

### One Range, One Result, One Name

## Fenner<sup>®</sup> QD Series Inverters The Power to Save Energy



## Fenner<sup>®</sup> QD Series Inverters

The Fenner range of Inverters offer simple, precise and powerful control, delivering the very best in performance and energy efficiency time after time. The QuickDrive (QD) range of inverters are available in a number of designs, such as the Fenner QD:Evo a simple general purpose drive and the Fenner QD:Neo ideal for demanding applications, both of which are designed for constant torque applications.

The range also caters for variable torque applications with the addition of the Fenner QD:Flow specifically designed to optimise the performance of fans and pumps used in HVAC applications.

Whatever your control requirements, Fenner can offer a solution that fits.

#### **The Complete Solution**

From initial product selection, through purchase, installation, operation and maintenance, you can rely on Fenner to deliver superb customer value underpinned by engineering excellence.

When you choose Fenner, you choose innovation, experience and practical reliable, simple to use solutions that have proved themselves over time with all those small pieces of engineering detail built in, honed by decades of experience to make a truly robust and reliable product.



## The Power to Save Energy



#### **Reliable Solutions**

Wherever our customers are located, they are assured that the Fenner brand will always meet the same exacting standards and will excel in today's demanding applications. Fenner reliability is guaranteed and the QD Series inverters are at the heart of automated systems around the world.













**Save Energy** 

and fans provides the most energy efficient method of control

Accurate speed control of pumps

- Energy Optimisation function minimises real time energy usage under partial load conditions
- Sleep and Wake Functions ensure operation only when required

#### **Save Money**

- Advanced on-board features remove the need for peripheral equipment
- Intelligent maintenance interval timing avoids costly downtime by allowing programmable maintenance reminders
- Automatic load monitoring provides an early warning of potential faults, such as blocked filters or belt failures

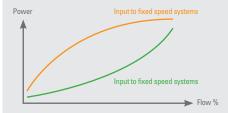
#### **Save Time**

- Built in keypad and OLED text display offer intuitive operation
- Simple parameter structure with carefully selected default values reduce commissioning time
- Practical design allows easy access to power and control terminals without specialist tools

#### **Optimising Efficiency with** Fenner QD: Inverters

#### **Instant Power Savings**

With variable speed control, HVAC immediately reduces power usage compared to fixed speed systems.



Example Savings based on a 45kW Load

Did you know that reducing your motor speed by just 20% can result in potential energy savings of up to 50% - particulary on fan and pump applications?



Calculation is based on a typical estimated factory working week and energy costs, including estimated components and installtion costs

#### Fenner QD Inverters at a glance...

- Wide power range, from 0.37 250kW
- Robust design in IP20, IP55 and IP66 variants
- Quick and simple installation and commissioning
- Built-in features which combine to offer significant total cost reductions compared to other leading manufacturers
- Offer energy saving potential in both constant and variable torque applications
- Application specific firmware and product development
- Permanent magnet motor control and market leading PM motor synchronisation

#### Future-proof Efficiency

The Fenner QD:Neo has been designed to work with both standard induction motors, which typically meet the IE2 efficiency standards as well as the latest generation of high efficiency permanent magnet motors designed to meet the future IE4 requirements.



## Fenner® QD:Neo Constant Torque 0.75kW - 200kW

Fenner QD:Neo offers the perfect combination of high performance and ease of use, providing a solid solution for even the most demanding applications. Fenner OD:Neo is suitable for use with both standard induction and permanent magnet motors.



415V 3~ 50H	z supply		
Part No	kW	Amps	Size
575N4011	11	24	4
575N4015	15	30	4
575N4018	18.5	39	4
575N4022	22	46	4
575N4030	30	61	5
575N4037	37	72	5
575N4045	45	90	6
575N4055	55	110	6
575N4075	75	150	6
575N4090	90	180	6
575N4110	110	202	7

7

240 7

302

132

575N4132

575N4160 160

415V 3~ 50Hz	z supply		
Part No	kW	Amps	Size
576N40P7	0.75	2.2	2
576N41P5	1.5	4.1	2
576N42P2	2.2	5.8	2
576N44P0	4.0	9.5	2
576N45P5	5.5	14	3
576N47P5	7.5	18	3

#### **High Performance**

- Sensorless Vector Control: Up to 200% torque from 0 speed ensures reliable starting and accurate speed control
- PM Motor Control future proof: Can be upgraded to the latest high efficiency permanent magnet motors
- I/O & Communications: Fenner QD:Neo supports a wide range of machine control systems interfaces

#### **Key Features**

- Just 14 basic parameters
- Pluggable control terminals
- Internal RFI filter complies with the latest EMC standards
- Up to 32kHz Output Switching Frequency gives ultra quiet motor operation
- Integral Brake Transistor
- Modbus and CANopen as standard
- IP20, IP55 & IP66 enclosures
- Bluetooth compatible Q-Stick for fast, accurate repeat programming

#### Applications

Cranes

- Compressors
- Winding
- Mixers Packaging
- Cutting

Conveyers Hoists

Extruders

Crushers

#### **Safe Torque Off Function**



The Fenner QD:Neo features a safe torque off function, as standard, to allow simple integration into machine critical safety circuits.

- Faster shut down and reset procedures reduce system maintenance time
- Better safety standard compared to mechanical solution
- Better motor connection. Single cable with no interruption

240V 1~ 50Hz supply

572N21P5 1.5

572N22P2 2.2

415V 3~ 50Hz supply

572N40P7 0.75

572N42P2 2.2

1.5

4

5.5

7.5

572N41P5

572N44P0

572N45P5

572N47P5

572N4011 11

0.75

43

7

10.5 2

2.2

4.1

5.8 2

9.5

14

18

24

2

2

2

2

2

3

3

3

572N20P

## Controlling the Latest Generation of Permanent Magnet Motors and Standard Induction Motors



### **High Performance**

#### **Sensorless Vector Control**

Up to 200% torque from zero speed ensures reliable starting and accurate speed control under all load conditions.

#### **PM Motor Control**

Future proof. Allows upgrade to the latest generation of high efficiency permanent magnet motors.

#### I/O & Communications

Fenner Neo supports a wide range of interfaces to machine control system

High Speed Compatibility Up to 2,000Hz

#### **Suited for Heavy Duty**

All QD:Neo units provide 150% overload for 60 seconds as standard, ensuring each drive is suitable for heavy duty applications

### Low Cost Installation

#### **Built-in EMC Filter**

An internal filter in every Fenner Neo saves cost and time for installation.

**Integral Brake Transistor** Saves space, cost and time for installation.

#### **Powerful PC Based Commissioning Software**

Fenner Tools Studio allows parameter upload, download and storage and access to Fenner Neo Simple PLC functionality. Fast parameter copying between drives

#### Stand Alone Versatility

IP55 & IP66 enclosures perfect for standalone installations, washdown and dustproof environments

## Motor Control for all Applications

#### V/F Control

V/F control is the standard method for variable speed AC motor control, suitable for induction and LSPM (LineStart, Permanent Magnet) motors. The control method is very simple, providing a variable output frequency and voltage, with the applied motor voltage being linearly proportional to the output frequency. This method is suitable for most simple applications.

#### Vector Control

Vector control is designed to provide high performance control of standard AC motors. This method provides improved starting performance, low frequency operation and better speed regulation with respect to load changes compared to V/F control. Dynamic performance is increased, and both the motor and machine are better protected through direct control and monitoring of the motor output torque.

#### **Open Loop PM Motor Control**

The latest generation of motors use a permanent magnet construction technique to achieve greater efficiency. These motors require a different control to obtain correct starting behaviour and maximise efficiency. The QD:Neo features a dedicated Open Loop PM motor control method which provides variable speed control with maximum efficiency and no requirement for a feedback device on the motor.

## Fenner<sup>®</sup> QD:Flow Variable Torque 0.75kW - 250kW

The Fenner QD:Flow sets a new standard for dedicated fan & pump control whilst retaining the ease of use you come to expect from Fenner inverters. Fenner QD:Flow has an innovative design, combined with robust performance to provide powerful flow control and reliability in a compact drive.



#### Fenner QD:Flow (IP55)

415V 3~ 50Hz supply			
Part No	kW	Amps	Size
575F4011	11	24	4
575F4015	15	30	4
575F4018	18.5	39	4
575F4022	22	46	4
575F4030	30	61	5
575F4037	37	72	5
575F4045	45	90	5
575F4055	55	110	6
575F4075	75	150	6
575F4090	90	180	6
575F4110	110	202	7
575F4132	132	240	7
575F4160	160	302	7

#### Fenner QD:Flow (IP66)

240V 1~ 50Hz Supply			
Part No	kW	Amps	Size
576F20P7	0.75	3	2
576F21P5	1.5	7	2
576F22P2	2.2	10.5	2

415V 3~ 50Hz Supply			
Part No	kW	Amps	Size
576F40P7	0.75	2.2	2
576F41P5	1.5	4.1	2
576F42P2	2.2	5.8	2
576F44P0	4	9.5	2
576F45P5	5.5	18	3
576F47P5	7.5	18	3

#### **Fieldbus Interfaces**

**Communication options:** 

- Profibus DP
- DeviceNet
- Ethernet IP

#### **Expansion Modules**

Extended functionality:

- Encoder Feedback
- Extended I/O
- Extended Relay

# Dedicated to optimising efficiency in pumping and HVAC systems



### **Building Comfort and Safety Systems**

#### Creating Comfortable and Efficient Building Environments

Air conditioning can use a huge amount of energy. Typically the air conditioning systems in buildings are designed for maximum occupancy and peak outside ambient. QD:Flow can vary the output of your air conditioning system to meet the varying demands throughout the day whilst reducing running costs.

#### **Fire Override Mode**

Fire override mode ignores signals and alarms, keeping the  $\Omega$ D:Flow operating for as long as possible. This feature is crucial for ensuring smoke extraction from buildings in the event of a fire. Selectable logic means that the  $\Omega$ D:Flow can easily be configured to the signal produced by your fire management system.

#### Stairwell Pressurisation

In the event of a fire, stairwells are often essential escape routes. The Fenner QD:Flow can be used to control air flow and pressure to help keep stairwells clear of smoke and allow safe evacuation and give firefighters safe access to buildings.

#### PID Control

The Fenner QD:Flow has a PID controller built in that is fully integrated with both HVAC and energy efficient features and is packaged in a user friendly way to ensure ease of use and fast commissioning. Now in the majority of applications it has become possible to eliminate the need for external controllers.

## **Multiple Fan Operation**

- All drives operate as variable speed for maximum energy saving.
- Equal run time sharing across each fan / fan bank.
- Automatic system reconfiguration in the event of a fan fault.
- Continued system operation when drives are individually powered off.
- Communication and +24V control voltage shared between drives via a standard RJ45 patch lead.
- Independent maintenance indicators for each fan bank.
- Any fan bank can be switched to hand operation at the touch of a button and will automatically rejoin the network when switched back to Auto.
- For belt driven fan applications each fan can be set for belt break detection.
- Optional mains isolator with lockoff for safe system maintenance.
- Drives configured through simple parameter set-up and intelligent drive self configuration.



## Fenner® QD:Evo Easy to Use 0.37kW - 11.0kW





DIN Rail Mount (IP20)



Q:Stick Programming



Convenient

EMC & Varistor

Disconnect

Optional Braking Resistor

#### High Performance

- Easy to install
- Simple keypad control
- 50°C ambient rating for hot, tough applications
- Free lifetime technical support
- Energy optimising function

#### **Key Features**

- Simple commissioning, 12 basic parameter settings, default settings suitable for most applications
- Internal RFI filter for full EMC compliance
- Modbus RTU allows easy integration with your control and monitoring systems
- Compact enclosures help minimise your space requirements
- Brake chopper on sizes 2 & 3, dynamic and compact options with heatsink mounted resistor.
- High overload capacity, 150% overload for 60 seconds and 170% overload for 2 seconds

Conveyers

#### Applications

Conveyors

- Blowers
  - Packaging
  - Fume extraction Crushers
    - Cutting
  - Pumping

## Q:Port & Q:Stick

The Q:Port and Q:Stick offer fast accurate repeat programming for multiple drives.



The Q:Port is a remote keypad and display for up to 63 QD:E drives which have the same

serial address on the network, the layout and operation of the Q:Port mimic the drive exactly.

#### Fenner QD:Evo (IP20)

230V 1~ 50Hz supply			
Part No	kW	Amps	Size
572B20P4	0.37	2.3	1
572B20P7	0.75	4.3	1
572B21P5	1.5	7	1
572B22P2	2.2	10.5	2

400V 3~ 50Hz supply			
Part No	kW	Amps	Size
572B40P7	0.75	2.2	1
572B41P5	1.5	4.2	1
572B42P2	2.2	5.8	2
572B44P0	4	9.5	2
572B45P5	5.5	14	3
572B47P5	7.5	18	3
572B4011	11	25	3

#### Fenner QD:Evo (IP66)

230V 1~ 50Hz supply			
Part No	kW	Amps	Size
576B20P4	0.37	2.3	1
576B20P7	0.75	4.3	1
576B21P5	1.5	7	1
576B22P2	2.2	10.5	2

400V 3~ 50Hz supply			
Part No	kW	Amps	Size
576B40P7	0.75	2.2	1
576B41P5	1.5	4.2	1
576B42P2	2.2	5.8	2
576B44P0	4	9.5	2
576B45P5	5.5	14	3
576B47P5	7.5	18	3
		18	



## Fenner® QD:Elevator 4kW to 37kW

The QD: Elevator drive is designed to provide smooth, reliable carriage control in all elevator applications. Suitable for both geared and gearless systems.



## **Advanced Features**

Rescue mode operation possible with external UPS

- On-board simple PLC function allows custom application programs to be written and interfacing with a wide variety of control systems
- Modbus RTU and CANopen as standard
- Full load operation up to 50° with no de-rating
- Output contactor control for SIL 3 compliance

#### Fenner QD:Elevator (IP20)

400V 3~ 50Hz Supply			
Part No	kW	Amps	Size
572L44P0	4	9.5	2
572L45P5	5.5	14	3
572L47P5	7.5	18	3
572L4011	11	24	3

#### Fenner QD:Elevator (IP55)

400V 3~ 50Hz Supply			
Part No	kW	Amps	Size
575L4011	11	24	4
575L4015	15	30	4
575L4018	18.5	39	4
575L4022	22	46	4
575L4030	30	61	5
575L4037	37	72	5

#### **Elevator Motor**

- Gearless motors
- Geared motors (open/closed loop)
- Permanent magnet motors (open loop)

#### Easy to Use

Plugable Control Terminals

Long Life, Low Noise Cooling Fan

OStick for fast and

accurate Repeat Programming

- Dedicated elevator drive with logical parameter and function groups
- Factory parameter settings suited to simple elevator applications for fast start up
- Drive setup using familiar elevator units
- Standstill autotune no shaft rotation-no rope removal required
- Wireless parameterisation (Using QD Stick)
- Five independent S-Ramps and dedicated motor holding brake control algorithm allowing fine tuning of the system

#### Flexibility

- Control of IM and PM motors in a single product, geared or gearless systems
- Open loop or Closed loop vector (with incremental encoder) control of standard IM motors
- Open loop or Closed loop (with EnDat encoder)control of PM motors.

#### Smart Rescue Mode Feature

Smart Rescue Mode is an automatic system designed to allow evacuation from an elevator in the event of a power outage. During the power cut, the QD:Elevator can be powered at a reduced voltage, from an uninterruptable power supply. Smart Rescue Mode allows the elevator to be manoeuvred at reduced speed, should the elevator car be trapped between floors. As soon as normal power is resumed, Smart Rescue Mode will automatically revert to normal operation.

## **Inverter Options**

## **Plug-in Modules**

## Extended functionality or communication options.

### **Fieldbus Interfaces**



Profibus

for QD:HVAC only)

## BACnet

- Modbus RTU onboard as standard (QD:HVAC)
- Modbus RTU and CANopen onboard as standard (QD:Neo)
- Modbus RTU and BACnet MS/TP onboard as standard (QD:HVAC)

### **Input Chokes**

Input chokes can be used to reduce the line harmonic current and voltage

borne interference.



distortions, the input chokes also provide enhanced protection for QD Drives against transient voltages (spikes) or other mains

## **Expansion modules**

- Encoder feedback
- Extended I/O
- Extended Relay
- Cascade control
- External remote I/O interface

### **OFilter - RFI Line Filters**

Where a higher standard of EMC compliance is desired or required, Fenner provide a range of suitable filters.

## **QBrake - Dynamic Braking** Resistors

Designed for or use with high inertia loads which need to be stopped rapidly.

The QBrake assists in managing the electrical energy returned from the motor during braking by converting it to heat energy.

## **Output Filters**

Output filters improve the quality of output waveform, they improve system functionaility, reliability and longevity.



### **Simple Configuration**

#### **Oport – Remote Keypad & LED Display**

The Oport is a remote keypad and display for QD Drives which have the same serial address on the network, the layout and operation of the QPort mimic the drive exactly.

- Realtime keypad and display operation
- П Single electrical interface for power and da<u>ta</u>
- Communicates with any compatible drive across a network
- Easy keypad switching to other network address<u>es</u>
- Parameter lock function available
- 3 metres data cable included

#### QStick – Rapid **Commissioning Tool**



- Allows rapid copying of parameters between multiple drives
- Provides Bluetooth wireless interface
- Back up and restore of drive parameters
- USB Connection Kit
- RS485 to USB PC connection kit

#### Mains Isolator

Lockable mains isolator option. Can be used with sizes 4-8.





## Fenner QD Series Inverters

Input Ratings		QD:Evo	QD:Neo	QD:Flow
nput nuting5	Supply Voltage	110 - 115V ± 10% 200 - 240V ± 10% 380 - 480V ± 10%	200 - 240V ±10% 380 - 480V ± 10%	200 - 240V ± 10% 380 - 480V ± 10%
	Supply Frequency	48-62Hz	48-62 Hz	48-62Hz
	Displacement Power Factor	> 0.98	>0.98	> 0.98
	Phase Imbalance	3% Maximum allowed	3% maximum allowed	3% Maximum allowed
	Inrush current	< rated current	< rated current	< rated current
	Power cycle	120 per hour maximum, evenly spaced	120 per hour max. evenly spaced	120 per hour maximum, evenly spaced
Dutput Ratings	Ouput Power	110V 1 Phase Input: 0.5–1.5HP	230V 1 Phase Input 0.75 - 2.2kW	230V 1 Phase Input: 0.75–2.2kW (1–3HP)
		(230V 3 Phase Output) 230V 1 Phase Input: 0.75-4kW (1–5HP) 230V 3 Phase Input: 0.75-4kW (1–5HP) 400V 3 Phase Input: 0.75-11kW 460V 3 Phase Input: 1–15HP	230V 3 Phase Input 0.75 - 75kW 400V 3 Phase Input 0.75 - 250kW 460V 3 Phase Input 1 - 350 HP	230V 3 Phase Input: 0.75–75kW (1–100HP) 400V 3 Phase Input: 0.75–250kW 460V 3 Phase Input: 1–350HP
	Overload Capacity	150% for 60 seconds, 175% for 2 seconds	200% for 4 seconds	110% for 60 seconds
	Output Frequency	0 – 500Hz, 0.1Hz resolution	0 - 500 Hz, 0.1 Hz resolution	0 – 120Hz, 0.1Hz resolution
	Typical Efficiency	-	98%	98%
mbient Conditions	Temperature	Storage : -40 to 60°C	Storage: -40° to 60°C	Storage : -40 to 60°C
		Operating : -10 to 40°C	Operating: -10°C to 40°C	Operating : -10 to 40°C
	Altitude	Up to 1000m ASL without derating Up to 2000m maximum UL Approved Up to 4000m maximum (non UL) Above 1000m : Derate by 1% per 100m	Up to 1000m ASL without derating Up to 2000m maximum UL Approved Up to 4000m maximum (non UL) Above 1000m : Derate by 1% per 100m	Up to 1000m ASL without derating Up to 2000m maximum UL approved Up to 4000m maximum (non UL) Above 1000m : Derate by 1% per 100m
	Humidity	95% Max, non-condensing	95% max, non-condensing	95% Max, non-condensing
Inclosure	Ingress Protection	IP20	IP20 (Size 2, 3)	IP20 (Frame sizes 2 & 3)
	-	IP66 (Excluding 11kW)	IP55 (Size 4, 5, 6, 7) IP66 (Size 2, 3)	IP66 (Frame sizes 2 & 3; up to 7.5kW) IP55 (Frame sizes 4 – 7)
rogramming	Keypad	Built-in Keypad as standard Optional remote mountable keypad	Built-in Keypad as standard Optional remote mountable keypad	Built-in keypad as standard Optional remote mountable keypad
	Display	Built-in LED display	Optional OLED or LED display (OLED Display Multi Language)	Built-in multi language OLED display (except IP20) LED display (IP20 only)
	PC Control Mathead	-	Yes	Yes
Control Specification	Control Method	V/F Voltage Vector Energy Optimised V/F	V/F Voltage Vector Energy Optimised V/F Sensorless Vector Speed Control Sensorless Vector Torque Control Closed Loop (Encoder) Speed Control Closed Loop (Encoder) Torque Control Open Loop PM Vector Control	Variable Torque V/F Variable Torque Energy Optimised V/F
	PWM Frequency	4 – 32kHz Effective	4 – 32kHz Effective	4 – 32kHz Effective
	Stopping Mode	Ramp to Stop : User Adjustable 0.01 – 600 seconds	Ramp to Stop : User Adjustable 0.1 – 600 seconds	Ramp to Stop : User Adjustable 1 – 600 seconds
		Coast to Stop	Coast to Stop	Coast to Stop
	Braking	Motor Flux Braking	Motor Flux Braking Built in Braking Transister (Ontional for frame sizes 6.8.7)	Motor Flux Braking
	Skip Frequency	Built-in Braking Transistor (Frames 2 & 3) Single point, user adjustable	Built-in Braking Transistor (Optional for frame sizes 6 & 7) Single point, user adjustable	Single point, user adjustable
	Setpoint Control	Analog Signal     0 to 10 Volts       10 to 0 Volts     0 to 20mA       20 to 0mA     20 to 0mA       4 to 20mA     20 to 4 mA       Digital     Motorised Potentiometer (Keypad) Modbus RTU       Optional     Gateway Profibus DP, DeviceNet, EthernetIP	Analog Signal 0 to 10 Volts 10 to 0 Volts -10 to 10 Volts 0 to 20mA 20 to 0mA 4 to 20mA 20 to 4 mA Digital Motorised Potentiometer (Keypad) Modbus RTU, CANopen Optional Profibus DP, DeviceNet, EthernetIP	Analog Signal 0 to 10 Volts 10 to 0 Volts -10 to +10 Volts 0 to 20mA 20 to 0mA 4 to 20mA 20 to 4 mA Digital Motorised Potentiometer (Keypad) Modbus RTU, BACnet 0 ptional BACnet/IP, Profibus DP,
			Luieineui	DeviceNet, EtherNet/IP
O Specification	Power Supply	24 Volt DC, 100mA, Short Circuit Protected	24 Volt DC, 100mA, Short Circuit Protected	24 Volt DC, 100mA, Short Circuit Protected
O Specification	Power Supply Programmable Inputs	24 Volt DC, 100mA, Short Circuit Protected 10 Volt DC, 5mA for Potentiometer 4 Total as standard 2 Digital		
/O Specification		10 Volt DC, 5mA for Potentiometer 4 Total as standard 2 Digital 2 Analog / Digital Selectable 10 – 30 Volt DC, internal or external supply, NPN	24 Volt DC, 100mA, Short Circuit Protected 10 Volt DC, 5mA for Potentiometer 5 Total as standard (Optional additional 3) 3 Digital (Optional additional 3) 2 Analog / Digital Selectable 10 – 30 Volt DC, internal or external supply, NPN	24 Volt DC, 100mA, Short Circuit Protected 10 Volt DC, 5mA for Potentiometer 5 Total as standard (Optional additional 3) 3 Digital (Optional additional 3) 2 Analog / Digital Selectable 10 – 30 Volt DC, internal or external supply, NPN
/O Specification	Programmable Inputs Digital Inputs	10 Volt DC, 5mA for Potentiometer 4 Total as standard 2 Digital 2 Analog / Digital Selectable 10 – 30 Volt DC, internal or external supply, NPN Response time : < 4ms	24 Volt DC, 100mA, Short Circuit Protected 10 Volt DC, 5mA for Potentiometer 5 Total as standard (Optional additional 3) 3 Digital (Optional additional 3) 2 Analog / Digital Selectable 10–30 Volt DC, internal or external supply, NPN Response time : < 4ms	24 Volt DC, 100mA, Short Circuit Protected 10 Volt DC, 5mA for Potentiometer 5 Total as standard (Optional additional 3) 3 Digital (Optional additional 3) 2 Analog / Digital Selectable 10 – 30 Volt DC, internal or external supply, NPN Response time : < 4ms
/O Specification	Programmable Inputs	10 Volt DC, 5mA for Potentiometer 4 Total as standard 2 Digital 2 Analog / Digital Selectable 10 – 30 Volt DC, internal or external supply, NPN Response time : < 4ms Resolution : 12 bits Response time : < 4ms Accuracy : < 1% full scale	24 Volt DC, 100mA, Short Circuit Protected 10 Volt DC, 5mA for Potentiometer 5 Total as standard (Optional additional 3) 3 Digital (Optional additional 3) 2 Analog / Digital Selectable 10 – 30 Volt DC, internal or external supply, NPN	24 Volt DC, 100mA, Short Circuit Protected 10 Volt DC, 5mA for Potentiometer 5 Total as standard (Optional additional 3) 3 Digital (Optional additional 3) 2 Analog / Digital Selectable 10 – 30 Volt DC, internal or external supply, NPN Response time : < 4ms Response time : < 4ms Accuracy: < 1% full scale
/O Specification	Programmable Inputs Digital Inputs	10 Volt DC, 5mA for Potentiometer 4 Total as standard 2 Digital 2 Analog / Digital Selectable 10 – 30 Volt DC, internal or external supply, NPN Response time : < 4ms Resolution : 12 bits Response time : < 4ms	24 Volt DC, 100mA, Short Circuit Protected 10 Volt DC, 5mA for Potentiometer 5 Total as standard (Optional additional 3) 3 Digital (Optional additional 3) 2 Analog / Digital Selectable 10 – 30 Volt DC, internal or external supply, NPN Response time : < 4ms Resolution : 12 bits Response time : < 4ms	24 Volt DC, 100mA, Short Circuit Protected 10 Volt DC, 5mA for Potentiometer 5 Total as standard (Optional additional 3) 3 Digital (Optional additional 3) 2 Analog / Digital Selectable 10–30 Volt DC, internal or external supply, NPN Response time : < 4ms Resolution : 12 bits Response time : < 4ms
/O Specification	Programmable Inputs Digital Inputs	10 Volt DC, 5mA for Potentiometer 4 Total as standard 2 Digital 2 Analog / Digital Selectable 10 – 30 Volt DC, internal or external supply, NPN Response time : < 4ms Resolution : 12 bits Response time : < 4ms Accuracy : < 1% full scale Parameter adjustable scaling and offset 2 Total 1 Analog / Digital	24 Volt DC, 100mA, Short Circuit Protected 10 Volt DC, 5mA for Potentiometer 5 Total as standard (Optional additional 3) 3 Digital (Optional additional 3) 2 Analog / Digital Selectable 10 – 30 Volt DC, internal or external supply, NPN Response time : < 4ms Resolution : 12 bits Response time : < 4ms Accuracy : < 1% full scale Parameter adjustable scaling and offset 4 Total (Optional additional 3) 2 Analog / Digital	24 Volt DC, 100mA, Short Circuit Protected 10 Volt DC, 5mA for Potentiometer 5 Total as standard (Optional additional 3) 3 Digital (Optional additional 3) 2 Analog / Digital Selectable 10 – 30 Volt DC, internal or external supply, NPN Response time : < 4ms Resolution : 12 bits Response time : < 4ms Accuracy : < 1% full scale Parameter adjustable scaling and offset 4 Total (Optional additional 3) 2 Analog / Digital
/O Specification	Programmable Inputs Digital Inputs Analog Inputs	10 Volt DC, 5mA for Potentiometer 4 Total as standard 2 Digital 2 Analog / Digital Selectable 10 – 30 Volt DC, internal or external supply, NPN Response time : < 4ms Resolution : 12 bits Response time : < 4ms Accuracy : < 1% full scale Parameter adjustable scaling and offset 2 Total 1 Analog / Digital 1 Relay Maximum Voltage : 250 VAC, 30 VDC Switching Current Capacity : 6A AC,	24 Volt DC, 100mA, Short Circuit Protected 10 Volt DC, 5mA for Potentiometer 5 Total as standard (Optional additional 3) 3 Digital (Optional additional 3) 2 Analog / Digital Selectable 10 – 30 Volt DC, internal or external supply, NPN Response time : < 4ms Resolution : 12 bits Response time : < 4ms Accuracy : < 1% full scale Parameter adjustable scaling and offset 4 Total (Optional additional 3) 2 Analog / Digital 2 Relays (Optional additional 3) Maximum Voltage : 250 VAC, 30 VDC Switching Current Capacity: 6A AC,	24 Volt DC, 100mA, Short Circuit Protected 10 Volt DC, 5mA for Potentiometer 5 Total as standard (Optional additional 3) 3 Digital (Optional additional 3) 2 Analog / Digital Selectable 10 – 30 Volt DC, internal or external supply, NPN Response time : < 4ms Response time : < 4ms Accuracy : < 1% full scale Parameter adjustable scaling and offset 4 Total (Optional additional 3) 2 Analog / Digital 2 Relays (Optional additional 3) 4 Analog / Digital 2 Relays (Optional additional 3) Maximum Voltage : 250 VAC, 30 VDC Switching Current Capacity : 6A AC,
O Specification	Programmable Inputs Digital Inputs Analog Inputs Programmable Outputs	10 Volt DC, 5mA for Potentiometer 4 Total as standard 2 Digital 2 Analog / Digital Selectable 10 – 30 Volt DC, internal or external supply, NPN Response time : < 4ms Respolution : 12 bits Response time : < 4ms Accuracy : < 1% full scale Parameter adjustable scaling and offset 2 Total 1 Analog / Digital 1 Relay Maximum Voltage : 250 VAC, 30 VDC	24 Volt DC, 100mA, Short Circuit Protected 10 Volt DC, 5mA for Potentiometer 5 Total as standard (Optional additional 3) 2 Janalog / Digital Selectable 10 – 30 Volt DC, internal or external supply, NPN Response time : < 4ms Response time : < 4ms Accuracy : < 1% full scale Parameter adjustable scaling and offset 4 Total (Optional additional 3) 2 Analog / Digital 2 Relays (Optional additional 3) Maximum Voltage : 250 VAC, 30 VDC Switching Current Capacity : 6A AC, 5A DC 0 to 10 Volt 0 to 20MA	24 Volt DC, 100mA, Short Circuit Protected 10 Volt DC, 5mA for Potentiometer 5 Total as standard (Optional additional 3) 2 Analog / Digital Selectable 10 – 30 Volt DC, internal or external supply, NPN Response time : 4ms Response time : 4ms Accuracy : < 1% full scale Parameter adjustable scaling and offset 4 Total (Optional additional 3) 2 Analog / Digital 2 Relays (Optional additional 3) Maximum Voltage : 250 VAC, 30 VDC Switching Current Capacity : 6A AC, 5A DC 0 to 10 Volt 0 to 20mA
	Programmable Inputs Digital Inputs Analog Inputs Programmable Outputs Relay Outputs	10 Volt DC, 5mA for Potentiometer 4 Total as standard 2 Digital 2 Analog / Digital Selectable 10 – 30 Volt DC, internal or external supply, NPN Response time : < 4ms Resolution : 12 bits Response time : < 4ms Accuracy : < 1% full scale Parameter adjustable scaling and offset 2 Total 1 Analog / Digital 1 Relay Maximum Voltage : 250 VAC, 30 VDC Switching Current Capacity : 6A AC, 5A DC	24 Volt DC, 100mA, Short Circuit Protected 10 Volt DC, 5mA for Potentiometer 5 Total as standard (Optional additional 3) 3 Digital (Optional additional 3) 2 Analog / Digital Selectable 10–30 Volt DC, internal or external supply, NPN Response time : < 4ms Resolution : 12 bits Response time : < 4ms Accuracy : < 1% full scale Parameter adjustable scaling and offset 4 Total (Optional additional 3) 2 Analog / Digital 2 Relays (Optional additional 3) Maximum Voltage : 250 VAC, 30 VDC Switching Current Capacity : 6A AC, 5A DC 0 to 10 Volt	24 Volt DC, 100mA, Short Circuit Protected 10 Volt DC, 5mA for Potentiometer 5 Total as standard (Optional additional 3) 2 Janalog / Digital Selectable 10 – 30 Volt DC, internal or external supply, NPN Response time : < 4ms Resolution : 12 bits Response time : < 4ms Accuracy : < 1% full scale Parameter adjustable scaling and offset 4 Total (Optional additional 3) 2 Analog / Digital 2 Relays (Optional additional 3) 2 Analog / Digital 2 Relays (Optional additional 3) Maximum Voltage : 250 VAC, 30 VDC Switching Current Capacity : 6A AC, 5A DC 0 to 10 Volt 0 to 20mA 4 to 20mA Fire Mode - Selectable direction, Selectable speed reference: Broken Belt Detection - Under load monitoring with autotuneconfiguration
Control Functions	Programmable Inputs Digital Inputs Analog Inputs Programmable Outputs Relay Outputs Analog Outputs	10 Volt DC, 5mA for Potentiometer 4 Total as standard 2 Digital 2 Analog / Digital Selectable 10 – 30 Volt DC, internal or external supply, NPN Response time : < 4ms Resolution : 12 bits Response time : < 4ms Accuracy : < 1% full scale Parameter adjustable scaling and offset 2 Total 1 Analog / Digital 1 Relay Maximum Voltage : 250 VAC, 30 VDC Switching Current Capacity : 6A AC, 5A DC 0 to 10 Volt PID Control - Internal PID control with feedback display	24 Volt DC, 100mA, Short Circuit Protected 10 Volt DC, 5mA for Potentiometer 5 Total as standard (Optional additional 3) 2 Analog / Digital Selectable 10 – 30 Volt DC, internal or external supply, NPN Response time : 4ms Resolution : 12 bits Response time : 4ms Accuracy : < 1% full scale Parameter adjustable scaling and offset 4 Total (Optional additional 3) 2 Analog / Digital 2 Relays (Optional additional 3) Maximum Voltage : 250 VAC, 30 VDC Switching Current Capacity : 6A AC, 5A DC to 10 Volt 0 to 20mA 4 to 20mA 4 to 20mA Voltage - 200 Vac - 200 Va	24 Volt DC, 100mA, Short Circuit Protected 10 Volt DC, 5mA for Potentiometer 5 Total as standard (Optional additional 3) 2 Analog / Digital Selectable 10 – 30 Volt DC, internal or external supply, NPN Response time : 4ms Resolution : 12 bits Response time : 4ms Accuracy : < 1% full scale Parameter adjustable scaling and offset 4 Total (Optional additional 3) 2 Analog / Digital 2 Relays (Optional additional 3) Maximum Voltage : 250 VAC, 30 VDC Switching Current Capacity : 6A AC, 5A DC 0 to 10 Volt 0 to 20mA 4 to 20mA Fire Mode - Selectable direction, Selectable speed reference Broken Belt Detection - Under load monitoring with autotuneconfiguration PID Control - Internal PID control with feedback display
Control Functions	Programmable Inputs Digital Inputs Analog Inputs Programmable Outputs Relay Outputs Analog Outputs Fault Memory	10 Volt DC, 5mA for Potentiometer 4 Total as standard 2 Digital 2 Analog / Digital Selectable 10 – 30 Volt DC, internal or external supply, NPN Response time : < 4ms Resolution : 12 bits Response time : < 4ms Accuracy : < 1% full scale Parameter adjustable scaling and offset 2 Total 1 Analog / Digital 1 Relay Maximum Voltage : 250 VAC, 30 VDC Switching Current Capacity : 6A AC, 5A DC 0 to 10 Volt PID Control - Internal PID control with feedback display Last 4 Trips stored with time stamp	24 Volt DC, 100mA, Short Circuit Protected 10 Volt DC, 5mA for Potentiometer 5 Total as standard (Optional additional 3) 2 Analog / Digital Selectable 10 – 30 Volt DC, internal or external supply, NPN Response time : 4ms Resolution : 12 bits Response time : 4ms Accuracy : <1% full scale Parameter adjustable scaling and offset 4 Total (Optional additional 3) 2 Analog / Digital 2 Relays (Optional additional 3) Maximum Voltage : 250 VAC, 30 VDC Switching Current Capacity : 6A AC, 5A DC 0 to 10 Volt 0 to 20mA 4 to 20mA Dedicated Hoist Operation Mode PID Control - Internal PID control with feedback display Last 4 Trips stored with time stamp	24 Volt DC, 100mA, Short Circuit Protected 10 Volt DC, 5mA for Potentiometer 5 Total as standard (Optional additional 3) 2 Analog / Digital Selectable 10 – 30 Volt DC, internal or external supply, NPN Response time : 4ms Response time : 4ms Accuracy : <1% full scale Parameter adjustable scaling and offset 4 Total (Optional additional 3) 2 Analog / Digital 2 Relays (Optional additional 3) 2 Analog / Digital 2 Relays (Optional additional 3) 4 Maximum Voltage : 250 VAC, 30 VDC Switching Current Capacity : 6A AC, 5A DC 0 to 10 Volt 0 to 20mA 4 to 20mA 4 to 20mA Fire Mode - Selectable direction, Selectable speed reference Broken Belt Detection - Under load monitoring with autotuneconfiguration PID Control - Internal PID control with feedback display Last 4 Trips stored with time stamp
Control Functions	Programmable Inputs Digital Inputs Analog Inputs Programmable Outputs Relay Outputs Analog Outputs	10 Volt DC, 5mA for Potentiometer 4 Total as standard 2 Digital 2 Analog / Digital Selectable 10 – 30 Volt DC, internal or external supply, NPN Response time : < 4ms Resolution : 12 bits Response time : < 4ms Accuracy : < 1% full scale Parameter adjustable scaling and offset 2 Total 1 Analog / Digital 1 Relay Maximum Voltage : 250 VAC, 30 VDC Switching Current Capacity : 6A AC, 5A DC 0 to 10 Volt PID Control - Internal PID control with feedback display Last 4 Trips stored with time stamp Logging of data prior to trip for diagnostic purposes :	24 Volt DC, 100mA, Short Circuit Protected 10 Volt DC, 5mA for Potentiometer 5 Total as standard (Optional additional 3) 2 Analog / Digital Selectable 10 – 30 Volt DC, internal or external supply, NPN Response time : < 4ms Resolution : 12 bits Resonse time : < 4ms Accuracy : < 1% full scale Parameter adjustable scaling and offset 4 Total (Optional additional 3) 2 Analog / Digital 2 Relays (Optional additional 3) 2 Analog / Digital 2 Relays (Optional additional 3) Maximum Voltage : 250 VAC, 30 VDC Switching Current Capacity: 6A AC, 5A DC 0 to 10 Volt 0 to 20mA 4 to 20mA Dedicated Hoist Operation Mode PID Control - Internal PID control with feedback display Last 4 Trips stored with time stamp Logging of data prior to trip for diagnostic purposes :	24 Volt DC, 100mA, Short Circuit Protected 10 Volt DC, 5mA for Potentiometer 5 Total as standard (Optional additional 3) 2 Janalog / Digital Selectable 10 – 30 Volt DC, internal or external supply, NPN Response time : < 4ms Resolution : 12 bits Resolution : 12 bits Resonse time : < 4ms Accuracy : < 1% full scale Parameter adjustable scaling and offset 4 Total (Optional additional 3) 2 Analog / Digital 2 Relays (Optional additional 3) 2 Analog / Digital 2 Relays (Optional additional 3) Maximum Voltage : 250 VAC, 30 VDC Switching Current Capacity : 6A AC, 5A DC 0 to 10 Volt 0 to 20mA 4 to 20mA Fire Mode - Selectable direction, Selectable speed reference: Broken Belt Detection - Under load monitoring with autotuneconfiguration PID Control - Internal PID control with feedback display Last 4 Trips stored with time stamp Logging of data prior to trip for diagnostic purposes :
Control Functions	Programmable Inputs Digital Inputs Analog Inputs Programmable Outputs Relay Outputs Analog Outputs Fault Memory	10 Volt DC, 5mA for Potentiometer 4 Total as standard 2 Digital 2 Analog / Digital Selectable 10 – 30 Volt DC, internal or external supply, NPN Response time : < 4ms Resolution : 12 bits Response time : < 4ms Accuracy : < 1% full scale Parameter adjustable scaling and offset 2 Total 1 Analog / Digital 1 Relay Maximum Voltage : 250 VAC, 30 VDC Switching Current Capacity : 6A AC, 5A DC 0 to 10 Volt PID Control - Internal PID control with feedback display Last 4 Trips stored with time stamp	24 Volt DC, 100mA, Short Circuit Protected 10 Volt DC, 5mA for Potentiometer 5 Total as standard (Optional additional 3) 2 Analog / Digital Selectable 10 – 30 Volt DC, internal or external supply, NPN Response time : 4ms Resolution : 12 bits Response time : 4ms Accuracy : < 1% full scale Parameter adjustable scaling and offset 4 Total (Optional additional 3) 2 Analog / Digital 2 Relays (Optional additional 3) 2 Analog / Digital 2 Relays (Optional additional 3) Maximum Voltage : 250 VAC, 30 VDC Switching Current Capacity : 6A AC, 5A DC 0 to 10 Volt 0 to 20mA 4 to 20mA 4 to 20mA Dedicated Hoist Operation Mode PID Control - Internal PID control with feedback display Last 4 Trips stored with time stamp Logging of data prior to trip for diagnostic purposes : Output Current, Drive Temperature, DC Bus Voltage Maintenance Indicator with user adjustable maintenance interval	24 Volt DC, 100mA, Short Circuit Protected 10 Volt DC, SmA for Potentiometer 5 Total as standard (Optional additional 3) 2 Analog / Digital Selectable 10 – 30 Volt DC, internal or external supply, NPN Response time : 4ms Resolution : 12 bits Response time : 4ms Accuracy : < 1% full scale Parameter adjustable scaling and offset 4 Total (Optional additional 3) 2 Analog / Digital 2 Relays (Optional additional 3) 4 Maximum Voltage : 250 VAC, 30 VDC Switching Current Capacity : 6A AC, 5A DC 0 to 10 Volt 0 to 20mA 4 to 20mA Fire Mode - Selectable direction, Selectable speed reference: Broken Belt Detection - Under load monitoring with autotuneconfiguration PID Control - Internal PID control with feedback display Last 4 Trips stored with time stamp Logging of data prior to trip for diagnostic purposes : 0 Output Current, Drive Temperature, DC Bus Voltage Maintenance Indicator with user adjustable maintenance inte
Control Functions	Programmable Inputs Digital Inputs Analog Inputs Programmable Outputs Relay Outputs Analog Outputs Fault Memory Data Logging	10 Volt DC, 5mA for Potentiometer 4 Total as standard 2 Digital 2 Analog / Digital Selectable 10 – 30 Volt DC, internal or external supply, NPN Response time : < 4ms Resolution : 12 bits Response time : < 4ms Accuracy : < 1% full scale Parameter adjustable scaling and offset 2 Total 1 Analog / Digital 1 Relay Maximum Voltage : 250 VAC, 30 VDC Switching Current Capacity : 6A AC, 5A DC 0 to 10 Volt PID Control - Internal PID control with feedback display Last 4 Trips stored with time stamp Logging of data prior to trip for diagnostic purposes :	24 Volt DC, 100mA, Short Circuit Protected 10 Volt DC, SmA for Potentiometer 5 Total as standard (Optional additional 3) 2 Analog / Digital Selectable 10 – 30 Volt DC, internal or external supply, NPN Response time : < 4ms Resolution : 12 bits Response time : < 4ms Accuracy : < 1% full scale Parameter adjustable scaling and offset 4 Total (Optional additional 3) 2 Analog / Digital 2 Relays (Optional additional 3) 2 Analog / Digital 2 Relays (Optional additional 3) Maximum Voltage : 250 VAC, 30 VDC Switching Current Capacity: 6A AC, 5A DC 0 to 10 Volt 0 to 20mA 4 to 20mA Dedicated Hoist Operation Mode PID Control - Internal PID control with feedback display Last 4 Trips stored with time stamp Logging of data prior to trip for diagnostic purposes : Output Current, Drive Temperature, DC Bus Voltage	24 Volt DC, 100mA, Short Circuit Protected 10 Volt DC, SmA for Potentiometer 5 Total as standard (Optional additional 3) 2 Analog / Digital Selectable 10 – 30 Volt DC, internal or external supply, NPN Response time : < 4ms Resolution : 12 bits Response time : < 4ms Accuracy : < 1% full scale Parameter adjustable scaling and offset 4 Total (Optional additional 3) 2 Analog / Digital 2 Relays (Optional additional 3) 2 Analog / Digital 2 Relays (Optional additional 3) 2 Analog / Digital 2 Relays (Optional additional 3) Maximum Voltage : 250 VAC, 30 VDC Switching Current Capacity : 6A AC, 5A DC 0 to 10 Volt 0 to 20mA Fire Mode - Selectable direction, Selectable speed referenced Broken Belt Detection - Under load monitoring with autotuneconfiguration PID Control - Internal PID control with feedback display Last 4 Trips stored with time stamp Logging of data prior to trip for diagnostic purposes : Output Current, Drive Temperature, DC Bus Voltage
/O Specification Control Functions Maintenance & Diagnostics	Programmable Inputs Digital Inputs Analog Inputs Programmable Outputs Relay Outputs Analog Outputs Fault Memory Data Logging Maintenance Indicator	10 Volt DC, 5mA for Potentiometer 4 Total as standard 2 Digital 2 Analog / Digital Selectable 10 – 30 Volt DC, internal or external supply, NPN Response time : < 4ms Resolution : 12 bits Response time : < 4ms Accuracy : < 1% full scale Parameter adjustable scaling and offset 2 Total 1 Analog / Digital 1 Relay Maximum Voltage : 250 VAC, 30 VDC Switching Current Capacity : 6A AC, 5A DC 0 to 10 Volt PID Control - Internal PID control with feedback display Last 4 Trips stored with time stamp Logging of data prior to trip for diagnostic purposes : Output Current, Drive Temperature, DC Bus Voltage	24 Volt DC, 100mA, Short Circuit Protected 10 Volt DC, 5mA for Potentiometer 5 Total as standard (Optional additional 3) 2 Analog / Digital Selectable 10 – 30 Volt DC, internal or external supply, NPN Response time : 4ms Resolution : 12 bits Response time : 4ms Accuracy : <1% full scale Parameter adjustable scaling and offset 4 Total (Optional additional 3) 2 Analog / Digital 2 Relays (Optional additional 3) 2 Analog / Digital 2 Relays (Optional additional 3) Maximum Voltage : 250 VAC, 30 VDC Switching Current Capacity : 6A AC, 5A DC 0 to 10 Volt 0 to 20mA 4 to 20mA Dedicated Hoist Operation Mode PID Control - Internal PID control with feedback display Last 4 Trips stored with time stamp Logging of data prior to trip for diagnostic purposes : Output Current, Drive Temperature, DC Bus Voltage Maintenance Indicator with user adjustable maintenance interval Onboard service life monitoring	24 Volt DC, 100mA, Short Circuit Protected 10 Volt DC, SmA for Potentiometer 5 Total as standard (Optional additional 3) 2 Analog / Digital Selectable 10 – 30 Volt DC, internal or external supply, NPN Response time : < 4ms Resolution : 12 bits Response time : < 4ms Accuracy : < 1% full scale Parameter adjustable scaling and offset 4 Total (Optional additional 3) 2 Analog / Digital 2 Relays (Optional additional 3) 2 Analog / Digital 2 Relays (Optional additional 3) 4 Maximum Voltage : 250 VAC, 30 VDC Switching Current Capacity : 6A AC, 5A DC 0 to 10 Volt 0 to 20mA 4 to 20mA 4 to 20mA Fire Mode - Selectable direction, Selectable speed reference Broken Belt Detection - Under load monitoring with autotuneconfiguration PID Control - Internal PID control with feedback display Last 4 Trips stored with time stamp Logging of data prior to trip for diagnostic purposes : Output Current, Drive Temperature, DC Bus Voltage Maintenance Indicator with user adjustable maintenance inter Onboard service life monitoring

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