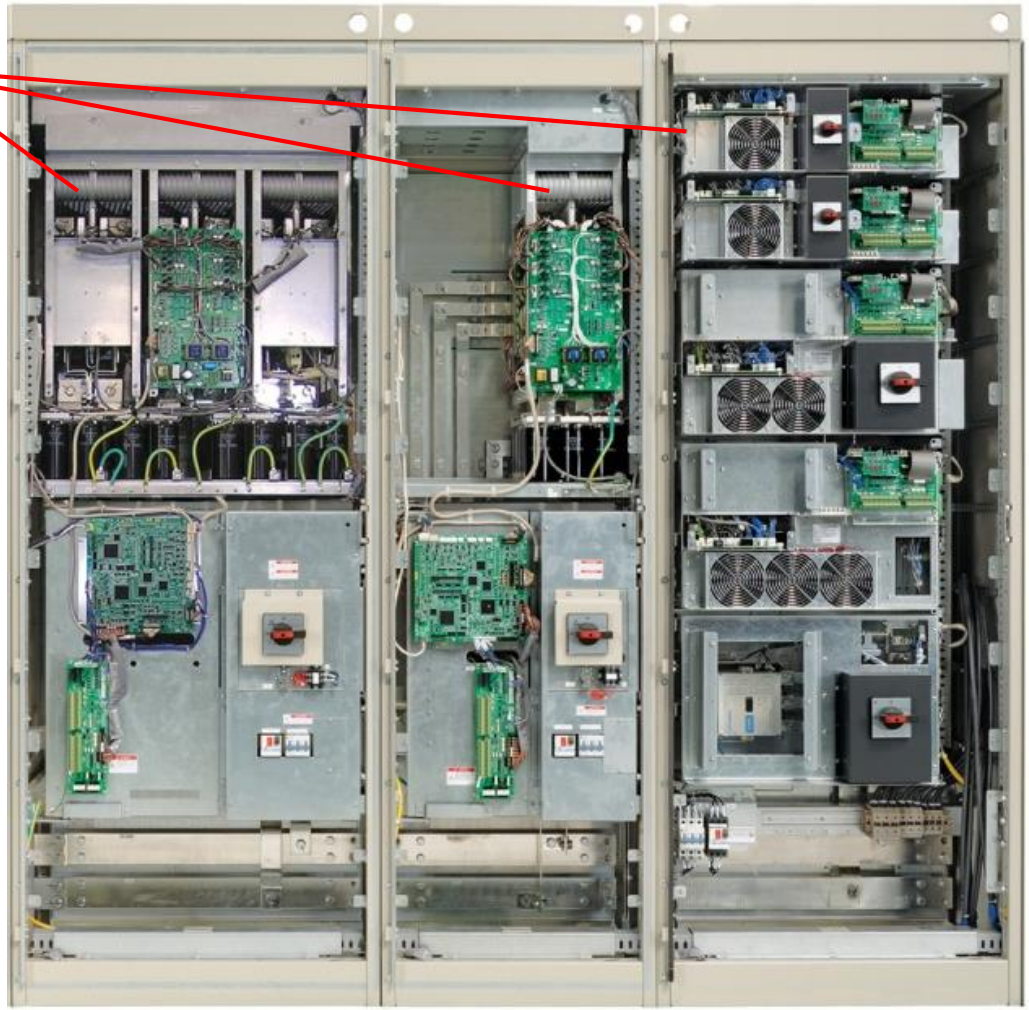


Outside View of TMdrive-10e2 panels door opened and cover removed

Inside View of TMdrive-10e2 panels

A Look Inside - Inverter

Heat Pipe Cooling Technology
Reduces footprint, audible noise and power bridge airflow requirements (on larger frame sizes)



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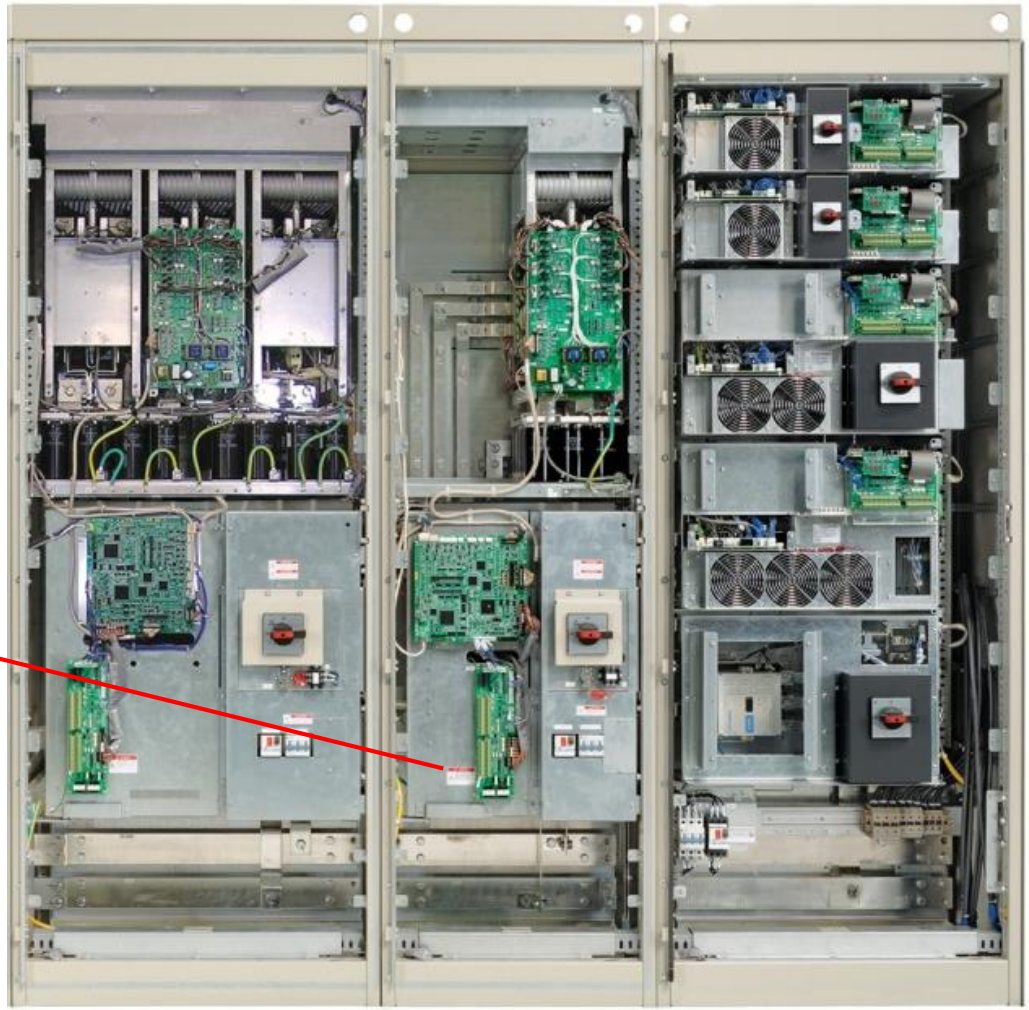

Motor Connections & Optional Output Contactor
Cabined style inverters include bus tabs for easy motor connection

A Look Inside - Inverter

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Inverter DC Bus Disconnect
Cabinet-style inverters can be equipped with an optional dc bus disconnect to allow lockout of individual inverters. Draw-out style inverters tied to the dc bus.

A Look Inside - Inverter

Draw-Out Style Inverters
For applications up to 193 kW (259) hp

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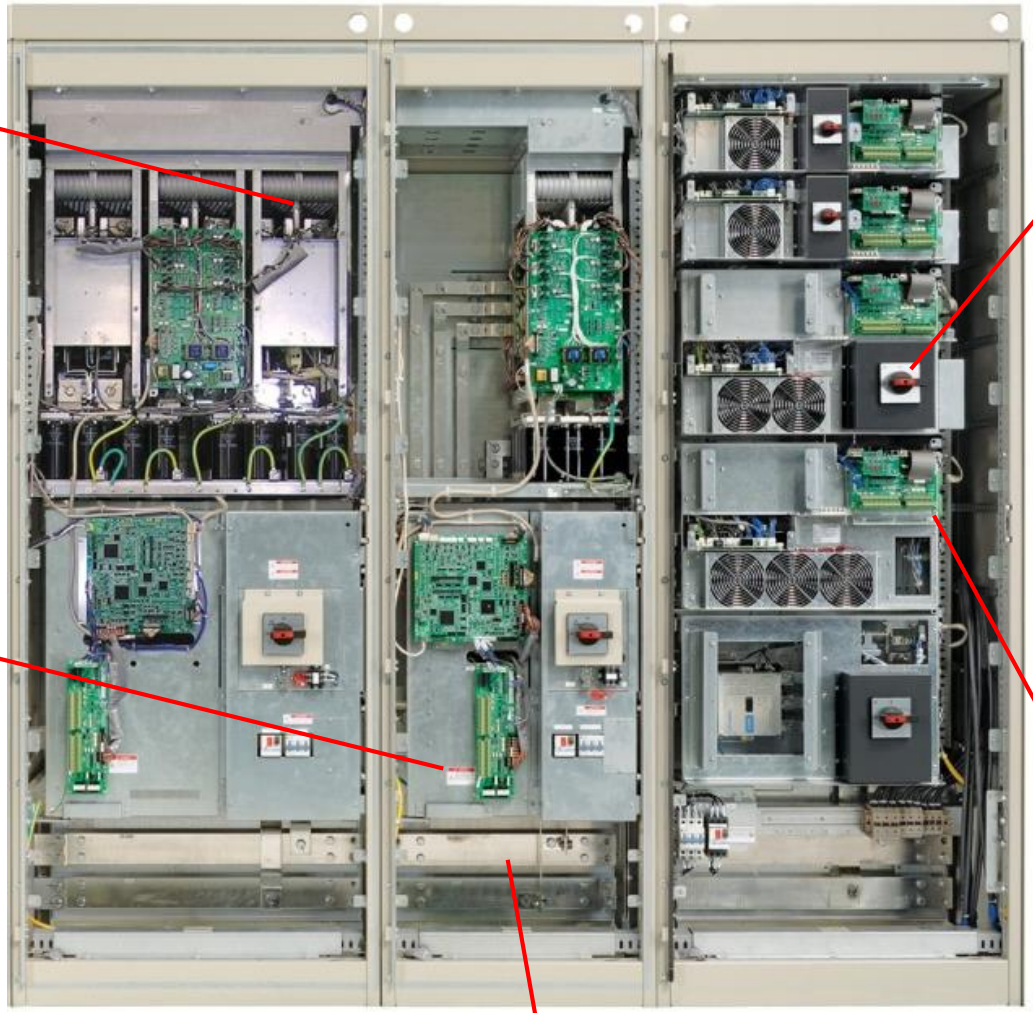

DC Bus

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Cabinet-style inverters can be equipped with an optional dc bus disconnect to allow lockout of individual inverters. Draw-out style inverters tied to the dc bus.

Draw-Out Style Inverters
For applications up to 193 kW (259) hp

Multi Stage Style Draw out Drives – Frames 15, 30, 60, 100, 150 and 250

Frame size is approximately equivalent to HP rating with 150% Overload

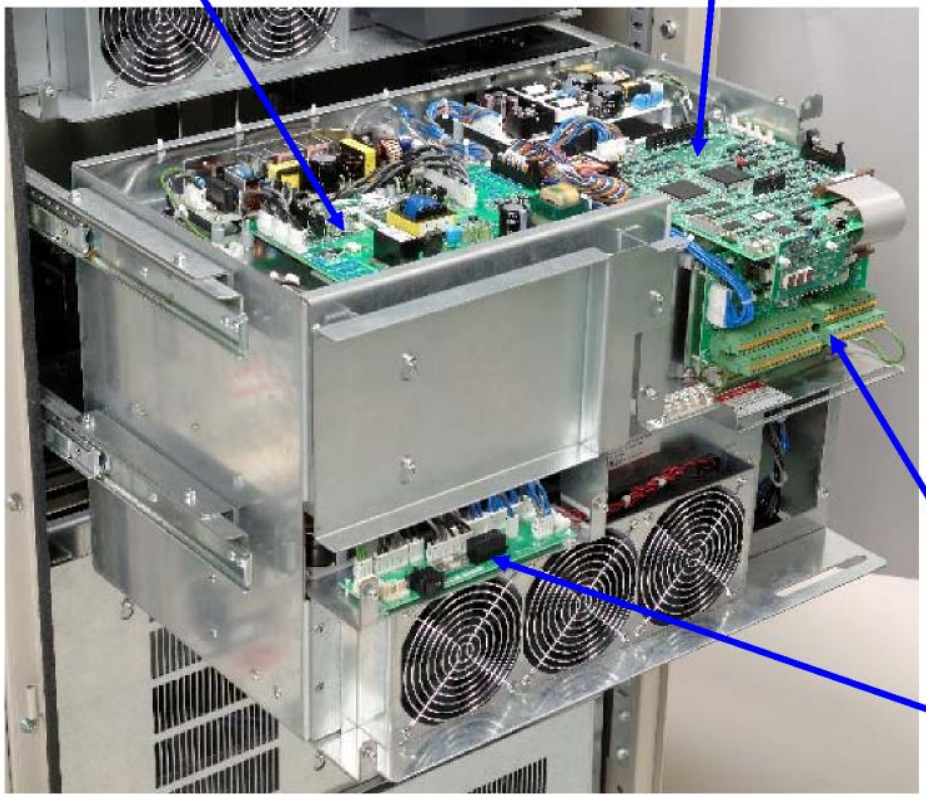
Multi-stage type

Safety Cover

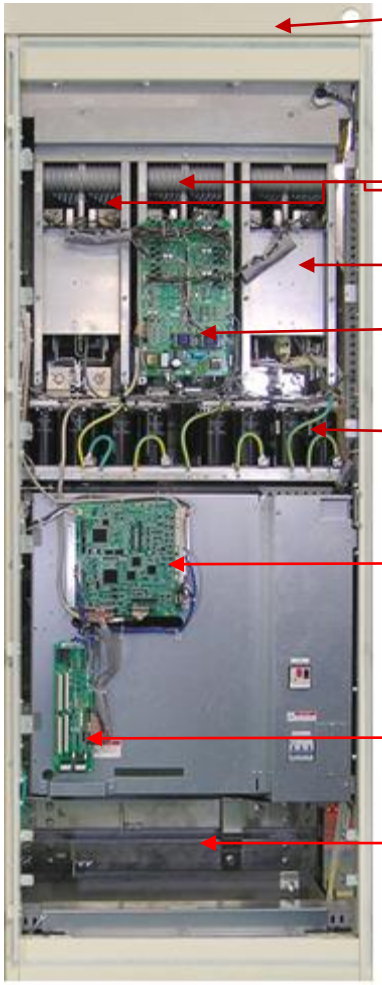
Multi Stage Style Draw out Drives – Frames 15, 30, 60, 100, 150 and 250

Frame size is approximately equivalent to HP rating with 150% Overload

Slide Rail

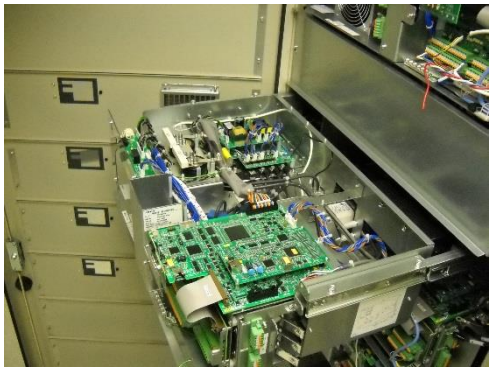


Features



Modular Drive Design

- **Major components** shown in adjacent picture can be **individually replaced**.
- **Maximum** weight of a 460V IGBT stack is **29 Kg** and minimum is 21 Kg.
- A **single trained person** can replace failed IGBT stack **in 30 minutes** without the need of a forklift, special lift or any special tools.
- Drive Cooling fan can be replaced **independent** of an IGBT stack and does **not require** removal of an IGBT stack.



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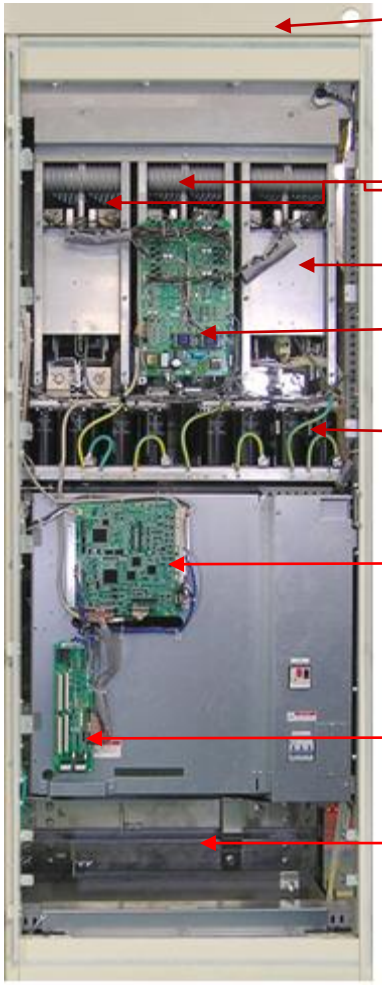
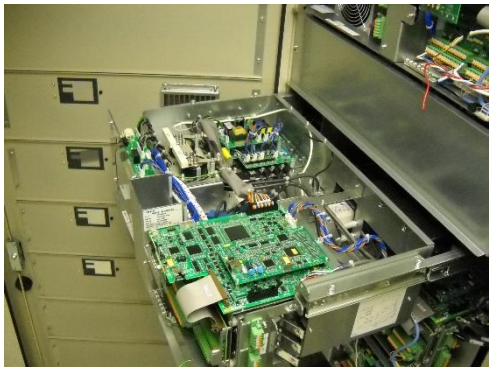


Advantages

- **Low maintenance cost** as complete drive does not have to be changed for a single component failure which is typical in package type drives
- **Lower Mean Time To Repair (MTTR < :30)**
- **Low cost of ownership**
- **MTBF > 41,000 hours**



Heat Pipe Technology

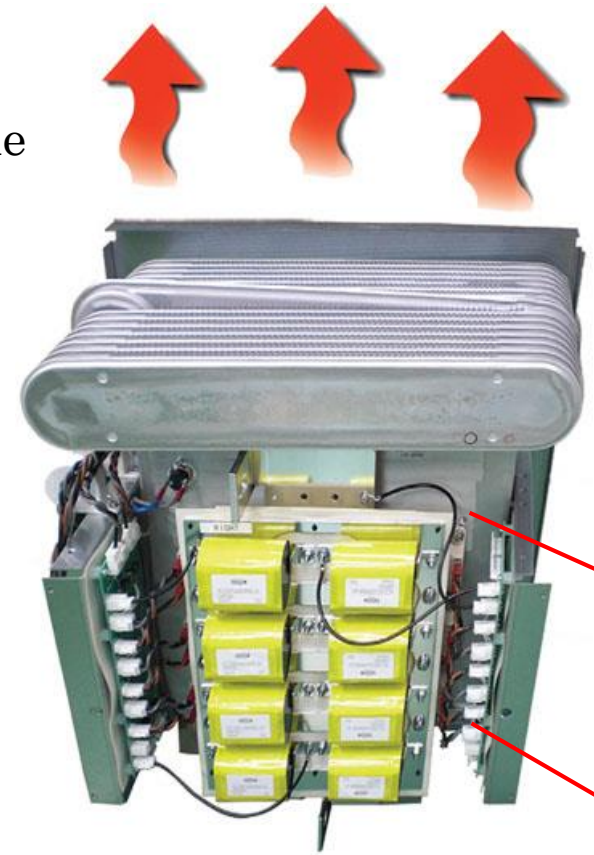
The dramatic advance in power bridge cooling design provides:

- Significant reduction in the footprint of the power bridge
- Lower audible noise

1 Condensate to Vapor

- The thermal cycle starts with the refrigerant in condensate form at the bottom of the chill plate.
- IGBTs are mounted to the multi-channeled chill plate.
- The heat generated by these IBGTs vaporizes the refrigerant, moving it up through the chill plate to the bottom of the condensing unit.

1 2 3 Thermal Cycle



The multi-channel chill plate contains 3M PF-5060 (a CFC-free refrigerant which is practically non-toxic to humans and ozone friendly.)

IGBT power switches

Heat Pipe Technology

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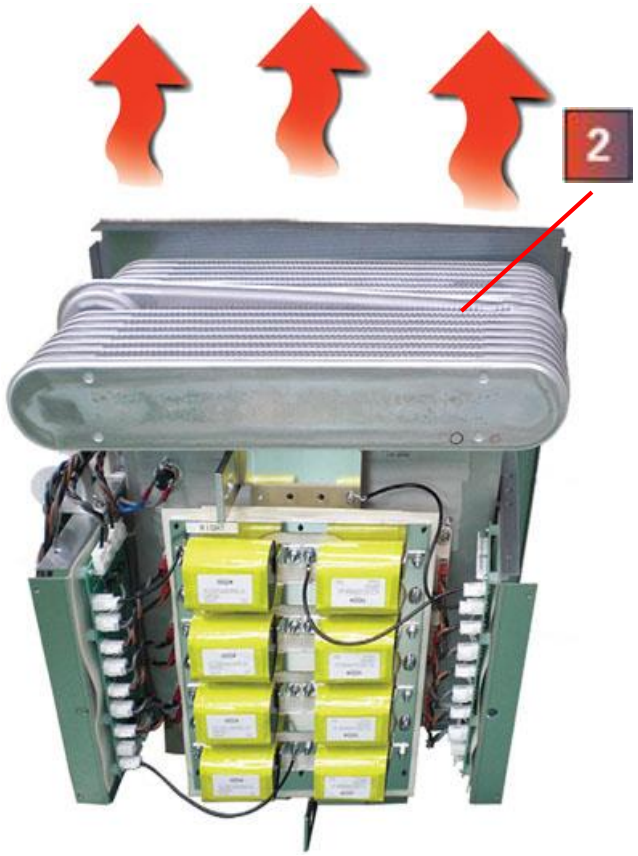
1 2 3 Thermal Cycle



2 Vapor to Condensate

- The refrigerant cools while moving through the condensing unit.
- Cooling air is pulled vertically through the power bridge and then the condensing unit by both convection and fans mounted in the top of the cabinet.

Heat Pipe Technology

The dramatic advance in power bridge cooling design provides:

1 2 3 Thermal Cycle

3 Return of Condensate

The condensate returns to the bottom of the multi-channeled chill plate for the beginning of another cycle.

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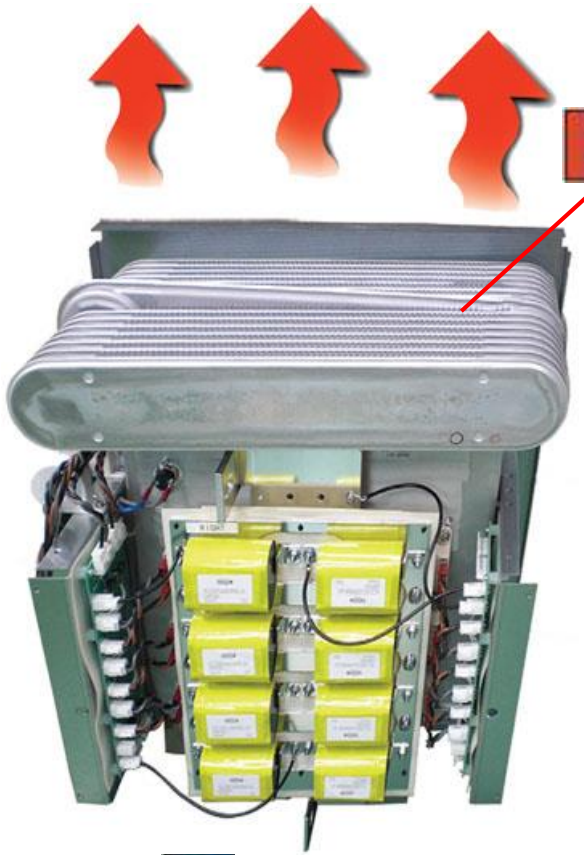
1 2 3 Thermal Cycle



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Features

- **Harmonic Filter**
  - TMEIC can supply a standard IEEE 519 harmonic filter as a part of drive line up or,
  - TMEIC can supply customized harmonic filter that can be installed in machine house
    - Advantage – Heat generating components of a harmonic filter like reactors and capacitors are NOT part of the EHouse which reduces A/C requirements.
    - Advantage - Design is customized to meet IEEE 519 at port defined PCC and will take into account existing, if any, DC and AC cranes or PF correction capacitor banks.
- **Incoming panel**
  - TMEIC can supply a standard incoming panel as a part of drive line up or,
  - TMEIC can supply customized incoming panel as a part of transformer in the machine house
    - Advantage – Since the line up is short, total length of the EHouse can be reduced which also reduces A/C requirements.

- Drive factory complies to applicable IEC, JIS, JEM, UL, CSA and NEMA standards.
- Equipment Marking -

Equipment Markings

c UL us
E221104
Canada
United States

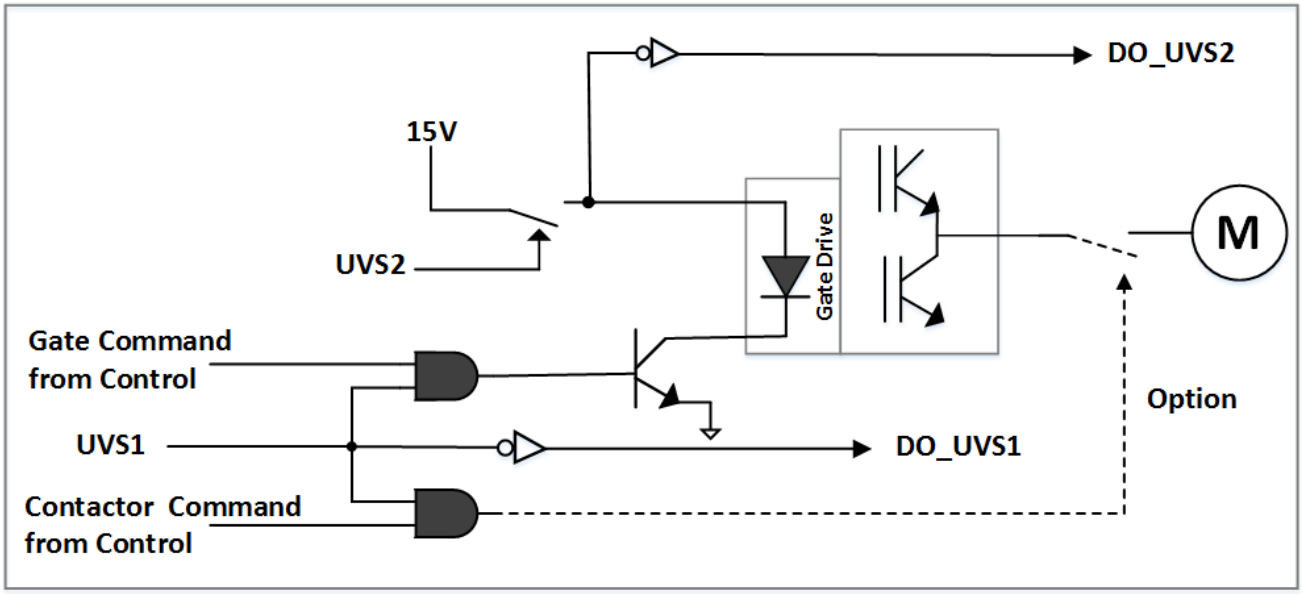
European Union

Features

- **Safety features** according to
  - ISO 13849-1 (Category 3)
  - IEC 61800-5-2 (Safety Integration Level 2)

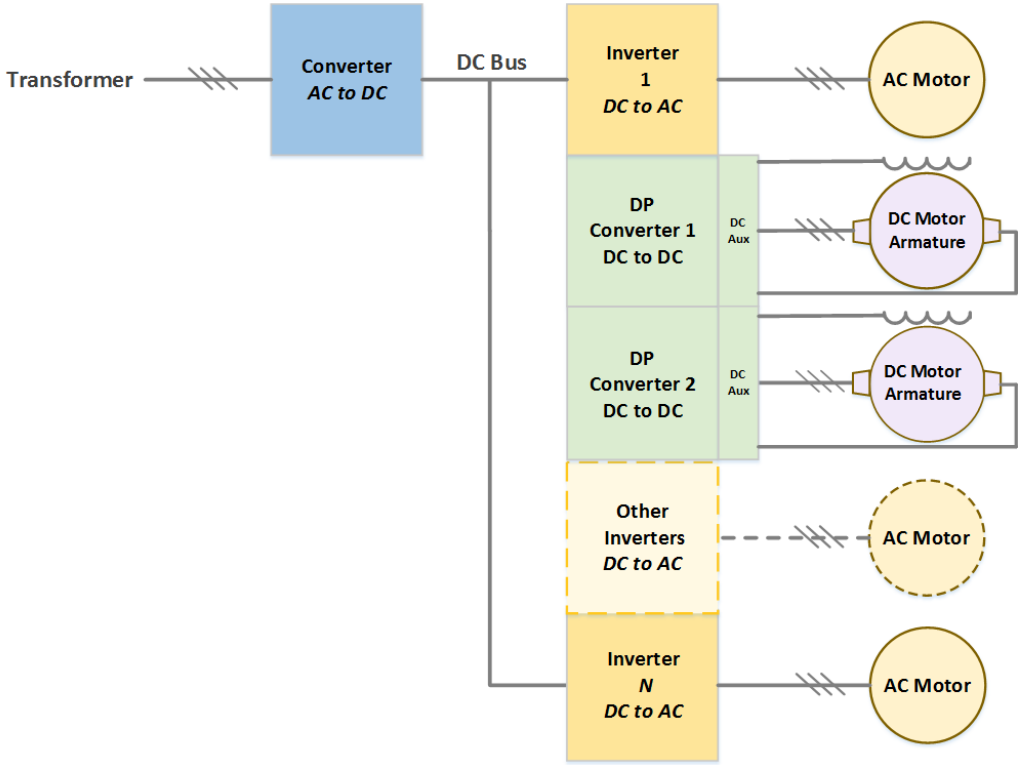
Safety Integrity

Safety features according to IEC 618005-2 (Safety Integration Level 2) and ISO 13849-1 (Category 3). Safety Integrity Level 2/Category 3 is insured by independent gate command lockout via two hardware inputs; UVS1 and UVS2. In addition, when the optional output contactor is supplied it is also disabled by the UVS1 signal providing additional protection.



Can the TMdrive 10e2-DP really save money ?

Replace old DC drives and retain DC motors



AC Motors ONLY where necessary

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Upgrade to AC Drive - SIMPLE

DV/DT filter on output side

Commonality of spare Parts

Benefits of TMdrive 10e2

What have been the options ????

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DC to DC Retrofits

What have been the options ????

DC to DFE Retrofits

What have been the options ????

DC to AC Retrofits

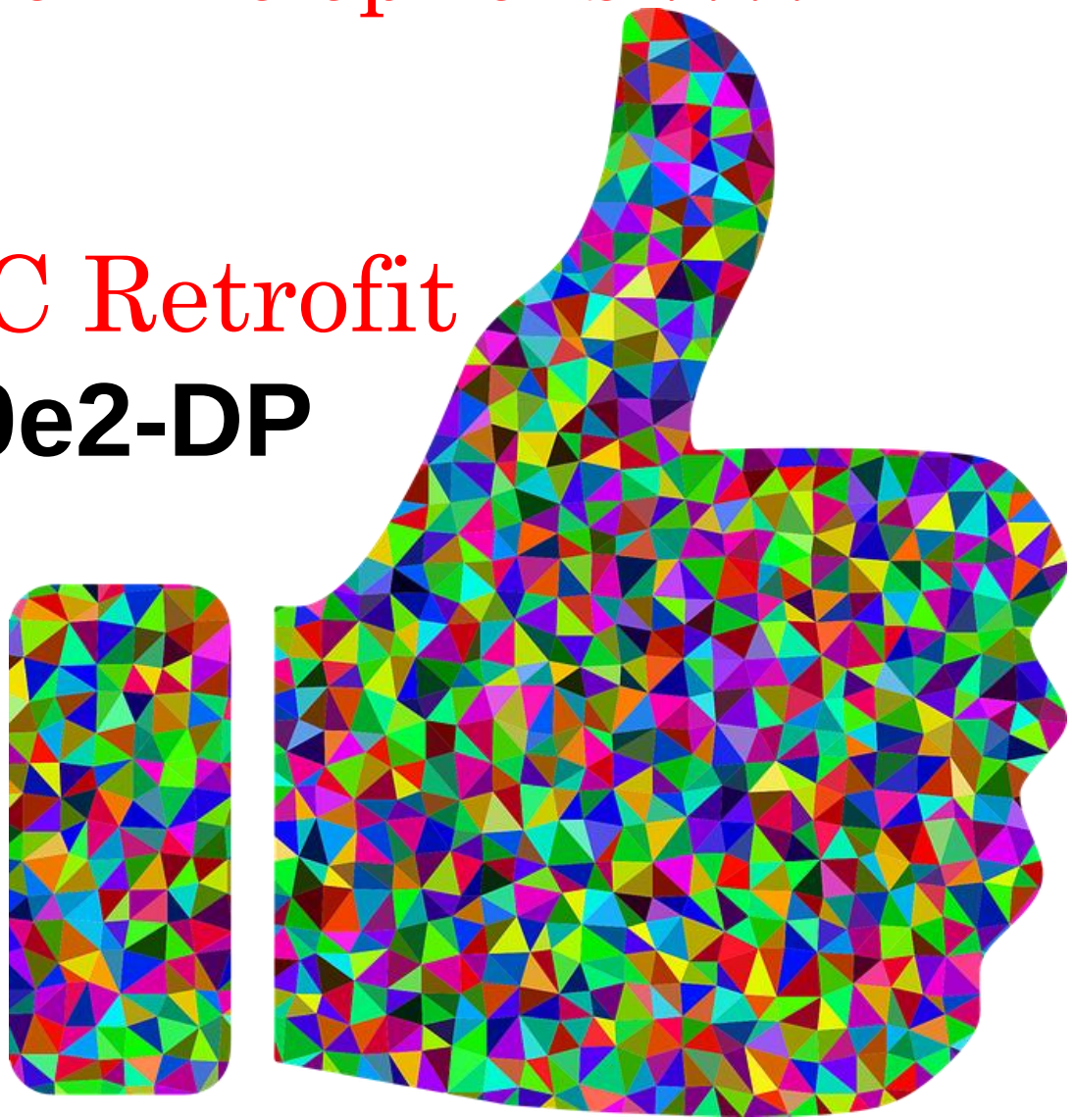
What have been the options ????

YOU now have a 4th option ????

What have been the options ????

DC to AC/DC Retrofit

TMdrive®-10e2-DP



Delivering Customer Success,
Every Project,
Every Time . . .

TMEiC