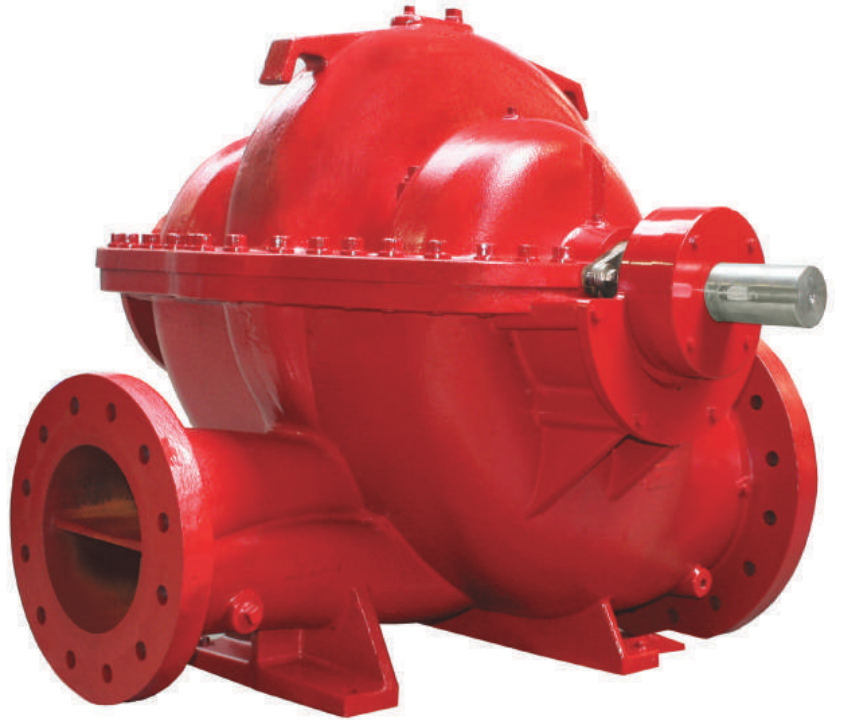
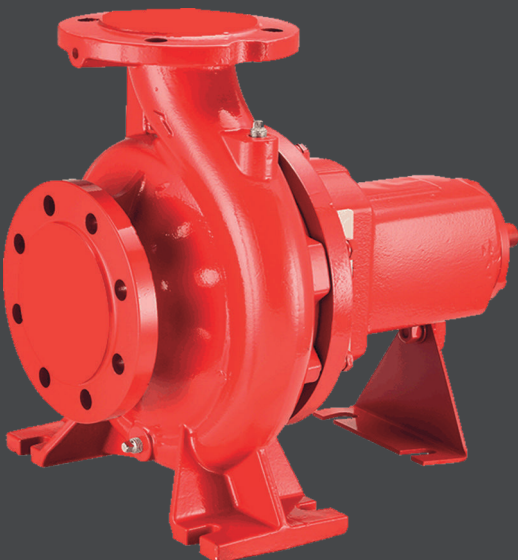


50Hz/60Hz



MENA
MECHANICAL INDUSTRIES CO.

FIRE PUMP



		
	Vendor Doc. No. TS-7506.2-T045	
Contractor Name: M/S. WATERWAVE ENERGY AND SAFETY SOLUTIONS	Contractor Ref. No.	
Project Name:	Contractor Job No.	

**FIRE PUMP SET
(VERTICAL TURBINE)**

TECHNICAL SUBMITTAL

CAPACITY
750 GPM @ 90PSI

(6.2 BAR)

(2E+J)

<i>0</i>	<i>SUBMITTED FOR APPROVAL</i>	<i>KY</i>	<i>KY</i>		<i>16/12/2024</i>
<i>Rev</i>	<i>Description</i>	<i>Prepared</i>	<i>Checked</i>	<i>Approved</i>	<i>Date</i>

	Vendor Ref. No.	
	Contractor Ref. No.	
Project Name:	Contractor Job No.	

DOCUMENT INDEX

Part	Seq. No.	Doc. Ref.	Description	Remarks
GENERAL DOCUMENTS	01	GD-SVL	Sub-Vendor List	
	02	GD-STC	System Technical Specifications	
	03	GD-CE	UL/FM Certificates	
	04	GD-CP	Catalogue and Trade License	
DIESEL DRIVEN PUMP				
ELECTRIC DRIVEN PUMP	05	EDP-PSC-750	Electric motor driven pump specifications	
	06	EDP-EMS-50/2	Electric motor specifications	
	07	EDP-PCS-YD	Electric motor driven fire pump controller specifications	
JOCKEY PUMP	08	JP-RV	Jockey Pump Specifications	
	09	JP-PCS-JP3	Jockey Pump Controller	
ACCESSORIES	10	A-CRV-R	Casing Relief Valve	
		A-ARV-VAL	Air Relief Valve	
		A-PG-W	Pressure Guages	
		A-FM-GRND	Flowmeter	
		A-JG	Gear Drive	

0	SUBMITTED FOR APPROVAL				
Rev	Description	Prepared	Checked	Approved	Date

	Vendor Ref. No.	
	Contractor Ref. No.	
Project Name:	Contractor Job No.	

SUB VENDOR LIST

0	SUBMITTED FOR APPROVAL				
Rev	Description	Prepared	Checked	Approved	Date

SUB VENDOR LIST

EQUIPMENT	BRAND	MAKE	DESCRIPTION
VERTICAL FIRE PUMP		MENA MECHANICAL INDUSTRIES, UAE	RANGE: 300 - 8000 US
GEAR DRIVE	AMARILLO	AMARILLO FM APPROVED	60 - 500 HP
FIRE PUMP MOTOR	TECHTOP	TECHTOP MOTORS - UL LISTED	RANGE: 11kW - 350kW Type: ODP & TEFC, NEMA2
FIRE PUMP CONTROLLERS		TORNATECH, INC UL LISTED & FM APPROVED	RANGE: 11kW to 350KW Type: Diesel, Electric, Jockey
AIR RELIEF VALVE	CAL-VAL OR FWIC Valves *As Per Availability	CAL-VAL, USA UL LISTED & FM APPROVED FWIC FM APPROVED	RANGE: 1/2 inch - 2 inch UP TO 300 PSI RANGE: 1/2 inch - 1 inch UP TO 300 PSI
FLOWMETER		GERAND, USA FM APPROVED	RANGE: 2-1/2 Inch to 8 Inch UP TO 300 PSI



		Vendor Ref. No.	
		Contractor Ref. No	
Project Name		Contractor Job No.	

SYSTEM TECHNICAL SUBMITTAL

0	SUBMITTED FOR APPROVAL				
Rev	Description	Prepared	Checked	Approved	Date

Electric Fire Pump

Item Description

Proposed

Electric Pump:	
Make	: MENA (MENA Mechanical Industries) UL Listed
Model	: VT125-180
Type	: Vertical Turbine Fire Pump
Rated Flow	: 750 USGPM
Rated Head	: 90 PSI (6.2 BAR)
Rated Speed	: 2950 RPM
Casing	: ASTM A536 65-45-12
Impeller Material	: STAINLESS STEEL
Shaft	: STAINLESS STEEL
Brand	: MENA
Pump Approval	: UL Listed 
Electric Motor:	
Make	: TECHTOP
Protection	: Class F
Type	: ODP
Performance Rating	: 60 HP, 3Ph, 60Hz , 380V, 2 POLES
Speed	: 3600 RPM GD 6:5
Motor Approval	: UL Listed 
Electric Pump Controller	
Make	: "Tornatech" 
Model	: GPY+GPU-380\60\3\60
Operation	: Combined Automatic , Manual Start & Remote Start
Enclosure	: NEMA 2
Mounting	: FLOOR / WALL
Method of Start	: Y-DELTA WITH ATS
Operation Interface	: Standard
Power Supply	: 3Ph, 380V, 60Hz
Controller Approval	: UL Listed & FM Approved, Built to NFPA 20 Standards  

Electric Fire Pump

Item Description

Proposed

Electric Pump:	
Make	: MENA (MENA Mechanical Industries) UL Listed
Model	: VT125-180
Type	: Vertical Turbine Fire Pump
Rated Flow	: 750 USGPM
Rated Head	: 90 PSI (6.2 BAR)
Rated Speed	: 2950 RPM
Casing	: ASTM A536 65-45-12
Impeller Material	: STAINLESS STEEL
Shaft	: STAINLESS STEEL
Brand	: MENA
Pump Approval	: UL Listed 
Electric Motor:	
Make	: TECHTOP
Protection	: Class F
Type	: ODP
Performance Rating	: 60 HP, 3Ph, 60Hz , 380V, 2 POLES
Speed	: 3600 RPM GD 6:5
Motor Approval	: UL Listed 
Electric Pump Controller	
Make	: "Tornatech" 
Model	: GPY-380\60\3\60
Operation	: Combined Automatic , Manual Start & Remote Start
Enclosure	: NEMA 2
Mounting	: FLOOR / WALL
Method of Start	: Y-DELTA
Operation Interface	: Standard
Power Supply	: 3Ph, 380V, 60Hz
Controller Approval	: UL Listed & FM Approved, Built to NFPA 20 Standards  

Jokey Fire Pump

Item Description

Proposed

<u>Electric Pump:</u>	
Make	: PACIFIC
Model	: RV10
Type	: Vertical Multistage
Rated Flow	: 60 USGPM
Rated Head	: 7 BAR
Rated Speed	: 3500 RPM, 60 Hz
<u>Motor:</u>	
Type	: TEFC Motor
Power Supply	: 3 Ph, 380V, 60 hz
Rated power	: 7.5 Hp
Speed	: 3500 RPM
<u>Jockey Pump Controller</u>	
Make	: "Tornatech"
Model	: JP3-380\7.5\3\60
Operation	: Combined Automatic , Manual Start
Enclosure	: NEMA 2
Mounting	: WALL
Method of Start	: DOL
Operation Interface	: Touch Screen
Power Supply	: 3 Phase, 380 V, 60 Hz
Controller Approval	: UL Listed / Built to NFPA 20 Standards



	Vendor Ref. No.	
	Contractor Ref. No.	
Project Name:	Contractor Job No.	

UL/FM CERTIFICATES

0	SUBMITTED FOR APPROVAL				
Rev	Description	Prepared	Checked	Approved	Date

CERTIFICATE OF COMPLIANCE

Certificate Number EX28924
Report Reference EX28924-20221107
Issue Date 2022-NOVEMBER-23

Issued to: **Volute Engineering Pvt Ltd**
No. 37, Muthiya Mudali Second Street
Royapettah Chennai Tamil Nadu 600014 IN

**This certificate confirms that
representative samples of** CENTRIFUGAL FIRE PUMPS, VERTICAL TURBINE
See addendum page for models

Have been evaluated by UL in accordance with the
Standard(s) indicated on this Certificate.

Standard(s) for Safety: UL448 - Standard for for Centrifugal Stationary Pumps for
Fire-Protection Service

Additional Information: See UL Product iQ® at <https://iq.ulprospector.com> for
additional information.

This Certificate of Compliance indicates that representative samples of the product described in the certification report have met the requirements for UL certification. It does not provide authorization to apply the UL Mark. Only the Authorization Page that references the Follow-Up Services Procedure for ongoing surveillance provides authorization to apply the UL Mark.

Only those products bearing the UL Mark should be considered as being UL Certified and covered under UL's Follow-Up Services.

Look for the UL Certification Mark on the product.

Deborah Jennings-Conner

Deborah Jennings-Conner, VP Regulatory Services

UL LLC

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CERTIFICATE OF COMPLIANCE

Certificate Number EX28924
Report Reference EX28924-20221107
Issue Date 2022-NOVEMBER-23

This is to certify that representative samples of the product as specified on this certificate were tested according to the current UL requirements.

Centrifugal Fire Pumps, Vertical Turbine :

VT80-145
VT100-155
VT125-180
VT145-270
VT150-265
VT170-304
VT185-335
VT200-350
VT225-400
VT250-400
VT275-430 |

Deborah Jennings-Conner

Deborah Jennings-Conner, VP Regulatory Services

UL LLC

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QXXW.EX28924 - Centrifugal Fire Pumps, Vertical Turbine

Centrifugal Fire Pumps, Vertical Turbine

EX28924

Volute Engineering Pvt Ltd
No. 37, Muthiya Mudali Second Street
Royapettah
Chennai, Tamil Nadu 600014 India

Trademark and/or Tradename: "VOLUTE" ,



Note: For additional marking information, refer to the [Guide Information Page](#)

View model for additional information

Centrifugal Fire Pumps, Vertical Turbine, Model(s): [VT100-155](#), [VT125-180](#), [VT145-270](#), [VT150-265](#), [VT170-304](#), [VT185-335](#), [VT200-350](#), [VT225-400](#), [VT250-400](#), [VT275-430](#), [VT80-145](#)

Last Updated on 2023-01-03

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Models 20, 30, 40, 60A, 80A, 100A, 125A, 150A, 200A, 250, 300, 350, 450A, 500A, 600A, 750A, 1000, 1200

	Usable Power, hp	Vert. Shaft Speed,	Horizontal Shaft r/min, Speed Increasing Ratios Driver:Driven							
Model	(kW)	r/min	1:2	4:7	2:3	3:4	4:5	5:6	10:11	1:1
20	20 (15)	1760	880	-	1173	1320	-	1467	-	1760
30	30 (22)	1760	880	-	1173	1320	-	1467	-	1760
40	40 (30)	1760	880	1012	1173	1320	-	1467	-	1760
60A	60 (45)	1760	880	1000	1173	1320	1408	1467	1584	1760
80A	80 (60)	1760	880	1000	1173	1320	1408	1467	1584	1760
100A	100 (75)	1760	880	1000	1173	1320	1408	1467	1584	1760
125A	125 (93)	1760	880	1000	1173	1320	1408	1467	1584	1760
150A	150 (112)	1760	832	1011	1173	1320	1408	1467	1590	1760
200A	200 (149)	1760	880	1000	1173	1320	1408	1458	1590	1760
250	250 (186)	1760	880	1000	1173	1320	1408	1475	1605	1812
300	300 (224)	1760	880	1000	1173	1320	1408	1475	1605	1812
350	350 (261)	1760	880	1000	1173	1320	1408	1475	1605	1812
450A	450 (336)	1760	863	1001	1188	1332	1408	1522	1605	1760
500A	500 (373)	1760	863	1001	1188	1332	1408	1522	-	1760
600A	600 (447)	1760	863	1001	1188	1332	1408	1452	1579	1760
750A	750 (559)	1760	864	992	1162	1311	1400	1467	1579	1760
1000*	1000 (746)	1760	837	992	1162	1302	1408	1478	-	1798
1200†	1200 (895)	1760	-	-	-	-	-	-	-	1798

450B	611 (456)	1760	-	-	-	1320	-	1475	1605	-
750B	789 (588)	1760	-	1000	-	1332	-	1522	1605	1760
1000B	1000 (746)	1760	-	-	1162	1332	-	1452	1616	-

	<i>Usable Power, hp</i>	<i>Vert. Shaft Speed,</i>	<i>Horizontal Shaft r/min, Speed Decreasing Ratios Driver:Driven</i>										
<i>Model</i>	<i>(kW)</i>	<i>r/min</i>	<i>1:1</i>	<i>10:11</i>	<i>11:10</i>	<i>6:5</i>	<i>5:4</i>	<i>5:6</i>	<i>4:3</i>	<i>3:2</i>	<i>8:5</i>	<i>7:4</i>	<i>2:1</i>
20	20 (15)	1760	1760	-	-	2112	-	-	2347	2640	-	-	-
30	30 (22)	1760	1760	-	-	2112	-	-	2347	2640	-	-	-
40	40 (30)	1760	1760	-	-	2112	-	-	2347	2640	-	3061	3520
60A	60 (45)	1760	1760	-	1956	2112	2200	-	2347	2640	2831	3061	3600
80A	80 (60)	1760	1760	-	1956	2112	2200	-	2347	2640	2831	3061	3600
100A	100 (75)	1760	1760	-	1956	2112	2200	-	2347	2640	-	3061	3600
125A	125 (93)	1760	1760	-	1956	2112	2200	-	2347	2640	-	-	-
150A	150 (112)	1760	1760	-	1949	2112	2200	-	2347	2640	-	3098	3520
200A	200 (149)	1760	1760	-	1949	2124	2200	-	2347	2640	-	3064	3520
250	250 (186)	1760	1811	-	1930	2124	2200	-	2347	2640	-	3098	3520
300	300 (224)	1760	1811	-	1930	2124	2200	-	2347	2640	-	3098	3520
350	350 (261)	1760	1811	-	1930	2124	2200	-	2347	2640	-	3098	3520
450A	450 (336)	1760	1760	-	1930	2035	2200	-	2326	2640	2816	3098	3590
500A	500 (373)	1760	1760	-	1940	2035	2200	-	2326	2607	2816	3095	3583
600A	600 (447)	1760	1760	-	1940	2133	2200	-	2326	2607	2816	3095	3583
750A	750 (559)	1760	1760	-	1916	2133	2200	-	2326	2607	2816	3095	3583
1000*	1000 (746)	1760	a	-		a	a	-	a	a	-	a	a
1200†	1200 (895)	1760	a	-	a	a	a	-	a	a	-	a	a

450B	450 (336)	1760	1812	1605	-	2100	-	1475	2347	-	-	-	-
500B	500 (373)	1760	1812	1605	-	2100	-	1475	2347	-	-	-	-
600B	600 (447)	1760	1760	-	1930	2100	-	-	2326	-	-	3098	-
750B	750 (559)	1760	1760	-	1930	2100	-	-	2326	-	-	3098	-
1000B	1000 (746)	1760	1760	-	1916	2133	-	-	2326	2667	-	-	-

* Available in speed decreasing ratios through 5:1 and ratios intermediate to those listed.
† Available in speed decreasing ratios through 6:1 and ratios intermediate to those listed.
a. These ratios are not available in 1760 r/min vertical shaft speeds. Consult manufacturer's catalog for available speeds and power ratings at those speeds.

Details

Class of Work : 1338 - Right Angle Gear Drives

Approval Standard : FM 1338 - Right Angle Gear Drives

Certification Type : FM Approved

Listing Country : United States of America

Category : Right Angle Gear Drives

Company

Amarillo Gear Co.

Box 1789, Amarillo, Texas 79105

United States of America

<http://amarillogear.com>

CERTIFICATE OF COMPLIANCE

Certificate Number EX26635
Report Reference EX26635-20200127
Issue Date 2020-FEBRUARY-14

Issued to: SHANGHAI TOP MOTOR CO LTD
303 KANGLIU RD
KANGQIAO TOWN
NANHUI
SHANGHAI
201315 CHINA

**This certificate confirms that
representative samples of** FIRE PUMP MOTORS
See Addendum page

Have been investigated by UL in accordance with the
Standard(s) indicated on this Certificate.

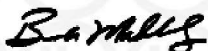
Standard(s) for Safety: UL 1004-1, Rotating Electrical Machines – General
Requirements
UL 1004-5, Fire Pump Motors
CSA C22.2 No. 100-14, Motors and Generators

Additional Information: See the UL Online Certifications Directory at
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Bruce Mahrenholz, Director North American Certification Program
UL LLC

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CERTIFICATE OF COMPLIANCE

Certificate Number	EX26635
Report Reference	EX26635-20200127
Issue Date	2020-FEBRUARY-14

This is to certify that representative samples of the product as specified on this certificate were tested according to the current UL requirements.

Models/Product

Model Number,F-TXC143T1U2B,F-TXC143T1U2B,F-TXC143T1U2B,F-TXC143T1U2B,F-TXC143T1U2B,F-TXC143T1U2B,F-TXC143T1.5U2B,F-TXC143T1.5U2B,F-TXC143T1.5U2B,F-TXC143T1.5U2B,F-TXC143T1.5U2B,F-TXC145T2U2B,F-TXC145T2U2B,F-TXC145T2U2B,F-TXC145T2U2B,F-TXC182T3U2B,F-TXC182T3U2B,F-TXC182T3U2B,F-TXC182T3U2B,F-TXC184T5U2B,F-TXC184T5U2B,F-TXC184T5U2B,F-TXC184T5U2B,F-TXC213T7.5U2B,F-TXC213T7.5U2B,F-TXC213T7.5U2B,F-TXC213T7.5U2B,F-TXC215T10U2B,F-TXC215T10U2B,F-TXC215T10U2B,F-TXC215T10U2B,F-TXC215T10U2B,F-TXC254T15U2B,F-TXC254T15U2B,F-TXC254T15U2B,F-TXC254T15U2B,F-TXC256T20U2B,F-TXC256T20U2B,F-TXC256T20U2B,F-TXC256T20U2B,F-TXC284TS25U2B,F-TXC284TS25U2B,F-TXC284TS25U2B,F-TXC284TS25U2B,F-TXC286TS30U2B,F-TXC286TS30U2B,F-TXC286TS30U2B,F-TXC286TS30U2B,F-TXC324TS40U2B,F-TXC324TS40U2B,F-TXC324TS40U2B,F-TXC324TS40U2B,F-TXC326TS50U2B,F-TXC326TS50U2B,F-TXC326TS50U2B,F-TXC326TS50U2B,F-TXC364TS60U2B,F-TXC364TS60U2B,F-TXC364TS60U2B,F-TXC364TS60U2B,F-TXC365TS75U2B,F-TXC365TS75U2B,F-TXC365TS75U2B,F-TXC365TS75U2B,F-TXC405TS100U2B,F-TXC405TS100U2B,F-TXC405TS100U2B,F-TXC405TS100U2B,F-TXC444TS125U2B,F-TXC444TS125U2B,F-TXC444TS125U2B,F-TXC444TS125U2B,F-TXC445TS150U2B,F-TXC445TS150U2B,F-TXC445TS150U2B,F-TXC445TS150U2B,F-TXC447TS200U2B,F-TXC447TS200U2B,F-TXC447TS200U2B,F-TXC447TS200U2B,F-TXC449TS250U2B,F-TXC449TS250U2B,F-TXC449TS250U2B,F-TXC449TS250U2B,F-TXC449TS250U2B,F-TXC449TS300U2B,F-TXC449TS300U2B,F-TXC449TS300U2B,F-TXC449TS300U2B,F-TXC586/7TS350U2B,F-TXC586/7TS350U2B,F-TXC586/7TS350U2B,F-TXC586/7TS350U2B,F-TXC586/7TS400U2B,F-TXC586/7TS400U2B,F-TXC586/7TS400U2B,F-TXC586/7TS400U2B,F-TXC586/7TS450U2B,F-TXC586/7TS450U2B,F-TXC586/7TS450U2B,F-TXC586/7TS450U2B,F-TXC143T1U4B,F-TXC143T1U4B,F-TXC143T1U4B,F-TXC143T1U4B,F-TXC145T1.5U4B,F-TXC145T1.5U4B,F-TXC145T1.5U4B,F-TXC145T1.5U4B,F-TXC145T2U4B,F-TXC145T2U4B,F-TXC145T2U4B,F-TXC145T2U4B,F-TXC182T3U4B,F-TXC182T3U4B,F-TXC182T3U4B,F-TXC182T3U4B,F-TXC184T5U4B,F-TXC184T5U4B,F-TXC184T5U4B,F-TXC184T5U4B,F-TXC213T7.5U4B,F-TXC213T7.5U4B,F-TXC213T7.5U4B,F-TXC213T7.5U4B,F-TXC215T10U4B,F-TXC215T10U4B,F-TXC215T10U4B,F-TXC215T10U4B,F-TXC254T15U4B,F-TXC254T15U4B,F-TXC254T15U4B,F-TXC254T15U4B,F-TXC256T20U4B,F-TXC256T20U4B,F-TXC256T20U4B,F-TXC284T25U4B,F-TXC284T25U4B,F-TXC284T25U4B,F-TXC284T25U4B,F-TXC286T30U4B,F-TXC286T30U4B,F-TXC286T30U4B,F-TXC286T30U4B,F-TXC324T40U4B,F-TXC324T40U4B,F-TXC324T40U4B,F-TXC324T40U4B,F-TXC324T40U4B,F-TXC326T50U4B,F-TXC326T50U4B,F-TXC326T50U4B,F-TXC326T50U4B,F-TXC364T60U4B,F-TXC364T60U4B,F-TXC364T60U4B,F-TXC365T75U4B,F-TXC365T75U4B,F-TXC365T75U4B,F-TXC405T100U4B,F-TXC405T100U4B,F-TXC405T100U4B,F-TXC444T125U4B,F-TXC444T125U4B,F-TXC444T125U4B,F-TXC444T125U4B,F-TXC445T150U4B,F-TXC445T150U4B,F-TXC445T150U4B,F-TXC445T150U4B,F-TXC447T200U4B,F-TXC447T200U4B,F-TXC447T200U4B,F-TXC447T200U4B,F-TXC449T250U4B,F-TXC449T250U4B,F-TXC449T250U4B,F-TXC449T250U4B

Barnhill

Bruce Mahrenholz, Director North American Certification Program

UL LLC

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CERTIFICATE OF COMPLIANCE

Certificate Number EX26635
Report Reference EX26635-20200127
Issue Date 2020-FEBRUARY-14

TXC449T250U4B,F-TXC449TS300U4B,F-TXC449TS300U4B,F-TXC449TS300U4B,F-TXC449TS300U4B,F-TXC586/7T350U4B,F-TXC586/7T350U4B,F-TXC586/7T350U4B,F-TXC586/7T350U4B,F-TXC586/7T400U4B,F-TXC586/7T400U4B,F-TXC586/7T400U4B,F-TXC586/7T400U4B,F-TXC586/7T450U4B,F-TXC586/7T450U4B,F-TXC586/7T450U4B,F-TXC586/7T450U4B,F-TXC145T1U6B,F-TXC145T1U6B,F-TXC145T1U6B,F-TXC145T1U6B,F-TXC182T1.5U6B,F-TXC182T1.5U6B,F-TXC182T1.5U6B,F-TXC182T1.5U6B,F-TXC184T2U6B,F-TXC184T2U6B,F-TXC184T2U6B,F-TXC184T2U6B,F-TXC213T3U6B,F-TXC213T3U6B,F-TXC213T3U6B,F-TXC213T3U6B,F-TXC215T5U6B,F-TXC215T5U6B,F-TXC215T5U6B,F-TXC215T5U6B,F-TXC254T7.5U6B,F-TXC254T7.5U6B,F-TXC254T7.5U6B,F-TXC254T7.5U6B,F-TXC256T10U6B,F-TXC256T10U6B,F-TXC256T10U6B,F-TXC256T10U6B,F-TXC284T15U6B,F-TXC284T15U6B,F-TXC284T15U6B,F-TXC284T15U6B,F-TXC286T20U6B,F-TXC286T20U6B,F-TXC286T20U6B,F-TXC286T20U6B,F-TXC324T25U6B,F-TXC324T25U6B,F-TXC324T25U6B,F-TXC324T25U6B,F-TXC326T30U6B,F-TXC326T30U6B,F-TXC326T30U6B,F-TXC326T30U6B,F-TXC364T40U6B,F-TXC364T40U6B,F-TXC364T40U6B,F-TXC364T40U6B,F-TXC365T50U6B,F-TXC365T50U6B,F-TXC365T50U6B,F-TXC365T50U6B,F-TXC404T60U6B,F-TXC404T60U6B,F-TXC404T60U6B,F-TXC404T60U6B,F-TXC405T75U6B,F-TXC405T75U6B,F-TXC405T75U6B,F-TXC405T75U6B,F-TXC444T100U6B,F-TXC444T100U6B,F-TXC444T100U6B,F-TXC444T100U6B,F-TXC445T125U6B,F-TXC445T125U6B,F-TXC445T125U6B,F-TXC445T125U6B,F-TXC447T150U6B,F-TXC447T150U6B,F-TXC447T150U6B,F-TXC447T150U6B,F-TXC449T200U6B,F-TXC449T200U6B,F-TXC449T200U6B,F-TXC449T200U6B,F-TXC586/7T250U6B,F-TXC586/7T250U6B,F-TXC586/7T250U6B,F-TXC586/7T250U6B,F-TXC586/7T300U6B,F-TXC586/7T300U6B,F-TXC586/7T300U6B,F-TXC586/7T300U6B,F-TXC586/7T350U6B,F-TXC586/7T350U6B,F-TXC586/7T350U6B,F-TXC586/7T350U6B,F-TXC586/7T400U6B,F-TXC586/7T400U6B,F-TXC586/7T400U6B,F-TXC586/7T400U6B,

B. Mahrenholz

Bruce Mahrenholz, Director North American Certification Program

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Certificate Number EX26635
Report Reference EX26635-20200127
Issue Date 2020-FEBRUARY-14

F-TDC254T15U2B,F-TDC254T15U2B,F-TDC254T15U2B,F-TDC254T15U2B,F-TDC256T20U2B,F-TDC256T20U2B,F-TDC256T20U2B,F-TDC256T20U2B,F-TDC284TS25U2B,F-TDC284TS25U2B,F-TDC284TS25U2B,F-TDC284TS25U2B,F-TDC286TS30U2B,F-TDC286TS30U2B,F-TDC286TS30U2B,F-TDC286TS30U2B,F-TDC286TS40U2B,F-TDC286TS40U2B,F-TDC286TS40U2B,F-TDC286TS40U2B,F-TDC324TS40U2B,F-TDC324TS40U2B,F-TDC324TS40U2B,F-TDC324TS40U2B,F-TDC324TS50U2B,F-TDC324TS50U2B,F-TDC324TS50U2B,F-TDC324TS50U2B,F-TDC326TS50U2B,F-TDC326TS50U2B,F-TDC326TS50U2B,F-TDC326TS50U2B,F-TDC326TS60U2B,F-TDC326TS60U2B,F-TDC326TS60U2B,F-TDC326TS60U2B,F-TDC364TS60U2B,F-TDC364TS60U2B,F-TDC364TS60U2B,F-TDC364TS60U2B,F-TDC364TS75U2B,F-TDC364TS75U2B,F-TDC364TS75U2B,F-TDC364TS75U2B,F-TDC365TS75U2B,F-TDC365TS75U2B,F-TDC365TS75U2B,F-TDC365TS75U2B,F-TDC365TS100U2B,F-TDC365TS100U2B,F-TDC365TS100U2B,F-TDC365TS100U2B,F-TDC405TS100U2B,F-TDC405TS100U2B,F-TDC405TS100U2B,F-TDC405TS100U2B,F-TDC404TS125U2B,F-TDC404TS125U2B,F-TDC404TS125U2B,F-TDC404TS125U2B,F-TDC444TS125U2B,F-TDC444TS125U2B,F-TDC444TS125U2B,F-TDC444TS125U2B,F-TDC405TS150U2B,F-TDC405TS150U2B,F-TDC405TS150U2B,F-TDC405TS150U2B,F-TDC445TS150U2B,F-TDC445TS150U2B,F-TDC445TS150U2B,F-TDC445TS150U2B,F-TDC444TS200U2B,F-TDC444TS200U2B,F-TDC444TS200U2B,F-TDC444TS200U2B,F-TDC447TS200U2B,F-TDC447TS200U2B,F-TDC447TS200U2B,F-TDC447TS200U2B,F-TDC449TS250U2B,F-TDC449TS250U2B,F-TDC449TS250U2B,F-TDC449TS250U2B,F-TDC447TS300U2B,F-TDC447TS300U2B,F-TDC447TS300U2B,F-TDC447TS300U2B,F-TDC449TS300U2B,F-TDC449TS300U2B,F-TDC449TS300U2B,F-TDC449TS300U2B,F-TDC449TS350U2B,F-TDC449TS350U2B,F-TDC449TS350U2B,F-TDC449TS350U2B,F-TDC449TS350U2B,F-TDC449TS350U2B,F-TDC449TS350U2B,F-TDC449TS350U2B,F-TDC449TS400U2B,F-TDC449TS400U2B,F-TDC449TS400U2B,F-TDC449TS400U2B,F-TDC449TS450U2B,F-TDC449TS450U2B,F-TDC449TS450U2B,F-TDC449TS450U2B,F-TDC449TS500U2B,F-TDC449TS500U2B,F-TDC449TS500U2B,F-TDC449TS500U2B,F-TDC254T15U4B,F-TDC254T15U4B,F-TDC254T15U4B,F-TDC254T15U4B,F-TDC256T20U4B,F-TDC256T20U4B,F-TDC256T20U4B,F-TDC256T20U4B,F-TDC284T25U4B,F-TDC284T25U4B,F-TDC284T25U4B,F-TDC284T25U4B,F-TDC286T30U4B,F-TDC286T30U4B,F-TDC286T30U4B,F-TDC286T30U4B,F-TDC324T40U4B,F-TDC324T40U4B,F-TDC324T40U4B,F-TDC324T40U4B,F-TDC326T50U4B,F-TDC326T50U4B,F-TDC326T50U4B,F-TDC326T50U4B,F-TDC364T60U4B,F-TDC364T60U4B,F-TDC364T60U4B,F-TDC364T60U4B,F-TDC365T75U4B,F-TDC365T75U4B,F-TDC365T75U4B,F-TDC365T75U4B,F-TDC405T100U4B,F-TDC405T100U4B,F-TDC405T100U4B,F-TDC405T100U4B,F-TDC405T125U4B,F-TDC405T125U4B,F-TDC405T125U4B,F-TDC405T125U4B,F-TDC444T125U4B,F-TDC444T125U4B,F-TDC444T125U4B,F-TDC444T125U4B,F-TDC444T150U4B,F-TDC444T150U4B,F-TDC444T150U4B,F-TDC444T150U4B,F-TDC445T150U4B,F-TDC445T150U4B,F-TDC445T150U4B,F-TDC445T150U4B,F-TDC445T200U4B,F-TDC445T200U4B,F-TDC445T200U4B,F-TDC445T200U4B,F-TDC447T200U4B,F-TDC447T200U4B,F-TDC447T200U4B,F-TDC447T200U4B,F-TDC447T250U4B,F-TDC447T250U4B,F-TDC447T250U4B,F-TDC447T250U4B,F-TDC449T250U4B,F-TDC449T250U4B,F-TDC449T250U4B,F-TDC449T250U4B,F-TDC449T300U4B,F-TDC449T300U4B,F-TDC449T300U4B,F-TDC449T300U4B,F-TDC449T350U4B,F-TDC449T350U4B,F-TDC449T350U4B,F-TDC449T350U4B,F-

B. Mahrenholz

Bruce Mahrenholz, Director North American Certification Program

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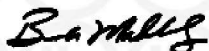
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CERTIFICATE OF COMPLIANCE

Certificate Number EX26635
Report Reference EX26635-20200127
Issue Date 2020-FEBRUARY-14

TDC449T350U4B,F-TDC449T350U4B,F-TDC449T400U4B,F-TDC449T400U4B,F-
TDC449T400U4B,F-TDC449T400U4B,F-TDC449T450U4B,F-TDC449T450U4B,F-TDC449T450U4B,



Bruce Mahrenholz, Director North American Certification Program

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QYZS.EX3971 Pump Controllers, Fire

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Pump Controllers, Fire

[See General Information for Pump Controllers, Fire](#)
TORNATECH INC

EX3971

#132

7075 PLACE ROBERT-JONCAS

ST LAURENT, QC H4M 2Z2 CANADA

Fire Pump Controllers: Models AF, AFP, AFR, AFY, ATF, ATR, ATP or ATY followed by C or N, followed by additional suffixes. All of the above controllers are suitable for use on circuits capable of delivering high fault currents. The withstand ratings are as follows:

Circuit Breaker	Max V AC	Max Short Circuit Current RMS Symmetrical Amps
MZMH6-63, MZMH6-100,	208; 240	25000; 42,000
MZMH6-160, MZMH6-250		
MZMH6-63, MZMH6-100,	480	65,000
MZMH6-160, MZMH6-250		

The controllers provided with Automatic Transfer Switches are suitable for use on circuits capable of delivering high fault currents. The withstand rating of the normal power source side is determined by the transfer switch as indicated below:

ASCO Transfer Switch	Max Controller Short Circuit Withstand Rating
9403704	22KA, 480 VAC Max
94031004	22KA, 480 VAC Max
94032604	35KA, 480 VAC Max

The withstand ratings for the alternate power source side will be dependent upon the ratings of the external circuit breaker provided. But in no case will they exceed those of the normal power source side.

Models AL or AL1 followed by additional suffixes.

All of the above controllers are suitable for use on circuits capable of delivering high fault currents. The withstand ratings are as follows:

Circuit Breaker	Max V AC	Max Short Circuit Current RMS Symmetrical Amps
NZM6B-63,	480	25,000
NZM6B-100, NZM6B-160		

The controllers provided with automatic Transfer Switches are suitable for use on circuits capable of delivering high fault currents. The withstand rating of the entire controller is determined by the transfer switch as indicated below:

ASCO Transfer Switch	Max Controller S. C. Withstand Rating
9403704	22KA, 480 VAC Max
94031004	22KA, 480 VAC Max
94032604	25KA, 480 VAC Max

The withstand ratings for the alternate power source side will be dependent upon the ratings of the external circuit breaker provided. But in no case will they exceed those of the normal power source side.

Authorities having jurisdiction should be consulted in all cases.

Model FPD Series controller for engine-driven centrifugal fire pumps.

Models FPA, FPP, FPR, FPS, FPV, FPW, FPY, VPA, VPR, and VPS may be followed by additional suffixes. The withstand ratings are as follows:

Withstand Ratings of Controllers Without Transfer Switch:

Short Circuit Withstand Ratings (Ampere Symmetrical)		
VOLTAGE	STANDARD	OPTIONAL HIGH
200 to 480 V	100,000A RMS	150,000A RMS
575 to 600 V	50,000A RMS	100,000A RMS

Models ATG , ATU, VPG or VPU. The controllers provided with Automatic Transfer Switches are suitable for use on circuits capable of delivering high fault currents. The withstand rating of the normal power side is the same as the withstand ratings of controllers without transfer switches. The withstand rating of the alternate power side is determined by the transfer switch as indicated by the following tables:

Withstand ratings of controllers with 120 A Tornatech Inc. Transfer Switch

200-208V 50/60 Hz MAX HP	230-240V 50/60 Hz MAX HP	380-416V 50/60 Hz MAX HP	440-480V 50/60 Hz MAX HP	600V 60Hz MAX HP	Withstand Rating (A)
40	40	—	—	—	65,000
—	—	60	75	—	25,000
—	—	—	—	100	18,000

Withstand Ratings For Controllers with Ascoelectric Transfer Switches

Transfer Switch (A)	200-208V 50/60 Hz Max HP	230-240V 50/60 Hz Max HP	Withstand Rating		Specific** Withstand Rating (A)
			(A)	Time (Cycles)	
100	30	30	10000	1.5	22000
150	50	50	1000	1.5	22000
400	150	150	35000	3	42000
600	N/A	N/A	50000	3	65000

** Tested and found suitable for 100kA

Withstand Ratings for Controllers with Ascoelectric Transfer Switches, Continued

Transfer Switch (A)	600V 60 Hz Max HP	Withstand Rating		Specific Withstand Rating (A)
		(A)	Time (Cycles)	
100	75	10000	1.5	N/A
150	150	1000	1.5	N/A
400	400	22000	3	N/A
600	N/A	N/A	N/A	N/A

Model ATU or VPU:	Normal Power Side:	Same as withstand rating of controller without transfer switch.
	Alternate Power Side:	Same as withstand rating of controller without transfer switch.

Model FPL:	Limited Service controllers with withstand ratings as follows:
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Short Circuit Withstand Ratings of Limited Service Controllers Without Transfer Switches		
VOLTAGE	STANDARD	OPTIONAL HIGH
200 to 480 V	25,000 A RMS	65,000 A RMS
575 to 600 V	18,000 A RMS	25,000 A RMS

Model LTG, GLG:	Automatic transfer switch for connection to a generator set.
Model LTU:	Automatic transfer switch for connection to a 2 nd utility.

Withstand ratings of Controller with transfer switch Model FPAT (Tornatech):

Model LTG:	Normal Power Side:	Same as withstand rating of controller without transfer switch.
	Alternate Power Side:	Withstand rating only applies when the generator set is protected by a molded case circuit breaker

TRANSFER SWITCH AMPERES	200-480 V H.P.	WITHSTAND RATING AMPERES
120	30	25,000

TRANSFER SWITCH AMPERES	600 V H.P.	WITHSTAND RATING AMPERES
120	30	18,000

Model LTU:	Normal Power Side:	Same as withstand rating of controller without transfer switch.
	Alternate Power Side:	Same as withstand rating of controller without transfer switch.

Withstand ratings of controller with transfer switch Model 940 (Ascolectric):

Model LTG:	Normal Power Side:	Same as withstand rating of controller without transfer switch.
	Alternate Power Side:	Withstand rating only applies when the generator set is protected by a molded case circuit breaker not exceeding the ampere rating of the transfer switch.

Transfer Switch A	200-480 V Max HP	Withstand Rating		Specific Withstand Rating A
		A	Time	
120	30	10,000	1.5	22,000

Transfer Switch A	600 V Max HP	Withstand Rating		Specific Withstand Rating A
		A	Time	
120	30	10,000	1.5	N/A

Model LTU:	Normal Power Side:	Same as withstand rating of controller without transfer switch.
	Alternate Power Side:	Same as withstand rating of controller without transfer switch.

Models CPA, CPP, CPR, CPS, CPV, CPW, CPY, may be followed by additional suffixes. The withstand ratings are as follows:

Withstand ratings of controllers without transfer switch:

Short circuit withstand ratings (ampere symmetrical)		
voltage	standard	optional
200 to 480 V	100 kA	150 kA
575 to 600 V	50 kA	100 kA

Model CPU - The controllers provided with automatic transfer switches are suitable for use on circuits capable of delivering high fault currents. The withstand rating of the normal power side and the alternate power side is the same as the withstand ratings of controllers without transfer switches.

Model CPU

Short circuit withstand rating for alternate power circuit with transfer switch (RMS Symmetrical)		
V	Standard	High (optional)
200 to 480 V	100 kA	150 kA
575 to 600 V	50 kA	100 kA

Model GPD Series controller for engine-driven centrifugal fire pumps.

Overcurrent Protection Panels, Model OPD; may be followed by a number 200 through 575 with - or /; followed by a number 200 through 600 with /; followed by a number 10 through 500 with /; followed by 1 or 3 with /; followed by 50 or 60 or 50/60. - These panels provide separate overcurrent protection and disconnect to comply with NFPA 70 Article 695.4(B)(2)(a) and 695.4(B)(3) and NFPA 20 Article 9.2.3.1, 9.2.3.4, and 9.2.3.4.1.

Short Circuit Withstand Ratings, A Symmetrical			
V	Standard	High (Optional)	High Capacity
200-480	25,000	35,000 to 65,000	150,000

575-600	18,000	20,000 to 25,000	50,000 to 100,00
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Battery chargers, BCE10, followed by 12 or 24, followed by 120 or 220.

Fire pump controllers, horsepower rated, Models GPA, GPAe, GPP, GPR, GPS, GPV, GPY, GPYe or GPW; may be followed by a number 110 through 575 with - or /; followed by a number 200 through 600 with /; followed by a number 1 through 500 with /; followed by 1 or 3 with /; followed by 50 or 60 or 50/60.

Fire pump controllers, kilowatt rated, Models GPA, GPAe, GPP, GPR, GPS, GPV, GPY, GPYe or GPW; followed by -400/; followed by a number 0.75 through 315 with kW/; followed by 3 with /; followed by 50 or 60 or 50/60.

Transfer switch, horsepower rated, Model GPU; may be followed by a number 110 through 575 with - or /; followed by a number 200 through 600 with /; followed by a number 1 through 500 with /; followed by 1 or 3 with /; followed by 50 or 60 or 50/60.

Transfer switch, kilowatt rated, Model GPU; followed by -400/; followed by a number 0.75 through 315 with kW/; followed by 3 with /; followed by 50 or 60 or 50/60.

Withstand ratings of normal power circuit for GPA, GPAe, GPP, GPR, GPS, GPV, GPY, GPYe and GPW controllers with or without gpu transfer switch.

Short Circuit Withstand Ratings for normal power circuit with or without transfer switch, A Symmetrical		
V	Standard	High (Optional) +
200-480	100,000	150,000
575-600 +	50,000	100,000
+ - Not applicable to controllers that use NOARK Power Components.		

Limited service fire pump controllers, kilowatt rated, Models GPL; followed by -400/; followed by a number 0.75 through 315 with kW/; followed by 3 with /; followed by 50 or 60 or 50/60.

Limited service fire pump controllers, , kilowatt rated, Models GPL; followed by -400/; followed by a number 0.75 through 315 with kW/; followed by 3 with /; followed by 50 or 60 or 50/60.

Limited service transfer switch, for connection to a second utility, horsepower rated, Model GLU; may be followed by a number 110 through 575 with - or /; followed by a number 200 through 600 with /; followed by a number 1 through 500 with /; followed by 1 or 3 with /; followed by 50 or 60 or 50/60.

Limited service transfer switch, for connection to a second utility, kilowatt rated, Model GLU; followed by -400/; followed by a number 0.75 through 315 with kW/; followed by 3 with /; followed by 50 or 60 or 50/60.

Withstand ratings of normal power circuit for GPL controller with or without GLU transfer switch.

Short Circuit Withstand Ratings for normal power circuit with or without transfer switch, A Symmetrical		
V	Standard	High (Optional)
200-240	65,000	-
380-480	25,000	65,000
575-600	18,000	25,000

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Certificate of Compliance

This certificate is issued for the following:

**Controllers for Electric Motor Driven and
Diesel Engine Driven Fire Pumps**

**Model GPx Series electric motor driven and
Model GPD diesel engine driven fire pump controllers
manufactured at Tornatech FZE in Dubai, UAE**

Prepared for:

TornaTech Inc.
7075 Pl Robert-Joncas, #132
St Laurent, QC H4M 2Z2
Canada

Manufactured at:

TornaTech FZE
Warehouse CC-4 near R/A 08
P.O. Box 18435, Jebel Ali
Dubai, United Arab Emirates

FM Approvals Class: 1321/1323

Approval Identification: 0003052698

Approval Granted: June 24, 2014

To verify the availability of the Approved product, please refer to www.approvalguide.com

Said Approval is subject to satisfactory field performance, continuing Surveillance Audits, and strict conformity to the constructions as shown in the Approval Guide, an online resource of FM Approvals.

A handwritten signature in black ink, appearing to read 'Richard B. Dunne', is written over a horizontal line.

Richard B. Dunne
Manager, Fire Protection
FM Approvals
1151 Boston-Providence Turnpike
Norwood, MA 02062



Member of the FM Global Group

CERTIFICATE OF COMPLIANCE

This certificate of compliance validates the following

TEST REPORT NUMBER:	3052698	TEST CERTIFICATE NUMBER:	3052698
DATE OF ISSUE:	24 June, 2014	DATE OF ISSUE:	24 June, 2014
DATE OF EXPIRY:	NONE	DATE OF EXPIRY:	NONE
NAME OF FACTORY/ MANUFACTURER:	TORNATECH INC.	NAME OF THE BRAND(S):	TORNATECH FZE
ADDRESS/REGION:	7075 PLACE ROBERT-JONCAS, #132 SAINT LAURENT, QUEBEC H4M 2Z2 CANADA		Warehouse CC-4 near R/A 08 P.O. Box 18435, Jebel Ali Dubai, United Arab Emirates
		MODEL/NO:	GPx series GPD series



LOGO ON THE PRODUCT:



DESCRIPTION OF THE PRODUCT:	Samples of the GPx series and GPD series were submitted for examination and testing. All testing and analysis was conducted and verified to be in compliance with the Standards listed in the Test Standards section below
TEST STANDARD:	FM Approvals, Approval Standard for Controllers for Electric Motor and Diesel Engine Driven Fire Pumps, Class 1321/1323, dated November 2007
TEST DESCRIPTION:	All testing and analysis considered appropriate was conducted and verified to be in compliance with the Standards listed in the Test Standards section. All data is on file at FM Approvals along with other documentation and correspondence applicable to this program.
SPECIFICATION OF TEST SPECIMEN:	The samples were considered to be representative of the product line and were examined, tested, and compared to the manufacturer's drawings.
TEST RESULTS:	Pass
NAME OF TEST FACILITY:	FM Approvals
TEST FACILITY ADDRESS/REGION:	
LABORATORY CONTACT:	Mr. Richard Dunne
CONTACT PHONE:	1-401-567-5701
CONTACT EMAIL:	Richard.Dunne@fmaprovals.com
PRODUCT APPLICATION GUIDELINE (END USE):	Installations shall comply with the manufacturer's instructions.

SIGNED BY:



The above certificate is valid only when installed in accordance with the "Product Application Guideline (End Use)" as stated above. To verify the validity of the product please log into our website, www.approvalguide.com.



Certificate of Compliance

This certificate is issued for the following:

Fire Pump Flowmeter Systems
(See complete listing details below)

Prepared for:

Quest Engineering dba Gerand Engineering
2300 Edgewood Avenue South
St. Louis Park, MN 55426

FM Approvals Class: 1046

Approval Identification: 3058542

Approval Granted: April 26, 2016

To verify the product continues to be Approved please refer to www.approvalguide.com.

Said Approval is subject to satisfactory field performance, continuing Surveillance Audits, and strict conformity to the constructions as shown in the Approval Guide, an online resource of FM Approvals.

A handwritten signature in dark ink, appearing to read 'D. B. Fuller'.

David B. Fuller
AVP, Manager of Fire Protection
FM Approvals
1151 Boston-Providence Turnpike
Norwood, MA 02062 USA



Member of the FM Global Group



Certificate of Compliance

Pump Rating, gal/min (dm ³ /min)	Nominal Meter Line Size in.	Model Designation	
		Venturi (1)	Orifice (2)
25 (95)	1 1/4	GV-25-1 1/4	-
50 (190)	2	GV-50-2	-
100 (380)	2 1/2	GV-100-2 1/2	GO-100-2 1/2
150 (570)	3	GV-150-3	GO-150-3
200 (755)	3, 4	GV-200-3, 4	GO-200-3, 4
250 (945)	4, 5	GV-250-4, 5	GO-250-4, 5
300 (1135)	4	GV-300-4	GO-300-4
400 (1515)	4, 5	GV-400-4, 5	GO-400-4, 5
450 (1705)	4, 5	GV-450-4, 5	GO-450-4, 5
500 (1895)	5, 6	GV-500-5, 6	GO-500-5, 6
750 (2840)	5, 6	GV-750-5, 6	GO-750-5, 6
1000 (3785)	6, 8	GV-1000-6, 8	GO-1000-6, 8
1250 (4730)	6, 8	GV-1250-6, 8	GO-1250-6, 8
1500 (5680)	8, 10	GV-1500-8, 10	GO-1500-8, 10
2000 (7570)	8, 10	GV-2000-8, 10	GO-2000-8, 10
2500 (9465)	8, 10	GV-2500-8, 10	GO-2500-8, 10
3000 (11 355)	8, 10	GV-3000-8, 10	GO-3000-8, 10



Member of the FM Global Group



Certificate of Compliance

Pump Rating, gal/min (dm ³ /min)	Nominal Meter Line Size in.	Model Designation	
		Venturi (1)	Orifice (2)
3500 (13 245)	10, 12	GV-3500-10, 12	GO-3500-10, 12
4000 (15 140)	10, 12	GV-4000-10, 12	GO-4000-10, 12
4500 (17 035)	10, 12	GV-4500-10, 12	GO-4500-10, 12
5000 (18 925)	10, 12	GV-5000-10, 12	GO-5000-10, 12

Each system consists of a Gerand Venturi (GV) or a Gerand Orifice (GO), a differential meter reading in gpm or dm³/min and associated fittings.

GV systems can be equipped with either a 4 1/2 in. dial meter (Gerand Model K) or a 6 in. dial meter (Gerand Model M). GO systems are only available with a 4 1/2 in. dial meter (Gerand Model I). Permanent installations (wall or panel mount) or portable installations are available on all systems. Rated working pressure is 500 psi (3445 kPa) except that:

GV systems with Model M dial meter have a rated working pressure of 175 psi (1205 kPa).

GV systems with Model K dial meter and Class 150 flanges have a rated working pressure of 275 psi (1905 kPa).

The following end-connection styles are available:

Venturi (1)/VS. Brass screw ends, 1 1/4 through 2 1/2 in.

Venturi (1)/VW-B. Steel butt-welded ends, 2 1/2 through 12 in.

Venturi (1)/V-GE. Steel grooved ends, 2 1/2 through 12 in.

Venturi (1)/VW-F. Steel flanged ends, 2 1/2 through 12 in. Class 150 flanges rated at 275 psi (1905 kPa). Class 300 flanges rated at 500 psi (3445 kPa).

Orifice (2). Steel socket-welded ends with adaptability for flanging, 2 1/2 through 12 in.



Member of the FM Global Group



Certificate of Compliance

This certificate is issued for the following:

Model ST0712, ST0713, ST0714 OS&Y Gate Valves

Model ST1312, ST1313, ST1314 NRS Gate Valves

Model ST0155, ST0166, ST0177 Indicator Posts

Model ST7011-300, ST7022-300 Indicating Butterfly Valves

Model ST0222 Check Valves

Model ST9011-200 Air Release Valves

Prepared for:

Sensor Tech Fire Fighting and Safety Equipment Trading
Office No 506, Al Saoud Building, Al Qusais-4
Dubai 231728
United Arab Emirates

FM Approvals Class: 1120/1130, 1110, 1112, 1210, 1344

Approval Identification: PR450489

Approval Granted: June 18, 2018

To verify the availability of the Approved product, please refer to www.approvalguide.com

Said Approval is subject to satisfactory field performance, continuing Surveillance Audits, and strict conformity to the constructions as shown in the Approval Guide, an online resource of FM Approvals.

David B. Fuller

VP, Manager - Fire Protection

FM Approvals

1151 Boston-Providence Turnpike

Norwood, MA 02062 USA



Member of the FM Global Group

Air Release Valves

An air release valve is designed to vent automatically the air from a horizontal split-case pump which is automatically controlled. Unless otherwise noted in the listing, these valves have 175 psi (1205 kPa) rated working pressure.

Air Release Valves

Product Designation	Size, in. (mm)	Orifice Diameter, In. (mm)	Pressure Rating psi (kPa)
3450AR-116 3475AR-116	3/4 (19)	1/16 (1.6)	175 (1207)
3410AR-116	1 (25)	1/16 (1.6)	175 (1207)
3450AR-332	1/2 (13)	3/32 (2.4)	175 (1207)
3475AR-332	3/4 (19)	3/32 (2.4)	175 (1207)
3410AR-332	1 (25)	3/32 (2.4)	175 (1207)
3450AR-16.3	1/2 (13)	1/16 (1.6)	300 (2069)
3475AR-16.3	3/4 (19)	1/16 (1.6)	300 (2069)
3410AR-116.3	1 (25)	1/16 (1.6)	300 (2069)

Company Name:	Cla-Val Co
Company Address:	Box 1325, Newport Beach, California 92659, USA
Company Website:	http://www.cla-val.com
New/Updated Product Listing:	No
Listing Country:	United States of America
Certification Type:	FM Approved

QWBS.EX27022 - Air-release Valves for Fire Pumps

Air-release Valves for Fire Pumps

See General Information for Air-release Valves for Fire Pumps

GRISWOLD INDUSTRIES, DBA CLA-VAL CO
1701 PLACENTIA AVE
COSTA MESA, CA 92627-4416 USA
Air-release valves for use with split-case fire pumps.

EX27022

Model	Inlet Size NPT In.	Orifice Size In.	Outlet Size NPT In.	Rated Pressure psig
3410-AR332	1/2, 3/4 and 1	3/32	1/2	175
3410-AR116.3	1	1/16	1/2	300
3410-AR332KX	1/2, 3/4 and 1	3/32	1/2	175

Last Updated on 2019-04-29

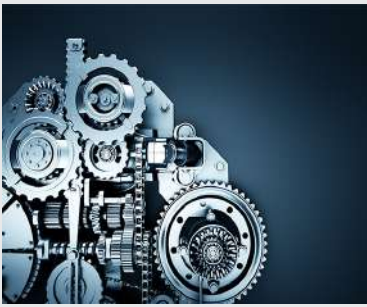
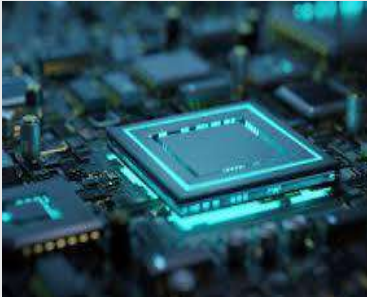
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	Vendor Ref. No.	
	Contractor Ref. No.	
Project Name:	Contractor Job No.	

COMPANY PROFILE & TRADE LICENSE

<i>0</i>	<i>SUBMITTED FOR APPROVAL</i>				
<i>Rev</i>	<i>Description</i>	<i>Prepared</i>	<i>Checked</i>	<i>Approved</i>	<i>Date</i>



MENA
MECHANICAL INDUSTRIES CO.

COMPANY PROFILE



CEO MESSAGE

Mena Mech Ind co has undergone a remarkable evolution in the past six years in the UAE. In the last 37 years in the Middle East, we've pursued our vision to become the leading fire pump systems provider in the Middle East and north Africa. But one of the most profound changes that have taken place over time is that we have a deeper and richer understanding, commitment and sustainability that has come into focus as we have refined our views of what it means to be a leader.

Today, as a result, we are increasingly adapting Mena strategies, operations and culture to drive positive results across our experience and provide a superior quality product to serve the commitments.

Our commitment in MENA is much stronger than ever. Indeed, one of the most important aspects of growth, opportunities for our company depends on solving engineering challenges a reality that is making sustainability a competitive imperative in the industry.

We also know our Customer's expectations from a leading company like Mena.

Our Company Profile will provide multiple examples of our commitment for supply, operation and after sales service, across wide range of products, from Fire Pump Solutions to pumps of the water sector, along with engineering Solutions etc.

MENA branches expands in all UAE emirates, Egypt, Palestine, Sudan, GCC Countries, and North Africa to serve our client.

With your continuous support and trust, Mena now poised to further grow its Middle east and north Africa network. In the end, I appreciate your business commitment.

Eng. Mamoun A. Al-Burieni
Chief Executive Officer



VISION

MENA MECH aspires to be among the leading companies of the field in the MENA region, renowned and recognized around the globe for offering comprehensive, professional services & products of the highest quality for its distinctive clients.

MISSION

MENA is committed to providing its clients with service and products of the highest quality; offering a comprehensive platform of services and products. Promoting the personal, and social career growth of all employees, adding to the human knowledge of contributing to culture, social and economic progress of society preserving and promoting the Arab, Islamic culture, heritage and history; and contributing to the advancement of firefighting and security of lives of people living in the middle east and north Africa.

VALUES

- Commitment to our clients.
- Be reliable and add value to our customers.
- Empowerment, Intergrity, Excellence and Collaboration.
- Trust our employees to make the right decisions.
- Show transparency in everything we do.
- Operate professionally, safely & effectively.
- Cooperation; work as one team to deliver value.



OUR STRATEGY

GUIDING PRIORITIES

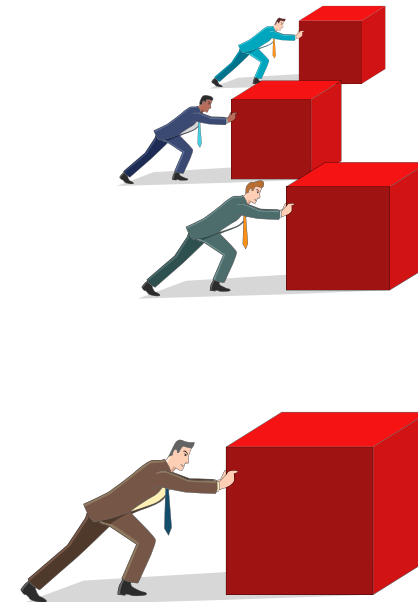
A major and comprehensive company: Mena Fire Fighting offers varieties of Pumping Solutions, in the field of firefighting and Water Applications.

• Client Success:

The company is committed to enriching its client's success within an economy rich environment.

• Emphasis on Quality:

The standard of our company enhances us to practice a diversity of designs that allow and evaluates the client's request. Our effectiveness and practicality of all the services and products offered by the company are to provide the best result for our clients.



• Supportive:

Our company emphasizes the importance of our services and products by providing the required training to operate the product and maintenance period to ensure that the client receives the maximum benefit of our services and products supplied.

• Global Vision:

Our Company takes pride in being a part of an international Supply chain with partner companies around the globe.

• Research Intensive:

Our company is continuously making strident moves to establish itself nationally and internationally through extensively researching the latest technologies in the field.



• Engagement With The Community:

Our company plays a vital role in the social and economic development and safety of UAE and middle east by introducing the most advanced technologies with affordable and competitive prices.

GUIDING PRIORITIES

A major and comprehensive company: MENA MECH IND CO offers varieties of Pumping Solutions, in the field of firefighting and Water Applications.

- **Client Success:**

The company is committed to enriching its client's success within an economy rich environment.

- **Emphasis on Quality:**

The standard of our company enhances us to practice a diversity of designs that allow and evaluates the client's request. Our effectiveness and practicality of all the services and products offered by the company are to provide the best result for our clients.



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- **Engagement With The Community:**

Our company plays a vital role in the social and economic development and safety of UAE and middle east by introducing the most advanced technologies with affordable and competitive prices.



SAFETY POLICY

MENA MECH IND CO is committed to emphasize on the education, interest and awareness of new employees in safety concepts in a safe environment before the assumption of duty.

Ensure that the organization's environment, facilities, equipment and substances are subject to safe systems of work to prevent risks to health or safety.

Just as we are keen for our client's safety, our employees have to be provided by the safest working environment including a spacious atmosphere, excellent ventilation, pest control, etc.

 END SUCTION & SPLIT CASE PUMPS VERTICAL TURBINE FIRE PUMP MENA MECHANICAL INDUSTRIES- UAE	 DIESEL DRIVER KIRLOSKAR, INDIA UL LISTED & FM APPROVED	 DIESEL DRIVER NM FIRE, CHINA UL LISTED & FM APPROVED	 DIESEL DRIVER GREAVES COTTON UL LISTED & FM APPROVED
 DIESEL DRIVER TAIDONG, CHINA UL LISTED LISTED	 DIESEL DRIVER CLARKE, UK /USA UL LISTED & FM APPROVED	 FIRE PUMP MOTOR WEG, BRAZIL UL LISTED APPROVED	 FIRE PUMP MOTOR MARATHON, USA UL LISTED
 FIRE PUMP CONTROLLERS TORNATECH, CANADA UL LISTED & FM APPROVED	 PRESSURE RELIEF VALVE SINGER VALVE, CANADA UL LISTED & FM APPROVED	 FIRE PUMP MOTOR TECHTOP, INC UL LISTED APPROVED	 FLOWMETER GERAND, USA FM APPROVED
VENDORS		 ARMAS	 AMERILLO GEARS - USA
			

THE COMPANY

Since 2017, our Headquarters has been located in the Emirate of Dubai. MENA MECH IND CO is charged with an ambitious growth with the mission to protect people of the United Arab Emirates, and middle east Countries by providing world-class fire pump solutions manufacture by MENA MECH IND CO.

Mena is efficiently covering its Services by having a regional office in Egypt, Sudan and various other locations in the Middle East.

Mena Mech IND CO is the sole distributor throughout the Gulf Countries for its products, which are approved from Civil defense in many countries including UAE.

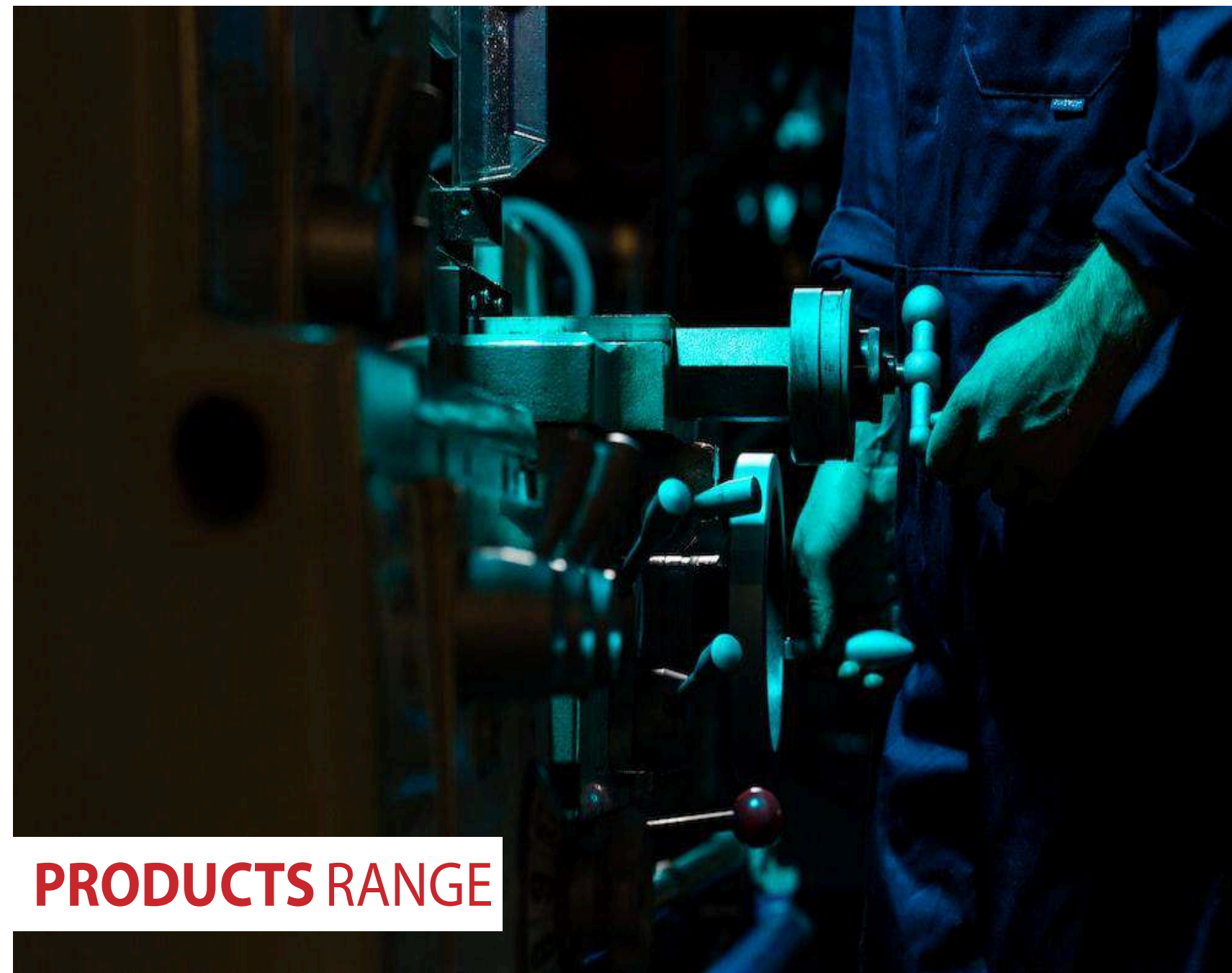
This company profile includes a complete illustration and real pictures of production process, starting from engineering, casting, machining, manufacturing, and ending with assembly.

The experts of MENA MECH IND CO are well managed, dedicated and well-versed with knowledge research and development in all aspects of Pumping Solutions. They are also supported with a qualified team of engineers and technicians with years of experiences to provide the best quality service to clients. and has an outstanding track record of delivering products on time and are punctual in providing services at regular intervals; this has been the bases of establishing a strong relationship with the clients.

MENA MECH IND CO has a well-equipped workshop for maintenance service as per International standards.

MENA MECH IND CO commits to consistently demonstrate the highest ethical standards in our actions through innovative solutions, honoring our agreements and being transparent in our communications.

Our value and service meets our customer expectations because we build and maintain a good relationship with them to ensure long-term satisfaction.

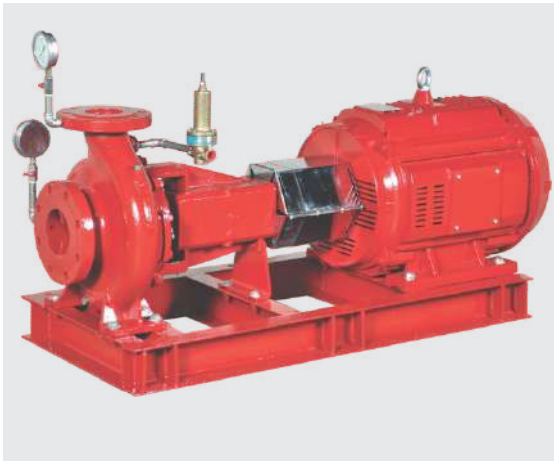


PRODUCTS RANGE

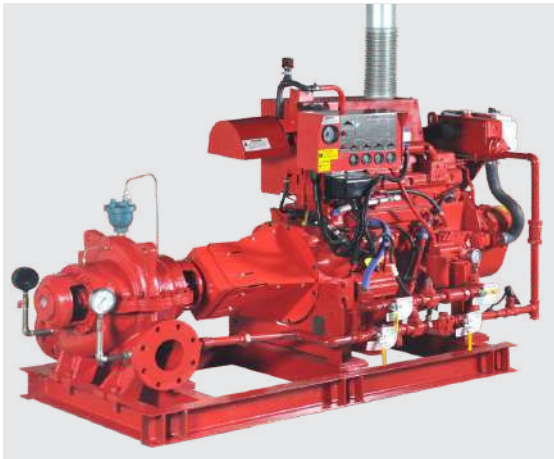
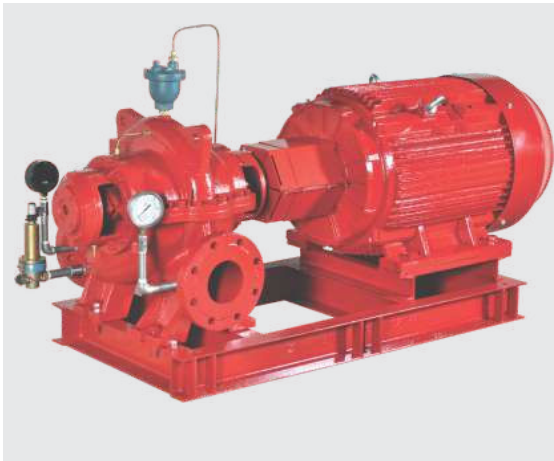
Vertical Turbine Fire Pumps



Horizontal End Suction



Horizontal Split Case



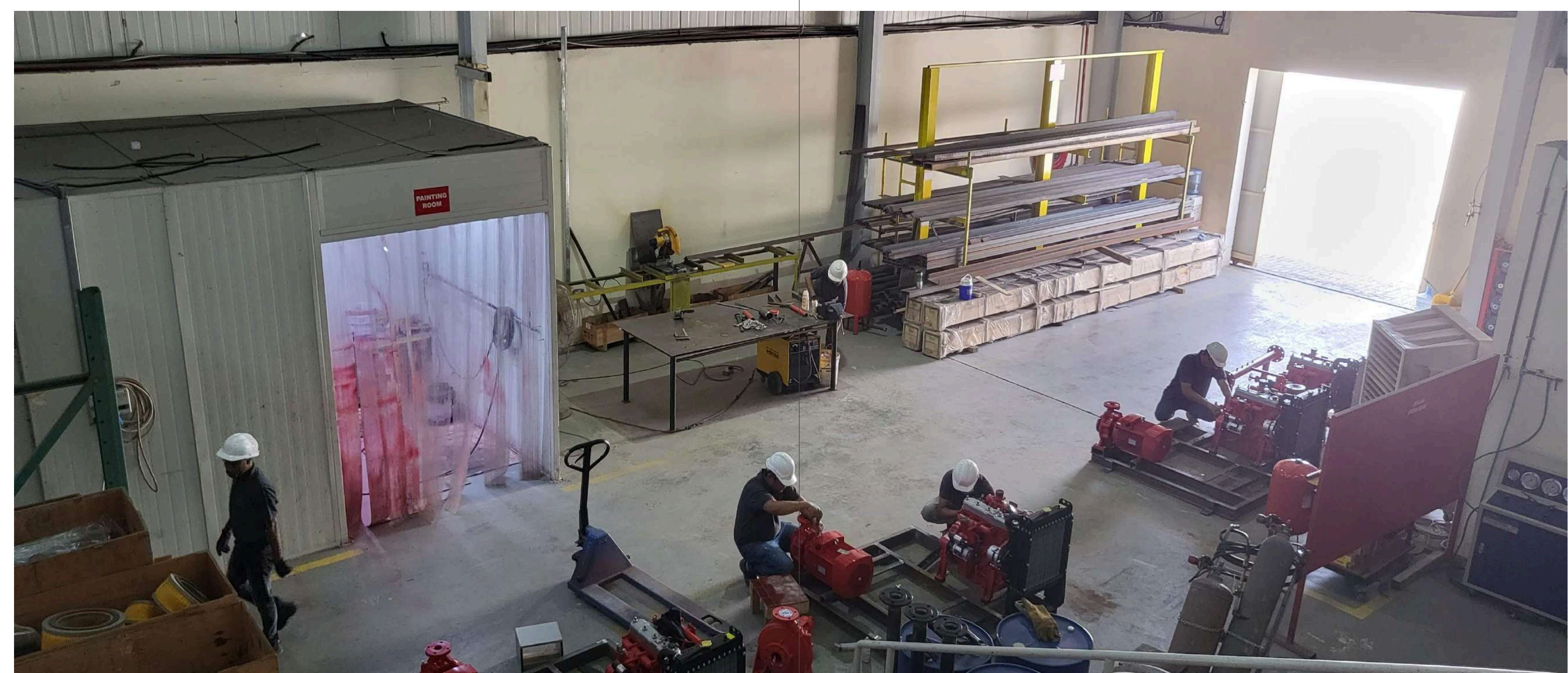
Product Range Overview

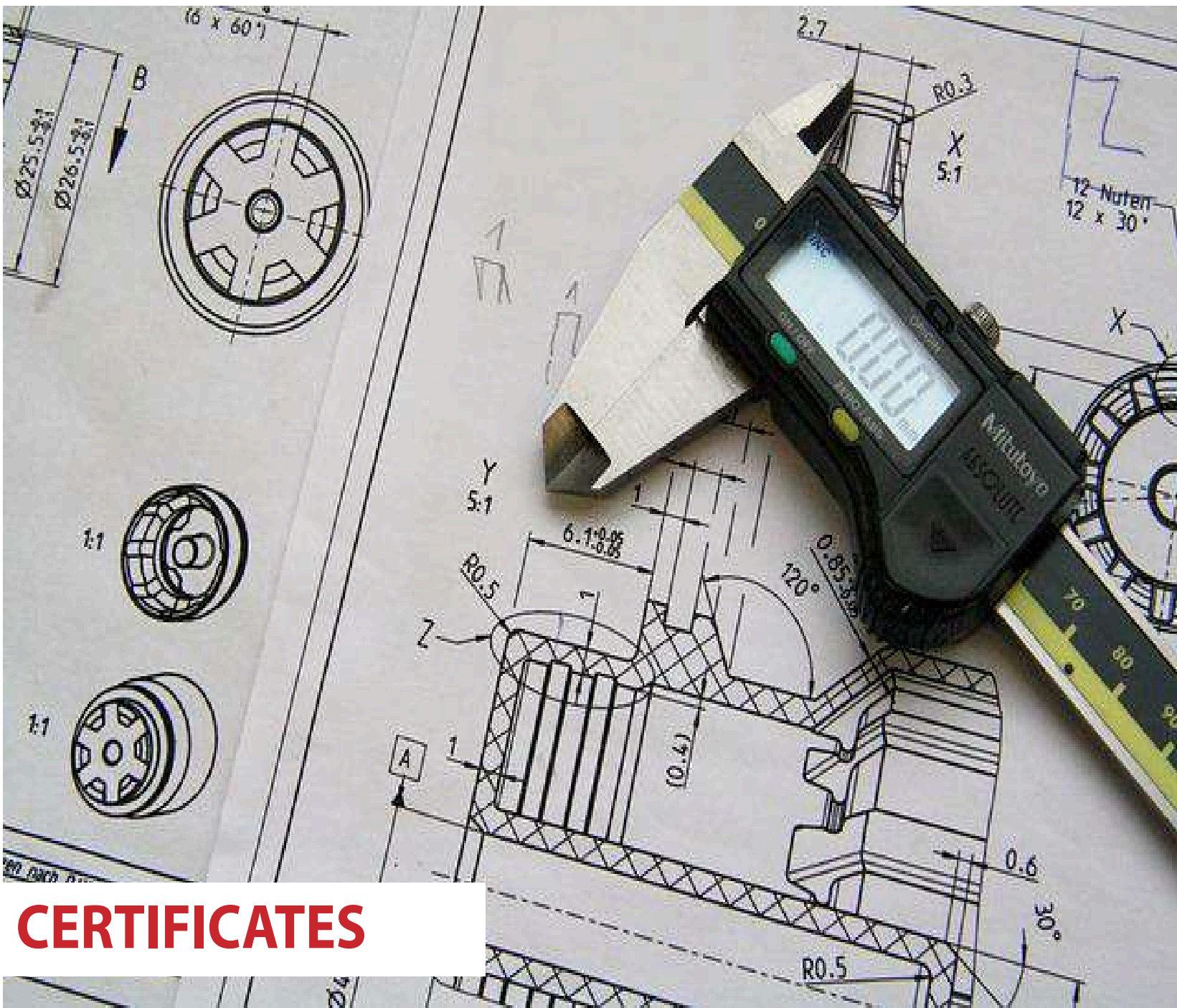
- UL Listed Horizontal End Suction Fire Pumps
- UL Listed Horizontal Split Case Fire Pumps
- UL Listed Vertical Turbine Fire Pumps
- UL/FM Industrial Packaged Fire Pump Set
- Diesel Engine Driven Pump Set
- Electric Motor Driven Pump Set
- Jockey Pump
- Fire Pump Packaged as per NFPA



PRODUCTION CAPABILITIES







CERTIFICATES

CERTIFICATE OF COMPLIANCE

Certificate Number EX28929
Report Reference EX28929
Issue Date 2023-JANUARY-04

Issued to: MENA MECH IND CO.
Sharjah Al Sajaa Industrial Shed 6
Victory Warehouse, Sajja New Industrial Area
Sharjah, United Arab Emirates

This certificate confirms that representative samples of Centrifugal Fire Pumps, End Suction
See Addendum for Models

Have been evaluated by UL in accordance with the Standard(s) indicated on this Certificate.

Standard(s) for Safety: ANSI/CAN/UL 448 – Centrifugal Stationary Pumps for Fire-Protection Service

Additional Information: See UL Product iQ® at <https://iq.ulprospector.com> for additional information.

This Certificate of Compliance indicates that representative samples of the product described in the certification report have met the requirements for UL certification. It does not provide authorization to apply the UL Mark. Only the Authorization Page that references the Follow-Up Services Procedure for ongoing surveillance provides authorization to apply the UL Mark.

Only those products bearing the UL Mark should be considered as being UL Certified and covered under UL's Follow-Up Services.

Look for the UL Certification Mark on the product.

Deborah Jennings-Gower, VP Regulatory Services
UL LLC

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CERTIFICATE OF COMPLIANCE

Certificate Number EX28977
Report Reference EX28977-2023-04-05
Issue Date 2023-APRIL-18

Issued to: MENA MECH IND CO.
Sharjah Al Sajaa Industrial Shed 6
Victory Warehouse, Sajja New Industrial Area
Sharjah, United Arab Emirates

This certificate confirms that
representative samples of Centrifugal Fire Pumps, Split Case
See Addendum for Models

Have been evaluated by UL in accordance with the
Standard(s) indicated on this Certificate.

Standard(s) for Safety: ANSI/CAN/UL 448 – Centrifugal Stationary Pumps for Fire-
Protection Service

Additional Information: See UL Product iQ® at <https://iq.ulprospector.com> for
additional information.

This Certificate of Compliance indicates that representative samples of the product described in the certification
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Look for the UL Certification Mark on the product.

Deborah Jennings-Corcoran
Deborah Jennings-Corcoran, VP Regulatory Services
UL LLC

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contact UL Customer Service at <http://ul.com/askulhelpdesk>



UL Product iQ®



Centrifugal Fire Pumps, Vertical Turbine

COMPANY

Volute Engineering Pvt Ltd

No. 37, Muthiya Mudali Second Street
Royapettah
Chennai, Tamil Nadu 600014 India

EX28924

Trademark and/or Tradename: "VOLUTE" ,



Note: For additional marking information, refer to the [Guide Information Page](#).

View model for additional information

Centrifugal Fire Pumps, Vertical Turbine, Model(s): [VT100-155](#), [VT125-180](#), [VT145-270](#), [VT150-265](#), [VT170-304](#), [VT185-335](#), [VT200-350](#), [VT225-400](#), [VT250-400](#), [VT275-430](#), [VT80-145](#)

Last Updated on 2023-01-03

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PROJECTS REFERENCE

Sr No.	Project Details (2022)					Capacity	
	Client	Main Contractor	Consultant	Project Name	Location	Flow (US GPM)	Head (Bar)
1	Sheikh Mohamed Zayed Al Nehyan	Miami Contracting Company	Development Engineering Consultant	G+M+4 Commercial Office Building	Dubai	500	10
2	Ismail Abdullah Al - Gergawi	Talai Contracting	Fourth Dimension Engineering Consultant	Commercial Building	Dubai	500	9
3	Al Bahidh General Trading LLC	Quick Steel Building Contracting LLC	Capital Engineering Consultant	G+M Cold Storage Building	Dubai	750	7
4	Mrs. Hawa Abdullah	Abdullah Bin Dasmal Contracting	Circle Engineering Consultant	G+3+R Residential Building, Muhaisnah	Dubai	750	8
5	Mr. Hassan Arab Darwish	Remal Al Sahra Building Contracting Company LLC	Sharjah Engineering Consultant	G+1 Commercial Building	Sharjah	300	9
6	Mr. Hassan Arab Darwish	Remal Al Sahra Building Contracting Company LLC	Sharjah Engineering Consultant	G+3 Commercial Buildindg	Sharjah	300	9
7	Mr. Essa Abdulla Buhumaid	Solid Building Contracting LLC	Retaj Engineering Consultancy	G+M Warehouse & G+M Office	Dubai	500	9
8	Mr. Younis Abdelaziz Al Nimr	Ideal Building Contracting	Emirates Engineer Consultant	G+5 Residential Building	Sharjah	500	10
9	H.H Saud bin Rashid Al Mualla	Zamalek Contracting	ATI Engineer Consultant	Commercial Building / School	Umm Al Quain	1500	9
10	Mr. Mohammed Abdulazez Ahmad	Hilal Al Emarate Contracting	High Arc Engineering Consultants	G+5 Residential Building	Sharjah	500	10
11	Shaikha Moudi Hamad Al Shami	Remal Al Sahra Contracting	Al Bait Engineering Consultants	G+2 building	Sharjah	500	9
12	Al Fahim Group	Hamed El Sayah Contracting	MAZ Engineering Consultant	Industrial Garage	Dubai	300	9
13	Ms. Metha Ahmed Ali Al Weis	Al Muntaser Building Contracting	Arabic Architechure Engineering Consultant	Commercial Building G+4 TYP	Dubai	750	10



CONSULTANTS



OUR CLIENTS



Vendor Ref. No.

Contractor Ref. No

Project Name:

Contractor Job No.

ELECTRIC MOTOR DRIVEN PUMP
SPECIFICATIONS

0	SUBMITTED FOR APPROVAL				
Rev	Description	Prepared	Checked	Approved	Date

VERTICAL TURBINE FIRE PUMP



VERTICAL TURBINE FIRE PUMP - VTP SERIES

Technical Specifications	
Flow	50-5000GPM
Discharge pressure	84-230PSI
Speed Range	1450-2900 RPM
Discharge fanges	2.5-12"

Material Specifications	
Discharge head	ASTM A53A Type S Gr.B
Impeller	ASTM A473, S41600
Bowl	ASTM A536, 65-45-12
Shaft	ASTM A473, S41600
Column Pipe	ASTM A473, S41600
Strainer	ASTMA240,S30400

Driver Options



Electrical



Diesel

Application Areas



Hydrant



Sprinkler



Overflow



Foam

Risk Class



Ordinary



High

Product Standard

UL 448, NFPA

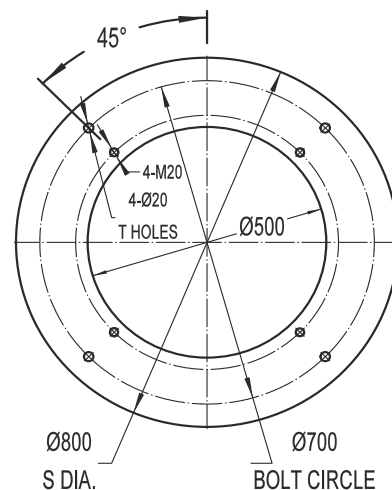
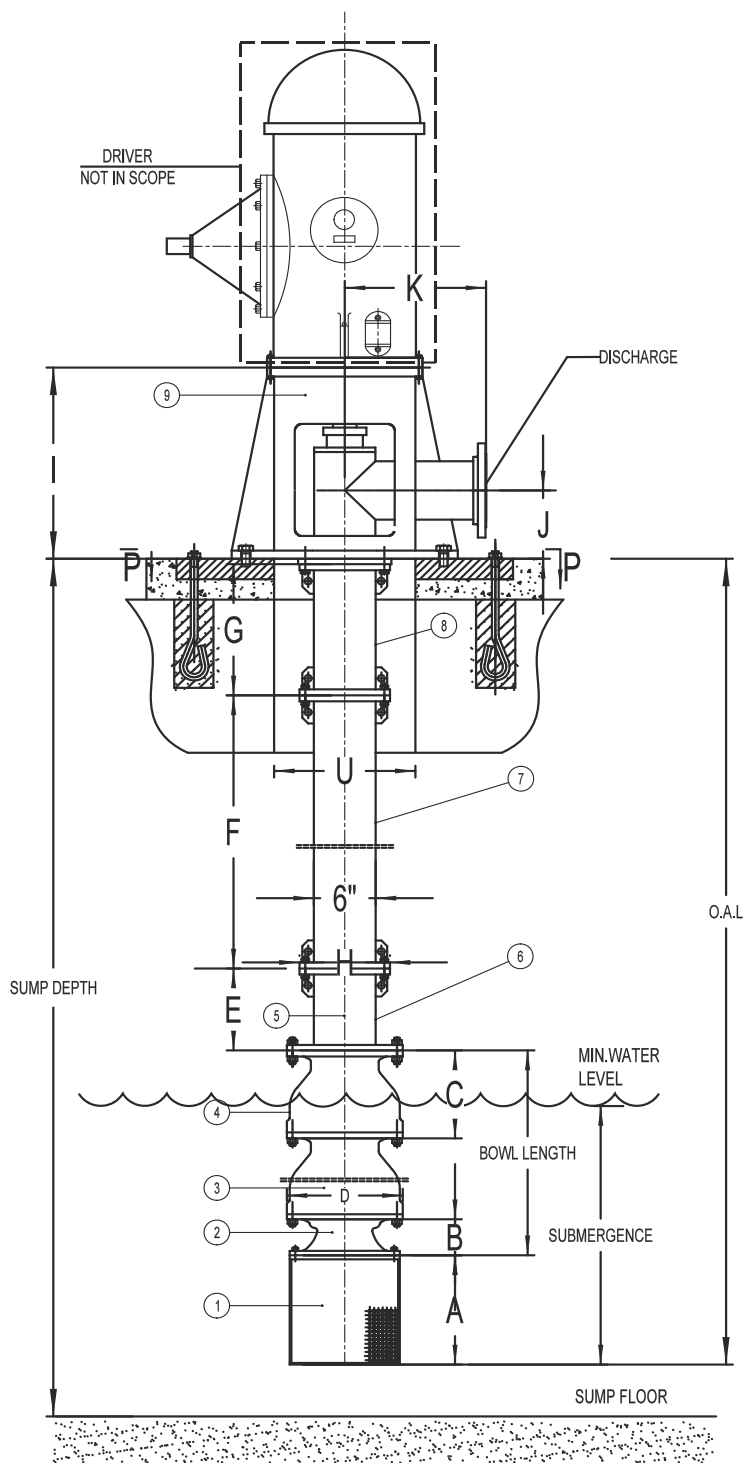
Product Approvals

Flange Standards

Pump Installing Dimensions are confirming to ISO2858 Standard, and Tested according to with UL 448 -2013

VERTICAL TURBINE FIRE PUMP

VERTICAL TURBINE FIRE PUMP - VTP SERIES



Foundation Plate Details

ITEM	DESCRIPTION	MATERIAL
1	Strainer	ASTM A240, S30400
2	Suction Bell	ASTM A536, 65-45-12
3	Impeller	ASTM A473, S41600
4	Bowl	ASTM A536, 65-45-12
5	Shaft	ASTM A473, S41600
6	Lower Column Pipe	ASTM A53A Type S Gr.B
7	Middle Column Pipe	ASTM A53A Type S Gr.B
8	Upper Column Pipe	ASTM A53A Type S Gr.B
9	Discharge Head	ASTM A53A Type S Gr.B

Pump				Column Pipe						Discharge Head and Baseplate											UL LISTED
Pump Model	Stage	A	B	C*n	D	E	F	G	H	Dia	I	J	K	M	N	O	Q	S	T	U	
	3~7	150	100	135*n	210	300	0	500	265	6"	550	200	380	600	550	4×Φ24	800	700	4×Φ20	500	VERTICAL TURBINE OUTLINE DIMENSIONS
	3~6	150	125	175*n	215	300	0	500	265	6"	550	200	380	600	550	4×Φ24	800	700	4×Φ20	500	
	2~5	200	150	235*n	256	300	0	500	265	6"	550	200	380	600	550	4×Φ24	800	700	4×Φ20	500	
	3~8	200	150	300*n	360	300	0	500	265	6"	550	200	380	600	550	4×Φ24	800	700	4×Φ20	500	
	3~8	200	150	300*n	360	300	0	500	265	6"	550	200	380	600	550	4×Φ24	800	700	4×Φ20	500	

VERTICAL TURBINE RANGE

Rated Capacity (gpm)	Model Dsg	Rated Net Pressure Range (psi)	Approx Speed (rpm)	Number of Stages
250	VT80-145	75-98	2950	3
250	VT80-145	106-230	2950	4-7
300	VT80-145	71-95	2950	3
300	VT80-145	100-221	2950	4-7
400	VT100-155	82-238	2950	3-6
500	VT100-155	78-228	2950	3-6
750	VT125-180	68-255	2950	2-5
300	VT145-270	70-277	1480	3-8
400	VT145-270	67-270	1480	3-8
500	VT145-270	64-261	1480	3-8
300	VT145-270	103-297	1760	3-6
400	VT145-270	97-292	1760	3-6
500	VT145-270	94-283	1760	3-6
500	VT150-265	68-274	1480	3-8
750	VT150-265	60-263	1480	3-8
500	VT150-265	96-296	1760	3-6
750	VT150-265	85-282	1760	3-6
750	VT170-304	75-85	1480	2
750	VT170-304	113-128	1480	3
750	VT170-304	150-170	1480	4
750	VT170-304	188-255	1480	5 - 6
1000	VT170-304	72-83	1480	2
1000	VT170-304	108-124	1480	3
1000	VT170-304	144-165	1480	4
1000	VT170-304	180-248	1480	5 - 6
1250	VT170-304	69-80	1480	2
1250	VT170-304	103-121	1480	3
1250	VT170-304	138-161	1480	4
1250	VT170-304	172-241	1480	5 - 6
750	VT170-304	109-123	1760	2
750	VT170-304	163-184	1760	3
750	VT170-304	217-246	1760	4
1000	VT170-304	105-119	1760	2
1000	VT170-304	157-179	1760	3
1000	VT170-304	210-238	1760	4
1250	VT170-304	102-116	1760	2
1250	VT170-304	152-174	1760	3
1250	VT170-304	203-232	1760	4
1250	VT185-335	80-94	1480	2
1250	VT185-335	119-140	1480	3
1250	VT185-335	159-187	1480	4
1250	VT185-335	199-234	1480	5

Rated Capacity (gpm)	Model Dsg	Rated Net Pressure Range (psi)	Approx Speed (rpm)	
1500	VT185-335	76-90	1480	2
1500	VT185-335	114-135	1480	3
1500	VT185-335	152-224	1480	4 - 5
1250	VT185-335	117-135	1760	2
1250	VT185-335	175-203	1760	3
1500	VT185-335	113-132	1760	2
1500	VT185-335	170-197	1760	3
1500	VT200-350	90-119	1480	2
1500	VT200-350	134-238	1480	3 - 4
2000	VT200-350	84-115	1480	2
2000	VT200-350	126-230	1480	3 - 4
1500	VT200-350	131-171	1760	2
2000	VT200-350	125-165	1760	2
2000	VT225-400	117-153	1480	2
2000	VT225-400	176-306	1480	3 - 4
2500	VT225-400	114-149	1480	2
2500	VT225-400	171-298	1480	3 - 4
3000	VT250-400	127-137	1480	2
3000	VT250-400	190-206	1480	3
3000	VT250-400	254-275	1480	4
3500	VT250-400	123-135	1480	2
3500	VT250-400	185-202	1480	3
3500	VT250-400	246-270	1480	4
4000	VT250-400	118-130	1480	2
4000	VT250-400	178-195	1480	3
4000	VT250-400	237-260	1480	4
4000	VT275-430	66-78	1480	1
4000	VT275-430	133-156	1480	2
4000	VT275-430	199-234	1480	3
4500	VT275-430	64-76	1480	1
4500	VT275-430	129-152	1480	2
4500	VT275-430	193-229	1480	3
5000	VT275-430	62-74	1480	1
5000	VT275-430	124-147	1480	2
5000	VT275-430	186-221	1480	3



Vendor Ref. No.

Contractor Ref. No

Project Name:

Contractor Job No.

ELECTRIC PUMP
ELECTRIC MOTOR SPECS

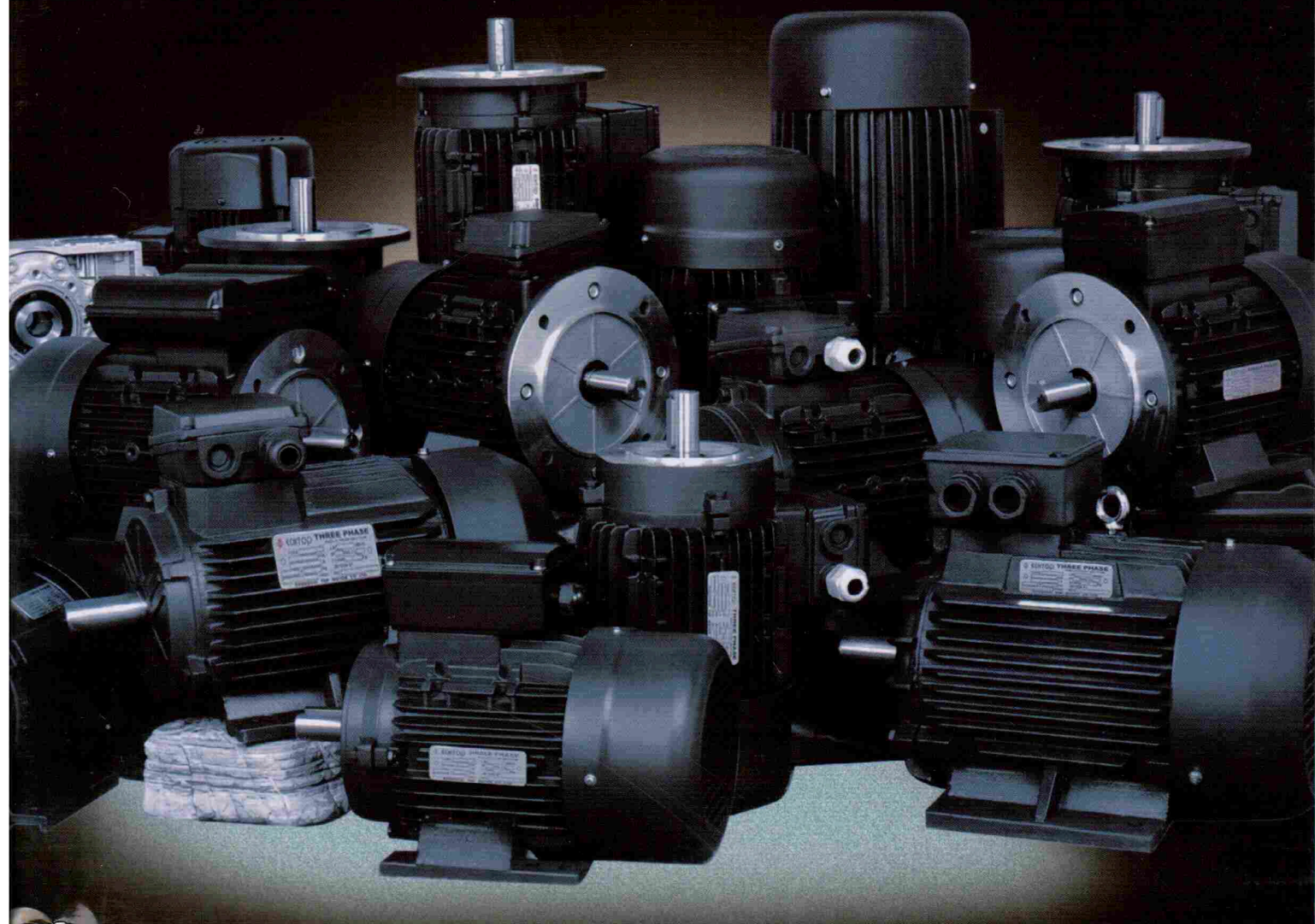
0	SUBMITTED FOR APPROVAL				
Rev	Description	Prepared	Checked	Approved	Date

ECHTOP[®] MOTOR

New! Fire Pump Motor Ready

SHANGHAI TOP MOTOR CO., LTD.

SHANGHAI HALOTOP IMPORT & EXPORT CO., LTD.
GLOBAL POWER ENGINEERING CO. LTD.

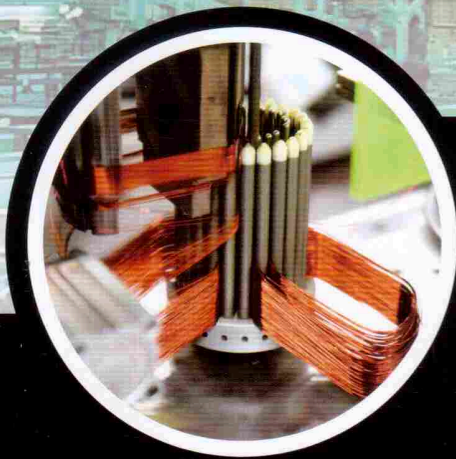




WORKSHOP & TECHNOLOGY

TECHTOP adopts computerized machine tools for metal parts; four cylinder oil hydraulic presses for stator stacking; vacuum high-pressure varnishing units for stator varnishing; clean-dry and auto-phosphorescing machines for motor housing, end shield, fan cover and other parts; electrostatic spraying-water screen-suspending line complexes for product surface painting.

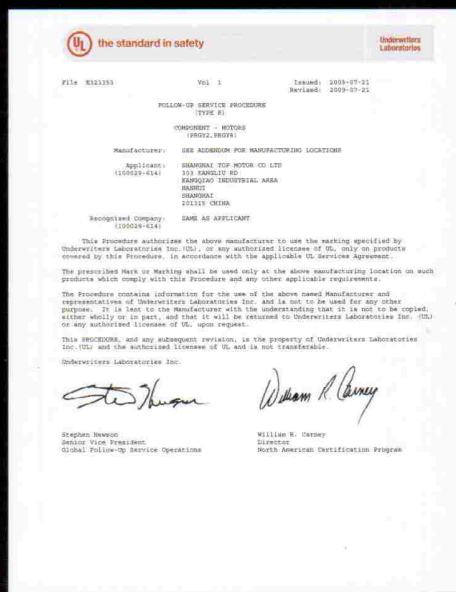




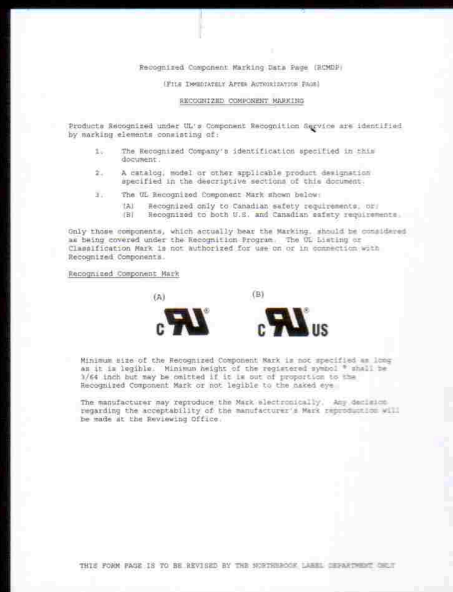
Various Certificates



ISO9001



UL



 ECHTOP®

Various Certificates

CERTIFICATE OF COMPLIANCE

Certificate Number 20150114-EX26635
Report Reference EX26635-20141231
Issue Date 2015-JANUARY-14

Issued to: SHANGHAI TOP MOTOR CO.LTD
303 KANGLIU RD, KANGQIAO INDUSTRIAL AREA,
NANHUI, SHANGHAI, 201315 CHINA

This is to certify that
representative samples of FIRE PUMP MOTORS
T Series, TXD Series, TDC Series, TXA Series, TXD
Series: See Addendum Page below for Models

Have been investigated by UL in accordance with the
Standard(s) indicated on this Certificate.

Standard(s) for Safety: UL 1004-1, Rotating Electrical Machines - General
Requirements, UL 1004-5, Fire Pump Motors

Additional Information: See the UL Online Certifications Directory at
www.ul.com/database for additional information.

Only those products bearing the UL Certification Mark should be considered as being covered by UL's
Certification and Follow-Up Service.

Look for the UL Certification Mark on the product.

Signature

UL LLC, 330 South Dearborn Street, Chicago, Illinois 60606-5001

UL LLC

Any information and documentation bearing UL Mark are provided on behalf of UL LLC (UL) or any authorized licensee of UL. For questions, please
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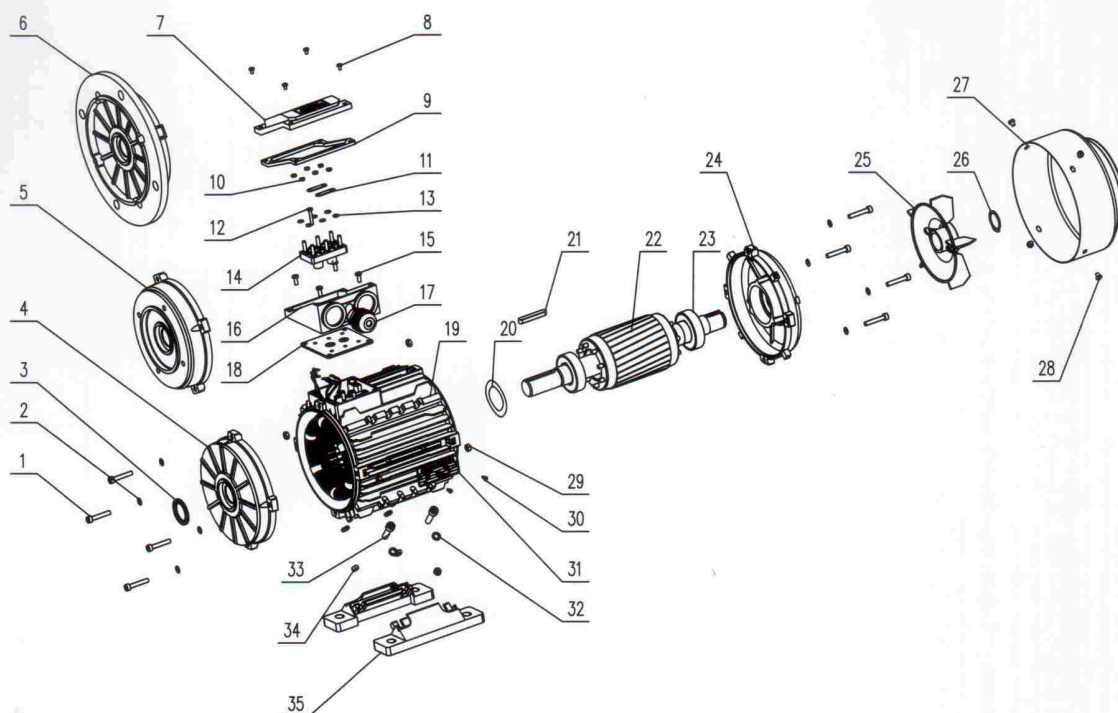
Page 1 of 3



UL

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Motor Spare Part List "Exploded Drawing"



- | | | |
|------------------------------|---------------------|----------------------------|
| 1.screw | 13.Terminal shim | 25.Cooling fan |
| 2.Gasket | 14.Terminal board | 26.Fan circlip |
| 3.V-ring | 15.TB fixing screws | 27.Fan cover |
| 4.Front endshield | 16.TB base | 28.Fan cover fixing screws |
| 5.B14 flange | 17.Cable gland | 29.Endshield fixing nut |
| 6.B5 flange | 18.TB bottomgasket | 30.Rivet |
| 7.TB cover | 19.Frame | 31.Rivet |
| 8.TB fixing screws | 20.Preload washer | 32.Foot fixing gasket |
| 9.TB upper gasket | 21.Key | 33.Foot fixing screws |
| 10.Terminal board fixing nut | 22.Rotor | 34.Foot fixing nut |
| 11.Terminal bridge | 23.Bearing | 35.Foot |
| 12.Terminal pin | 24.NDE endshield | |



Serie Fire Pump Motors' Main Performance Parameters (IEC)

Serial NO.	Model NO.	Volts	Output (KW)	Output (HP)	Hz /DC	Locked current A(standard) 400V	Locked torque multiple (standard)	Maximum torque multiple (standard)	Minimum torque multiple (standard)	INS class	RPM	The test environment temperature
1	T 801-2	380-415V	0.75	1.0	50	19.0	175	250	120	F	2848	50°C
2	T 802-2	380-415V	1.1	1.5	50	25.7	175	250	120	F	2846	50°C
3	T 803-2	380-415V	1.5	2.0	50	32.3	170	240	120	F	2852	50°C
4	T 90S-2	380-415V	1.5	2.0	50	32.3	170	240	120	F	2852	50°C
5	T 90L1-2	380-415V	2.2	3.0	50	40.9	160	230	110	F	2845	50°C
6	T 90L2-2	380-415V	3	4.0	50	49.4	155	220	105	F	2851	50°C
7	T 100L-2	380-415V	3	4.0	50	49.4	155	220	105	F	2851	50°C
8	T 100L2-2	380-415V	4	5.5	50	61.8	145	215	105	F	2910	50°C
9	T 112M-2	380-415V	4	5.5	50	61.8	145	215	105	F	2910	50°C
10	T 112L-2	380-415V	5.5	7.5	50	79.8	140	200	100	F	2905	50°C
11	T 132S1-2	380-415V	5.5	7.5	50	79.8	140	200	100	F	2905	50°C
12	T 132S2-2	380-415V	7.5	10.0	50	101.7	135	200	100	F	2910	50°C
13	T 132M1-2	380-415V	9.2	12.0	50	118.8	130	200	100	F	2910	50°C
14	T 132M2-2	380-415V	11	15.0	50	146.3	130	200	100	F	2920	50°C
15	T 160M1-2	380-415V	11	15.0	50	146.3	130	200	100	F	2920	50°C
16	T 160M2-2	380-415V	15	20.0	50	184.3	130	200	100	F	2918	50°C
17	T 160L-2	380-415V	18.5	25.0	50	230.9	130	200	100	F	2922	50°C
18	T 180M-2	380-415V	22	30.0	50	274.6	130	200	100	F	2930	50°C
19	T 200L1-2	380-415V	30	40.0	50	367.7	125	200	100	F	2925	50°C
20	T 200L2-2	380-415V	37	50.0	50	457.9	120	200	100	F	2930	50°C
21	T 225M-2	380-415V	45	60.0	50	549.1	120	200	100	F	2930	50°C
22	T 250M-2	380-415V	55	75.0	50	685.9	105	200	95	F	2940	50°C
23	T 280S-2	380-415V	75	100.0	50	916.8	105	200	95	F	2940	50°C
24	T 280M-2	380-415V	90	125.0	50	1146.7	100	200	90	F	2940	50°C
25	T 315S-2	380-415V	110	150.0	50	1369.0	100	200	90	F	2940	50°C
26	T 315M-2	380-415V	132	175.0	50	1599.8	100	200	90	F	2940	50°C
27	T 315L1-2	380-415V	160	215.0	50	1900.0	90	175	65	F	2945	50°C
28	T 315L2-2	380-415V	200	270.0	50	2636.3	70	175	65	F	2945	50°C
29	T 355M-2	380-415V	250	330.0	50	3125.5	70	175	65	F	2945	50°C
30	T 355L-2	380-415V	315	420.0	50	4075.5	70	175	65	F	2945	50°C
31	T 802-4	380-415V	0.75	1.0	50	19.0	275	300	190	F	1420	50°C
32	T 803-4	380-415V	1.1	1.5	50	25.7	250	280	175	F	1425	50°C
33	T 90S-4	380-415V	1.1	1.5	50	25.7	250	280	175	F	1425	50°C
34	T 90L-4	380-415V	1.5	2.0	50	32.3	235	270	165	F	1420	50°C
35	T 90L2-4	380-415V	2.2	3.0	50	40.9	215	250	150	F	1430	50°C
36	T 100L1-4	380-415V	2.2	3.0	50	40.9	215	250	150	F	1430	50°C
37	T 100L2-4	380-415V	3	4.0	50	49.4	200	230	140	F	1430	50°C
38	T 100L3-4	380-415V	4	5.5	50	61.8	180	225	130	F	1435	50°C
39	T 112M-4	380-415V	4	5.5	50	61.8	180	225	130	F	1435	50°C
40	T 112L-4	380-415V	5.5	7.5	50	79.8	175	215	120	F	1430	50°C
41	T 132S-4	380-415V	5.5	7.5	50	79.8	175	215	120	F	1430	50°C
42	T 132M-4	380-415V	7.5	10.0	50	101.7	165	200	115	F	1430	50°C
43	T 132L1-4	380-415V	9.2	12.0	50	118.8	160	200	115	F	1430	50°C
44	T 132L2-4	380-415V	11	15.0	50	146.3	160	200	110	F	1440	50°C
45	T 160M-4	380-415V	11	15.0	50	146.3	160	200	110	F	1440	50°C
46	T 160L-4	380-415V	15	20.0	50	184.3	150	200	105	F	1445	50°C
47	T 180M-4	380-415V	18.5	25.0	50	230.9	150	200	105	F	1445	50°C
48	T 180L-4	380-415V	22	30.0	50	274.6	150	200	105	F	1460	50°C
49	T 200L-4	380-415V	30	40.0	50	367.7	140	200	100	F	1460	50°C
50	T 225S-4	380-415V	37	50.0	50	457.9	140	200	100	F	1470	50°C



Serie Fire Pump Motors' Main Performance Parameters (IEC)

Serial NO.	Model NO.	Volts	Output (KW)	Output (HP)	Hz /DC	Locked current A(standard) 400V	Locked torque multiple (standard)	Maximum torque multiple (standard)	Minimum torque multiple (standard)	INS class	RPM	The test environment temperature
51	T 225M-4	380-415V	45	60.0	50	549.1	140	200	100	F	1480	50°C
52	T 250M-4	380-415V	55	75.0	50	685.9	140	200	100	F	1480	50°C
53	T 280S-4	380-415V	75	100.0	50	916.8	125	200	100	F	1480	50°C
54	T 280M-4	380-415V	90	125.0	50	1146.7	110	200	100	F	1480	50°C
55	T 315S-4	380-415V	110	150.0	50	1369.0	110	200	100	F	1480	50°C
56	T 315M-4	380-415V	132	175.0	50	1599.8	100	200	90	F	1480	50°C
57	T 315L1-4	380-415V	160	215.0	50	1900.0	90	175	75	F	1480	50°C
58	T 315L2-4	380-415V	200	270.0	50	2636.3	80	175	75	F	1480	50°C
59	T 355M1-4	380-415V	220	300.0	50	2874.7	80	175	75	F	1480	50°C
60	T 355M2-4	380-415V	250	330.0	50	3125.5	80	175	75	F	1480	50°C
61	T 355L1-4	380-415V	280	375.0	50	3604.3	80	175	75	F	1480	50°C
62	T 355L2-4	380-415V	315	420.0	50	4075.5	80	175	75	F	1480	50°C
63	T 355L3-4	380-415V	355	475.0	50	4563.8	80	175	75	F	1480	50°C
64	T 803-6	380-415V	0.75	1.0	50	19.0	170	265	120	F	935	50°C
65	T 90S-6	380-415V	0.75	1.0	50	19.0	170	265	120	F	935	50°C
66	T 90L-6	380-415V	1.1	1.5	50	25.7	165	250	115	F	935	50°C
67	T 100L-6	380-415V	1.5	2.0	50	32.3	160	240	110	F	940	50°C
68	T 112M-6	380-415V	2.2	3.0	50	40.9	155	230	110	F	940	50°C
69	T 112M1-6	380-415V	3	4.0	50	49.4	150	220	105	F	940	50°C
70	T 112M2-6	380-415V	4	5.5	50	61.8	150	215	105	F	940	50°C
71	T 132S-6	380-415V	3	4.0	50	49.4	150	220	105	F	940	50°C
72	T 132M1-6	380-415V	4	5.5	50	61.8	150	215	105	F	945	50°C
73	T 132M2-6	380-415V	5.5	7.5	50	79.8	150	205	105	F	945	50°C
74	T 132M3-6	380-415V	7.5	10.0	50	101.7	150	200	105	F	945	50°C
75	T 160M-6	380-415V	7.5	10.0	50	101.7	150	200	105	F	955	50°C
76	T 160L-6	380-415V	11	15.0	50	146.3	140	200	100	F	960	50°C
77	T 180L-6	380-415V	15	20.0	50	184.3	135	200	100	F	960	50°C
78	T 200L1-6	380-415V	18.5	25.0	50	230.9	135	200	100	F	965	50°C
79	T 200L2-6	380-415V	22	30.0	50	274.6	135	200	100	F	965	50°C
80	T 225M-6	380-415V	30	40.0	50	367.7	135	200	100	F	975	50°C
81	T 250M-6	380-415V	37	50.0	50	457.9	135	200	100	F	975	50°C
82	T 280S-6	380-415V	45	60.0	50	549.1	135	200	100	F	980	50°C
83	T 280M-6	380-415V	55	75.0	50	685.9	135	200	100	F	980	50°C
84	T 315S-6	380-415V	75	100.0	50	916.8	125	200	100	F	980	50°C
85	T 315M-6	380-415V	90	125.0	50	1146.7	125	200	100	F	980	50°C
86	T 315L1-6	380-415V	110	150.0	50	1369.0	120	200	100	F	980	50°C
87	T 315L2-6	380-415V	132	175.0	50	1599.8	120	200	100	F	980	50°C
88	T 355M1-6	380-415V	160	215.0	50	1900.0	100	175	90	F	980	50°C
89	T 355M2-6	380-415V	200	270.0	50	2636.3	100	175	90	F	980	50°C
90	T 355L1-6	380-415V	220	300.0	50	2874.7	100	175	90	F	980	50°C
91	T 355L2-6	380-415V	250	330.0	50	3125.5	100	175	90	F	980	50°C



DC Serie Fire Pump Motors' Main Performance Parameters(NEMA 415V 50HZ)

Serial NO.	Model NO.	Volts	Output (HP)	Hz /DC	Locked current A(standard) 415V	Locked torque multiple (standard)	Maximum torque multiple (standard)	Minimum torque multiple (standard)	Service factor	INS class	RPM	The test environment temperature
1	TDC254T15U2B	380-415V	15	50	141	130	200	100	1.15	F	2920	50℃
2	TDC256T20U2B	380-415V	20	50	177	130	200	100	1.15	F	2920	50℃
3	TDC284TS25U2B	380-415V	25	50	222	130	200	100	1.15	F	2930	50℃
4	TDC286TS30U2B	380-415V	30	50	264	130	200	100	1.15	F	2930	50℃
5	TDC324TS40U2B	380-415V	40	50	354	125	200	100	1.15	F	2930	50℃
6	TDC326TS50U2B	380-415V	50	50	441	120	200	100	1.15	F	2930	50℃
7	TDC364TS60U2B	380-415V	60	50	529	120	200	100	1.15	F	2930	50℃
8	TDC365TS75U2B	380-415V	75	50	661	105	200	95	1.15	F	2940	50℃
9	TDC405TS100U2B	380-415V	100	50	883	105	200	95	1.15	F	2940	50℃
10	TDC444TS125U2B	380-415V	125	50	1105	100	200	90	1.15	F	2940	50℃
11	TDC445TS150U2B	380-415V	150	50	1319	100	200	90	1.15	F	2940	50℃
12	TDC 254T15U4B	380-415V	15	50	141	160	200	110	1.15	F	1440	50℃
13	TDC 256T20U4B	380-415V	20	50	177	150	200	105	1.15	F	1445	50℃
14	TDC 284T25U4B	380-415V	25	50	222	150	200	105	1.15	F	1450	50℃
15	TDC 286T30U4B	380-415V	30	50	264	150	200	105	1.15	F	1460	50℃
16	TDC 324T40U4B	380-415V	40	50	354	140	200	100	1.15	F	1460	50℃
17	TDC 326T50U4B	380-415V	50	50	441	140	200	100	1.15	F	1470	50℃
18	TDC364T60U4B	380-415V	60	50	529	140	200	100	1.15	F	1480	50℃
19	TDC365T75U4B	380-415V	75	50	661	140	200	100	1.15	F	1480	50℃
20	TDC405T100U4B	380-415V	100	50	883	125	200	100	1.15	F	1480	50℃
21	TDC444T125U4B	380-415V	125	50	1105	110	200	100	1.15	F	1480	50℃
22	TDC445T150U4B	380-415V	150	50	1319	110	200	100	1.15	F	1480	50℃
23	TDC 254T7.5U6B	380-415V	7.5	50	77	150	200	105	1.15	F	955	50℃
24	TDC 256T10U6B	380-415V	10	50	98	150	200	105	1.15	F	960	50℃
25	TDC 284T15U6B	380-415V	15	50	141	140	200	100	1.15	F	960	50℃
26	TDC 286T20U6B	380-415V	20	50	177	135	200	100	1.15	F	965	50℃
27	TDC 324T25U6B	380-415V	25	50	222	135	200	100	1.15	F	965	50℃
28	TDC 326T30U6B	380-415V	30	50	264	135	200	100	1.15	F	975	50℃
29	TDC364T40U6B	380-415V	40	50	354	135	200	100	1.15	F	975	50℃
30	TDC365T50U6B	380-415V	50	50	441	135	200	100	1.15	F	980	50℃
31	TDC404T60U6B	380-415V	60	50	529	135	200	100	1.15	F	980	50℃
32	TDC405T75U6B	380-415V	75	50	661	135	200	100	1.15	F	980	50℃
33	TDC444T100U6B	380-415V	100	50	883	125	200	100	1.15	F	980	50℃
34	TDC445T125U6B	380-415V	125	50	1105	125	200	100	1.15	F	980	50℃



DC Serie Fire Pump Motors' Main Performance Parameters(NEMA ODP 208~230/460V 60HZ)

Serial NO.	Model NO.	Volts	Output (HP)	Hz /DC	Locked current A(standard) 460V	Locked torque multiple (standard)	Maximum torque multiple (standard)	Minimum torque multiple (standard)	Service factor	INS class	RPM	The test environment temperature
1	TDC254T15U2B	208~230/460V	15	60	116.0	130	200	100	1.15	F	3504	50℃
2	TDC256T20U2B	208~230/460V	20	60	145.0	130	200	100	1.15	F	3504	50℃
3	TDC284TS25U2B	208~230/460V	25	60	182.5	130	200	100	1.15	F	3516	50℃
4	TDC286TS30U2B	208~230/460V	30	60	217.5	130	200	100	1.15	F	3516	50℃
5	TDC324TS40U2B	208~230/460V	40	60	290.0	125	200	100	1.15	F	3516	50℃
6	TDC326TS50U2B	208~230/460V	50	60	362.5	120	200	100	1.15	F	3516	50℃
7	TDC364TS60U2B	208~230/460V	60	60	435.0	120	200	100	1.15	F	3516	50℃
8	TDC365TS75U2B	208~230/460V	75	60	542.5	105	200	95	1.15	F	3528	50℃
9	TDC405TS100U2B	208~230/460V	100	60	725.0	105	200	95	1.15	F	3528	50℃
10	TDC444TS125U2B	460V	125	60	907.5	100	200	90	1.15	F	3528	50℃
11	TDC445TS150U2B	460V	150	60	1085.0	100	200	90	1.15	F	3528	50℃
12	TDC 254T15U4B	208~230/460V	15	60	116.0	160	200	110	1.15	F	1728	50℃
13	TDC 256T20U4B	208~230/460V	20	60	145.0	150	200	105	1.15	F	1734	50℃
14	TDC 284T25U4B	208~230/460V	25	60	182.5	150	200	105	1.15	F	1740	50℃
15	TDC 286T30U4B	208~230/460V	30	60	217.5	150	200	105	1.15	F	1752	50℃
16	TDC 324T40U4B	208~230/460V	40	60	290.0	140	200	100	1.15	F	1752	50℃
17	TDC 326T50U4B	208~230/460V	50	60	362.5	140	200	100	1.15	F	1764	50℃
18	TDC364T60U4B	208~230/460V	60	60	435.0	140	200	100	1.15	F	1776	50℃
19	TDC365T75U4B	208~230/460V	75	60	542.5	140	200	100	1.15	F	1776	50℃
20	TDC405T100U4B	208~230/460V	100	60	725.0	125	200	100	1.15	F	1776	50℃
21	TDC444T125U4B	460V	125	60	907.5	110	200	100	1.15	F	1776	50℃
22	TDC445T150U4B	460V	150	60	1085.0	110	200	100	1.15	F	1776	50℃
23	TDC 254T7.5U6B	208~230/460V	7.5	60	63.5	150	200	105	1.15	F	1146	50℃
24	TDC 256T10U6B	208~230/460V	10	60	81.0	150	200	105	1.15	F	1152	50℃
25	TDC 284T15U6B	208~230/460V	15	60	116.0	140	200	100	1.15	F	1152	50℃
26	TDC 286T20U6B	208~230/460V	20	60	145.0	135	200	100	1.15	F	1158	50℃
27	TDC 324T25U6B	208~230/460V	25	60	182.5	135	200	100	1.15	F	1158	50℃
28	TDC 326T30U6B	208~230/460V	30	60	217.5	135	200	100	1.15	F	1170	50℃
29	TDC364T40U6B	208~230/460V	40	60	290.0	135	200	100	1.15	F	1170	50℃
30	TDC365T50U6B	208~230/460V	50	60	362.5	135	200	100	1.15	F	1176	50℃
31	TDC404T60U6B	208~230/460V	60	60	435.0	135	200	100	1.15	F	1176	50℃
32	TDC405T75U6B	208~230/460V	75	60	542.5	135	200	100	1.15	F	1176	50℃
33	TDC444T100U6B	208~230/460V	100	60	725.0	125	200	100	1.15	F	1176	50℃
34	TDC445T125U6B	460V	125	60	907.5	125	200	100	1.15	F	1176	50℃



XC Serie Fire Pump Motors' Main Performance Parameters (NEMA ODP 208~230/460V 60HZ)

Serial NO.	Model NO.	Volts	Output (HP)	Hz /DC	Locked current A(standard) 460V	Locked torque multiple (standard)	Maximum torque multiple (standard)	Minimum torque multiple (standard)	Service factor	INS class	RPM	The test environment temperature
1	TXC 143T1U2B	208~230/460V	1	60	15	175	250	120	1.15	F	3450	50°C
2	TXC 143T1.5U2B	208~230/460V	1.5	60	20	175	250	120	1.15	F	3450	50°C
3	TXC 145T2U2B	208~230/460V	2	60	25	170	240	120	1.15	F	3450	50°C
4	TXC 182T3U2B	208~230/460V	3	60	32	160	230	110	1.15	F	3510	50°C
5	TXC 184T5U2B	208~230/460V	5	60	46	150	215	105	1.15	F	3510	50°C
6	TXC 213T7.5U2B	208~230/460V	7.5	60	63.5	140	200	100	1.15	F	3520	50°C
7	TXC 215T10U2B	208~230/460V	10	60	81	135	200	100	1.15	F	3520	50°C
8	TXC 254T15U2B	208~230/460V	15	60	116	130	200	100	1.15	F	3540	50°C
9	TXC 256T20U2B	208~230/460V	20	60	145	130	200	100	1.15	F	3540	50°C
10	TXC 284TS25U2B	208~230/460V	25	60	182.5	130	200	100	1.15	F	3550	50°C
11	TXC 286TS30U2B	208~230/460V	30	60	217.5	130	200	100	1.15	F	3550	50°C
12	TXC 324TS40U2B	208~230/460V	40	60	290	125	200	100	1.15	F	3560	50°C
13	TXC 326TS50U2B	208~230/460V	50	60	362.5	120	200	100	1.15	F	3560	50°C
14	TXC364TS60U2B	208~230/460V	60	60	435	120	200	100	1.15	F	3560	50°C
15	TXC365TS75U2B	208~230/460V	75	60	542.5	105	200	95	1.15	F	3560	50°C
16	TXC405TS100U2B	208~230/460V	100	60	725	105	200	95	1.15	F	3570	50°C
17	TXC444TS125U2B	460	125	60	907.5	100	200	90	1.15	F	3575	50°C
18	TXC445TS150U2B	460	150	60	1085	100	200	90	1.15	F	3575	50°C
19	TXC447TS200U2B	460	200	60	1450	100	200	90	1.15	F	3575	50°C
20	TXC449TS250U2B	460	250	60	1825	70	175	65	1.15	F	3575	50°C
21	TXC 143T1U4B	208~230/460V	1	60	15	275	300	190	1.15	F	1730	50°C
22	TXC 145T1.5U4B	208~230/460V	1.5	60	20	250	280	175	1.15	F	1730	50°C
23	TXC 145T2U4B	208~230/460V	2	60	25	235	270	165	1.15	F	1730	50°C
24	TXC 182T3U4B	208~230/460V	3	60	32	215	250	150	1.15	F	1735	50°C
25	TXC 184T5U4B	208~230/460V	5	60	46	185	225	130	1.15	F	1735	50°C
26	TXC 213T7.5U4B	208~230/460V	7.5	60	63.5	175	215	120	1.15	F	1740	50°C
27	TXC 215T10U4B	208~230/460V	10	60	81	165	200	115	1.15	F	1740	50°C
28	TXC 254T15U4B	208~230/460V	15	60	116	160	200	110	1.15	F	1750	50°C
29	TXC 256T20U4B	208~230/460V	20	60	145	150	200	105	1.15	F	1750	50°C
30	TXC 284T25U4B	208~230/460V	25	60	182.5	150	200	105	1.15	F	1760	50°C
31	TXC 286T30U4B	208~230/460V	30	60	217.5	150	200	105	1.15	F	1760	50°C
32	TXC 324T40U4B	208~230/460V	40	60	290	140	200	100	1.15	F	1770	50°C
33	TXC 326T50U4B	208~230/460V	50	60	362.5	140	200	100	1.15	F	1770	50°C
34	TXC364T60U4B	208~230/460V	60	60	435	140	200	100	1.15	F	1775	50°C
35	TXC365T75U4B	208~230/460V	75	60	542.5	140	200	100	1.15	F	1775	50°C
36	TXC405T100U4B	208~230/460V	100	60	725	125	200	100	1.15	F	1780	50°C
37	TXC444T125U4B	460	125	60	907.5	110	200	100	1.15	F	1780	50°C
38	TXC445T150U4B	460	150	60	1085	110	200	100	1.15	F	1780	50°C
39	TXC447T200U4B	460	200	60	1450	100	200	90	1.15	F	1780	50°C
40	TXC449T250U4B	460	250	60	1825	80	175	75	1.15	F	1780	50°C
41	TXC 145T1U6B	208~230/460V	1	60	15	170	265	120	1.15	F	1150	50°C
42	TXC 182T1.5U6B	208~230/460V	1.5	60	20	165	250	115	1.15	F	1150	50°C
43	TXC 184T2U6B	208~230/460V	2	60	25	160	240	110	1.15	F	1150	50°C
44	TXC 213T3U6B	208~230/460V	3	60	32	155	230	110	1.15	F	1150	50°C
45	TXC 215T5U6B	208~230/460V	5	60	46	150	215	105	1.15	F	1160	50°C
46	TXC 254T7.5U6B	208~230/460V	7.5	60	63.5	150	200	105	1.15	F	1160	50°C
47	TXC 256T10U6B	208~230/460V	10	60	81	150	200	105	1.15	F	1165	50°C
48	TXC 284T15U6B	208~230/460V	15	60	116	140	200	100	1.15	F	1165	50°C
49	TXC 286T20U6B	208~230/460V	20	60	145	135	200	100	1.15	F	1170	50°C
50	TXC 324T25U6B	208~230/460V	25	60	182.5	135	200	100	1.15	F	1170	50°C
51	TXC 326T30U6B	208~230/460V	30	60	217.5	135	200	100	1.15	F	1175	50°C
52	TXC364T40U6B	208~230/460V	40	60	290	135	200	100	1.15	F	1175	50°C
53	TXC365T50U6B	208~230/460V	50	60	362.5	135	200	100	1.15	F	1180	50°C
54	TXC404T60U6B	208~230/460V	60	60	435	135	200	100	1.15	F	1180	50°C
55	TXC405T75U6B	208~230/460V	75	60	542.5	135	200	100	1.15	F	1180	50°C
56	TXC444T100U6B	208~230/460V	100	60	725	125	200	100	1.15	F	1180	50°C
57	TXC445T125U6B	460	125	60	907.5	125	200	100	1.15	F	1180	50°C
58	TXC447T150U6B	460	150	60	1085	120	200	100	1.15	F	1180	50°C
59	TXC449T200U6B	460	200	60	1450	120	200	100	1.15	F	1180	50°C



TECHNICAL DATA

PRODUCT FEATURES

Model	F-TDC364TS60U2B		
Standard	NEMA MG-1	Output rating	60 HP
Frequency	60 Hz	Mounting	Foot-mounted
Voltage	380-400 V	Flange	Without
Number of poles	2	Mounting	F-1
Degree of Protection	IP23	Terminal box ¹	Left position
Synchronous speed	3600 rpm	Enclosure	IC01 - ODP

PRODUCT DETAILS

Frame	364TS	Frequency	60 Hz
Output	60 HP (45 kW)	Number of Poles	2
Slip	0.02333	Rated speed	3516 rpm
Rated voltage	380-400 V	Temperature rise	80 K
Rated current	82.4-78.3 A	Duty Cycle	Cont.(S1)
L. R. Amperes	536-508 A	Starting Method	Wye-Delta
LRC	6.5x(Code G)	Ambient temperature	50°C
No load current	19-18A	Altitude	1000 m.a.s.l.
Rated torque	89.66 ft.lb	Noise level	89.0 dB(A)
Locked rotor torque	120%	Approx. weight	590 lb
Breakdown torque	200%	Service factor	1.15
Locked rotor time	30s (cold) 16s (hot)	Design	B
Moment of inertia	3.76 ft.lb²	Insulation Class	F
Efficiency/Power factor	Load	Efficiency	Power factor
	100%	91.7	0.9
	75%	92.2	0.86
	50%	91.2	0.8
Bearing	Drive-end	6313C3	
	Opposite drive-end	6313C3	



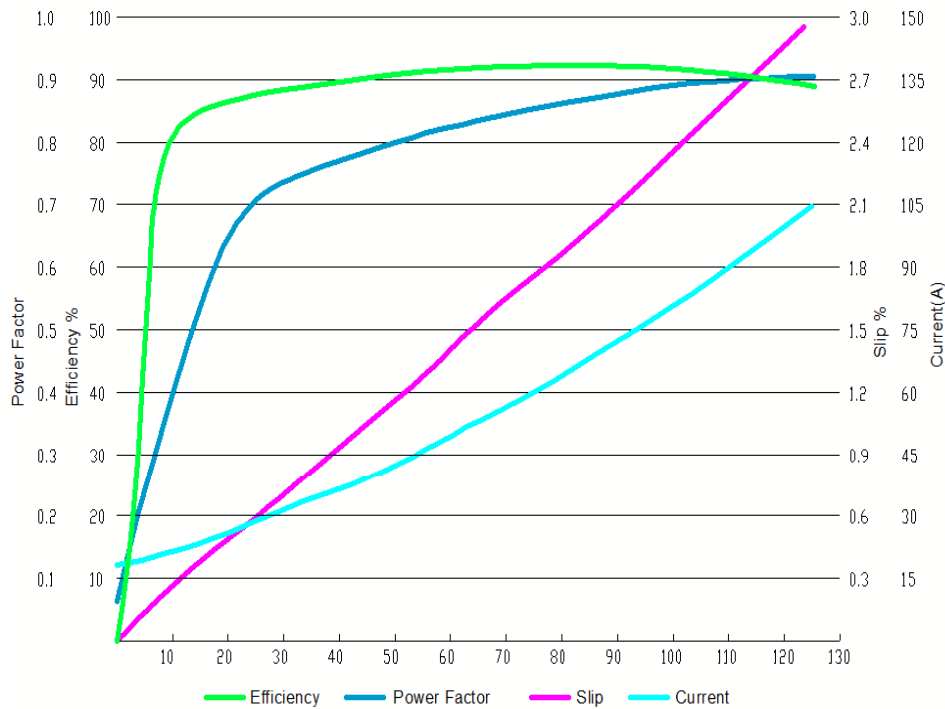
LISTED
FIRE PUMP MOTOR
EX26635



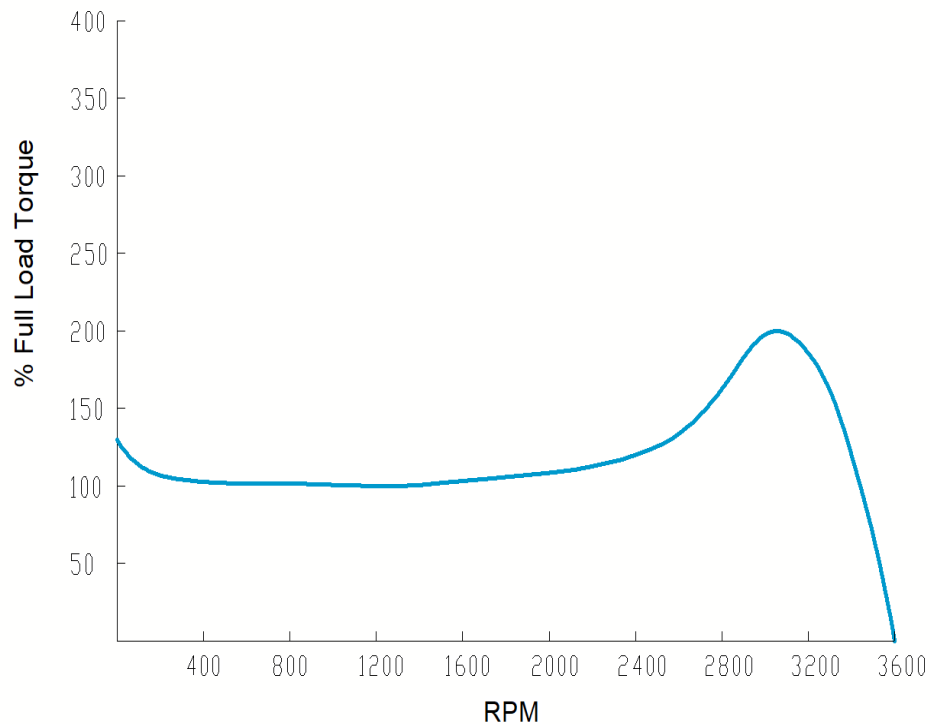
PERFORMANCE CURVES

Torque Values	Torque (lb-ft)	Torque Values	Torque (lb-ft)
Locked Rotor Torque	107.59	Breakdown Torque	179.32
Pull-Up Torque	89.66	Full Load Torque	89.66

Load Performance Curve



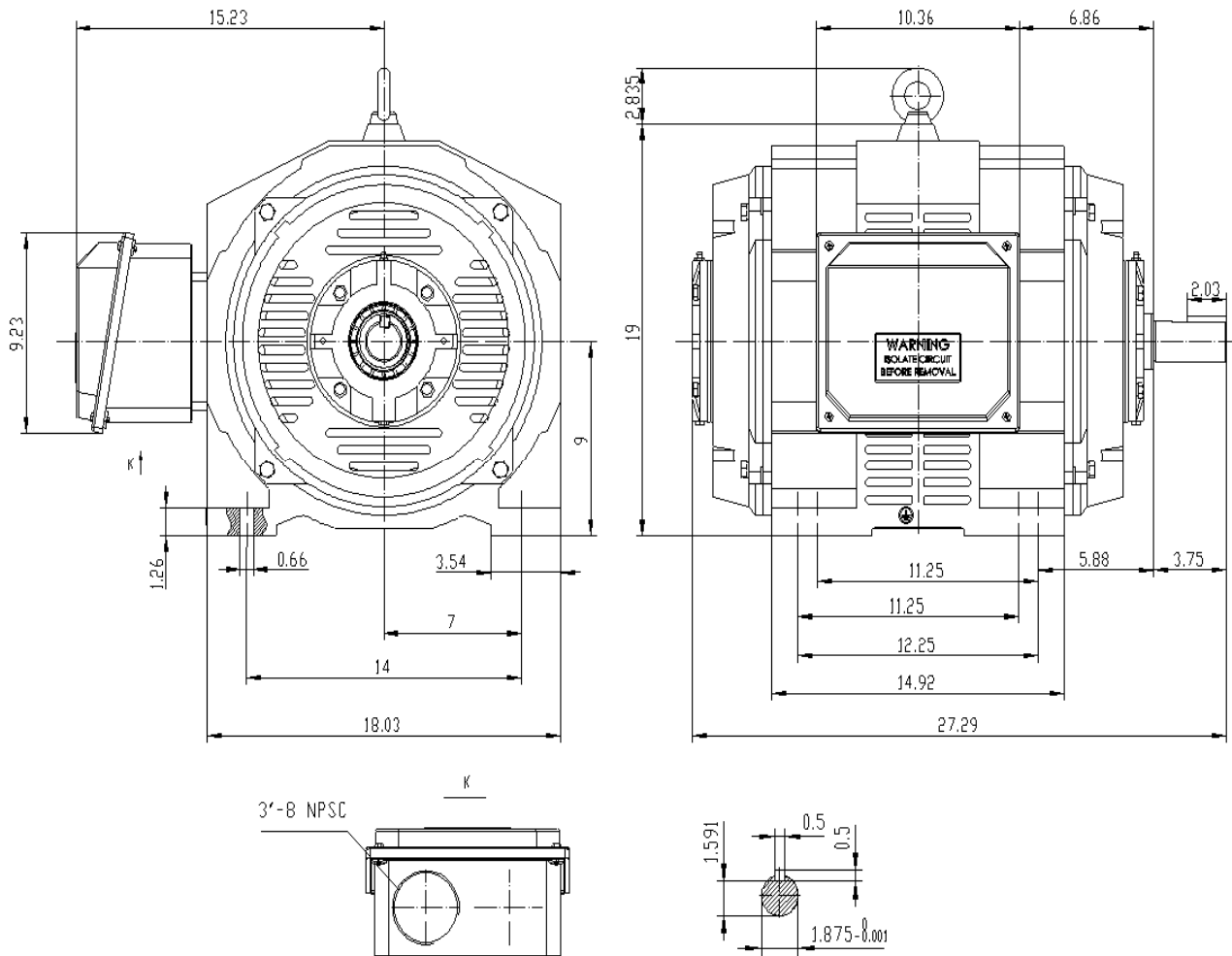
Torque Speed(T-n)Curve





DRAWINGS

Frame size	364TS	Frame Material	Cast iron
Poles	2	DWG NO	CY230.A16.001
Units	Inch		





Vendor Ref. No.

Contractor Ref. No

Project Name:

Contractor Job No.

**ELECTRIC PUMP CONTROLLER
SPECIFICATIONS
ATS**

0	SUBMITTED FOR APPROVAL				
Rev	Description	Prepared	Checked	Approved	Date



TORNATECH

Project: _____

Customer: _____

Engineer: _____

Pump Manufacturer: _____

Technical Data Submittal Document

GPx Series

Full Service

Electric Fire Pump Controller
with Automatic Power Transfer Switch



Contents:

Data Sheets

Dimensional Data

Wiring Schematics

Field Connections

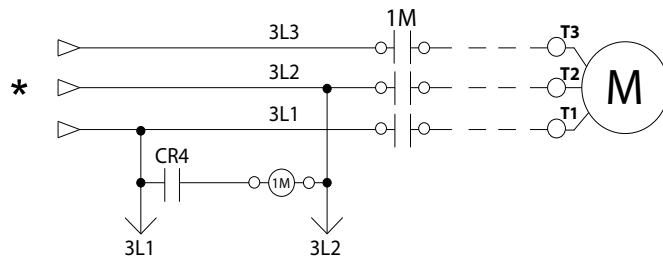
Note: The drawings included in this package are for controllers covered under our standard offering. Actual AS BUILT drawings may differ from what is shown in this package.



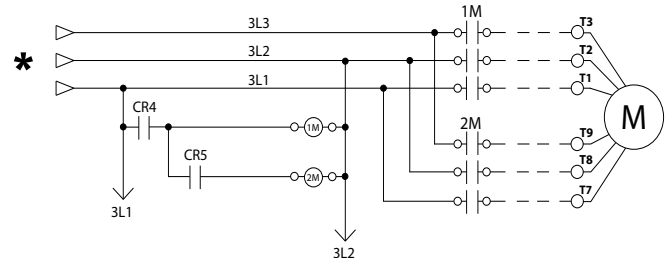
June 2022

Select starting method

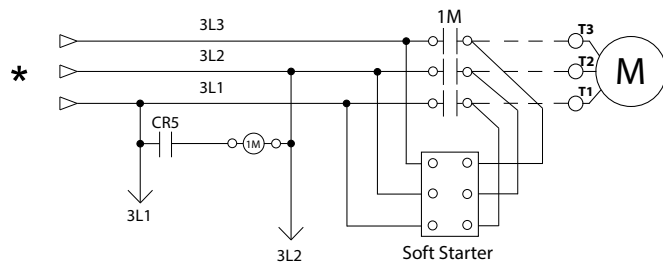
☐ **Model GPA**
Across the line



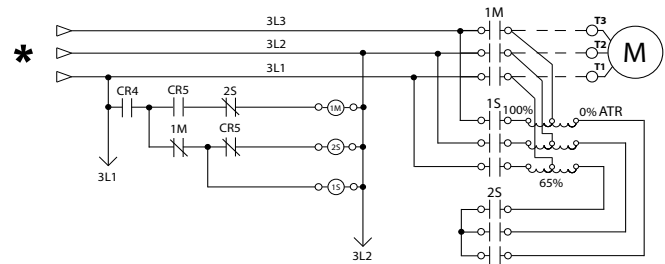
Model GPP Partwinding



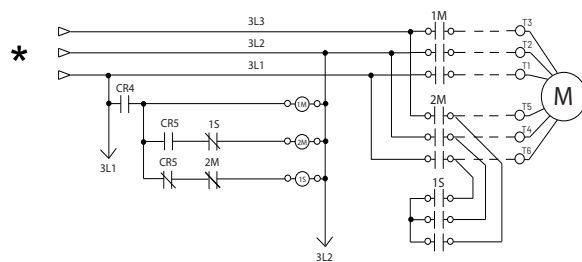
☐ **Model GPS**
Soft Start Soft Stop



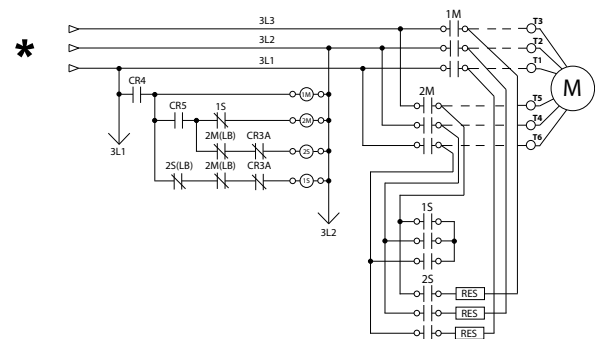
☐ **Model GPR**
Autotransformer



☒ **Model GPY**
Wye-Delta Open



☒ **Model GPW**
Wye-Delta Closed



*From Automatic Power Transfer Switch

GPx Series Full Service Electric Fire Pump Controller
with Automatic Power Transfer Switch

Standard, Listings, Approvals and Certifications	Built to NFPA 20 (latest edition)		
	Underwriters Laboratory (UL)	• UL218 - Fire Pump Controllers • UL 1008 - Automatic power transfer switches for fire pump controllers	
	FM Global	Class 1321/1323	
	New York City	Accepted for use in the City of New York by the Department of Buildings	
	CE Mark	Various EN, IEC & CEE directives and standards	
	Built in Canada or U.A.E		Built in Europe
	☐ CE Mark Option		Supplied as Standard
Enclosure	Protection Rating		
	Built in Canada or U.A.E		Built in Europe
	☒ Standard: NEMA 2		☒ Standard: IP55
	Optional		
	☐ NEMA 12	☐ NEMA 4X-304 sst painted	☐ IP54
	☐ NEMA 3	☐ NEMA 4X-304 sst brushed finish	☐ IP55
	☐ NEMA 3R	☐ NEMA 4X-316 sst painted	☐ IP65
	☐ NEMA 4	☐ NEMA 4X-316 sst brushed finish	☐ IP66
	Accessories • Bottom entry gland plate • Lifting Lugs • Keylock handle	Paint Specifications • Red RAL3002 • Powder coating • Glossy textured finish	

Shortcircuit Withstand Rating	200V to 208V 60Hz	220V to 240V 60Hz	380V to 415V 50 Hz / 60Hz	440V to 480V 60Hz	575V to 600V 60Hz
	HP (kw)				
☒ Standard 100kA	5 - 150 (3.7 - 110)	5 - 200 (3.7 - 149)	5 - 300 (3.7 - 223)	5 - 400 (3.7 - 298)	N/A
☐ Optional 150kA					
☐ Standard 50kA	200 (149)	250 (186)	350 - 450 (261 - 335)	450 - 500 (335 - 373)	5 - 500 (3.7 - 373)
☐ Optional 100kA	N/A	N/A	350 - 500 (261 - 373)	450 - 500 (335 - 373)	
☒ Optional 200kA	5 - 150 (3.7 - 110)	5 - 200 (3.7 - 149)	5 - 300 (3.7 - 223)	5 - 400 (3.7 - 298)	N/A

*Please see Disconnecting Means details on page 4



Ambient Temperature Rating	Standard: ☐ 4°C to 40°C / 39°F to 104°F Optional: ☐ 4°C to 55°C / 39°F to 131°F Controllers built in Dubai, UAE (Tornatech FZE) are supplied standard with 55°C rating.
Surge Suppression	Surge arrestor rated to suppress surges above line voltage
Disconnecting Means	- Isolating switch and circuit breaker assembly: - Door interlocked in the ON position - Isolating switch rated not less than 115% of motor full load current - Circuit breaker continuous rating not less than 115% of motor full load current - Overcurrent sensing non-thermal type, magnetic only - Instantaneous trip setting of not more than 20 times the motor full load current - Common flange mounted operating handle
Service Entrance Rating	Suitable as service entrance equipment
Emergency Start Handle	- Flange mounted - Integrated limit switch - Pull and latch activation - Across the line start (direct on line)
Locked Rotor Protector	- Operate shunt trip to open circuit breaker - Factory set at 600% of motor full load current - Trip between 8 and 20 seconds
Electrical Readings	- Voltage phase to phase (normal power) - Amperage of each phase when motor is running
Pressure Readings	- Continuous system pressure display - Cut-in and Cut-out pressure settings
Pressure and Event recorder	- Pressure readings with date stamp - Event recording with date stamp - Under regular maintained operation, events are stored in memory for the life of the controller. - Data viewable on operator interface display screen - Downloadable by USB port to external memory device
Pressure Sensing	- Pressure transducer and run test solenoid valve assembly for fresh water application - Pressure sensing line connection 1/2" Female NPT - Drain connection 3/8" - Rated for 0-500PSI working pressure (standard display at 0-300PSI) - Externally mounted with protective cover



Audible Alarm	6" alarm bell - 85 dB at 10ft. (3m)		
Visual Indications	• Power available • Motor run • Periodic test • Manual start	• Deluge valve start • Remote automatic start • Remote manual start • Emergency start	• Pump on demand/Automatic start • Pump room temperature (°F or °C) • Lockout
Visual & Audible Alarms	Visual only • Alternate lock rotor current • Alternate power phase reversal • Automatic transfer switch trouble • Control voltage not healthy • Invalid cut-in • Lock rotor current • Loss of power • Low ambient temperature Visual and Audible • ACB in OFF or tripped • Alternate IS tripped/open • Fail to start		
Remote Alarm Contacts	DPDT-8A-250V.AC • Power available • Phase reversal • Motor run • Common pump room alarm (field re-assignable)** • Overvoltage • Undervoltage • Phase unbalance • Low pump room temperature • High Pump room temperature • Common motor trouble (field re-assignable)** • Overcurrent • Fail to start • Undercurrent • Ground fault • Free (field programmable)**		

**Tornatech reserves the right to use any of these three alarm points for special specific application requirements.



GPx Series Full Service Electric Fire Pump Controller with Automatic Power Transfer Switch

ViZiTouch V2 Operator Interface	• Embedded microcomputer with software PLC logic • 7.0" color touch screen (HMI technology) • Upgradable software • Multi-language		
Communication Protocol Capability	• Protocol: Modbus • Connection type: Shielded female connector RJ45 • Frame Format: TCP/IP • Addresses: See bulletin MOD-GPx		
Operation	Automatic Start	• Start on pressure drop • Remote start signal from automatic device • Deluge valve start	
	Manual Start	• Start pushbutton • Run test pushbutton • Remote start from manual device	
	Stopping	• Manual with Stop pushbutton • Automatic after expiration of minimum run timer ***	
	Timers	Field Adjustable & Visual Countdown	• Minimum run timer ***(off delay) • Sequential start timer (on delay) • Periodic test timer
	Actuation	Visual Indication	• Pressure • Non-pressure
	Mode		• Automatic • Non-automatic

***Can only be used if approved by the AHJ

GPx Series Full Service Electric Fire Pump Controller
with Automatic Power Transfer Switch

Automatic Power Transfer Switch	Surge Suppression	Surge arrestor rated to suppress surges above line voltage
	Disconnecting Means	• Isolating switch and circuit breaker assembly: - Door interlocked in the ON position - Isolating switch rated not less than 115% of motor full load current - Circuit breaker continuous rating not less than 115% of motor full load current - Overcurrent sensing non-thermal type, magnetic only - Instantaneous trip setting of not more than 20 times the motor full load current • Common flange mounted operating handle
	Locked Rotor Protector	• Operate shunt trip to open circuit breaker • Factory set at 600% of motor full load current • Trip between 8 and 20 seconds
	Visual Indications	• Alternate (emergency) isolating switch in the OFF position • Alternate (emergency) voltage phase to phase • Transfer switch in normal position • Transition timers
	Visual Alarms	• Transfer switch trouble • Alternate power phase reversal • Alternate isolating switch open/tripped • Alternate circuit breaker open/tripped • Alternate side locked rotor current
	Transfer switch test pushbutton	
	Bypass for re-transfer and generator shutdown	
	Electrically operated and mechanically held in the normal or alternate position	
	Provision for manual operation	
	Remote Alarm Contacts SPDT-8A-250VAC • Isolating switch in the OFF position • Transfer switch in normal position • Transfer switch in alternate (emergency) position	
	Time Delays • Momentary normal power outage override (factory set at 3 sec - field adjustable 1 to 3 sec) • Alternate (emergency) power available delay (factory set at 3 sec - field adjustable 1 to 3 sec) • Transfer trouble delay (factory set at 20 sec - field adjustable 1 to 60 sec) • Retransfer to normal (factory set at 5 min - field adjustable 1 to 20 min) • Generator cooldown (factory set at 5 min - field adjustable 1 to 20 min)	
	Voltage Sensing • Transfer to alternate (normal power dropout) 85% of nominal - field adjustable 0 to 100% • Phase reversal transfer to alternate • Retransfer to normal (normal power pickup) 90% of nominal - field adjustable 0 to 100%	
	Audible Alarm (AIS Open) 6" alarm bell - 85 dB at 10ft. (3m)	
	Generator Start Connection SPDT-8A-250V.AC	



GPx Series Full Service Electric Fire Pump Controller with Automatic Power Transfer Switch

☐ A4	Flow switch provision	☐ C19	Emergency start alarm contact (DPDT)
☐ A8	Foam pump application w/o pressure transducer and run test solenoid valve.	☐ C20	Manual start alarm contact (DPDT)
☐ A9	Low zone pump control function	☐ C21	Deluge valve start alarm contact (DPDT)
☐ A10	Middle zone pump control function	☐ C22	Remote automatic start alarm contact (DPDT)
☐ A11	High zone pump control function	☐ C23	Remote manual start alarm contact (DPDT)
☐ A13	Non-pressure actuated controller w/o pressure transducer and run test solenoid valve	☐ C24	High pump room temperature alarm contact (DPDT)
☐ A16	Lockout/interlock circuit from equipment installed inside the pump room	☐ C25	Second set of standard alarm contacts (DPDT) (Typical for city of Los Angeles and Denver)
☐ B11	Built in alarm panel (120V.AC supervisory power) providing indication for: • Audible alarm & silence pushbutton for motor run, phase reversal, loss of phase. • Pilot lights for loss of phase & supervisory power available	☐ Cx	Additional visual and alarm contact (Specify function) (DPDT)
☐ B11B	Built in alarm panel same as B11 but 220-240VAC supervisory power	☐ D1	Low suction pressure transducer for fresh water rated at 0-300PSI with visual indication and alarm contact
☐ B19A	High motor temperature c/w thermostat relay and alarm contacts (DPDT)	☐ D1A	Low suction pressure transducer for sea water rated at 0-300PSI with visual indication and alarm contact
☐ B19B	High motor temperature c/w PT100 relay and alarm contacts (DPDT)	☐ D5	Pressure transducer and run test solenoid valve for fresh water rated for 0-500PSI (for factory calibration purposes only)
☐ B21	Ground fault alarm detection c/w visual indication and alarm contact (DPDT)	☐ D5D	Pressure transducer and run test solenoid valve for sea water rated for 0-500PSI
☐ C1	Extra motor run alarm contact (DPDT)	☐ D10	Omit mounting feet (when applicable)
☐ C4	Periodic test alarm contact (DPDT)	☐ D13	High withstand rating for: • 200V to 208V @ 150HP max. = 150kA* • 200V to 208V @ 200HP = 100kA* • 220V to 240V @ 200HP max. = 150kA* • 220V to 240V @ 250HP = 100kA* • 380V to 415V @ 300HP max. = 150kA* • 380V to 415V @ 350HP to 450HP = 100kA* • 440V to 480V @ 400HP max. = 150kA* • 440V to 480V @ 450HP to 500HP = 100kA* • 600V @ 500HP max. = 100kA*
☐ C6	Low discharge pressure alarm contact (DPDT)	☐ D13A	High withstand rating for: • 380V to 480V = 65kA* • 600V = 25kA*
☐ C7	Low pump room temperature alarm contact (DPDT)	☐ D13B	High withstand rating for: • 200V to 208V @ 150HP max. = 200kA* • 220V to 240V @ 200HP max. = 200kA* • 380V to 415V @ 300HP max. = 200kA* • 440V to 480V @ 400HP max. = 200kA*
☐ C10	Low water reservoir level alarm contact (DPDT)	☐ D14	Anti-condensation heater & thermostat
☐ C11	High electric motor temperature alarm contact (DPDT)	☐ D14A	Anti-condensation heater & humidistat
☐ C12	High electric motor vibration c/w visual indication and alarm contact (DPDT)	☐ D14B	Anti-condensation heater & thermostat & humidistat
☐ C14	Pump on demand / automatic start alarm contact (DPDT)		
☐ C15	Pump fail to start alarm contact (DPDT)		
☐ C16	Control voltage healthy alarm contact (DPDT)		
☐ C17	Flow meter valve loop open c/w visual indication and alarm contact (DPDT)		
☐ C18	High water reservoir level c/w visual indication and alarm contact (DPDT)		

Note: Options chosen from this page are not electrically represented on the wiring schematics in this submittal package.

**GPx Series Full Service Electric Fire Pump Controller
with Automatic Power Transfer Switch**

☐ D15	Tropicalization
☐ D18	CE Mark with factory certificate
☐ D26	Modbus with RTU frame format and RS485 connection
☐ D27	Motor heater connection (external single phase power source and heater on/off contact)
☐ D27A	Motor heater connection (internal single phase power source and heater on/off contact)
☐ D28	Customized drawing set
☐ D34A	Field programmable I/O board - 5 Input / 5 output
☐ D36	Redundant pressure transducer for fresh water rated for 0-500PSI
☐ D36A	Redundant pressure transducer for sea water rated for 0-500PSI
☐ D43	Seismic Certification compliant to CBC 2019, IBC 2018 rigid base/wall mounted only
☐ D44	Special Seismic Certification compliant to OSHPD rigid base/wall mounted only
☐ E1	Permanent load shedding contacts
☐ E2	Temporary pump motor start period load shedding contacts
☐ E3	Temporary & permanent load shedding contacts
☐ F2	Anti condensation heater & thermostat (alternate power section)
☐ F2A	Anti condensation heater & humidistat (alternate power section)
☐ F2B	Anti condensation heater & thermostat & humidistat (alternate power section)
☐ F6	High withstand rating for (model GPU only) : • 208V to 480V=150kA • 600V=100kA

☐ L01	Other language and English (bilingual)
☐ L02	French
☐ L03	Spanish
☐ L04	German
☐ L05	Italian
☐ L06	Polish
☐ L07	Romanian
☐ L08	Hungarian
☐ L09	Slovak
☐ L10	Croatian
☐ L11	Czech
☐ L12	Portuguese
☐ L13	Dutch
☐ L14	Russian
☐ L15	Turkish
☐ L16	Swedish
☐ L17	Bulgarian
☐ L18	Thai
☐ L19	Indonesian
☐ L20	Slovenian
☐ L21	Danish
☐ L22	Greek
☐ L23	Arabic
☐ L24	Hebrew
☐ L25	Chinese

Additional Options:

☐ _____

☐ _____

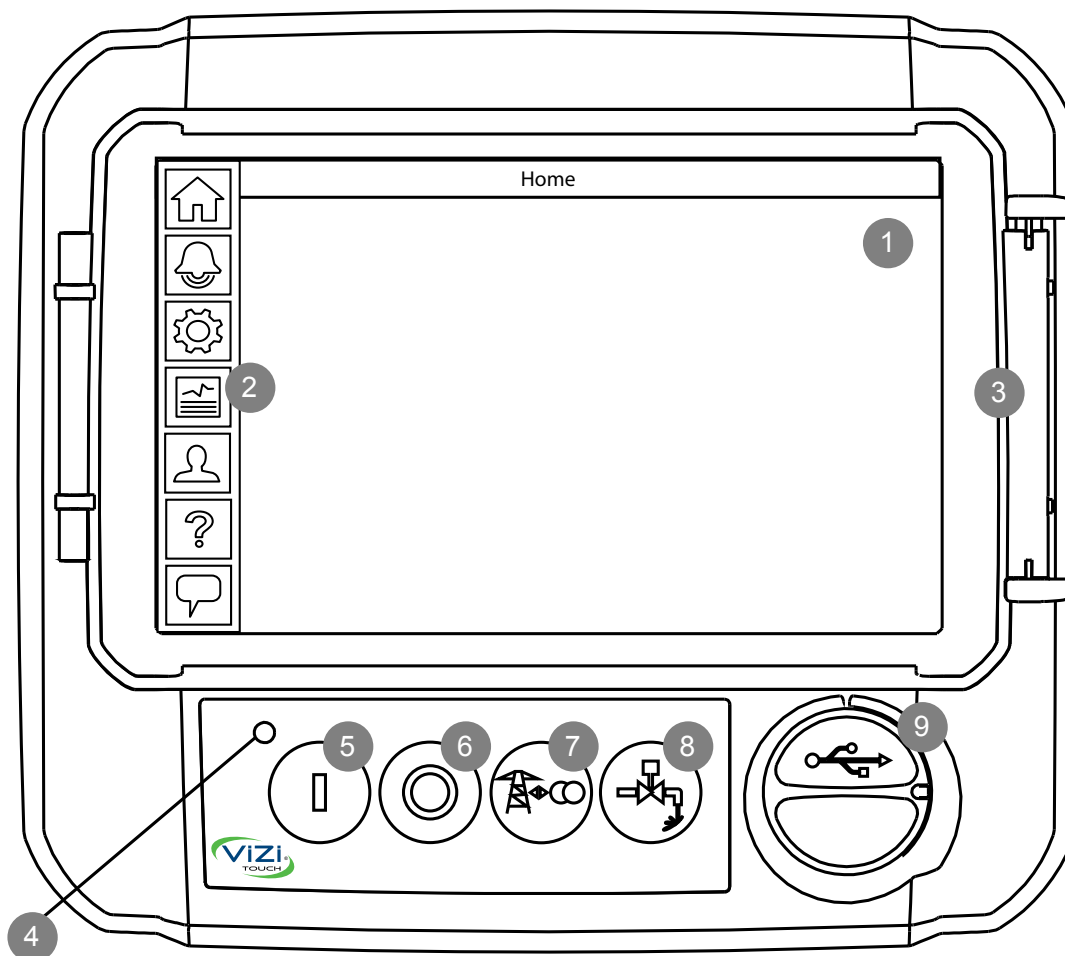
☐ _____

☐ _____

☐ _____

Note: Options chosen from this page are not electrically represented on the wiring schematics in this submittal package.

ViZiTouch V2 Operator Interface



- | | |
|------------------------|---------------------------------|
| 1 - Color touch screen | 3 - Screen protector |
| 2 - Onscreen menu | 4 - Power LED (3 colors) |
| • HOME page | 5 - START button |
| • ALARM page | 6 - STOP button |
| • CONFIGURATION page | 7 - TRANSFER SWITCH TEST button |
| • HISTORY page | 8 - RUN TEST button |
| • SERVICE page | 9 - USB port |
| • MANUAL page | |
| • LANGUAGES page | |

Model: GPA/GPP/GPY
+GPU

Notes:

- Standard NEMA: NEMA 2
- Standard paint : textured red RAL 3002.
- All dimensions are in inches [millimeters].
- Center of ViZiTouCh screen: 29-5/8" [751] from bottom (no feet).
- Bottom conduit entrance through removable gland plate recommended.
- Use watertight conduit and connector only.
- Protect equipment against drilling chips.
- Door swing equal to door width.

Projection



REV.	DESCRIPTION	DD/MM/YY	Drawing number
3.	Removed Seismic logo (optional)	18/05/22	GPX-DI162 /E
2.	New Logo	10/05/18	
1.	Valve Change	21/11/17 COL	

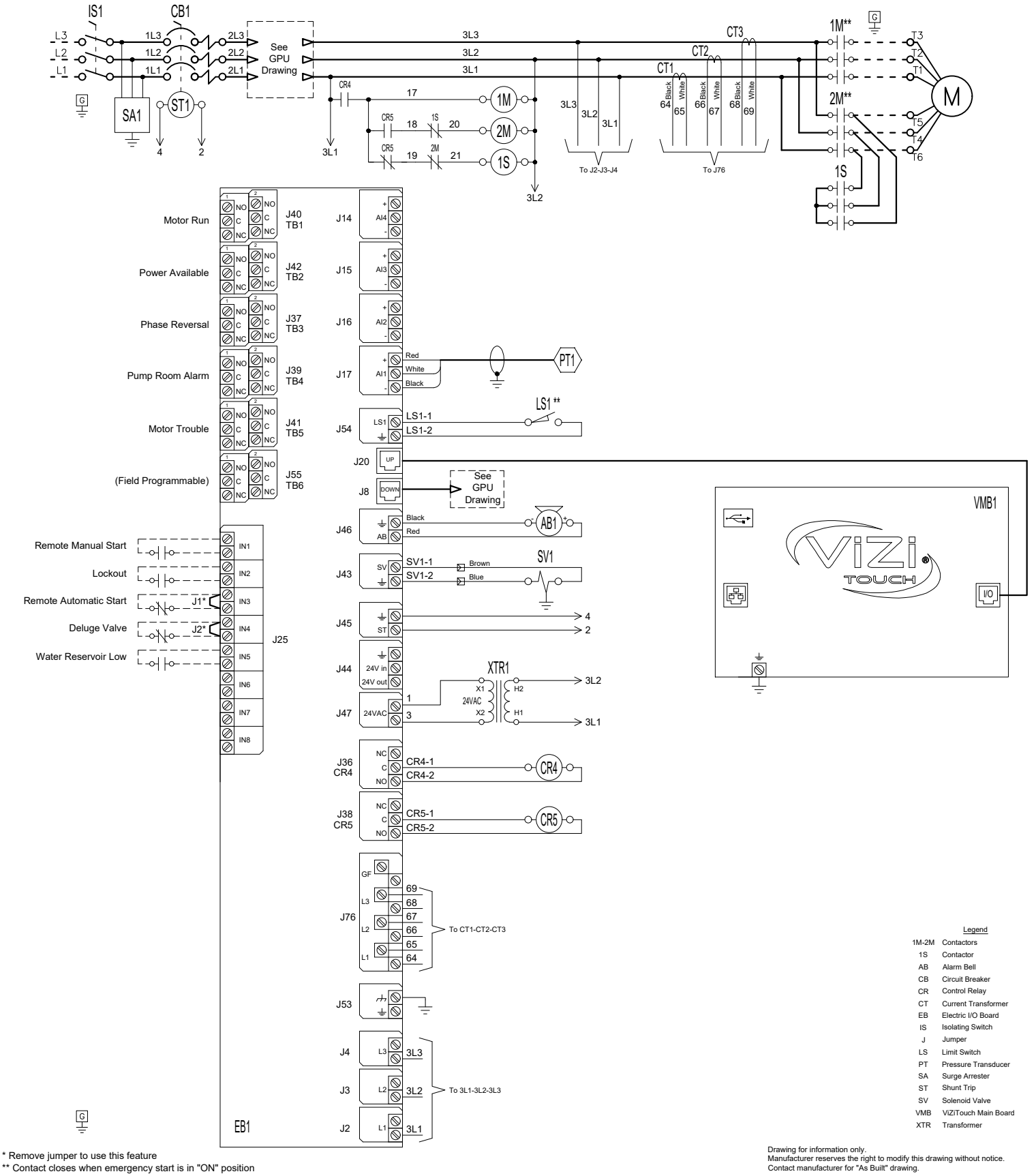
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Electric Fire Pump Controller
Reduced Voltage / Wye-Delta (Open Transition)
With Automatic Transfer Switch

Model: GPY+GPU

Wiring schematic

Built to the latest edition of the NFPA 20 standard



* Remove jumper to use this feature

** Contact closes when emergency start is in "ON" position

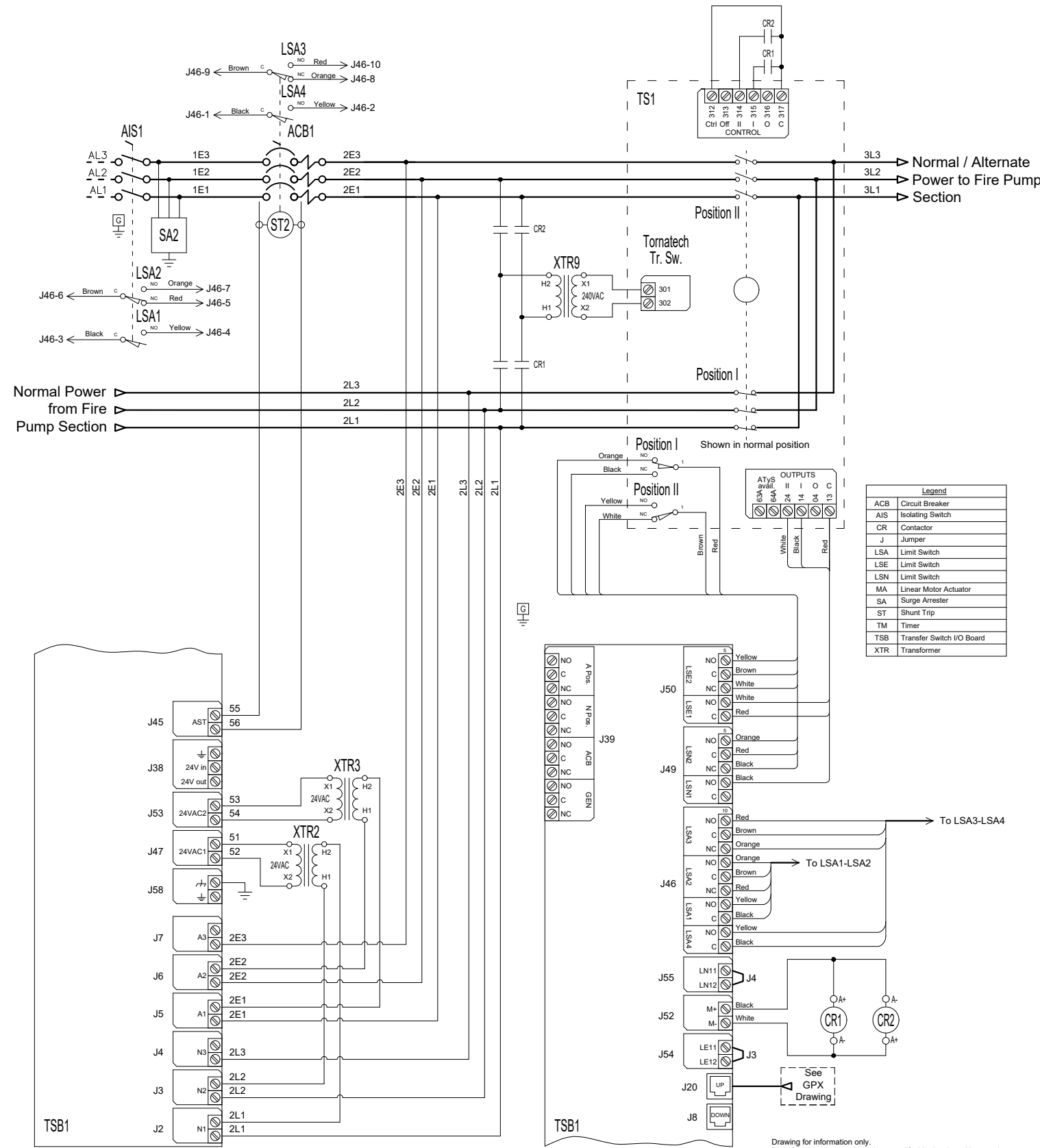
Drawing for information only.
Manufacturer reserves the right to modify this drawing without notice.
Contact manufacturer for "As Built" drawing.

Automatic Transfer Switch
For Electric Fire Pump Controller

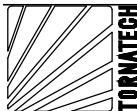
Model: GPU

Wiring schematic

Built to the latest edition of the NFPA 20 standard

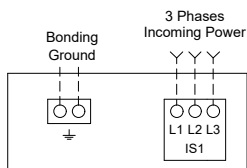


Drawing for information only.
Manufacturer reserves the right to modify this drawing without notice.
Contact manufacturer for "As Built" drawing.



Model: GPX

Built to the latest edition of the NFPA 20 standard



- 1 - For proper wire sizing, refer to NFPA70 and NEC (USA) or CEC (Canada) or local code.
- 2 - Controller suitable for service entrance in USA.
- 3 - For more accurate motor connections refer to motor manufacturer or motor nameplate.
- 4 - Controller is phase sensitive. Incoming lines must be connected in ABC sequence.

Field Wiring According to Bending Space (AWG or MCM). Terminals L1 - L2 - L3

Bending Space	5 " (127 mm)							8 " (203 mm)		
HP Voltage	5	7.5	10	15	20	25	30	40	50	60
208	1x (10 to 1/0)	1x (8 to 1/0)	1x (8 to 1/0)	1x (6 to 1/0)	1x (4 to 1/0)	1x (3 to 1/0)	1x (2 to 1/0)	1x (1/0 to 3/0)	1x (3/0 to 250)	1x (4/0 to 250)
220 to 240	1x (10 to 1/0)	1x (10 to 1/0)	1x (8 to 1/0)	1x (6 to 1/0)	1x (4 to 1/0)	1x (4 to 1/0)	1x (3 to 1/0)	1x (1 to 3/0)	1x (2/0 to 3/0)	1x (3/0 to 250)
380 to 416	1x (10 to 1/0)	1x (10 to 1/0)	1x (10 to 1/0)	1x (8 to 1/0)	1x (8 to 1/0)	1x (6 to 1/0)	1x (6 to 1/0)	1x (4 to 1/0)	1x (3 to 1/0)	1x (3 to 1/0)
440 to 480	1x (10 to 1/0)	1x (10 to 1/0)	1x (10 to 1/0)	1x (10 to 1/0)	1x (8 to 1/0)	1x (8 to 1/0)	1x (6 to 1/0)	1x (6 to 1/0)	1x (4 to 1/0)	1x (3 to 1/0)
600	1x (10 to 1/0)	1x (10 to 1/0)	1x (10 to 1/0)	1x (10 to 1/0)	1x (10 to 1/0)	1x (8 to 1/0)	1x (8 to 1/0)	1x (6 to 1/0)	1x (6 to 1/0)	1x (4 to 1/0)

Bending Space	12 " (305 mm)				16 " (406 mm)						
HP Voltage	75	100	125	150	200	250	300	350	400	450	500
208	2x (1/0 to 500)	2x (2/0 to 500)	2x (4/0 to 500)	2x (250 to 500)	3x (4/0 to 500)	-----	-----	-----	-----	-----	-----
220 to 240	1x (250)	2x (2/0 to 500)	2x (3/0 to 500)	2x (4/0 to 500)	2x (350 to 500)	3x (250 to 500)	-----	-----	-----	-----	-----
380 to 416	1x (1/0 to 3/0)	1x (3/0 to 250)	1x (250)	2x (1/0 to 500)	2x (3/0 to 500)	2x (4/0 to 500)	2x (300 to 500)	2x (400 to 500)	3x (250 to 500)	3x (300 to 500)	-----
440 to 480	1x (1 to 3/0)	1x (2/0 to 3/0)	1x (3/0 to 250)	1x (4/0 to 250)	2x (1/0 to 500)	2x (3/0 to 500)	2x (4/0 to 500)	2x (300 to 500)	2x (350 to 500)	2x (400 to 500)	3x (250 to 500)
600	1x (3 to 1/0)	1x (1 to 3/0)	1x (2/0 to 3/0)	1x (3/0 to 250)	1x (250)	2x (2/0 to 500)	2x (3/0 to 500)	2x (4/0 to 500)	2x (250 to 500)	2x (300 to 500)	2x (350 to 500)
Bending Space	5 " (127 mm)	8 " (203 mm)				12 " (305 mm)					

Field Wiring According to Bending Space (AWG or MCM). Terminals L1 - L2 - L3

Bending Space	5" (127 mm)							8" (203 mm)		10" (254 mm)
HP Voltage	5	7.5	10	15	20	25	30	40	50	60
208	1x (10 to 1/0)	1x (6 to 1/0)	1x (6 to 1/0)	1x (4 to 1/0)	1x (3 to 1/0)	1x (1 to 1/0)	1x (1/0)	1x (3/0)	1x (4/0 to 250)	1x (300) ** or 1x (250) 90°C
220 to 240	1x (10 to 1/0)	1x (8 to 1/0)	1x (6 to 1/0)	1x (4 to 1/0)	1x (3 to 1/0)	1x (2 to 1/0)	1x (1 to 1/0)	1x (2/0 to 3/0)	1x (3/0) 90°C *	1x (250)
380 to 416	1x (10 to 1/0)	1x (10 to 1/0)	1x (10 to 1/0)	1x (6 to 1/0)	1x (6 to 1/0)	1x (4 to 1/0)	1x (4 to 1/0)	1x (2 to 1/0)	1x (1 to 1/0)	1x (1/0)
440 to 480	1x (10 to 1/0)	1x (10 to 1/0)	1x (10 to 1/0)	1x (8 to 1/0)	1x (6 to 1/0)	1x (6 to 1/0)	1x (6 to 1/0)	1x (4 to 1/0)	1x (2 to 1/0)	1x (1 to 1/0)
600	1x (10 to 1/0)	1x (10 to 1/0)	1x (10 to 1/0)	1x (10 to 1/0)	1x (8 to 1/0)	1x (6 to 1/0)	1x (6 to 1/0)	1x (4 to 1/0)	1x (4 to 1/0)	1x (2 to 1/0)

Bending Space	12 " (305 mm)				16 " (406 mm)						
HP	75	100	125	150	200	250	300	350	400	450	500
Voltage	208	2x (2/0 to 500)	2x (300 to 500)	2x (350 to 500)	3x (300 to 500)	-----	-----	-----	-----	-----	-----
220 to 240	1x (350) ** N/A	2x (3/0 to 500)	2x (250 to 500)	2x (300 to 500)	2x (500)	3x (400 to 500)	-----	-----	-----	-----	-----
380 to 416	1x (3/0)	1x (250 to 350)	1x (350) ** N/A	2x (3/0 to 500)	2x (4/0 to 500)	2x (300 to 500)	2x (500)	3x (300 to 500) ** 2x (500) 90°C *	3x (350 to 500)	3x (400 to 500)	-----
440 to 480	1x (1/0 to 3/0)	1x (3/0)	1x (250)	1x (300 to 350) ** 1x (250) 90°C *	2x (3/0 to 500)	2x (250 to 500)	2x (300 to 500)	2x (400 to 500)	2x (500)	2x (500) 90°C *	3x (350 to 500)
600	1x (1 to 1/0)	1x (2/0 to 3/0)	1x (3/0) 90°C *	1x (4/0 to 250)	1x (350 to 500)	2x (3/0 to 500)	2x (4/0 to 250)	2x (300 to 500)	2x (350 to 500)	2x (400 to 500)	2x (500)
Bending Space	5 " (127 mm)	8 " (203 mm)			12 " (305 mm)						

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 Manufacturer reserves the right to modify this drawing without notice.
 Contact manufacturer for "As Built" drawing



REV.	DESCRIPTION	DD/MM/YY	Drawing number
1	Removed Seismic logo (optional)	18/05/22	GPX-TD612 1/2 /E
0	First issue	22/12/20	

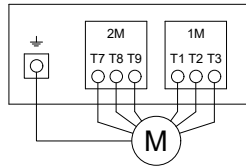
Electric Fire Pump Controller

Model: GPX

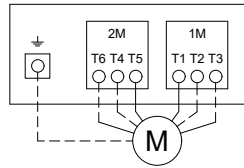
Terminal Diagram and Sizing For GPP,GPY & GPW

Built to the latest edition of the NFPA 20 standard

Motor Terminals



Model : GPP



Models : GPW & GPY

Notes:

- 1 - For proper wire sizing, refer to NFPA70 and NEC (USA) or CEC (Canada) or local code.
- 2 - Controller suitable for service entrance in USA.
- 3 - For more accurate motor connections refer to motor manufacturer or motor nameplate.
- 4 - Controller is phase sensitive. Incoming lines must be connected in ABC sequence.

COPPER CONDUCTORS for Motor Connection (1M-2M).

Field Wiring According to Bending Space (AWG or MCM). Terminals T1-T2-T3-T4-T5-T6-T7-T8-T9

HP Voltage	5	7.5	10	15	20	25	30	40	50	60
208	1x (10 to 4)	1x (10 to 4)	1x (10 to 4)	1x (8 to 4)	1x (8 to 4)	1x (6 to 4)	1x (6 to 4)	1x (4 to 2/0)	1x (2 to 2/0)	1x (1 to 2/0)
220 to 240	1x (10 to 4)	1x (10 to 4)	1x (10 to 4)	1x (8 to 4)	1x (8 to 4)	1x (6 to 4)	1x (6 to 4)	1x (4)	1x (3 to 2/0)	1x (2 to 2/0)
380 to 416	1x (10 to 4)	1x (10 to 4)	1x (10 to 4)	1x (10 to 4)	1x (10 to 4)	1x (10 to 4)	1x (8 to 4)	1x (8 to 4)	1x (6 to 4)	1x (4)
440 to 480	1x (10 to 4)	1x (10 to 4)	1x (10 to 4)	1x (10 to 4)	1x (10 to 4)	1x (10 to 4)	1x (10 to 4)	1x (8 to 4)	1x (8 to 4)	1x (6 to 4)
600	1x (10 to 4)	1x (10 to 4)	1x (10 to 4)	1x (10 to 4)	1x (10 to 4)	1x (10 to 4)	1x (10 to 4)	1x (10 to 4)	1x (8 to 4)	1x (8 to 4)

HP Voltage	75	100	125	150	200	250	300	350	400	450	500
208	1x (2/0 to 3/0)	1x (3/0 to 300)	1x (250 to 300)	2x (1/0 to 300)	2x (3/0 to 350)	-----	-----	-----	-----	-----	-----
220 to 240	1x (1/0 to 2/0)	1x (3/0)	1x (4/0 to 300)	1x (300)	2x (2/0 to 300)	2x (4/0 to 350)	-----	-----	-----	-----	-----
380 to 416	1x (4 to 2/0)	1x (2 to 2/0)	1x (1/0 to 2/0)	1x (2/0 to 3/0)	1x (4/0 to 300)	1x (300)	2x (2/0 to 300)	2x (3/0 to 300)	2x (4/0 to 350)	2x (4/0 to 350)	-----
440 to 480	1x (4 to 2/0)	1x (3 to 2/0)	1x (2 to 2/0)	1x (1/0 to 3/0)	1x (2/0 to 3/0)	1x (4/0 to 300)	1x (300)	2x (1/0 to 300)	2x (2/0 to 300)	2x (3/0 to 350)	2x (4/0 to 350)
600	1x (6 to 4)	1x (4)	1x (3 to 2/0)	1x (2 to 2/0)	1x (1/0 to 3/0)	1x (2/0 to 3/0)	1x (4/0 to 300)	1x (250 to 300)	1x (300)	2x (1/0 to 300)	2x (2/0 to 300)

ALUMINUM CONDUCTORS for Contactor (1M-2M).

Field Wiring According to Bending Space (AWG or MCM). Terminals T1-T2-T3-T4-T5-T6-T7-T8-T9

HP Voltage	5	7.5	10	15	20	25	30	40	50	60
208	1x (12 to 2/0) **	1x (10 to 2/0) **	1x (10 to 2/0) **	1x (8 to 2/0) **	1x (6 to 2/0) **	1x (4 to 2/0) **	1x (4 to 2/0) **	1x (2 to 2/0)	1x (1/0 to 2/0)	1x (2/0)
220 to 240	1x (12 to 2/0) **	1x (10 to 2/0) **	1x (10 to 2/0) **	1x (8 to 2/0) **	1x (8 to 2/0) **	1x (6 to 2/0) **	1x (4 to 2/0) **	1x (2 to 2/0) **	1x (1 to 2/0)	1x (1/0 to 2/0)
380 to 416	1x (12 to 2/0) **	1x (12 to 2/0) **	1x (12 to 2/0) **	1x (10 to 2/0) **	1x (10 to 2/0) **	1x (8 to 2/0) **	1x (8 to 2/0) **	1x (6 to 2/0) **	1x (4 to 2/0) **	1x (3 to 2/0) **
440 to 480	1x (12 to 2/0) **	1x (12 to 2/0) **	1x (12 to 2/0) **	1x (12 to 2/0) **	1x (10 to 2/0) **	1x (10 to 2/0) **	1x (8 to 2/0) **	1x (8 to 2/0) **	1x (6 to 2/0) **	1x (4 to 2/0) **
600	1x (12 to 2/0) **	1x (12 to 2/0) **	1x (12 to 2/0) **	1x (12 to 2/0) **	1x (10 to 2/0) **	1x (10 to 2/0) **	1x (10 to 2/0) **	1x (8 to 2/0) **	1x (8 to 2/0) **	1x (6 to 2/0) **

HP Voltage	75	100	125	150	200	250	300	350	400	450	500
208	1x (3/0)	Consult Factory	1x (300) 90°C *	2x (3/0 to 300)	2x (250 to 350)	-----	-----	-----	-----	-----	-----
220 to 240	1x (2/0) 90°C *	Consult Factory	1x (300)	1x (300) 90°C *	2x (4/0 to 300)	2x (300 to 350)	-----	-----	-----	-----	-----
380 to 416	1x (2 to 2/0)	1x (1/0 to 2/0)	1x (1/0 to 2/0)	1x (3/0) 90°C *	1x (300)	1x (300) 90°C *	2x (4/0 to 300)	2x (250 to 300)	2x (300 to 350)	2x (300 to 350)	-----
440 to 480	1x (3 to 2/0) **	1x (2 to 2/0)	1x (2/0) 90°C *	1x (2/0 to 3/0)	1x (3/0) 90°C *	1x (300)	1x (300) 90°C *	2x (3/0 to 300)	2x (4/0 to 300)	2x (250 to 350)	2x (300 to 350)
600	1x (4 to 2/0) **	1x (3 to 2/0) **	1x (2 to 2/0)	1x (1/0 to 3/0)	1x (3/0)	1x (3/0) 90°C *	1x (300)	1x (300) 90°C *	Consult Factory	2x (3/0 to 300)	2x (4/0 to 300)

*For standard enclosure, use 90°C aluminium wire. Consult Factory for Use of Conductors Rated Lower than 90°C.

**Option V659 required.

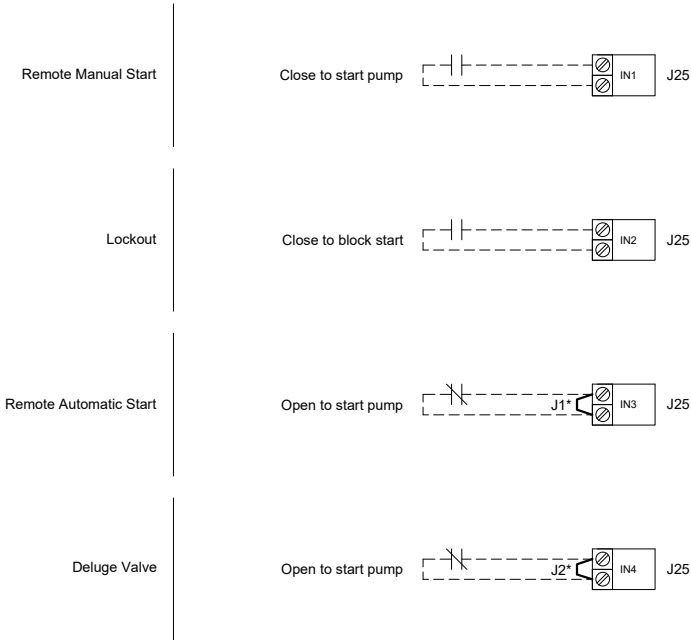
Drawing for information only.
Manufacturer reserves the right to modify this drawing without notice.
Contact manufacturer for "As Built" drawing.



REV.	DESCRIPTION	DD/MM/YY	Drawing number
1	Removed Seismic logo (optional)	18/05/22	GPX-TD612 2/2 /E
0	First issue	22/12/20	

Control Terminals (EB1)

Terminals Wire Size:
24 - 12 AWG
0.5 Nm



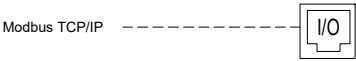
Alarm Inputs (EB1)

Terminals Wire Size:
24 - 12 AWG
0.5 Nm



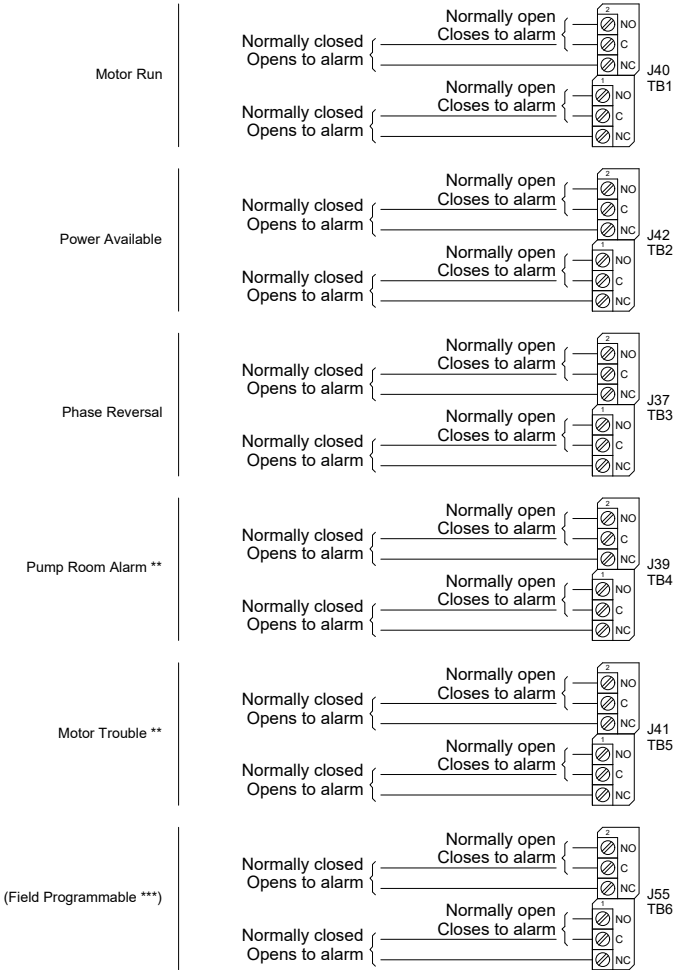
Network Connection (VMB1)

Shielded Female Connector RJ45



Remote Alarm Terminals (EB1)

Terminals Wire Size:
24 - 12 AWG
0.5 Nm



* Remove jumper to use this feature
** Re-assignable
*** Not available on GPS models

Drawing for information only.
Manufacturer reserves the right to modify this drawing without notice.
Contact manufacturer for "As Built" drawing.

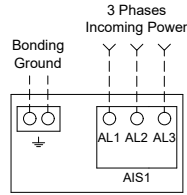
Automatic Transfer Switch For Electric Fire Pump Controller

Model: GPU

Terminal Diagram and Sizing

Built to the latest edition of the NFPA 20 standard

Power Terminals



Notes:

1 - Controller is phase sensitive. Incoming lines must be connected in ABC sequence.

COPPER CONDUCTORS for Isolating Switch (AIS1).

Field Wiring According to Bending Space (AWG or MCM). Terminals AL1 - AL2 - AL3

Bending Space	5 " (127 mm)							8 " (203 mm)		
HP	5	7.5	10	15	20	25	30	40	50	60
208	1x (10 to 1/0)	1x (8 to 1/0)	1x (8 to 1/0)	1x (6 to 1/0)	1x (4 to 1/0)	1x (3 to 1/0)	1x (2 to 1/0)	1x (1/0 to 3/0)	1x (3/0 to 250)	1x (4/0 to 250)
220 to 240	1x (10 to 1/0)	1x (10 to 1/0)	1x (8 to 1/0)	1x (6 to 1/0)	1x (4 to 1/0)	1x (4 to 1/0)	1x (3 to 1/0)	1x (1 to 3/0)	1x (2/0 to 3/0)	1x (3/0 to 250)
380 to 416	1x (10 to 1/0)	1x (10 to 1/0)	1x (10 to 1/0)	1x (8 to 1/0)	1x (8 to 1/0)	1x (6 to 1/0)	1x (6 to 1/0)	1x (4 to 1/0)	1x (3 to 1/0)	1x (3 to 1/0)
440 to 480	1x (10 to 1/0)	1x (10 to 1/0)	1x (10 to 1/0)	1x (10 to 1/0)	1x (8 to 1/0)	1x (8 to 1/0)	1x (6 to 1/0)	1x (6 to 1/0)	1x (4 to 1/0)	1x (3 to 1/0)
600	1x (10 to 1/0)	1x (10 to 1/0)	1x (10 to 1/0)	1x (10 to 1/0)	1x (10 to 1/0)	1x (8 to 1/0)	1x (8 to 1/0)	1x (6 to 1/0)	1x (6 to 1/0)	1x (4 to 1/0)

Bending Space	12 " (305 mm)				16 " (406 mm)						
HP	75	100	125	150	200	250	300	350	400	450	500
208	2x (1/0 to 500)	2x (2/0 to 500)	2x (4/0 to 500)	2x (250 to 500)	3x (4/0 to 500)	-----	-----	-----	-----	-----	-----
220 to 240	1x (250)	2x (2/0 to 500)	2x (3/0 to 500)	2x (4/0 to 500)	2x (350 to 500)	3x (250 to 500)	-----	-----	-----	-----	-----
380 to 416	1x (1/0 to 3/0)	1x (3/0 to 250)	1x (250)	2x (1/0 to 500)	2x (3/0 to 500)	2x (4/0 to 500)	2x (300 to 500)	2x (400 to 500)	3x (250 to 500)	3x (300 to 500)	-----
440 to 480	1x (1 to 3/0)	1x (2/0 to 3/0)	1x (3/0 to 250)	1x (4/0 to 250)	2x (1/0 to 500)	2x (3/0 to 500)	2x (4/0 to 500)	2x (300 to 500)	2x (350 to 500)	2x (400 to 500)	3x (250 to 500)
600	1x (3 to 1/0)	1x (1 to 3/0)	1x (2/0 to 3/0)	1x (3/0 to 250)	1x (250)	2x (2/0 to 500)	2x (3/0 to 500)	2x (4/0 to 500)	2x (250 to 500)	2x (300 to 500)	2x (350 to 500)
Bending Space	5 " (127 mm)				8 " (203 mm)			12 " (305 mm)			

ALUMINUM CONDUCTORS for Isolating Switch (AIS1).

Field Wiring According to Bending Space (AWG or MCM). Terminals AL1 - AL2 - AL3

Bending Space	5 " (127 mm)							8 " (203 mm)		10 " (254 mm)
HP	5	7.5	10	15	20	25	30	40	50	60
208	1x (10 to 1/0)	1x (6 to 1/0)	1x (6 to 1/0)	1x (4 to 1/0)	1x (3 to 1/0)	1x (1 to 1/0)	1x (1/0)	1x (3/0)	1x (4/0 to 250)	1x (300) ** or 1x (250) 90°C *
220 to 240	1x (10 to 1/0)	1x (8 to 1/0)	1x (6 to 1/0)	1x (4 to 1/0)	1x (3 to 1/0)	1x (2 to 1/0)	1x (1 to 1/0)	1x (2/0 to 3/0)	1x (3/0) 90°C *	1x (250)
380 to 416	1x (10 to 1/0)	1x (10 to 1/0)	1x (10 to 1/0)	1x (6 to 1/0)	1x (6 to 1/0)	1x (4 to 1/0)	1x (4 to 1/0)	1x (2 to 1/0)	1x (1 to 1/0)	1x (1/0)
440 to 480	1x (10 to 1/0)	1x (10 to 1/0)	1x (10 to 1/0)	1x (8 to 1/0)	1x (6 to 1/0)	1x (6 to 1/0)	1x (6 to 1/0)	1x (4 to 1/0)	1x (2 to 1/0)	1x (1 to 1/0)
600	1x (10 to 1/0)	1x (10 to 1/0)	1x (10 to 1/0)	1x (10 to 1/0)	1x (8 to 1/0)	1x (6 to 1/0)	1x (6 to 1/0)	1x (4 to 1/0)	1x (4 to 1/0)	1x (2 to 1/0)

Bending Space	12 " (305 mm)				16 " (406 mm)						
HP	75	100	125	150	200	250	300	350	400	450	500
208	2x (2/0 to 500)	2x (4/0 to 500)	2x (300 to 500)	2x (350 to 500)	3x (300 to 500)	-----	-----	-----	-----	-----	-----
220 to 240	1x (350) ** N/A	2x (3/0 to 500)	2x (250 to 500)	2x (300 to 500)	2x (500)	3x (400 to 500)	-----	-----	-----	-----	-----
380 to 416	1x (3/0)	1x (250 to 350)	1x (350) ** N/A	2x (3/0 to 500)	2x (4/0 to 500)	2x (300 to 500)	2x (500)	3x (300 to 500) ** 2x (500) 90°C *	3x (350 to 500)	3x (400 to 500)	-----
440 to 480	1x (1/0 to 3/0)	1x (3/0)	1x (250)	1x (300 to 350) ** 1x (250) 90°C *	2x (3/0 to 500)	2x (250 to 500)	2x (300 to 500)	2x (400 to 500)	2x (500)	2x (500) 90°C *	3x (350 to 500)
600	1x (1 to 1/0)	1x (2/0 to 3/0)	1x (3/0) 90°C *	1x (4/0 to 250)	1x (350 to 500)	2x (3/0 to 500)	2x (4/0 to 250)	2x (300 to 500)	2x (350 to 500)	2x (400 to 500)	2x (500)
Bending Space	5 " (127 mm)				8 " (203 mm)			12 " (305 mm)			

* For standard enclosure, use 90°C aluminium wire. Consult Factory for Use of Conductors Rated Lower than 90°C.

** Consult Factory

Drawing for information only.
Manufacturer reserves the right to modify this drawing without notice.
Contact manufacturer for "As Built" drawing.

REV.	DESCRIPTION	DD/MM/YY	Drawing number
1	Removed Seismic logo (optional)	18/05/22	GPU-TD613 1/2 /E
0	First Issue	08/01/21	

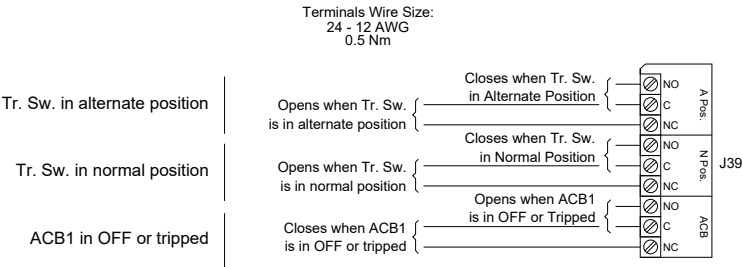
Automatic Transfer Switch For Electric Fire Pump Controller

Model: GPU

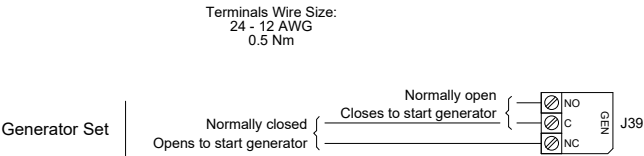
Terminal Diagram and Sizing

Built to the latest edition of the NFPA 20 standard

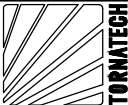
Remote Alarm Terminals (TSB1)



Control Terminals (TSB1)



Drawing for information only.
Manufacturer reserves the right to modify this drawing without notice.
Contact manufacturer for "As Built" drawing.

	  	REV.	DESCRIPTION	DD/MM/YY	Drawing number
		1	Removed Seismic logo (optional)	18/05/22	GPU-TD613 2/2 /E
		0	First Issue	08/01/21	
					

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Vendor Ref. No.

Contractor Ref. No

Project Name:

Contractor Job No.

**ELECTRIC PUMP CONTROLLER
SPECIFICATIONS
WITHOUT ATS**

0	SUBMITTED FOR APPROVAL				
Rev	Description	Prepared	Checked	Approved	Date



TORNATECH

Project: _____

Customer: _____

Engineer: _____

Pump Manufacturer: _____

Technical Data Submittal Document

GPx Series

Full Service

Electric Fire Pump Controller



Contents:

Data Sheets

Dimensional Data

Wiring Schematics

Field Connections

Note: The drawings included in this package are for controllers covered under our standard offering. Actual AS BUILT drawings may differ from what is shown in this package.



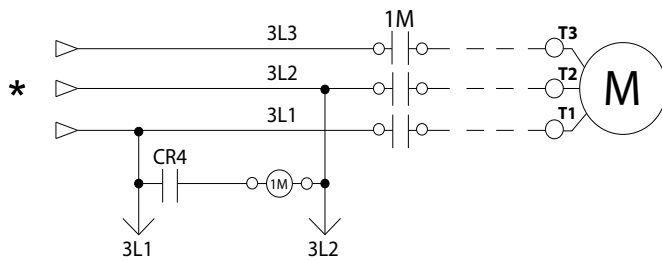
June 2022



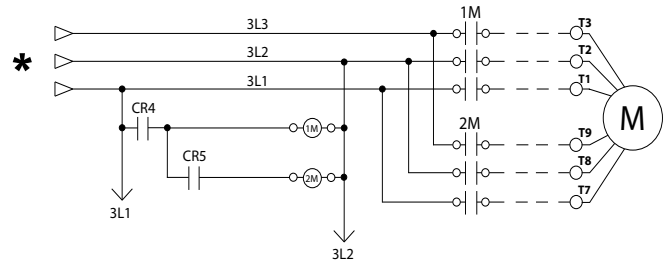
Select starting method



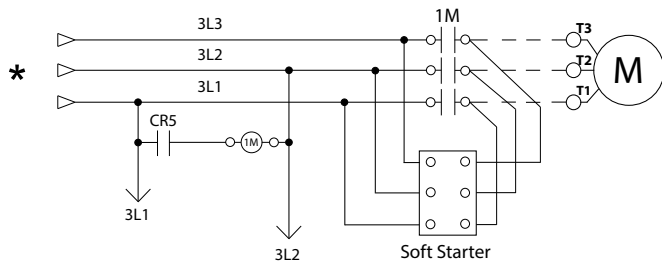
Model GPA Across the line



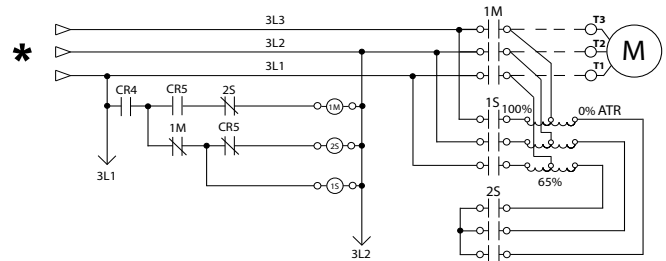
Model GPP Partwinding



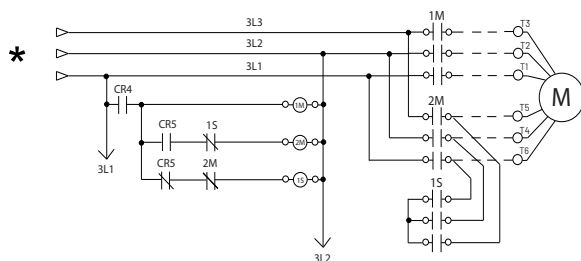
Model GPS Soft Start Soft Stop



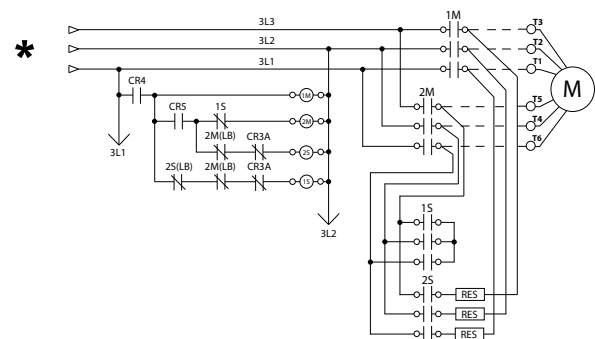
Model GPR Autotransformer



Model GPY Wye-Delta Open



Model GPW Wye-Delta Closed



*From normal incoming power through Disconnecting Means (IS/CB)



Standard, Listings, Approvals and Certifications	Built to NFPA 20 (latest edition)		
	Underwriters Laboratory (UL)	UL218 - Fire Pump Controllers	
	FM Global	Class 1321/1323	
	New York City	Accepted for use in the City of New York by the Department of Buildings	
	CE Mark	Various EN, IEC & CEE directives and standards	
	Built in Canada or U.A.E		Built in Europe
	☒ CE Mark Option		Supplied as Standard
Enclosure	Protection Rating		
	Built in Canada or U.A.E		Built in Europe
	☒ Standard: NEMA 2		☐ Standard: IP55
	Optional		
	☐ NEMA 12	☐ NEMA 4X-304 sst painted	☐ IP54
	☐ NEMA 3	☐ NEMA 4X-304 sst brushed finish	☐ IP55
	☐ NEMA 3R	☐ NEMA 4X-316 sst painted	☐ IP65
	☐ NEMA 4	☐ NEMA 4X-316 sst brushed finish	☐ IP66
	Accessories • Bottom entry gland plate • Lifting Lugs • Keylock handle		
	Paint Specifications • Red RAL3002 • Powder coating • Glossy textured finish		

Shortcircuit Withstand Rating	200V to 208V 60Hz	220V to 240V 60Hz	380V to 415V 50 Hz / 60Hz	440V to 480V 60Hz	575V to 600V 60Hz
	HP (kw)				
☒ Standard 100kA	5 - 150 (3.7 - 110)	5 - 200 (3.7 - 149)	5 - 300 (3.7 - 223)	5 - 400 (3.7 - 298)	N/A
☐ Optional 150kA					
☐ Standard 50kA	200 (149)	250 (186)	350 - 450 (261-335)	450 - 500 (335 - 373)	5 - 500 (3.7- 373)
☐ Optional 100kA	N/A	N/A	350 - 500 (261 - 373)	450 - 500 (335 - 373)	
☐ Optional 200kA	5 - 150 (3.7 - 110)	5 - 200 (3.7 - 149)	5 - 300 (3.7 - 223)	5 - 400 (3.7 - 298)	N/A

*Please see Disconnecting Means details on page 4



Ambient Temperature Rating	Standard: ☒ 4°C to 40°C / 39°F to 104°F Optional: ☐ 4°C to 55°C / 39°F to 131°F Controllers built in Dubai, UAE (Tornatech FZE) are supplied standard with 55°C rating.
Surge Suppression	Surge arrestor rated to suppress surges above line voltage
Disconnecting Means	- Isolating switch and circuit breaker assembly: - Door interlocked in the ON position - Isolating switch rated not less than 115% of motor full load current - Circuit breaker continuous rating not less than 115% of motor full load current - Overcurrent sensing non-thermal type, magnetic only - Instantaneous trip setting of not more than 20 times the motor full load current - Common flange mounted operating handle
Service Entrance Rating	Suitable as service entrance equipment
Emergency Start Handle	- Flange mounted - Integrated limit switch - Pull and latch activation - Across the line start (direct on line)
Locked Rotor Protector	- Operate shunt trip to open circuit breaker - Factory set at 600% of motor full load current - Trip between 8 and 20 seconds
Electrical Readings	- Voltage phase to phase (normal power) - Amperage of each phase when motor is running
Pressure Readings	- Continuous system pressure display - Cut-in and Cut-out pressure settings
Pressure and Event recorder	- Pressure readings with date stamp - Event recording with date stamp - Under regular maintained operation, events are stored in memory for the life of the controller. - Data viewable on operator interface display screen - Downloadable by USB port to external memory device
Pressure Sensing	- Pressure transducer and run test solenoid valve assembly for fresh water application - Pressure sensing line connection 1/2" Female NPT - Drain connection 3/8" - Rated for 0-500PSI working pressure (standard display at 0-300PSI) - Externally mounted with protective cover



Audible Alarm	6" alarm bell - 85 dB at 10ft. (3m)		
Visual Indications	• Power available • Motor run • Periodic test • Manual start	• Deluge valve start • Remote automatic start • Remote manual start • Emergency start	• Pump on demand/Automatic start • Pump room temperature (°F or °C) • Lockout
Visual & Audible Alarms	Visual • Control voltage not healthy • Invalid cut-in • Lock rotor current • Loss of power • Low ambient temperature • Low water level • Motor trouble • Phase reversal (normal power) Visual and audible • Fail to start Overcurrent • Overcurrent • Overvoltage • Phase loss L1 • Phase loss L2 • Phase loss L3 • Phase unbalanced • Pressure transducer fault detected Pump on demand • Pump on demand • Pump room alarm • Service required • Undercurrent • Undervoltage • Check weekly test solenoid • Weekly test cut-in reached		
Remote Alarm Contacts	DPDT-8A-250V.AC • Power available • Phase reversal • Motor run • Common pump room alarm (field re-assignable)** • Overvoltage • Undervoltage • Phase unbalance • Low pump room temperature • High Pump room temperature • Common motor trouble (field re-assignable)** • Overcurrent • Fail to start • Undercurrent • Ground fault • Free (field programmable)**		

**Tornatech reserves the right to use any of these three alarm points for special specific application requirements.



ViZiTouch V2 Operator Interface	• Embedded microcomputer with software PLC logic • 7.0" color touch screen (HMI technology) • Upgradable software • Multi-language		
Communication Protocol Capability	• Protocol: Modbus • Connection type: Shielded female connector RJ45 • Frame Format: TCP/IP • Addresses: See bulletin MOD-GPx		
Operation	Automatic Start	• Start on pressure drop • Remote start signal from automatic device • Deluge valve start	
	Manual Start	• Start pushbutton • Run test pushbutton • Remote start from manual device	
	Stopping	• Manual with Stop pushbutton • Automatic after expiration of minimum run timer ***	
	Timers	Field Adjustable & Visual Countdown	• Minimum run timer ***(off delay) • Sequential start timer (on delay) • Periodic test timer
	Actuation	Visual Indication	• Pressure • Non-pressure
	Mode		• Automatic • Non-automatic

***Can only be used if approved by the AHJ



☐	A4	Flow switch provision	☐	C19	Emergency start alarm contact (DPDT)
☒	A8	Foam pump application w/o pressure transducer and run test solenoid valve.	☐	C20	Manual start alarm contact (DPDT)
☐	A9	Low zone pump control function	☐	C21	Deluge valve start alarm contact (DPDT)
☐	A10	Middle zone pump control function	☐	C22	Remote automatic start alarm contact (DPDT)
☐	A11	High zone pump control function	☐	C23	Remote manual start alarm contact (DPDT)
☐	A13	Non-pressure actuated controller w/o pressure transducer and run test solenoid valve	☐	C24	High pump room temperature alarm contact (DPDT)
☐	A16	Lockout/interlock circuit from equipment installed inside the pump room	☐	C25	Second set of standard alarm contacts (DPDT) (Typical for city of Los Angeles and Denver)
☐	B11	Built in alarm panel (120V.AC supervisory power) providing indication for: • Audible alarm & silence pushbutton for motor run, phase reversal, loss of phase. • Pilot lights for loss of phase & supervisory power available	☐	Cx	Additional visual and alarm contact (Specify function) (DPDT)
☐	B11B	Built in alarm panel same as B11 but 220-240VAC supervisory power	☐	D1	Low suction pressure transducer for fresh water rated at 0-300PSI with visual indication and alarm contact
☐	B19A	High motor temperature c/w thermostat relay and alarm contacts (DPDT)	☐	D1A	Low suction pressure transducer for sea water rated at 0-300PSI with visual indication and alarm contact
☐	B19B	High motor temperature c/w PT100 relay and alarm contacts (DPDT)	☐	D5	Pressure transducer and run test solenoid valve for fresh water rated for 0-500PSI (for factory calibration purposes only)
☐	B21	Ground fault alarm detection c/w visual indication and alarm contact (DPDT)	☐	D5D	Pressure transducer and run test solenoid valve for sea water rated for 0-500PSI
☐	C1	Extra motor run alarm contact (DPDT)	☐	D10	Omit mounting feet (when applicable)
☐	C4	Periodic test alarm contact (DPDT)	☐	D13	High withstand rating for: • 200V to 208V @ 150HP max. = 150kA* • 200V to 208V @ 200HP = 100kA* • 220V to 240V @ 200HP max. = 150kA* • 220V to 240V @ 250HP = 100kA* • 380V to 415V @ 300HP max. = 150kA* • 380V to 415V @ 350HP to 450HP = 100kA* • 440V to 480V @ 400HP max. = 150kA* • 440V to 480V @ 450HP to 500HP = 100kA* • 600V @ 500HP max. = 100kA*
☐	C6	Low discharge pressure alarm contact (DPDT)	☐	D13A	High withstand rating for: • 380V to 480V = 65kA* • 600V = 25kA*
☐	C7	Low pump room temperature alarm contact (DPDT)	☐	D13B	High withstand rating for: • 200V to 208V @ 150HP max. = 200kA* • 220V to 240V @ 200HP max. = 200kA* • 380V to 415V @ 300HP max. = 200kA* • 440V to 480V @ 400HP max. = 200kA*
☐	C10	Low water reservoir level alarm contact (DPDT)	☐	D14	Anti-condensation heater & thermostat
☐	C11	High electric motor temperature alarm contact (DPDT)	☐	D14A	Anti-condensation heater & humidistat
☐	C12	High electric motor vibration c/w visual indication and alarm contact (DPDT)	☐	D14B	Anti-condensation heater & thermostat & humidistat
☐	C14	Pump on demand / automatic start alarm contact (DPDT)			
☐	C15	Pump fail to start alarm contact (DPDT)			
☐	C16	Control voltage healthy alarm contact (DPDT)			
☐	C17	Flow meter valve loop open c/w visual indication and alarm contact (DPDT)			
☐	C18	High water reservoir level c/w visual indication and alarm contact (DPDT)			

*For fire pump controller section only.

Note: Options chosen from this page are not electrically represented on the wiring schematics in this submittal package.



☐	D15	Tropicalization
☐	D18	CE Mark with factory certificate
☐	D26	Modbus with RTU frame format and RS485 connection
☐	D27	Motor heater connection (external single phase power source and heater on/off contact)
☐	D27A	Motor heater connection (internal single phase power source and heater on/off contact)
☐	D28	Customized drawing set
☐	D34A	Field programmable I/O board - 5 Input / 5 output
☐	D43	Seismic Certification compliant to CBC 2019, IBC 2018 rigid base/wall mounted only
☐	D44	Special Seismic Certification compliant to OSHPD rigid base/wall mounted only

☐	L01	Other language and English (bilingual)
☐	L02	French
☐	L03	Spanish
☐	L04	German
☐	L05	Italian
☐	L06	Polish
☐	L07	Romanian
☐	L08	Hungarian
☐	L09	Slovak
☐	L10	Croatian
☐	L11	Czech
☐	L12	Portuguese
☒	L13	Dutch
☐	L14	Russian
☐	L15	Turkish
☐	L16	Swedish
☐	L17	Bulgarian
☐	L18	Thai
☐	L19	Indonesian
☐	L20	Slovenian
☐	L21	Danish
☐	L22	Greek
☐	L23	Arabic
☐	L24	Hebrew
☐	L25	Chinese

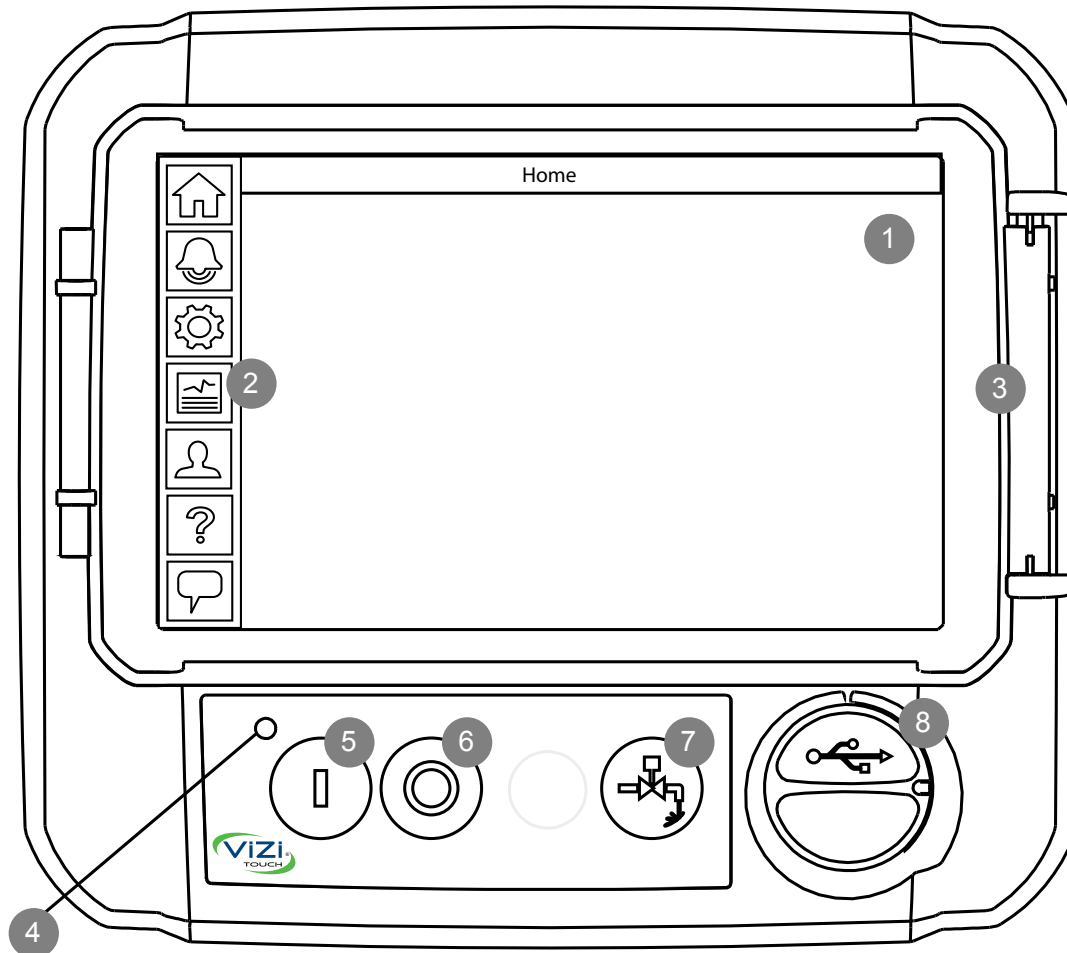
Additional Options:

☐	_____
☐	_____
☐	_____
☐	_____
☐	_____

Note: Options chosen from this page are not electrically represented on the wiring schematics in this submittal package.



ViZiTouch V2 Operator Interface



- 1 - Color touch screen
- 2 - Onscreen menu
 - HOME page
 - ALARM page
 - CONFIGURATION page
 - HISTORY page
 - SERVICE page
 - MANUAL page
 - LANGUAGES page

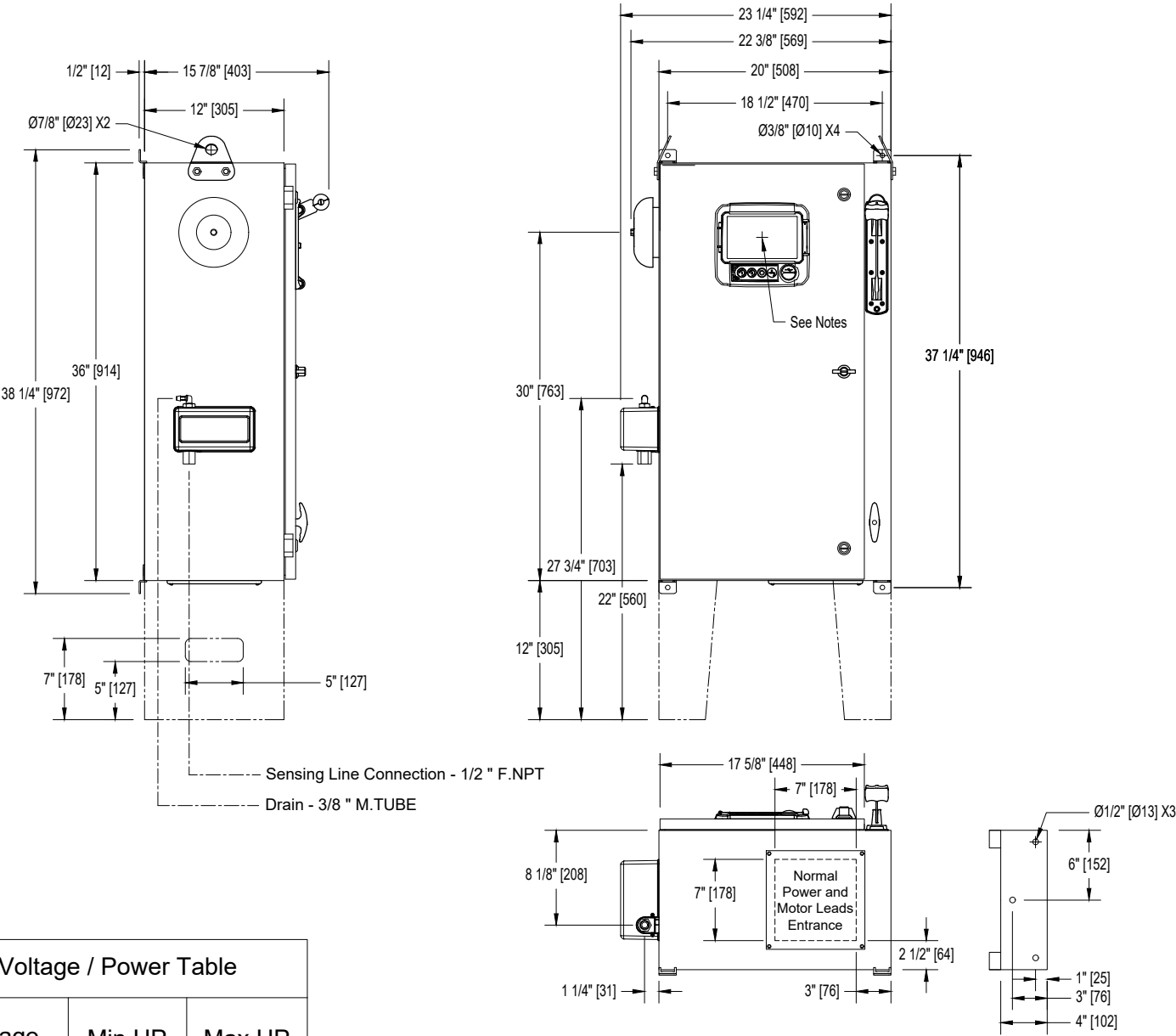
- 3 - Screen protector
- 4 - Power LED (3 colors)
- 5 - START button
- 6 - STOP button
- 7 - RUN TEST button
- 8 - USB port

Electric Fire Pump Controller

Model:GPA/GPY

Dimensions

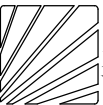
Built to the latest edition of the NFPA 20 standard



Voltage / Power Table		
Voltage	Min HP	Max HP
208	5	30
220 - 240	5	30
380 - 400 - 415	5	60
440 - 480	5	60
600	5	75

- Notes:
- Standard NEMA: NEMA 2
 - Standard paint : textured red RAL 3002.
 - All dimensions are in inches [millimeters].
 - Center of ViZiTouCh screen: 29-5/8" [751] from bottom (no feet).
 - Bottom conduit entrance through removable gland plate recommended.
 - Use watertight conduit and connector only.
 - Protect equipment against drilling chips.
 - Door swing equal to door width.

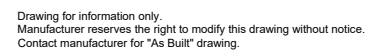
Drawing for information only.
Manufacturer reserves the right to modify this drawing without notice.
Contact manufacturer for "As Built" drawing.



REV.	DESCRIPTION	DD/MM/YY	Drawing number
3.	Removed Seismic logo (optional)	18/05/22	GPX-DI161 /E
2.	New Logo	10/05/18	
1.	Valve Change	21/11/17	

Model: GPY

Built to the latest edition of the NFPA 20 standard

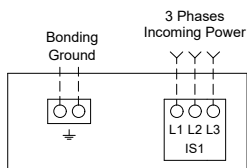


REV.	DESCRIPTION	DD/MM/YY	Drawing number
3	Removed Seismic logo (optional)	18/05/22	GPY-WS600 /E
2	Update Logo	23/04/18	
1	Removed (fail safe) text from Power Available relay	20/02/17	



Model: GPX

Built to the latest edition of the NFPA 20 standard



- 1 - For proper wire sizing, refer to NFPA70 and NEC (USA) or CEC (Canada) or local code.
- 2 - Controller suitable for service entrance in USA.
- 3 - For more accurate motor connections refer to motor manufacturer or motor nameplate.
- 4 - Controller is phase sensitive. Incoming lines must be connected in ABC sequence.

Bending Space	5 " (127 mm)							8 " (203 mm)		
HP Voltage	5	7.5	10	15	20	25	30	40	50	60
208	1x (10 to 1/0)	1x (8 to 1/0)	1x (8 to 1/0)	1x (6 to 1/0)	1x (4 to 1/0)	1x (3 to 1/0)	1x (2 to 1/0)	1x (1/0 to 3/0)	1x (3/0 to 250)	1x (4/0 to 250)
220 to 240	1x (10 to 1/0)	1x (10 to 1/0)	1x (8 to 1/0)	1x (6 to 1/0)	1x (4 to 1/0)	1x (4 to 1/0)	1x (3 to 1/0)	1x (1 to 3/0)	1x (2/0 to 3/0)	1x (3/0 to 250)
380 to 416	1x (10 to 1/0)	1x (10 to 1/0)	1x (10 to 1/0)	1x (8 to 1/0)	1x (8 to 1/0)	1x (6 to 1/0)	1x (6 to 1/0)	1x (4 to 1/0)	1x (3 to 1/0)	1x (3 to 1/0)
440 to 480	1x (10 to 1/0)	1x (10 to 1/0)	1x (10 to 1/0)	1x (10 to 1/0)	1x (8 to 1/0)	1x (8 to 1/0)	1x (6 to 1/0)	1x (6 to 1/0)	1x (4 to 1/0)	1x (3 to 1/0)
600	1x (10 to 1/0)	1x (10 to 1/0)	1x (10 to 1/0)	1x (10 to 1/0)	1x (10 to 1/0)	1x (8 to 1/0)	1x (8 to 1/0)	1x (6 to 1/0)	1x (6 to 1/0)	1x (4 to 1/0)

Bending Space	12 " (305 mm)				16 " (406 mm)						
HP Voltage	75	100	125	150	200	250	300	350	400	450	500
208	2x (1/0 to 500)	2x (2/0 to 500)	2x (4/0 to 500)	2x (250 to 500)	3x (4/0 to 500)	-----	-----	-----	-----	-----	-----
220 to 240	1x (250)	2x (2/0 to 500)	2x (3/0 to 500)	2x (4/0 to 500)	2x (350 to 500)	3x (250 to 500)	-----	-----	-----	-----	-----
380 to 416	1x (1/0 to 3/0)	1x (3/0 to 250)	1x (250)	2x (1/0 to 500)	2x (3/0 to 500)	2x (4/0 to 500)	2x (300 to 500)	2x (400 to 500)	3x (250 to 500)	3x (300 to 500)	-----
440 to 480	1x (1 to 3/0)	1x (2/0 to 3/0)	1x (3/0 to 250)	1x (4/0 to 250)	2x (1/0 to 500)	2x (3/0 to 500)	2x (4/0 to 500)	2x (300 to 500)	2x (350 to 500)	2x (400 to 500)	3x (250 to 500)
600	1x (3 to 1/0)	1x (1 to 3/0)	1x (2/0 to 3/0)	1x (3/0 to 250)	1x (250)	2x (2/0 to 500)	2x (3/0 to 500)	2x (4/0 to 500)	2x (250 to 500)	2x (300 to 500)	2x (350 to 500)
Bending Space	5 " (127 mm)		8 " (203 mm)			12 " (305 mm)					

Bending Space	5" (127 mm)							8" (203 mm)		10" (254 mm)
HP Voltage	5	7.5	10	15	20	25	30	40	50	60
208	1x (10 to 1/0)	1x (6 to 1/0)	1x (6 to 1/0)	1x (4 to 1/0)	1x (3 to 1/0)	1x (1 to 1/0)	1x (1/0)	1x (3/0)	1x (4/0 to 250)	1x (300) ** or 1x (250) 90°C
220 to 240	1x (10 to 1/0)	1x (8 to 1/0)	1x (6 to 1/0)	1x (4 to 1/0)	1x (3 to 1/0)	1x (2 to 1/0)	1x (1 to 1/0)	1x (2/0 to 3/0)	1x (3/0) 90°C *	1x (250)
380 to 416	1x (10 to 1/0)	1x (10 to 1/0)	1x (10 to 1/0)	1x (6 to 1/0)	1x (6 to 1/0)	1x (4 to 1/0)	1x (4 to 1/0)	1x (2 to 1/0)	1x (1 to 1/0)	1x (1/0)
440 to 480	1x (10 to 1/0)	1x (10 to 1/0)	1x (10 to 1/0)	1x (8 to 1/0)	1x (6 to 1/0)	1x (6 to 1/0)	1x (6 to 1/0)	1x (4 to 1/0)	1x (2 to 1/0)	1x (1 to 1/0)
600	1x (10 to 1/0)	1x (10 to 1/0)	1x (10 to 1/0)	1x (10 to 1/0)	1x (8 to 1/0)	1x (6 to 1/0)	1x (6 to 1/0)	1x (4 to 1/0)	1x (4 to 1/0)	1x (2 to 1/0)

Bending Space	12 " (305 mm)				16 " (406 mm)						
HP	75	100	125	150	200	250	300	350	400	450	500
Voltage	208	2x (2/0 to 500)	2x (300 to 500)	2x (350 to 500)	3x (300 to 500)	-----	-----	-----	-----	-----	-----
220 to 240	1x (350) ** N/A	2x (3/0 to 500)	2x (250 to 500)	2x (300 to 500)	2x (500)	3x (400 to 500)	-----	-----	-----	-----	-----
380 to 416	1x (3/0)	1x (250 to 350)	1x (350) ** N/A	2x (3/0 to 500)	2x (4/0 to 500)	2x (300 to 500)	2x (500)	3x (300 to 500) ** 2x (500) 90°C *	3x (350 to 500)	3x (400 to 500)	-----
440 to 480	1x (1/0 to 3/0)	1x (3/0)	1x (250)	1x (300 to 350) ** 1x (250) 90°C *	2x (3/0 to 500)	2x (250 to 500)	2x (300 to 500)	2x (400 to 500)	2x (500)	2x (500) 90°C *	3x (350 to 500)
600	1x (1 to 1/0)	1x (2/0 to 3/0)	1x (3/0) 90°C *	1x (4/0 to 250)	1x (350 to 500)	2x (3/0 to 500)	2x (4/0 to 250)	2x (300 to 500)	2x (350 to 500)	2x (400 to 500)	2x (500)
Bending Space	5 " (127 mm)	8 " (203 mm)			12 " (305 mm)						

	  	REV.	DESCRIPTION	DD/MM/YY	Drawing number
					GPX-TD612 1/2 /E
		1	Removed Seismic logo (optional)	18/05/22	
		0	First issue	22/12/20	

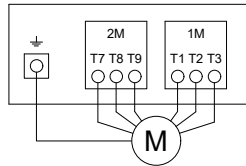
Electric Fire Pump Controller

Model: GPX

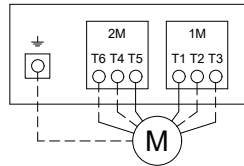
Terminal Diagram and Sizing For GPP, GPY & GPW

Built to the latest edition of the NFPA 20 standard

Motor Terminals



Model : GPP



Models : GPW & GPY

Notes:

- 1 - For proper wire sizing, refer to NFPA70 and NEC (USA) or CEC (Canada) or local code.
- 2 - Controller suitable for service entrance in USA.
- 3 - For more accurate motor connections refer to motor manufacturer or motor nameplate.
- 4 - Controller is phase sensitive. Incoming lines must be connected in ABC sequence.

COPPER CONDUCTORS for Motor Connection (1M-2M).

Field Wiring According to Bending Space (AWG or MCM). Terminals T1-T2-T3-T4-T5-T6-T7-T8-T9

HP Voltage	5	7.5	10	15	20	25	30	40	50	60
208	1x (10 to 4)	1x (10 to 4)	1x (10 to 4)	1x (8 to 4)	1x (8 to 4)	1x (6 to 4)	1x (6 to 4)	1x (4 to 2/0)	1x (2 to 2/0)	1x (1 to 2/0)
220 to 240	1x (10 to 4)	1x (10 to 4)	1x (10 to 4)	1x (8 to 4)	1x (8 to 4)	1x (6 to 4)	1x (6 to 4)	1x (4)	1x (3 to 2/0)	1x (2 to 2/0)
380 to 416	1x (10 to 4)	1x (10 to 4)	1x (10 to 4)	1x (10 to 4)	1x (10 to 4)	1x (10 to 4)	1x (8 to 4)	1x (8 to 4)	1x (6 to 4)	1x (4)
440 to 480	1x (10 to 4)	1x (10 to 4)	1x (10 to 4)	1x (10 to 4)	1x (10 to 4)	1x (10 to 4)	1x (10 to 4)	1x (8 to 4)	1x (8 to 4)	1x (6 to 4)
600	1x (10 to 4)	1x (10 to 4)	1x (10 to 4)	1x (10 to 4)	1x (10 to 4)	1x (10 to 4)	1x (10 to 4)	1x (10 to 4)	1x (8 to 4)	1x (8 to 4)

HP Voltage	75	100	125	150	200	250	300	350	400	450	500
208	1x (2/0 to 3/0)	1x (3/0 to 300)	1x (250 to 300)	2x (1/0 to 300)	2x (3/0 to 350)	-----	-----	-----	-----	-----	-----
220 to 240	1x (1/0 to 2/0)	1x (3/0)	1x (4/0 to 300)	1x (300)	2x (2/0 to 300)	2x (4/0 to 350)	-----	-----	-----	-----	-----
380 to 416	1x (4 to 2/0)	1x (2 to 2/0)	1x (1/0 to 2/0)	1x (2/0 to 3/0)	1x (4/0 to 300)	1x (300)	2x (2/0 to 300)	2x (3/0 to 300)	2x (4/0 to 350)	2x (4/0 to 350)	-----
440 to 480	1x (4 to 2/0)	1x (3 to 2/0)	1x (2 to 2/0)	1x (1/0 to 3/0)	1x (2/0 to 3/0)	1x (4/0 to 300)	1x (300)	2x (1/0 to 300)	2x (2/0 to 300)	2x (3/0 to 350)	2x (4/0 to 350)
600	1x (6 to 4)	1x (4)	1x (3 to 2/0)	1x (2 to 2/0)	1x (1/0 to 3/0)	1x (2/0 to 3/0)	1x (4/0 to 300)	1x (250 to 300)	1x (300)	2x (1/0 to 300)	2x (2/0 to 300)

ALUMINUM CONDUCTORS for Contactor (1M-2M).

Field Wiring According to Bending Space (AWG or MCM). Terminals T1-T2-T3-T4-T5-T6-T7-T8-T9

HP Voltage	5	7.5	10	15	20	25	30	40	50	60
208	1x (12 to 2/0) **	1x (10 to 2/0) **	1x (10 to 2/0) **	1x (8 to 2/0) **	1x (6 to 2/0) **	1x (4 to 2/0) **	1x (4 to 2/0) **	1x (2 to 2/0)	1x (1/0 to 2/0)	1x (2/0)
220 to 240	1x (12 to 2/0) **	1x (10 to 2/0) **	1x (10 to 2/0) **	1x (8 to 2/0) **	1x (8 to 2/0) **	1x (6 to 2/0) **	1x (4 to 2/0) **	1x (2 to 2/0) **	1x (1 to 2/0)	1x (1/0 to 2/0)
380 to 416	1x (12 to 2/0) **	1x (12 to 2/0) **	1x (12 to 2/0) **	1x (10 to 2/0) **	1x (10 to 2/0) **	1x (8 to 2/0) **	1x (8 to 2/0) **	1x (6 to 2/0) **	1x (4 to 2/0) **	1x (3 to 2/0) **
440 to 480	1x (12 to 2/0) **	1x (12 to 2/0) **	1x (12 to 2/0) **	1x (12 to 2/0) **	1x (10 to 2/0) **	1x (10 to 2/0) **	1x (8 to 2/0) **	1x (8 to 2/0) **	1x (6 to 2/0) **	1x (4 to 2/0) **
600	1x (12 to 2/0) **	1x (12 to 2/0) **	1x (12 to 2/0) **	1x (12 to 2/0) **	1x (10 to 2/0) **	1x (10 to 2/0) **	1x (10 to 2/0) **	1x (8 to 2/0) **	1x (8 to 2/0) **	1x (6 to 2/0) **

HP Voltage	75	100	125	150	200	250	300	350	400	450	500
208	1x (3/0)	Consult Factory	1x (300) 90°C *	2x (3/0 to 300)	2x (250 to 350)	-----	-----	-----	-----	-----	-----
220 to 240	1x (2/0) 90°C *	Consult Factory	1x (300)	1x (300) 90°C *	2x (4/0 to 300)	2x (300 to 350)	-----	-----	-----	-----	-----
380 to 416	1x (2 to 2/0)	1x (1/0 to 2/0)	1x (1/0 to 2/0)	1x (3/0) 90°C *	1x (300)	1x (300) 90°C *	2x (4/0 to 300)	2x (250 to 300)	2x (300 to 350)	2x (300 to 350)	-----
440 to 480	1x (3 to 2/0) **	1x (2 to 2/0)	1x (2/0) 90°C *	1x (2/0 to 3/0)	1x (3/0) 90°C *	1x (300)	1x (300) 90°C *	2x (3/0 to 300)	2x (4/0 to 300)	2x (250 to 350)	2x (300 to 350)
600	1x (4 to 2/0) **	1x (3 to 2/0) **	1x (2 to 2/0)	1x (1/0 to 3/0)	1x (3/0)	1x (3/0) 90°C *	1x (300)	1x (300) 90°C *	Consult Factory	2x (3/0 to 300)	2x (4/0 to 300)

*For standard enclosure, use 90°C aluminium wire. Consult Factory for Use of Conductors Rated Lower than 90°C.

**Option V659 required.

Drawing for information only.
Manufacturer reserves the right to modify this drawing without notice.
Contact manufacturer for "As Built" drawing.



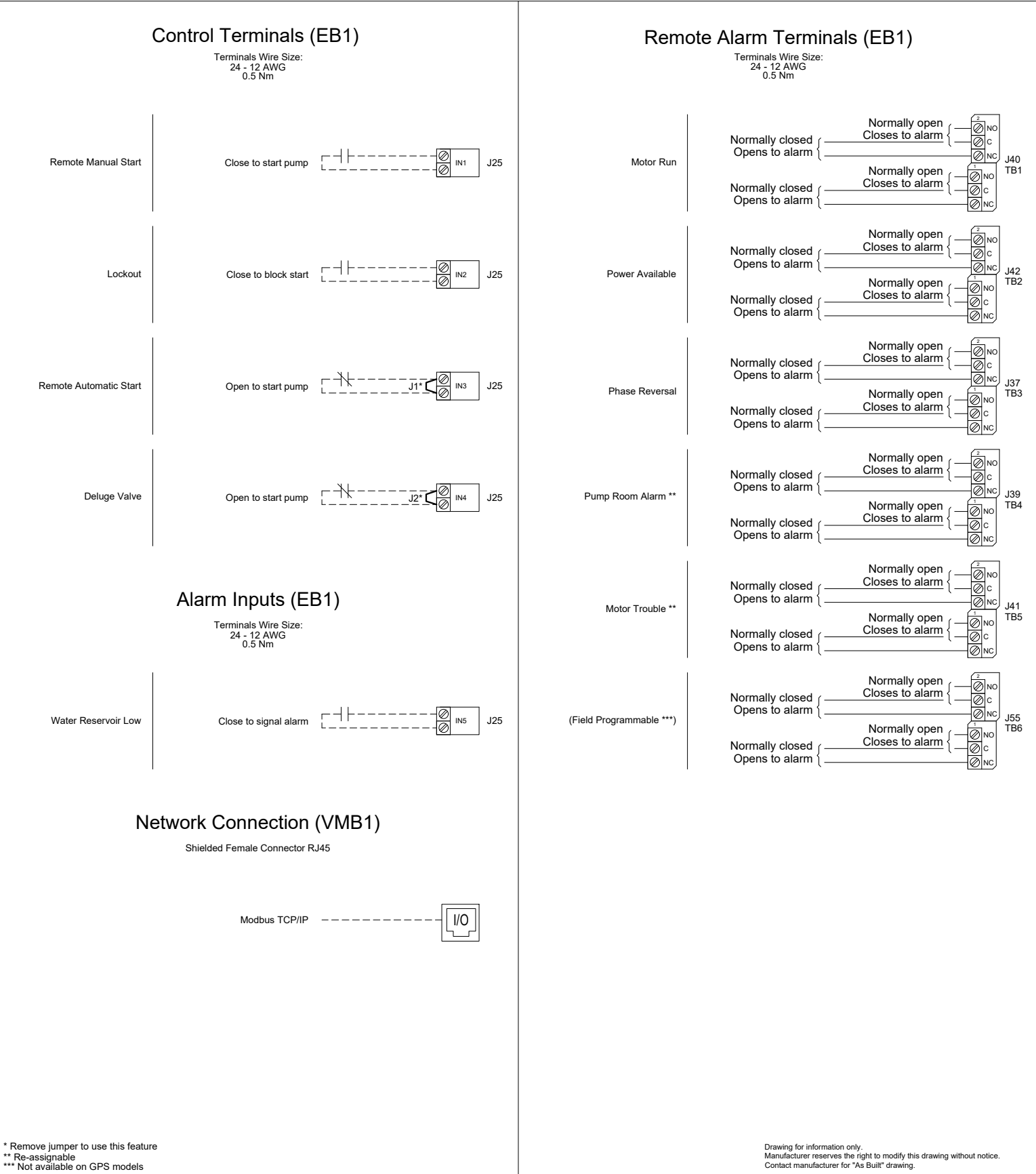
REV.	DESCRIPTION	DD/MM/YY	Drawing number
1	Removed Seismic logo (optional)	18/05/22	GPX-TD612 2/2 /E
0	First issue	22/12/20	

Electric Fire Pump Controller

Model: GPX

Terminal Diagram and Sizing

Built to the latest edition of the NFPA 20 standard





Vendor Ref. No.

Contractor Ref. No

Project Name:

Contractor Job No.

JOCKEY PUMP

0	SUBMITTED FOR APPROVAL				
Rev	Description	Prepared	Checked	Approved	Date

PACIFIC STAINLESS STEEL WATER PUMP



HIGH PERFORMANCE PUMPS FOR ALL WATER APPLICATIONS

Product introduction

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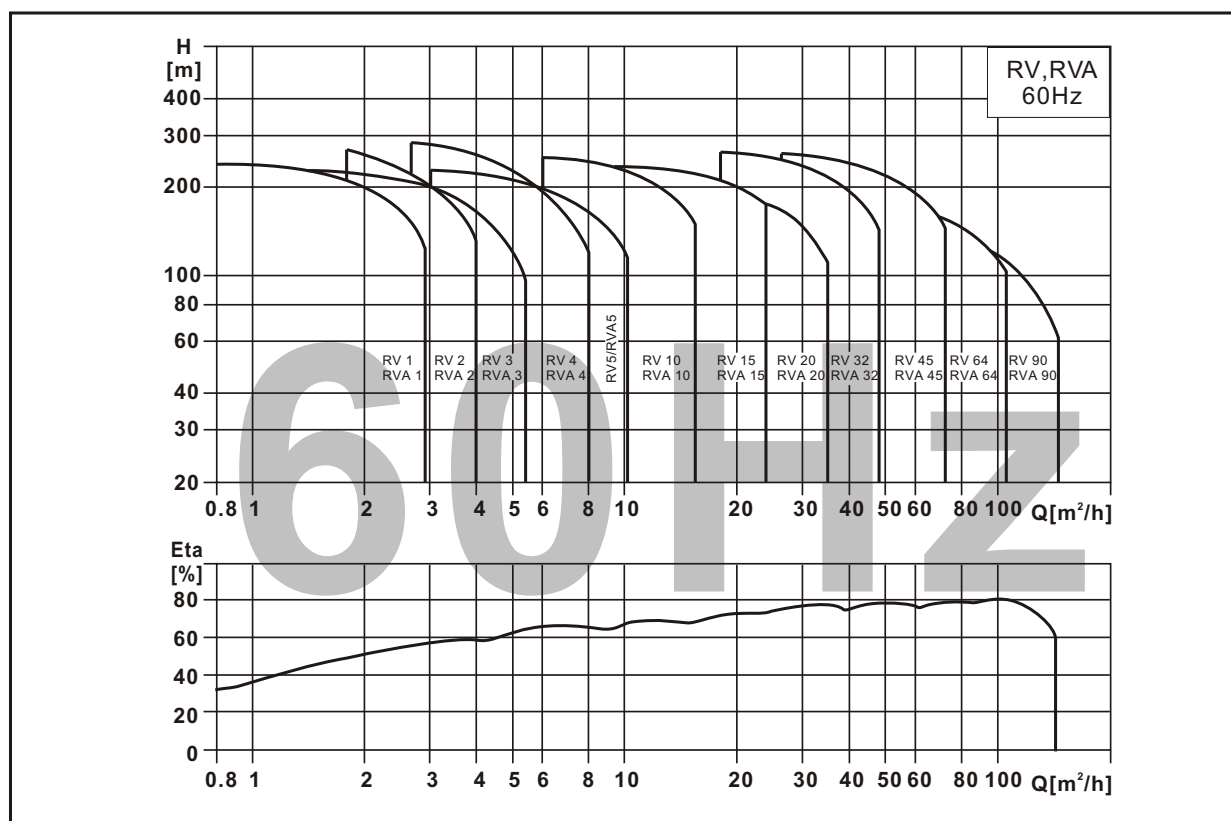
Performance Curves and Technical Data

RVA1	16~17
RV1	18~19
RVA2	20~21
RV2	22~23
RVA3	24~25
RV3	26~27
RVA4	28~29
RV4	30~31

RVA5	32~33
RV5	34~35
RVA10	36~37
RV10	38~39
RVA15	40~41
RV15	42~43
RVA20	44~45
RV20	46~47
RVA32	48~49
RV32	50~51
RVA45	52~53
RV45	54~55
RVA64	56~57
RV64	58~59
RVA90	60~61
RV90	62~64
Accessories	65~69

Product introduction

Performance range



Applications

Application	RVA	RV
Water supply		
Filtration and transfer at waterworks	●	●
Distribution from waterworks	●	●
Pressure boosting in mains	●	●
Pressure boosting in high-rise buildings, hotels, etc.	●	●
Pressure boosting for industrial water supply	●	●
Industry		
Pressure boosting		
Process water systems	●	●
Washing and cleaning systems	●	●
Vehicle washing tunnels	●	●
Fire fighting systems	●	●
Liquid transfer		
Cooling and air-conditioning systems (refrigerants)	●	●
Boiler feed and condensate systems	●	●
Machine tools (cooling lubricants)	●	●
Aquafarming	●	●
Transfer		
Oil and alcohol	●	●
Glycol and coolants	●	●
Water treatment		
Ultra-filtration systems	●	○
Reverse osmosis systems	●	○
Softening, ionising, demineralizing systems	●	○
Distillation systems	●	○
Separators	●	○
Swimming baths	●	●
Irrigation		
Field irrigation (flooding)	●	●
Sprinkler irrigation	●	●
Drip-feed irrigation	●	●

- Recommended pump model
- Option pump model

Product introduction

Vertical Multistage Centrifugal Pump

Product range

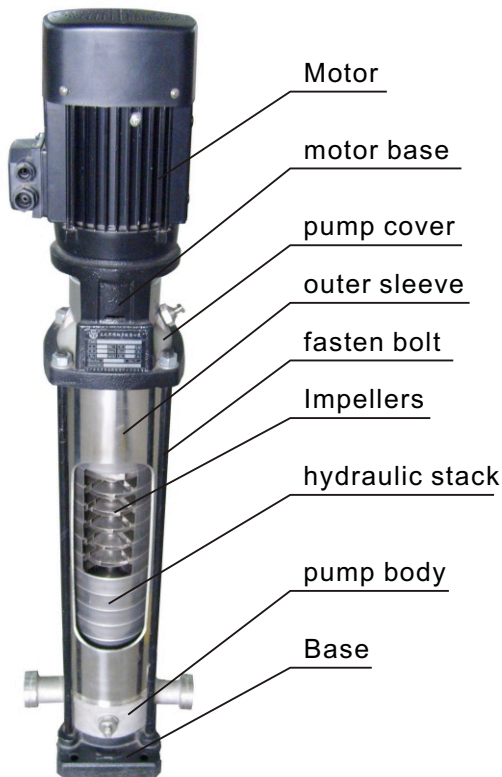
Range	RV1 RVA1	RV2 RVA2	RV3 RVA3	RV4 RVA4	RV5 RVA5	RV10 RVA10	RV15 RVA15	RV20 RVA20	RV32 RVA32	RV45 RVA45	RV64 RVA64	RV90 RVA90
Nominal rated [m ³ /h]	1	2	3	4	5	10	15	20	32	45	64	90
Temperature range [°C]	-20~+104											
Temperature on range [°C]	-40~+180									-40~+180		
Max Efficiency [%]	44	45	56	58	65	66	68	69	77	78	80	81
RV pump												
Flow range [m ³ /h]	0.7-2.4	1-3.2	1.2-4.5	2-4.8	2.5-8	5-13	9-24	10-29	14-40	20-56	30-85	40-120
Max Pressure [bar]	22	25	24	25	24	22	23	25	28	26	20	20
High Pressure on request [bar]	47	47	47	47	47	47	47	47	39	40	39	39
Motor power [kW]	0.37-2.2	0.37-3	0.37-3	0.37-4	0.37-5.5	0.37-7.5	1.1-15	1.1-18.5	1.5-30	3-45	4-45	5.5-45
Material type												
RV cast iron, S.S EN1.4301/AISI 304	●	●	●	●	●	●	●	●	●	●	●	●
RVA S.S EN1.4301/AISI 304	●	●	●	●	●	●	●	●	●	●	●	●
RVN S.S EN1.4401/AISI 316	●	●	●	●	●	●	●	●	●	●	●	●
RV pump pipe connection												
Flange	DN25 DN32	DN25 DN32	DN25 DN32	DN25 DN32	DN25 DN32	DN40	DN50	DN50	DN65	DN80	DN100	DN100
Flange on request	—	—	—	—	—	DN50	DN65	DN65	DN80	DN100	DN125	DN125
RVA/RV pump pipe connection												
column pipe thread★	G1 G1 ¹ / ₄	G1 G1 ¹ / ₄	G1 G1 ¹ / ₄	G1 G1 ¹ / ₄	G1 G1 ¹ / ₄	G1 ¹ / ₂ G2	G2 ¹ / ₂	G2 ¹ / ₂	—	—	—	—
column pipe thread on request★	G1 ¹ / ₂	G1 ¹ / ₂	G1 ¹ / ₂	G1 ¹ / ₂	G1 ¹ / ₂	—	G2	G2	—	—	—	—
Flange	DN25 DN32	DN25 DN32	DN25 DN32	DN25 DN32	DN25 DN32	DN40	DN50	DN50	DN65	DN80	DN100	DN100
Flange on request	—	—	—	—	—	DN50	DN65	DN65	DN80	DN100	DN125	DN125
Cutting ferrule joint [PJE] ★	G1 ¹ / ₄ DN32	G1 ¹ / ₄ DN32	G1 ¹ / ₄ DN32	G1 ¹ / ₄ DN32	G1 ¹ / ₄ DN32	G2 DN50	G2 DN50	G2 DN50	—	—	—	—

★NPT thread are on request

Pump

RVA and RV are non-self priming vertical multistage centrifugal pump, the pumps are available with standard motor, the inlet and outlet are located at the pump bottom at the same plane (inline type). All pumps are equipped with a maintenance-free mechanical seal set of the cartridge type.

Fig.1 RVA



Motor

RVA and RV are fitted with a totally enclosed, fan-cooled, 2-pole, three-phase standard motor. From 0.37kW to 2.2kW, are also available with single-phase motor. (1*220-230V/240V).

Motor Protection

Single-phase motor have a built-in thermal overload switch. Three-phase motors must be connected to a motor protective circuit breaker according to local regulations.

Ambient temperature

Ambient temperature: maximum +40°C, if the ambient temperature exceeds +40°C, or the pump is installed at an altitude exceeding 1000 meters, the motor must not be fully loaded due to the risk of overheating. Overheating may result from excessive ambient temperatures or the low density and consequently low cooling effect of the air.

In such cases, it may be necessary to use a motor with a higher rated output.

Terminal box positions

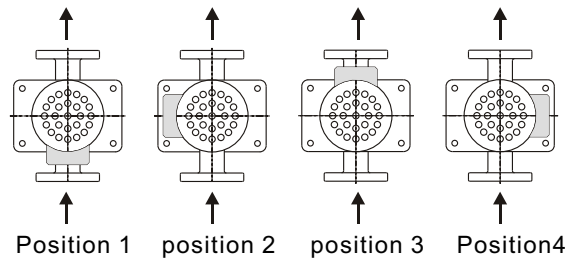
As standard the terminal box is mounted on the suction side of the pump, meanwhile, 0°, 90°, 180°, 270° could be adjusted according to the following proceeding:

1. If necessary, disassembling the protective cover of the shaft connector, but did not disassembling the shaft connector.
2. Disassembling the motor fixation screws.
3. Turn the motor to the required direction.
4. Fasten the motor screws.
5. Install the shaft connector's protective cover.

The voltage and frequency are marked on the label, the correct power should be confirm with the label before usage.

To ensure the electric connection is conformity to the drawing marked on the label inside the terminal box.

Fig2. Terminal box positions

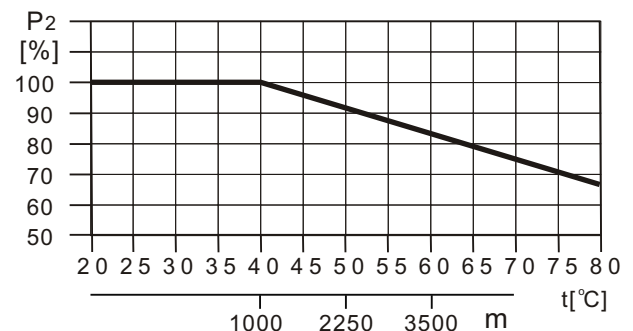


Viscosity

The pumping of liquids with densities or kinematic viscosities higher than those of water will cause a considerable pressure drop, a drop in the hydraulic performance and a rise in the power consumption.

In such situations the pump should be fitted with a larger motor, if in doubt.

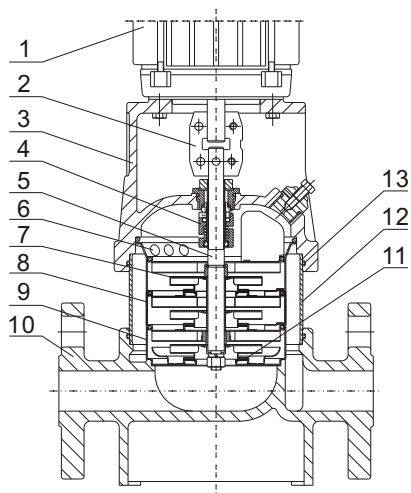
Fig.3 Relationship between motor output (P2) and temperature



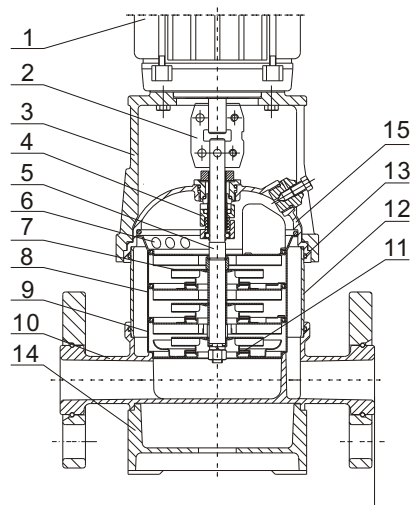
Example:

From the Fig.3, the pump is installed at an altitude exceeding altitude 3500 meters, P2 will decrease to 88%, if the ambient temperature is up to 70°C, P2 will decrease to 78%.

RV1,2,3,4,5
Sectional drawing



RVA1,2,3,4,5
Sectional drawing



Material RV

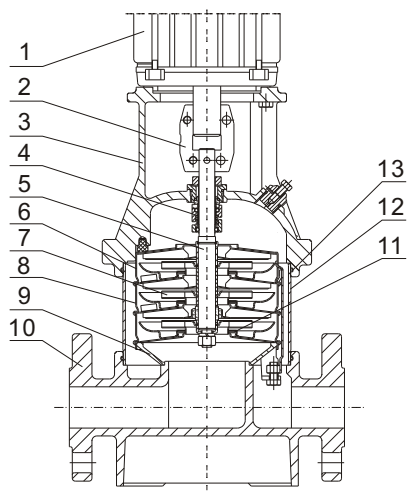
No.	Description	Material	EN/DIN	AISI/ASTM
1	Motor			
2	Shaft connector			
3	Pump head	Castiron	EN-JL1030	ASTM25B
4	Mechanical seal			
5	Shaft	S.S		AISI420
6	Outlet	S.S	1.4301	AISI304
7	Impeller	S.S	1.4301	AISI304
8	Hydraulic stack	S.S	1.4301	AISI304
9	Inlet	S.S	1.4301	AISI304
10	Pump body	Castiron	EN-JL1030	ASTM25B
11	Neck ring	PTFE		
12	Outer sleeve	S.S	1.4301	AISI304
13	O-ring	EPDM/FKM		

Material RVA

No.	Description	Material	EN/DIN	AISI/ASTM
1	Motor			
2	Shaft connector			
3	Pump head	Castiron	EN-JL1030	ASTM25B
4	Mechanical seal			
5	Shaft	S.S	1.4057	AISI431
6	Outlet	S.S	1.4301	AISI304
7	Impeller	S.S	1.4301	AISI304
8	Hydraulic stack	S.S	1.4301	AISI304
9	Inlet	S.S	1.4301	AISI304
10	Pump body	S.S	1.4301	AISI304
11	Neck ring	PTFE		
12	Outer sleeve	S.S	1.4301	AISI304
13	O-ring	EDM/FKM		
14	Bottom base	Castiron	EN-JL1030	ASTM25B
15	Pump cover	S.S	1.4301	AISI304

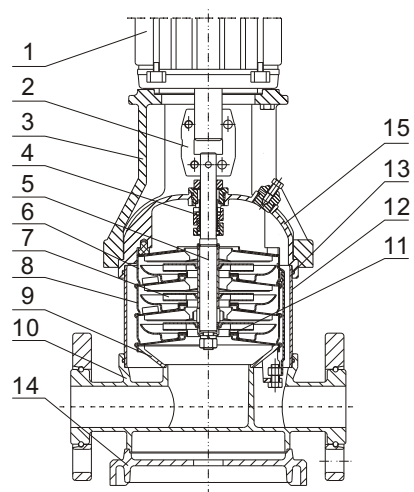
RV10,15,20

Sectional drawing



RVA10,15,20

Sectional drawing



Material RV

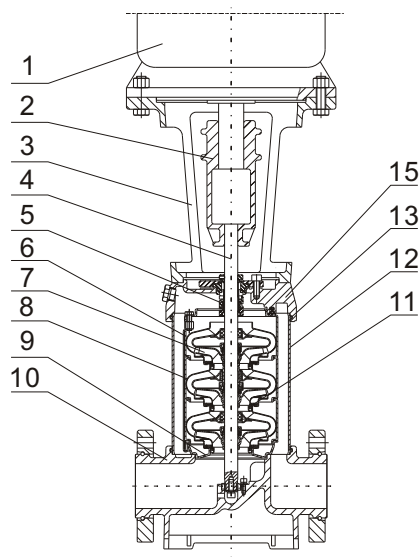
No.	Description	Material	EN/DIN	AISI/ASTM
1	Motor			
2	Shaft connector			
3	Pump head	Cast iron	EN-JL1030	ASTM25B
4	Mechanical seal			
5	Shaft	S.S		AISI420
6	Outlet	S.S	1.4301	AISI304
7	Impeller	S.S	1.4301	AISI304
8	Hydraulic stack	S.S	1.4301	AISI304
9	Settled cover	S.S	1.4301	AISI304
10	Pump body	Cast iron	EN-JL1030	ASTM25B
11	Neck ring	PTFE		
12	Outer sleeve	S.S	1.4301	AISI304
13	O-ring	EPDM/FKM		

Material RVA

No.	Description	Material	EN/DIN	AISI/ASTM
1	Motor			
2	Shaft connector			
3	Pump head	Cast iron	EN-JL1030	ASTM25B
4	Mechanical seal			
5	Shaft	S.S	1.4057	AISI431
6	Outlet	S.S	1.4301	AISI304
7	Impeller	S.S	1.4301	AISI304
8	Hydraulic stack	S.S	1.4301	AISI304
9	Settled cover	S.S	1.4301	AISI304
10	Pump body	S.S	1.4301	AISI304
11	Neck ring	PTFE		
12	Outer sleeve	S.S	1.4301	AISI304
13	O-ring	EPDM/FKM		
14	Bottom base	Cast iron	EN-JL1030	ASTM25B
15	Pump cover	S.S	1.4301	AISI304

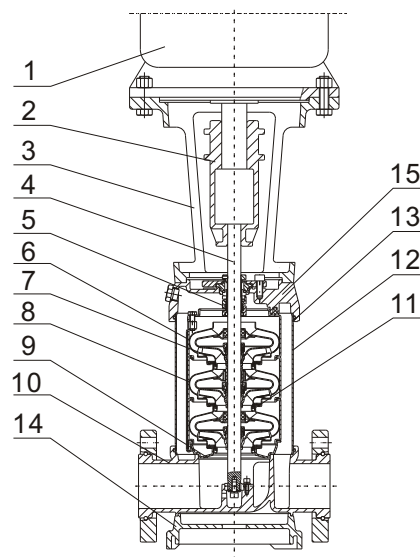
RV32,45,64,90

Sectional drawing



RVA32,45,64,90

Sectional drawing



Material RV

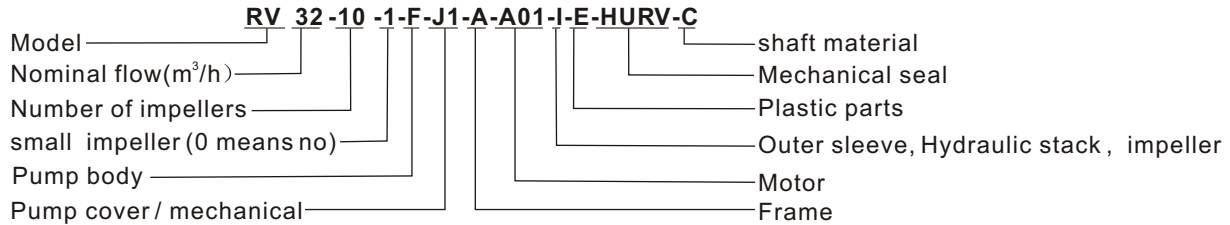
No.	Description	Material	EN/DIN	AISI/ASTM
1	Motor			
2	Shaft connector			
3	Pump head	Cast iron	EN-JL1030	ASTM25B
4	Shaft	S.S		AISI420
5	Mechanical sea			
6	Outlet	S.S	1.4301	AISI304
7	Impeller	S.S	1.4301	AISI304
8	Hydraulic stack	S.S	1.4301	AISI304
9	Inlet	S.S	1.4301	AISI304
10	Pump body	Cast iron	EN-JL1030	ASTM25B
11	Neck ring	PTFE		
12	Outer sleeve	S.S	1.4301	AISI304
13	O-ring	EPDM/FKM		
14	Pump cover	Cast iron	EN-JL1030	ASTM25B

Material RVA

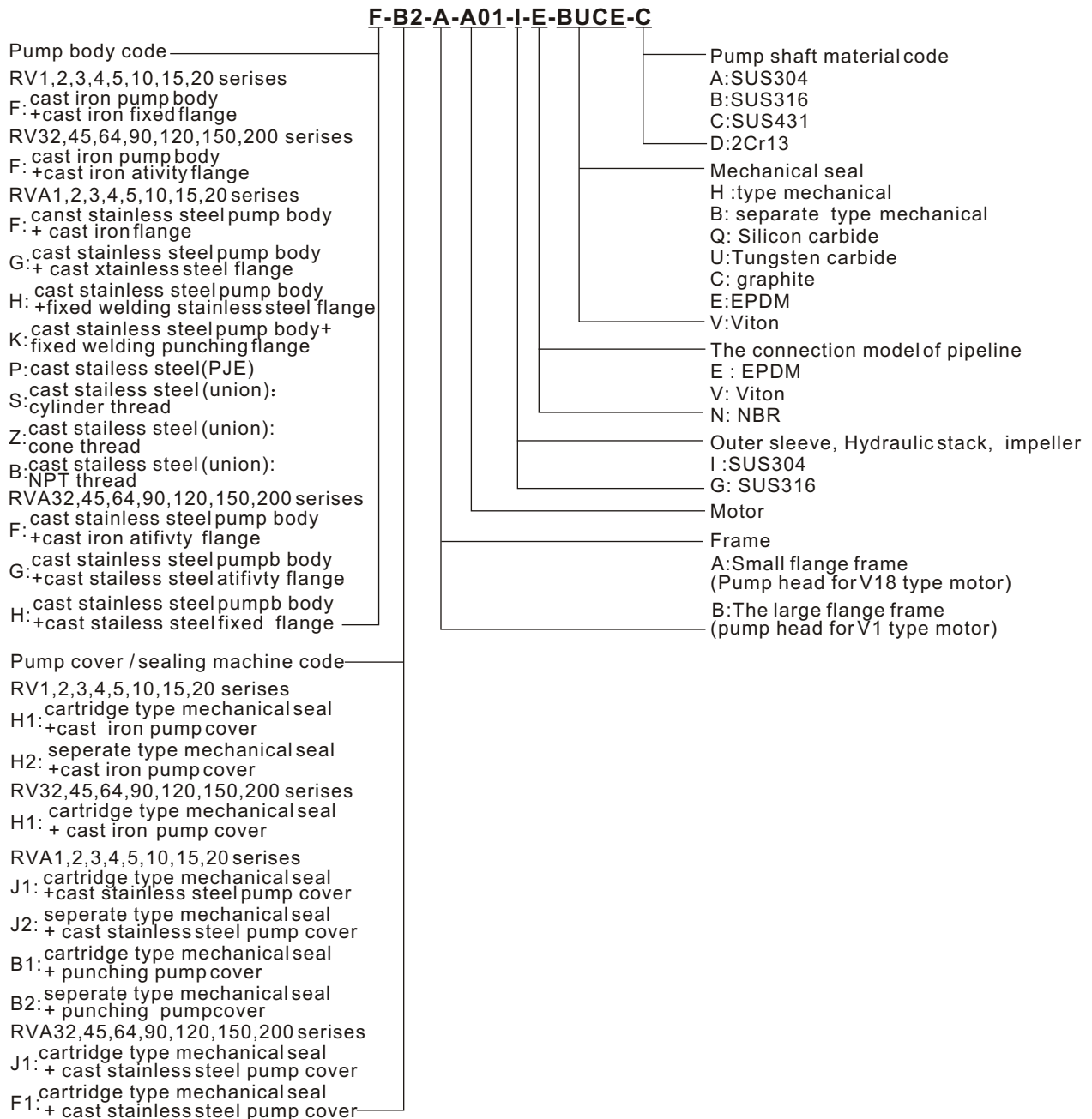
No.	Description	Material	EN/DIN	AISI/ASTM
1	Motor			
2	Shaft connector			
3	Pump head	Cast iron	EN-JL1030	ASTM25B
4	Shaft	S.S	1.4057	AISI431
5	Mechanical seal			
6	Outlet	S.S	1.4301	AISI304
7	Impeller	S.S	1.4301	AISI304
8	Hydraulic stack	S.S	1.4301	AISI304
9	Inlet	S.S	1.4301	AISI304
10	Pump body	S.S	1.4301	AISI304
11	Neck ring	PTFE		
12	Outer sleeve	S.S	1.4301	AISI304
13	O-ring	EPDM/FKM		
14	Bottom base	Cast iron	EN-JL1030	ASTM25B
15	Pump cover	S.S	1.4301	AISI304

Model instruction

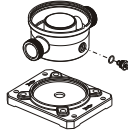
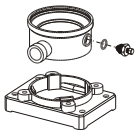
RV/RVA1,2,3,4,5,10,15 and 20...



Codes



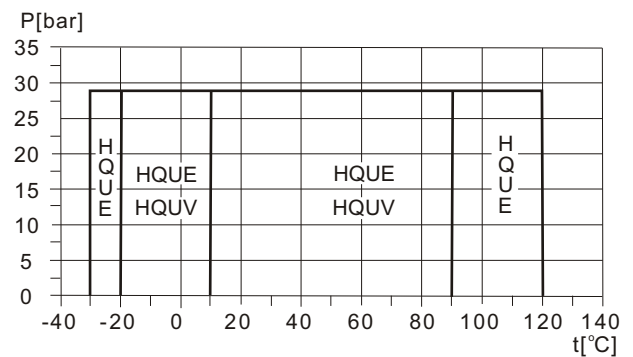
Maximum operating pressure and temperature range

	DIN-FGJ	UNION	PJE
			
	Max. permissible operating pressure		Liquid temperature range
RV,RVA1	25bar		-20 °C to +104 °C
RV,RVA2	25bar		-20 °C to +104 °C
RV,RVA3	25bar		-20 °C to +104 °C
RV,RVA4	25bar		-20 °C to +104 °C
RV,RVA5	25bar		-20 °C to +104 °C
RV,RVA10-1→RV,RVA10-10	16bar		-20 °C to +104 °C
RV,RVA10-12→RV,RVA10-17	25bar		-20 °C to +104 °C
RV,RVA15-1→RV,RVA15-8	16bar		-20 °C to +104 °C
RV,RVA15-9→RV,RVA15-12	25bar		-20 °C to +104 °C
RV,RVA20-1→RV,RVA20-7	16bar		-20 °C to +104 °C
RV,RVA20-8→RV,RVA20-10	25bar		-20 °C to +104 °C
RV,RVA32-1-1→RV,RVA32-5	16bar		-20 °C to +104 °C
RV,RVA32-6-2→RV,RVA32-8	25bar		-20 °C to +104 °C
RV,RVA32-9-2→RV,RVA32-10-2	30bar		-20 °C to +104 °C
RV,RVA45-1-1→RV,RVA45-4	16bar		-20 °C to +104 °C
RV,RVA45-5-2→RV,RVA45-6-1	25bar		-20 °C to +104 °C
RV,RVA45-6→RV,RVA45-7	30bar		-20 °C to +104 °C
RV,RVA64-1-1→RV,RVA64-3	16bar		-20 °C to +104 °C
RV,RVA64-4-2→RV,RVA64-5-2	25bar		-20 °C to +104 °C
RV,RVA90-1-1→RV,RVA90-3	16bar		-20 °C to +104 °C
RV,RVA90-4-2	25bar		-20 °C to +104 °C

Operating range of the shaft seal

The operating range of the shaft seal depends on operating pressure, pump type, type of shaft seal and liquid temperature. The range shown in fig 4. Applies to cleanwater and water with glycol liquids.

Fig.4 Operating range of standard shaft seals



maximum inlet pressure

The following table shows the maximum permissible inlet pressure. However, the actual inlet pressure the pressure against a closed valve must always be lower than the maximum permissible operating pressure. If the maximum permissible operating pressure is exceeded, the bearing in the motor may be damaged and the life of the shaft seal reduced.

RV,RVA 1		
RV,RVA1-2 → RV,RVA1-25		10bar
RV,RVA1-27		15bar
RV,RVA 2		
RV,RVA2-2 → RV,RVA2-26		10bar
RV,RVA 3		
RV,RVA3-2 → RV,RVA3-15		10bar
RV,RVA3-17 → RV,RVA3-25		15bar
RV,RVA 4		
RV,RVA4-2 → RV,RVA4-22		15bar
RV,RVA 5		
RV,RVA5-2 → RV,RVA5-9		10bar
RV,RVA5-10 → RV,RVA5-24		15bar
RV,RVA 10		
RV,RVA10-1 → RV,RVA10-5		8bar
RV,RVA10-6 → RV,RVA10-17		10bar
RV,RVA 15		
RV,RVA 15-1 → RV,RVA 15-2		8bar
RV,RVA 15-3 → RV,RVA 15-12		10bar
RV,RVA20		
RV,RVA20-1		8bar
RV,RVA20-2 → RV,RVA20-10		10bar
RV,RVA 32		
RV,RVA32-1-1 → RV,RVA32-2		4bar
RV,RVA32-3-2 → RV,RVA32-6		10bar
RV,RVA32-7-2 → RV,RVA32-10-2		15bar
RV,RVA 45		
RV,RVA45-1-1 → RV,RVA45-1		4bar
RV,RVA45-2-2 → RV,RVA45-3		10bar
RV,RVA45-4-2 → RV,RVA45-7		15bar
RV,RVA 64		
RV,RVA64-1-1		4bar
RV,RVA64-1 → RV,RVA64-2-1		10bar
RV,RVA64-2 → RV,RVA64-5-2		15bar
RV,RVA 90		
RV,RVA90-1-1 → RV,RVA90-2-2		10bar
RV,RVA90-2-1 → RV,RVA90-4-2		15bar

Example of operating and inlet pressures :

The values for operating and inlet pressures shown in the table must not be considered individually but must always be compared, see the following examples.

Example 1:

pump model: RVA-5-20-A-FGJ-E-HQUE

Max. operating pressure: 25bar

Max. inlet pressure: 15bar

discharge pressure against a closed valve:

13.7bar, see page 31.

the pump is not allowed to start at an inlet pressure of 15 bar, but at an inlet pressure of $25 - 13.7 = 11.3$ bar.

Example 2:

MODEL: RVA15-3-A-P-E-HQUE

Max. operating pressure: 16bar

Max. inlet pressure: 8bar

discharge pressure against a closed valve:

4.2bar, see page 39 curves chart.

This pump is allowed to start at an inlet pressure of 6bar, as the discharge pressure against a closed valve is only 4.2bar, which results in an operating pressure of $6 + 4.2 = 10.2$ bar. On the contrary, the max. Operating pressure of this pump limited to 12.2bar, as a higher operating pressure bigger than 8bar will require on the Inlet.

selection of pumps

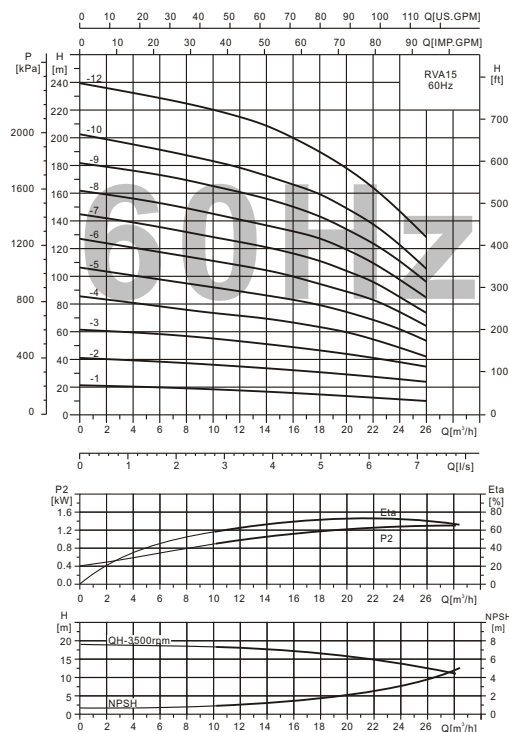
selection of pumps should be based on:

- the duty point of the pump(see page12).
- dimensional data such as pressure loss as a
- result of height differences,friction loss in the pipework,pump efficiency etc.(see page12).
- pump materials(see page6,7,8)
- pump connections(see page13)
- shaft seal(see page13)

1. Duty point of the pump

From a duty point it is possible to select a pump on the basis of the curve charts shown in "performance curves/technical" data.

Fig.5 example of curve chart



2. dimensional data

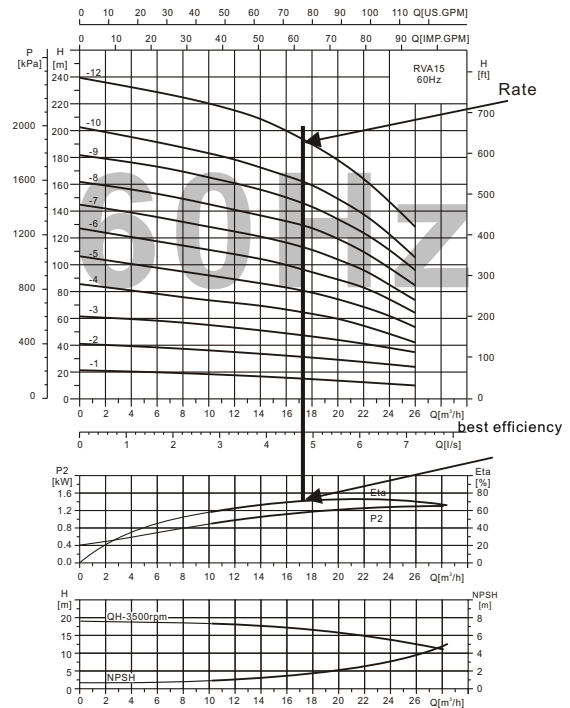
When sizing a pump the following must be taken into accounting:

- Required flow and pressure at the draw-off point.
- Pressure loss as a result of height differences(H_{geo}).
- Friction loss in the pipework(H_f) It may.
- Best efficiency at the estimated duty point.
- NPSH value.
- For calculation of the NPSH value, see corresponding curves chart.

pump efficiency

Before determining the best efficiency point, the operation pattern of the pump needs to be identified. If the pump expected to operate as the same duty point, then select a RVA pump which is operating at a duty point corresponding with the best efficiency of the pump.

Fig.6 example of duty point



As the pump is sized on the basis of the highest possible flow, it is important always to have the duty point to the right on the efficiency curve(eta) in order to keep efficiency high when the flow drops.

Fig.7 best efficiency

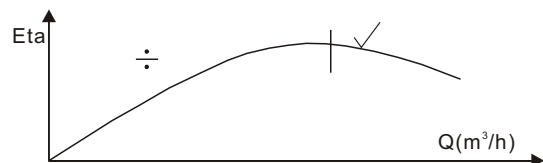
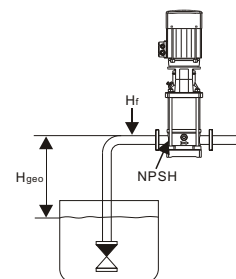


Fig.8 dimensional data



3. pump material

The material variant(RV,RVA)should be selected based of the liquid to be pump.

RVA wetted parts are made of AISI304.

RV pump body is made of cast-iron and .

Wetted parts are made of AISI304.

4. Pump connections

selection of pump connection depend on the rated pressure and pipework. To meet any requirement the RV, RVA pump offer a wide range of flexible connection such as:

- DIN frange.
- PJE coupling.
- union connection.
- Other connections on request.

5.shaft seal

As standard, the RV AND RVA range is fitted with a cartridge type suitable for themost common applications. The following key parameters must be taken into account ,when selecting the shaft seal:

- type of pumped liquid.
- liquid temperature and
- maximum pressure.

Inlet pressure and operating pressure

The limit values stated on page 10 and page 11 must not be exceeded as regards

- maximum inlet pressure and
- maximum operating pressure.

Fig. 9 RV pump

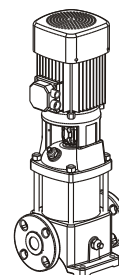
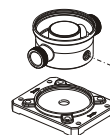


Fig. 10 pump connections

DIN-FGJ



UNION



PJE

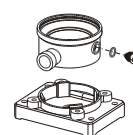


Fig.11 Shaft seal (cartridge type)

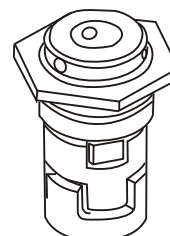
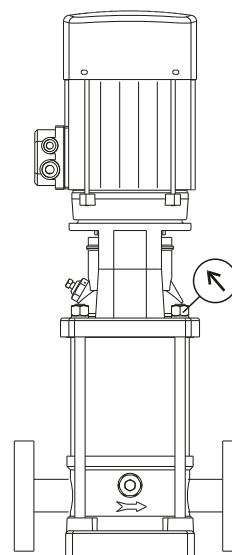


Fig.12 Inlet pressure and operating pressure



Minimum inlet pressure-NPSH

Calculation of the inlet pressure "H" is recommended in these situations :

- the liquid temperature is high.
 - the flow is significantly higher than the rated flow.
 - water is drawn from depths.
 - water is drawn through long pipes.
- inlet conditions are poor. to avoid cavitation, make sure that there is a minimum pressure on the suction side of the pump.

The maximum suction lift "H" in metres head can be calculated as follows:

$$H = P_b \cdot 10.2 - \text{NPSH} - H_f - H_v - H_s$$

P_b = Barometric pressure in bar.
(Barometric pressure can be set to 1 bar).
in closed systems, P_b indicates the system pressure in bar.

NPSH = Net positive suction Head in metres head.
(To be read from the NPSH curve at the highest flow the pump will be delivering).

H_f = Friction loss in suction pipe(unit:m).
(At the highest flow the pump will be delivering.)

H_v = Vapour pressure (unit:m).
(To be read from the vapour pressure scale).

H_s = safety margin=minimum 0.5 metres head.

If the "H" calculated is positive, the pump can operate at a suction lift of maximum "H" metres head. If the "H" calculated is negative, an inlet pressure of minimum "H" metres head is required.

Example:

$P_b = 1 \text{ bar}$

pump model: RVA10,50Hz

flow: $10 \text{ m}^3/\text{h}$

NPSH(P36 reference: 2.1 metres head.

liquid temperature: $+50^\circ\text{C}$

H_v (reference picture4): 1.3 metres head.

$H = P_b \cdot 10.2 - \text{NPSH} - H_f - H_v - H_s$

$H = 1 \cdot 10.2 - 2.1 - 3.0 - 1.3 - 0.5 = 3.3 \text{ (metres)}$

It means the pump can operate at a suction lift of maximum 3.3 metres head.

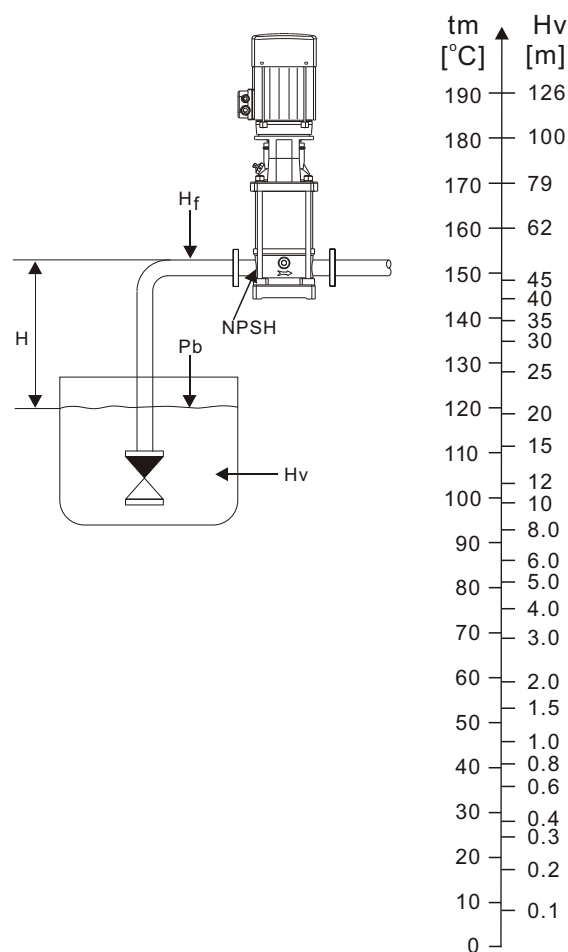
exchanged meter head to bar:

1 metre head $= 1 \cdot 0.0981 = 0.0981 \text{ bar}$

exchanged metre head to kpa:

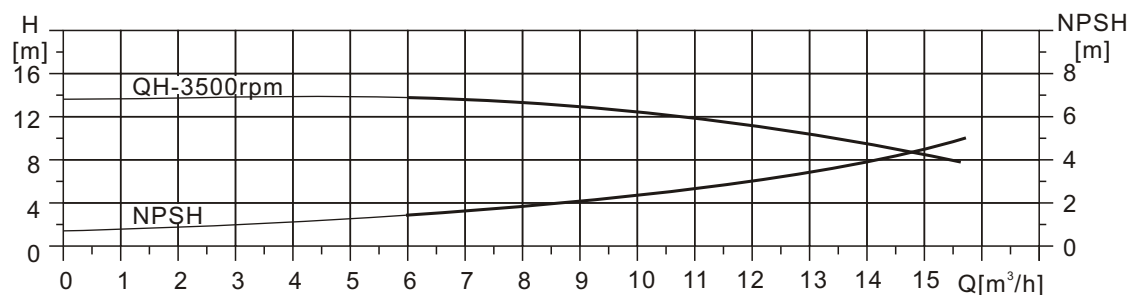
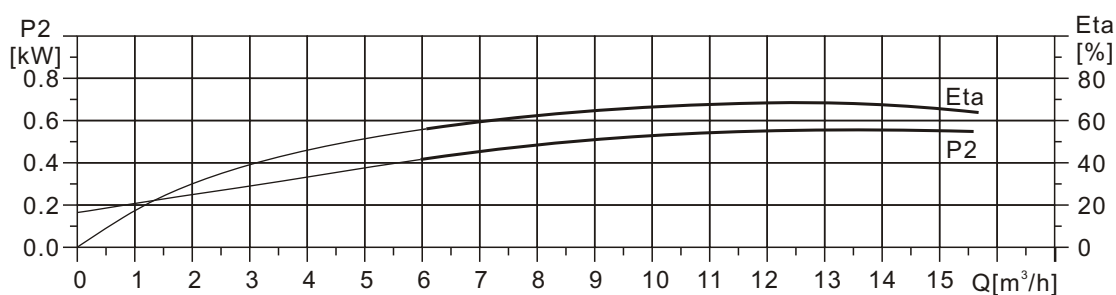
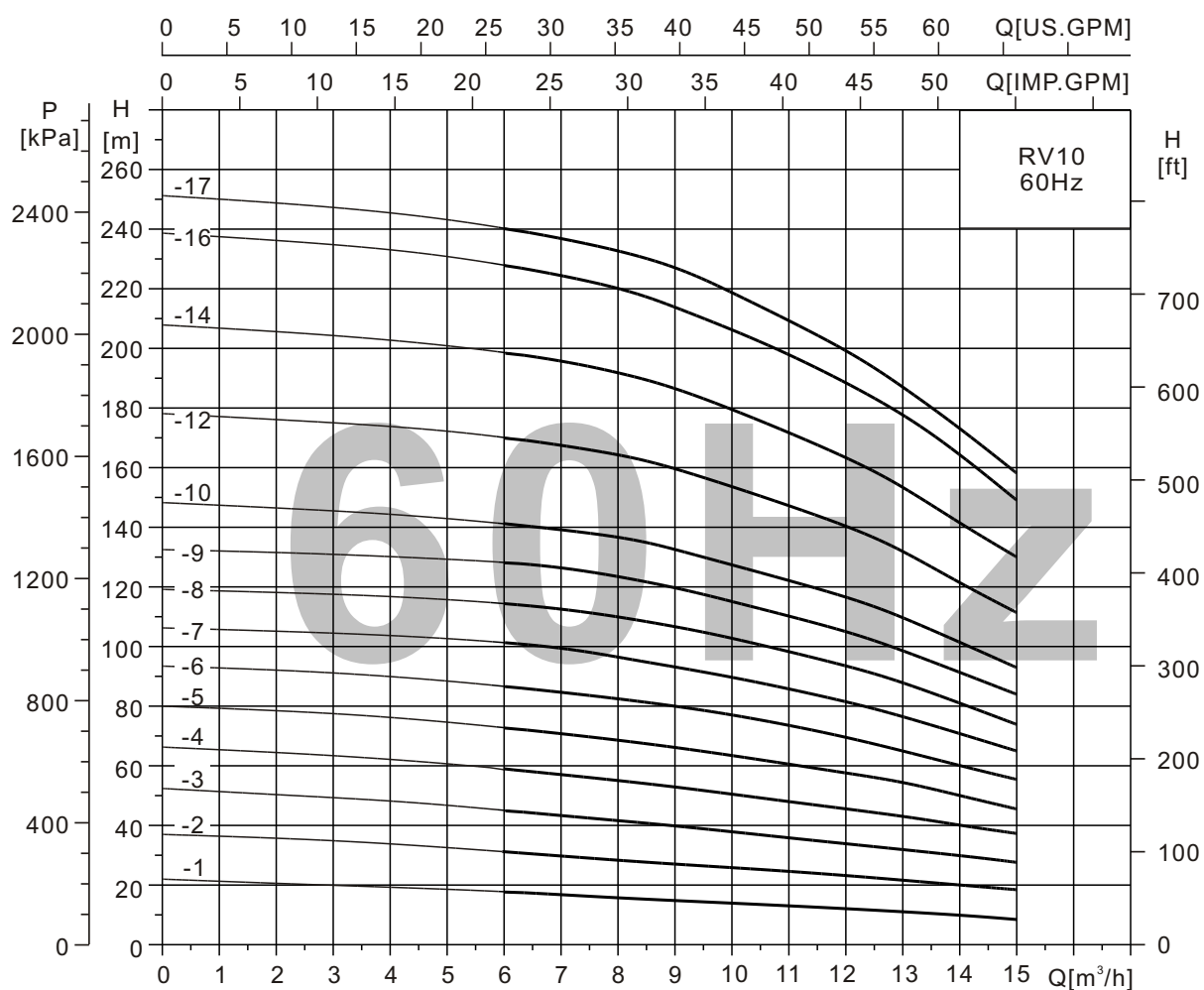
1 metre head $= 1 \cdot 9.81 = 9.81 \text{ kpa}$.

Fig.13 Minimum inlet pressure-NPSH



Performance Curve

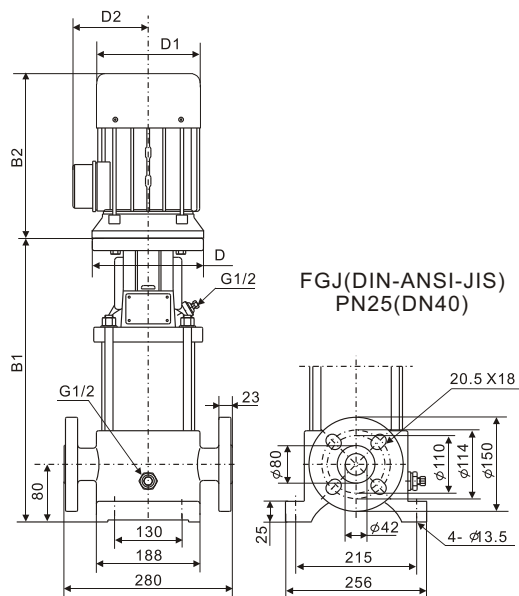
RV10-60Hz



Performance Table

Model	Power P ₂ (kW)	Q (m ³ /h)	7.0	8.0	9.0	10	11	12	13	14	15	16
RV10-1	0.75	H (m)	14	13.5	13.3	12.5	12	11.5	11	10	9.5	8
RV10-2	1.5		28	27	26	25.5	24	23	22	20	19	16
RV10-3	2.2		43	41	40	38	36	35	33	30	28	24
RV10-4	3.0		57	55	53	51	48	47	44	40	37	32
RV10-5	3.0		71	69	67	64	60	58	55	50	46	40
RV10-6	4.0		82	82	80	77	73	70	66	60	56	48
RV10-7	5.5		100	96	93	90	85	82	77	70	65	56
RV10-8	5.5		114	110	107	104	97	94	88	80	74	64
RV10-9	5.5		128	124	120	115	109	106	99	90	84	72
RV10-10	7.5		142	137	133	128	121	117	100	100	93	80
RV10-12	7.5		171	165	160	151	145	141	132	121	111	96
RV10-14	11		202	192	187	184	170	164	154	141	130	112
RV10-16	11		228	220	214	205	194	188	175	163	149	128
RV10-17	11		242	234	227	218	206	200	187	173	158	136

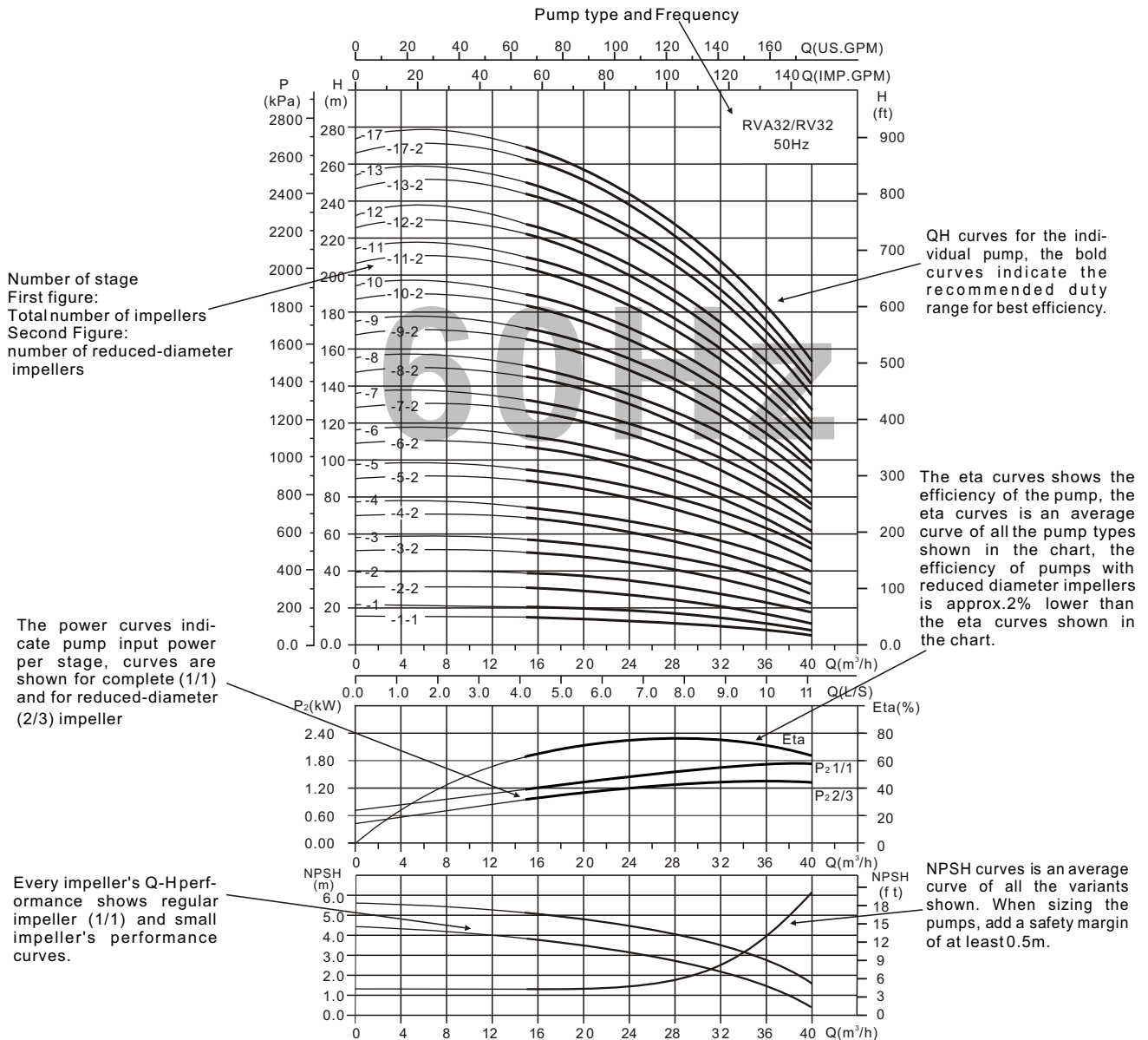
Installation sketches



Dimensions and weights

Model	Dimensions(mm)						Weight (kg)
	B1	B2	B1+B2	D	D1	D2	
RV10-1	322	205	527	-	133	102	36
RV10-2	388	241/293	629	-	154	111	44
RV10-3	426	275/293	701	-	177	116	47
RV10-4	456	293	731	-	177	116	52
RV10-5	486	293	761	-	177	116	53
RV10-6	536	305	841	-	197	148	64
RV10-7	587	390	977	300	275	210	86
RV10-8	617	390	1007	300	275	210	87
RV10-9	647	390	1037	300	275	210	88
RV10-10	677	390	1067	300	275	210	91
RV10-12	737	390	1127	300	275	210	94
RV10-14	897	505	1402	350	330	255	127
RV10-16	957	505	1462	350	330	255	129
RV10-17	987	505	1492	350	330	255	131

How to read the curve charts

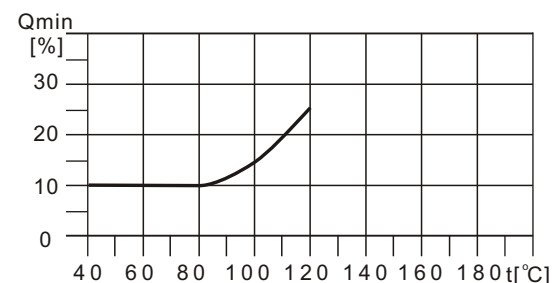


Guidelines to performance curve

The guidelines below apply to the curves shown on the following pages:

1. Tolerance to ISO9906, Annex A.
2. Measurements have been made with airless water at a temperature of 20°C
3. The curves apply to kinematic viscosity: $\nu = 1 \text{ mm}^2/\text{s}$ (1 cst)
4. Due to the risk of overheating, the pumps should not be used at a flow below the minimum flow rate.
5. The QH curves apply to a rated motor speed of 2900 min^{-1} , all curves are based on current motor speeds.

The curve below shows the minimum flow rate as a percentage of the nominal flow rate in relation to the liquid temperature.



Note: Water valve must be open during operation.

Technical Data

Standard motor

Power P_2 (kW)	Voltage (V)	Current I_N (A)	Power factor $\cos \varphi$	EFFiciency (%)	I_{st}/I_N
0.37	Δ 220/Y380	Δ 1.8/Y1.0	0.78	70.0	6.2
0.55	Δ 220/Y380	Δ 2.5/Y1.5	0.81	71.0	6.4
0.75	Δ 220/Y380	Δ 3.3/Y1.9	0.82	72.0	6.5
1.1	Δ 220/Y380	Δ 4.6/Y2.7	0.82	76.5	7.2
1.5	Δ 220/Y380	Δ 6.2/Y3.6	0.83	76.8	7.3
2.2	Δ 220/Y380	Δ 8.5/Y4.9	0.84	81.1	7.5
3.0	Δ 220/Y380	Δ 11.5/Y6.7	0.84	81.5	7.5
4.0	Δ 380/Y660	Δ 8.2/Y4.7	0.88	84.2	7.5
5.5	Δ 380/Y660	Δ 11.1/Y6.4	0.88	85.7	8.1
7.5	Δ 380/Y660	Δ 14.9/Y8.6	0.88	87.0	8.3
11	Δ 380/Y660	Δ 21.2/Y12.2	0.89	88.4	8.4
15	Δ 380/Y660	Δ 28.6/Y16.5	0.89	89.4	8.5
18.5	Δ 380/Y660	Δ 34.7/Y20.0	0.90	90.0	8.5
22	Δ 380/Y660	Δ 41.0/Y23.6	0.90	90.5	8.4
30	Δ 380/Y660	Δ 55.4/Y31.9	0.90	91.4	7.5
37	Δ 380/Y660	Δ 67.9/Y39.1	0.90	92.0	7.5
45	Δ 380/Y660	Δ 82.1/Y47.3	0.90	92.5	7.5

High efficiency motor

Power P_2 (kW)	Voltage (V)	Current I_N (A)	Power factor $\cos \varphi$	EFFiciency (%)	I_{st}/I_N
0.75	Δ 220/Y380	Δ 3.1/Y1.8	0.83	77.6	6.7
1.1	Δ 220/Y380	Δ 4.2/Y2.4	0.83	82.9	7.4
1.5	Δ 220/Y380	Δ 5.6/Y3.2	0.84	84.2	7.7
2.2	Δ 220/Y380	Δ 7.9/Y4.6	0.85	85.7	7.6
3.0	Δ 220/Y380	Δ 10.4/Y6.0	0.87	86.8	7.6
4.0	Δ 380/Y660	Δ 7.9/Y4.5	0.88	87.7	7.6
5.5	Δ 380/Y660	Δ 10.7/Y6.2	0.88	88.7	7.6
7.5	Δ 380/Y660	Δ 14.5/Y8.3	0.88	89.6	7.3
11	Δ 380/Y660	Δ 21.0/Y12.1	0.88	90.6	7.4
15	Δ 380/Y660	Δ 28.3/Y16.3	0.88	91.4	7.6
18.5	Δ 380/Y660	Δ 34.8/Y20.0	0.88	91.9	7.7
22	Δ 380/Y660	Δ 41.2/Y23.7	0.88	92.3	7.6
30	Δ 380/Y660	Δ 55.8/Y32.1	0.88	92.9	7.1
37	Δ 380/Y660	Δ 68.4/Y39.4	0.88	93.4	7.1
45	Δ 380/Y660	Δ 83.0/Y47.8	0.88	93.6	7.1

Remark: Special motor is available on request.

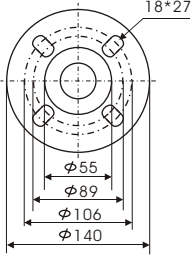
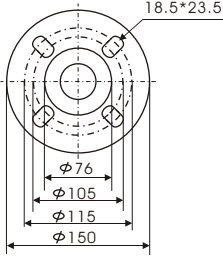
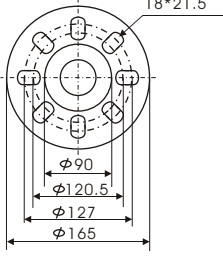
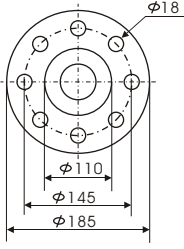
Pipe connection

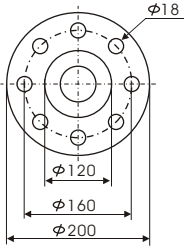
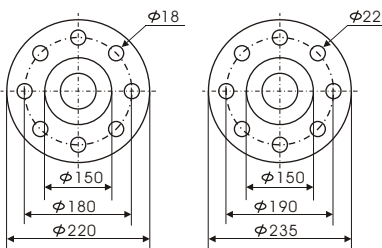
Various sets of counter flanges and couplings are available.

Counter flange for RV series

A set consists of one counter flange, one gasket, bolts and nuts.

(Remarks: The above accessories are not necessary for pumps, there will be extra charge for them if needed)

counter flange	pump type	description		rated pressure	pipe work Connection	product Number
	RV1 RV2 RV3 RV4 RV5	Threaded	16 bar, EN 1092-2		G1	
		For welding	25 bar, EN 1092-2		25mm, nominal	
		Threaded	16 bar, EN 1092-2		G1 ¹ / ₄	
		For welding	25 bar, EN 1092-2		32mm, nominal	
	RV10	Threaded	16 bar, EN 1092-2		G1 ¹ / ₂	
			16 bar, EN 1092-2		G2	
		For welding	25 bar, EN 1092-2		40mm, nominal	
		For welding	40 bar, special flange		50mm, nominal	
	RV15 RV20	Threaded	16 bar, EN 1092-2		G2	
		Threaded	16 bar, special flange		G2 ¹ / ₂	
		Threaded	16 bar, special flange		G2 ¹ / ₂	
		For welding	25 bar, EN 1092-2		50mm, nominal	
	RV32	Threaded	16 bar, EN 1092-2		G2 ¹ / ₂	
		Threaded	16 bar, special flange		G3	
		For welding	16 bar, EN 1092-2		65mm, nominal	
		For welding	40 bar, DIN 2635		65mm, nominal	
		For welding	16 bar, special flange		80mm, nominal	

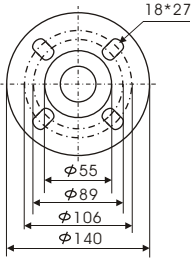
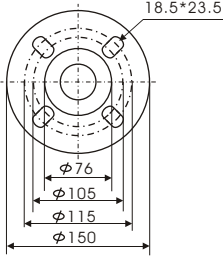
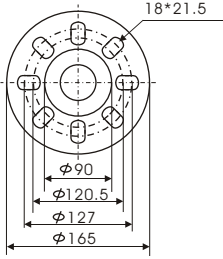
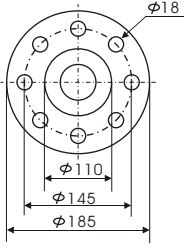
counter flange	pump type	description	rated pressure	pipe work Connection	product Number
	RV45	Threaded	16 bar	G3	
		For welding	16 bar	80mm,nominal	
		For welding	40 bar	80mm,nominal	
	RV64 RV90	Threaded	16 bar	G4	
		For welding	16 bar	100mm,nominal	
		For welding	25 bar	100mm,nominal	

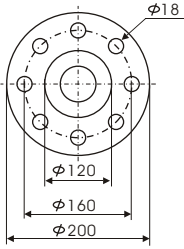
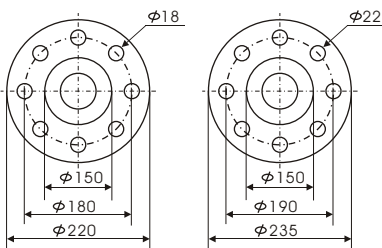
Counter flange for RVA series

they are made of stainless steel EN1.4403(AISI304)

A set consists of one counter flange, one gasket, bolts and nuts.

(Remarks: The above accessories are not necessary for pumps, there will be extra charge for them if needed)

counter flange	pump type	description	rated pressure	pipe work Connection	product Number
	RVA1 RVA2 RVA3 RVA4 RVA5	Threaded	16 bar, EN 1092-2	G1	
		For welding	25 bar, EN 1092-2	25mm, nominal	
		Threaded	16 bar, EN 1092-2	G1 ¹ / ₄	
		For welding	25 bar, EN 1092-2	32mm, nominal	
	RVA10	Threaded	16 bar, EN 1092-2	G1 ¹ / ₂	
		Threaded	16 bar, EN 1092-2	G2	
		For welding	25 bar, EN 1092-2	40mm, nominal	
		For welding	25 bar, special flange	50mm, nominal	
	RVA15 RVA20	Threaded	16 bar, EN 1092-2	G2	
		Threaded	16 bar, special flange	G2 ¹ / ₂	
		Threaded	16 bar, special flange	G2 ¹ / ₂	
		For welding	25 bar, EN 1092-2	50mm, nominal	
		For welding	25 bar, special flange	65mm, nominal	
	RVA32	Threaded	16 bar	G2 ¹ / ₂	
		Threaded	16 bar, special flange	G3	
		For welding	16 bar	65mm, nominal	
		For welding	40 bar	65mm, nominal	
		For welding	16 bar, special flange	80mm, nominal	
		For welding	25 bar, special flange	80mm, nominal	

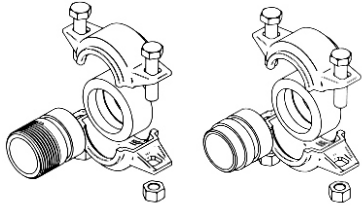
counter flange	pump type	description	rated pressure	pipe work Connection	product Number
	RVA45	Threaded	16 bar	G3	
		For welding	16 bar	80mm,nominal	
		For welding	40 bar	80mm,nominal	
	RVA64 RVA90	Threaded	16 bar	G4	
		For welding	16 bar	100mm,nominal	
		For welding	40 bar	100mm,nominal	

PJE Couplings for RVA series

they are made of stainless steel EN1.4403(AISI304)

A set consists of one clamp, one gasket, bolts and nuts.

(Remarks: The above accessories are not necessary for pumps, there will be extra charge for them if needed)

counter flange		pump type	description	PN	pipe work Connection	rubber parts	Number of coupling sets needed
		RVA1	Threaded	80bar	G1 ¹ / ₄	EPDM	2
		RVA2				FKM	2
		RVA3	For welding	80bar	DN32	EPDM	2
		RVA4				FKM	2
		RVA5				EPDM	2
		RVA10	Threaded	70bar	G2	FKM	2
		RVA15				EPDM	2
		RVA20	For welding	70bar	DN50	FKM	2

Edition:2013.08

The technical data are subject to amend without notice.



Vendor Ref. No.

Contractor Ref. No

Project Name:

Contractor Job No.

JOCKEY PUMP
CONTROLLER

0	SUBMITTED FOR APPROVAL				
Rev	Description	Prepared	Checked	Approved	Date



TORNATECH

Project: _____

Customer: _____

Engineer: _____

Pump Manufacturer: _____

Technical Data Submittal Document

Model JP3

Across the Line Start
Jockey Pump Controller



Contents:

Data Sheets

Dimensional Data

Wiring Schematics

Field Connections

Note: The drawings included in this package are for controllers covered under our standard offering. Actual AS BUILT drawings may differ from what is shown in this package.



N.Y.C.
APPROVED



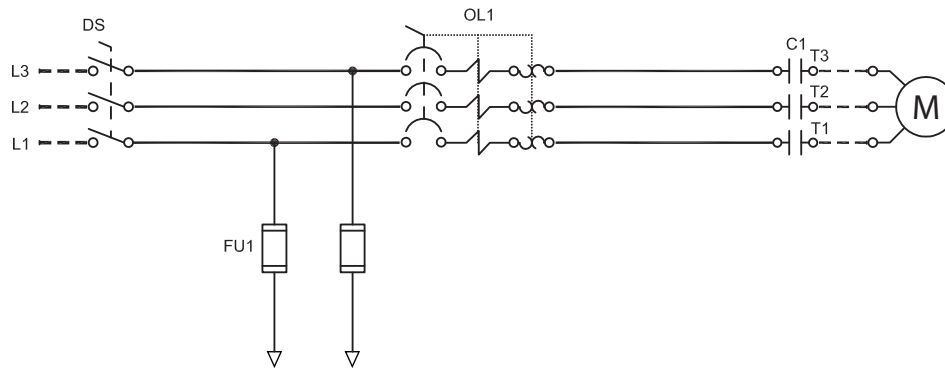
March 2020



TORNATECH

Technical Data

Model JP3 Jockey Pump Controller



N.Y.C.
APPROVED



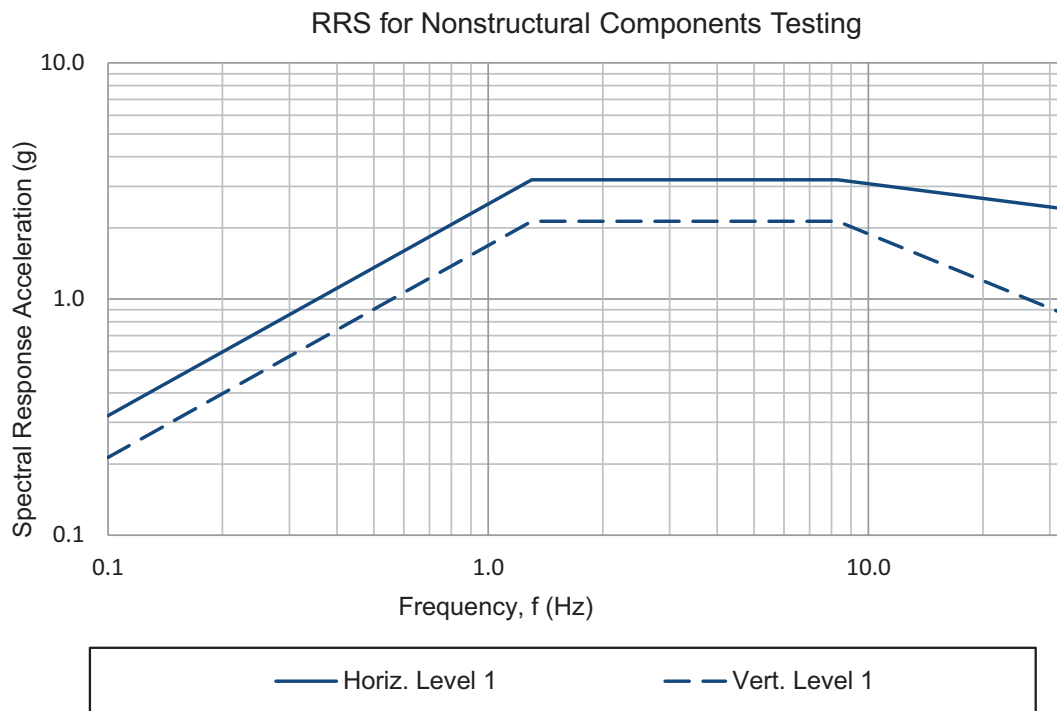
Listing	Underwriters Laboratory (UL)	UL508A - Industrial Pump Controllers
	CSA	CSA C22.2 No. 14 Industrial Control Equipment
	New York City	Accepted for use in the City of New York by the Department of Buildings
	Seismic Certification	See page 4 for details
	Optional	
	☐ CE Mark	Various EN, IEC & CEE directives and standards
Enclosure	Protection Rating ☒ Standard: NEMA 2	
	Optional ☐ NEMA 12 ☐ NEMA 4X-304 sst painted ☐ NEMA 3 ☐ NEMA 4X-304 sst brushed finish ☐ NEMA 3R ☐ NEMA 4X-316 sst painted ☐ NEMA 4 ☐ NEMA 4X-316 sst brushed finish	
	Accessories • Wall mounting lugs (x4)	Paint Specifications • Red RAL3002 • Powder coating • Glossy textured finish



Fuseless Motor Starter	• Main disconnect – padlockable – rotary type handle – door interlocked • Thermo-magnetic motor protector • Contactor		
Control Circuit	• 24V.AC		
iPD+ Operator Interface	• Solid state controls • All adjustments on door front • Navigation pushbuttons		
Pressure Sensing	• Pressure transducer for fresh water application 316 stainless steel construction • Rated for 0-600psi working pressure • Pressure sensing line connection 1/2" brass Male NPT		
Visual Indications	• Manual motor start/run LED • Automatic motor start/run LED • Motor overload • Pressure reading • Start pressure • Stop pressure • System pressure • System pressure diagnostic LED's • Green: system pressure at or above stop pressure • Yellow: system pressure between start and stop pressure • Red: system pressure at or below start pressure • AUTO mode • OFF mode		
Timers	• Minimum run timer (off delay) • Delay start timer (on delay) • Visual countdown		
Counters	• Pump start counter • Elapsed timer meter (hours / non-resettable)		
Operators	• OFF-AUTO pushbutton • Start and Stop pushbutton		
Operation	Automatic Start	Start on pressure drop	
	Manual Start	Start pushbutton	
	Stopping	Stop pushbutton	
	Timers	Field adjustable & visual countdown	• Minimum run timer (off delay) • Delay start timer (on delay)



Seismic Certification	Seismic Certification Company	TRU Compliance, LLC A Tobalski Watkins Affiliate					TWEI Project No.: 15014				
	Mounting details	Rigid wall mounting									
	Seismic Information	Building Code	Test Criteria	Seismic Parameters	S _{Ds}	z/h	I _p	A _{FLX-H}	A _{RIG-H}	A _{FLX-V}	A _{RIG-V}
		IBC 2015, CBC 2016	ICC-ES AC156	ASCE 7-10 Chapter 13	2.0	1.0	1.5	3.20	2.40	1.33	0.53
					3.2	0.0	1.5	3.20	1.28	2.13	0.85



Notes:

- Components are tested in accordance with ICC-ES AC156, IBC 2015 & CBC 2016.
- OSHPD Special Seismic Certification Preapproval (OSP)

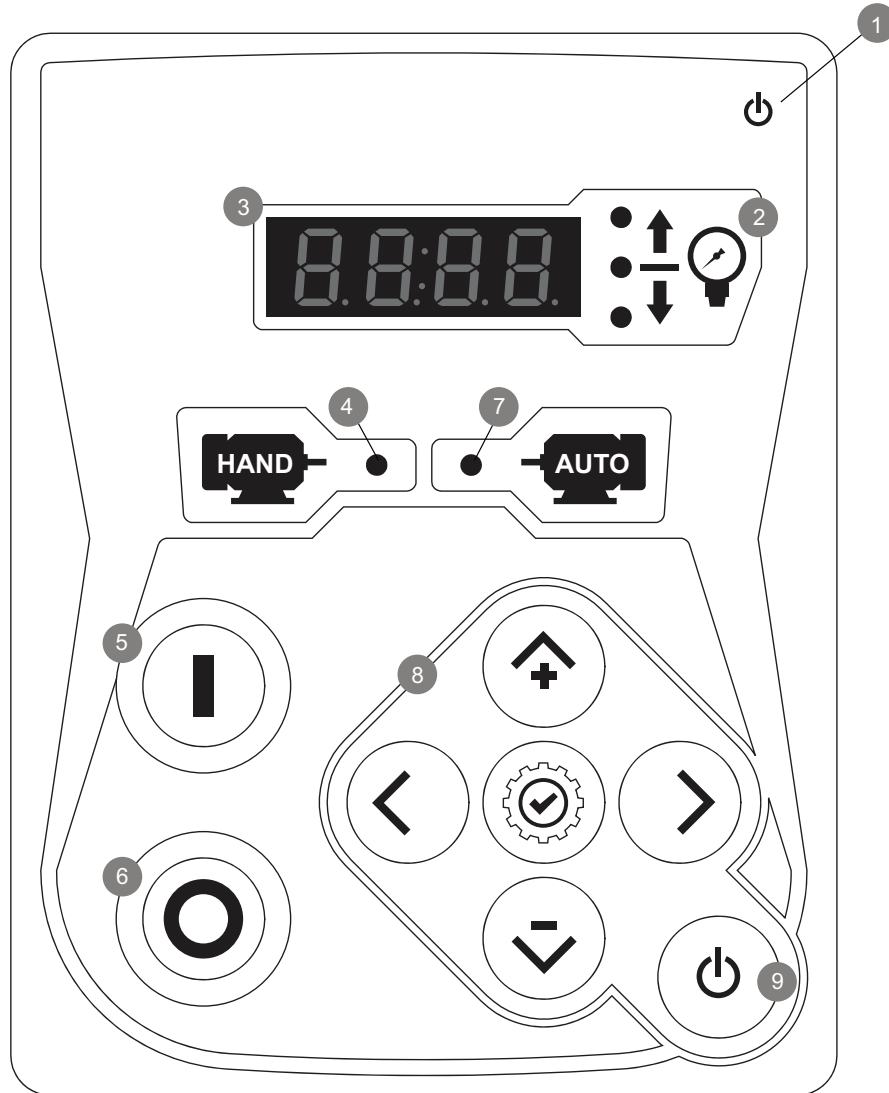


☐ A4	Elapsed time meter (time totalizer)
☐ A5	Motor run alarm contact
☐ A6	Loss of power alarm contact
☐ A7	Overload or short circuit alarm contact
☐ D11D	Pressure transducer 0-600psi with ½" MNPT 316 stainless steel bushing
☐ D14	Export packing for 1 controller
☐ D13A	Externally mounted wetted parts
☐ D14	Export packing for 1 controller
☐ D18	Audible alarm
☐ D19	Anti-condensation heater and thermostat
☐ D20	Anti-condensation heater and humidistat
☐ D21	Tropicalization
☐ D22	Phase reversal / failure pilot light and alarm contact
☐ D23	Controller power healthy pilot light and alarm contact
☐ D24	Pump failure via current sensing relay with pilot light and dry alarm contact
☐ D25	Low zone pump control function
☐ D26	Mid zone pump control function
☐ D27	High zone pump control function
☐ D28	Selector switch in auto alarm contacts
☐ D29	Selector switch in off alarm contacts
☐ D30	Motor heater circuit
☐ D32	Service entrance rated - 100kA short circuit withstand rating: • 120V/1ph (0.5hp max.) • 240V/1ph (1hp max.) • 200V-208V - 60hz (2hp max.) • 220V-240V - 60hz (3hp max.) • 380V-416V - 50hz - 60hz (5hp max.) • 440V-480V - 60hz (5hp max.)
☐ D33	Service entrance rated - 65kA short circuit withstand rating: • 120V/1ph (0.5hp max.) • 240V/1ph (1hp max.) • 200V-208V - 60hz (3hp-15hp max.) • 220V-240V - 60hz (515hp max.) • 380V-416V - 50hz - 60hz (7.5hp - 40hp max.) • 440V-480V - 60hz (7.5hp-40hp max.)
☐ D34	Service entrance rated - 42kA short circuit withstand rating: • 600V - 60hz (7.5hp max.)

☐ L01	Other language and English (bilingual)
☐ L02	French
☐ L03	Spanish
☐ L04	German
☐ L05	Italian
☐ L06	Polish
☐ L07	Romanian
☐ L08	Hungarian
☐ L09	Slovak
☐ L10	Croatian
☐ L11	Czech
☐ L12	Portuguese
☐ L13	Dutch
☐ L14	Russian
☐ L15	Turkish
☐ L16	Swedish
☐ L17	Bulgarian
☐ L18	Thai
☐ L19	Indonesian
☐ L20	Slovenian
☐ L21	Danish
☐ L22	Greek
☐ L23	Arabic
☐ L24	Hebrew
☐ L25	Chinese

Note: Options chosen from this page are not electrically represented on the wiring schematics in this submittal package.

iPD+ Operator Interface



- | | |
|-----------------------|-------------------------|
| 1 - Power on LED | 6 - STOP pushbutton |
| 2 - System status LED | 7 - Auto start LED |
| 3 - Digital display | 8 - Navigation keypad |
| 4 - Hand start LED | 9 - ON - OFF pushbutton |
| 5 - START pushbutton | |

Jockey Pump Controller

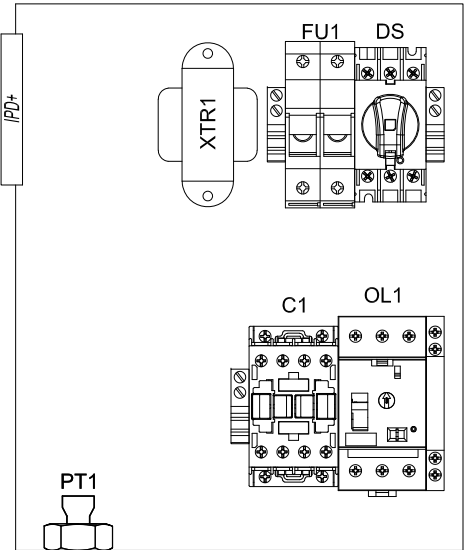
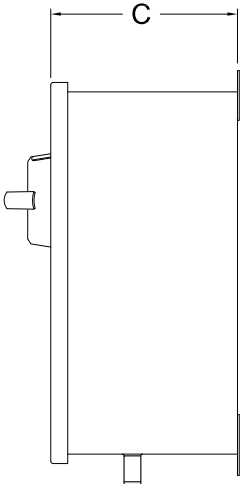
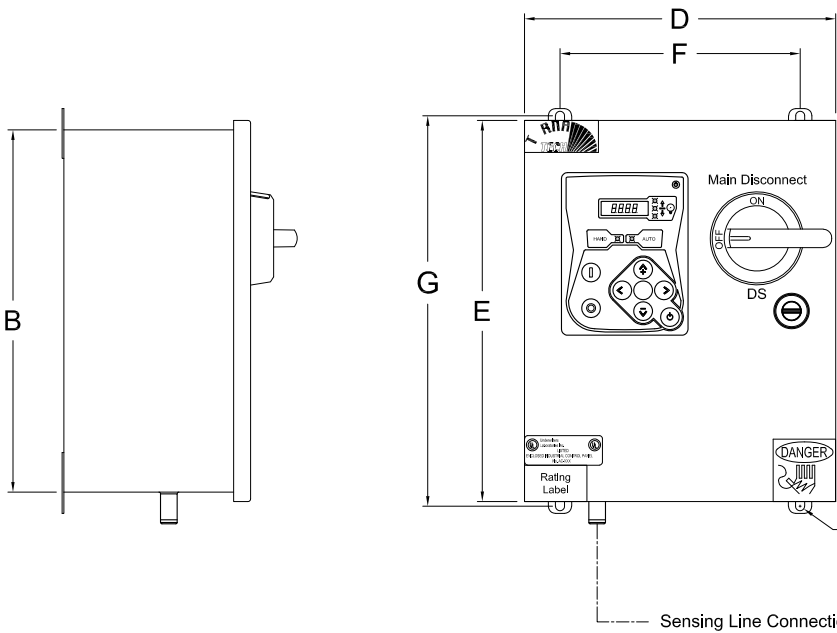
Across the Line / 3 Phase

Dimensions

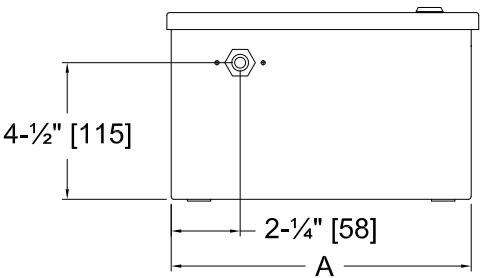
Model:JP3

Built to the latest edition of the UL 508A & CSA C22.2 No.14 standard

PER QUOTE DRAWING No.					NYC Dept of Building Approved	 TORNATECH	
REV.	DESCRIPTION				DD/MM/YY		Drawing No. JP3-DI500/E
6	Modified J19 Outputs ID				10/06/16		
7	Revised logo				18/06/18		
8	Sensing line connection changed				25/03/25		



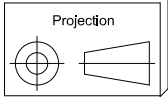
Standard Internal Layout



Dimensions*								
Maximum Motor Horsepower					Enclosure Dimensions	Door Dimensions	Anchor Dimensions	
200-208V	220-240V	380-416V	440-480V	575-600V	A X B X C	D X E	F X G	
10HP	10HP	15HP	20HP	25HP	10"X12"X6-1/2"	10-3/4"X12-3/4"	8"X12-3/4"	
20HP	30HP	40HP	60HP	60HP	16"X16"X7-1/2"	16-1/2"X16-1/2"	14"X16-3/4"	

- Notes:
- Standard NEMA: NEMA 2
 - Standard Paint: Textured Red RAL 3002.
 - All Dimensions are in Inches [Millimeters]
 - Use Watertight Conduit and Connector Only.
 - Protect Equipment Against Drilling Chips.
 - Door Swing Equal to Door Width

Drawing for information only.
Manufacturer reserves the right to modify this drawing without notice.
Contact manufacturer for "As Built" drawing.
*Dimensions may change depending on option required. Consult Factory for exact dimensions.



Jockey Pump Controller

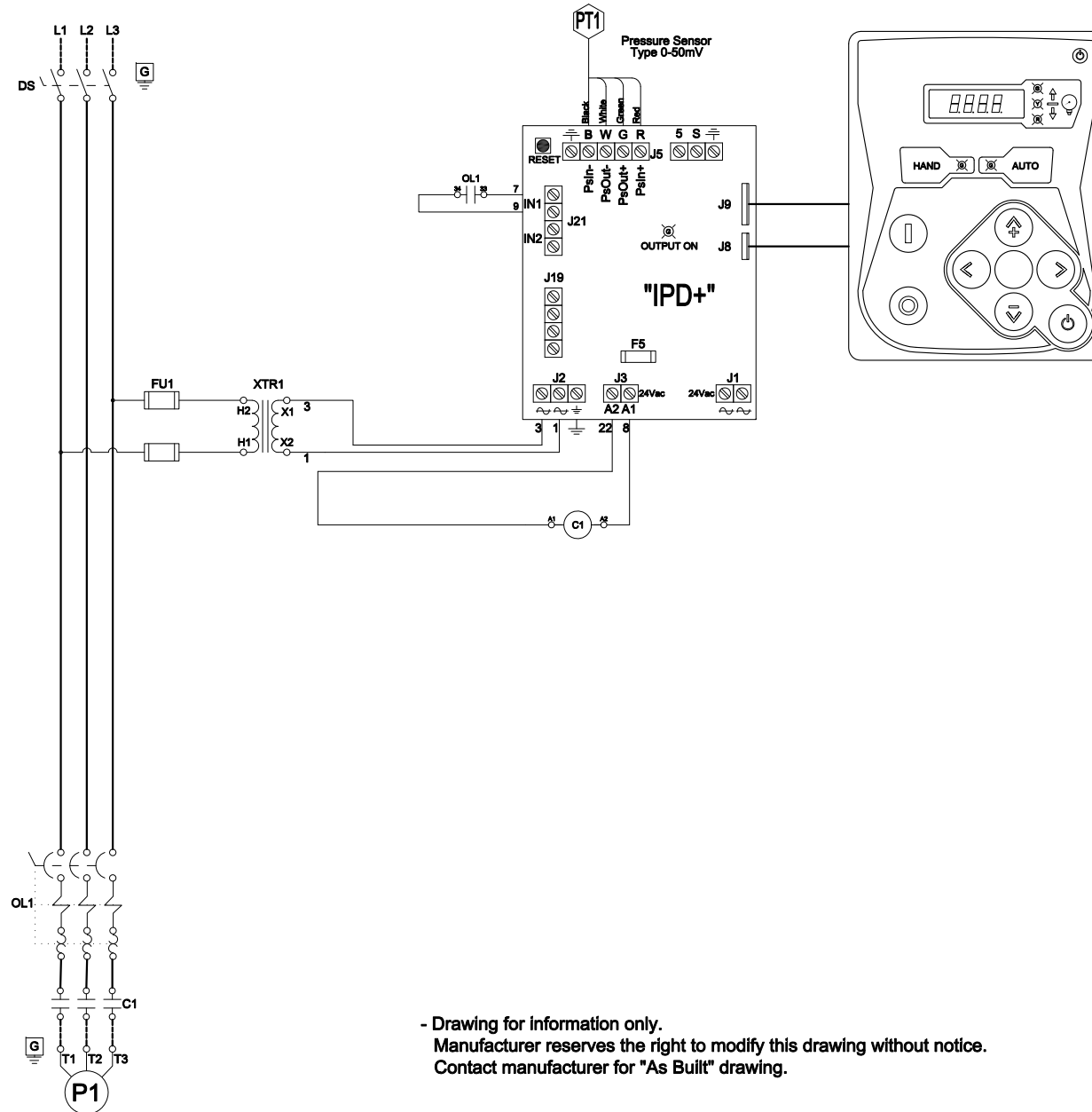
Across the Line / 3 Phase

Model:JP3

Wiring schematic

Built to the latest edition of the UL 508A & CSA C22.2 No.14 standard

PER QUOTE DRAWING No.					NYC Dept of Building Approved	
REV.	DESCRIPTION	DD/MM/YY				
5	Modified Tornatech & Seismic Logo	14/04/16				
6	Modified J19 Outputs ID	10/06/16				
7	Revised logo	18/06/18				
Drawing No.						JP3-WS500/E



- Drawing for information only.
 Manufacturer reserves the right to modify this drawing without notice.
 Contact manufacturer for "As Built" drawing.

Jockey Pump Controller

Across the Line / 3 Phase

Model:JP3

Line and Motor Terminal Size

Built to the latest edition of the UL 508A & CSA C22.2 No.14 standard

PER QUOTE DRAWING No.



REV.

DESCRIPTION

DD/MM/YY

5 Modified Tomatech & Seismic Logo

14/04/16

6 Modified J19 Outputs ID

10/06/16

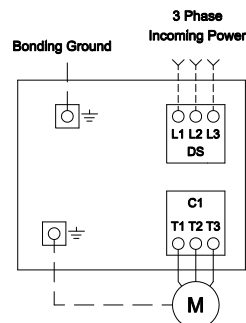
7 Revised logo

18/06/18

Drawing No.

JP3-TD500/E

Power Connections and Motor Connections



Line Terminals (L1,L2,L3,GND)

Maximum Motor Horsepower					Wire Size Copper Only	Torque	Wire Size Ground Copper Only
200-208V	220-240V	380-416V	440-480V	575-600V			
10HP	10HP	20HP	20HP	25HP	#14 AWG - #6 AWG	2 Nm	#14 AWG - #2 AWG
20HP	30HP	40HP	60HP	60HP	#12 AWG - #1 AWG	6 Nm	#6 AWG - #2 AWG

Motor Terminals (T1,T2,T3,GND)

Maximum Motor Horsepower					Wire Size Copper Only	Torque	Wire Size Ground Copper Only
200-208V	220-240V	380-416V	440-480V	575-600V			
5HP	7.5HP	10HP	15HP	20HP	#14 AWG - #10 AWG	1.8 Nm	#14 AWG - #2 AWG
10HP	10HP	15HP	20HP	25HP	#14 AWG - #6 AWG	2.5 Nm	#12 AWG - #2 AWG
15HP	20HP	30HP	50HP	50HP	#10 AWG - #3 AWG	5 Nm	#12 AWG - #2 AWG
20HP	30HP	40HP	60HP	60HP	#10 AWG - #2 AWG	11.3 Nm	#12 AWG - #2 AWG



		Vendor Ref. No.	
		Contractor Ref. No	
Project Name:		Contractor Job No.	

ACCESSORIES

0	SUBMITTED FOR APPROVAL				
Rev	Description	Prepared	Checked	Approved	Date



		Vendor Ref. No.	
		Contractor Ref. No.	
Project Name:		Contractor Job No.	

Flow Meter

0	SUBMITTED FOR APPROVAL				
Rev	Description	Prepared	Checked	Approved	Date



GERAND ENGINEERING

"MODEL G" FIRE PUMP TEST METERS

Accurate Pump Performance and Quality Service for 50 Years

NEW

**BEST VALUE
IN THE
INDUSTRY**

**5 YEAR
WARRANTY**

**MANUFACTURED
IN THE USA**

**HIGH GRADE
MATERIALS:**

*CARBON STEEL,
STAINLESS STEEL,
EPOXY AND
MONEL*

FM

APPROVED

MODEL-G METERS

-- RATING 500 PSI --
(Buttweld, Grooved,
300# Flanged)

-- RATING 275 PSI --
(150# Flanged)

CALIBRATED VENTURI &
ATTACHED GPM METER

4½" DIAL METER
MOUNTS ON
VENTURI BRACKET



**ADDITIONAL SIZES LISTED
AT WWW.GERAND.COM**

PUMP GPM	PIPE SIZE	VENTURI STYLE	METER RANGE (GPM)	VENTURI LENGTH (BUTTWELD OR GROOVED)	VENTURI LENGTH (150# FLANGED)	VENTURI LENGTH (300# FLANGED)
50	2"	685	25-100	4½" THREADED	-	-
100	2 1/2"	746	50-200	3" BUTTWELD 4" GROOVED	9½"	10"
250	4"	744	125-500	3½" BUTTWELD 3¾" GROOVED	9½"	10¾"
300	4"	744	150-600			
450	4"	744	225-900	5"	12"	13¾"
500	5"	715	250-1000			
500	6"	743	250-1000			
750	6"	743	375-1500			
1000	6"	743	500-2000	6"	13"	14¾"
1250	6"	743	625-2500			
1500	8"	750	750-3000			
2000	8"	750	1000-4000			
2500	8"	750	1250-5000	7"	15'	16¾"

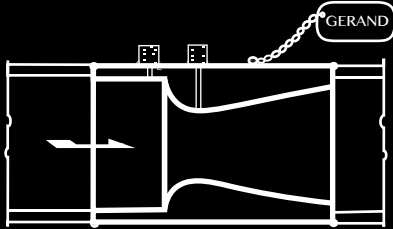
WWW.GERAND.COM FOR MORE INFORMATION

*Venturi available in Raised or Flat Face; Steel, Stainless Steel or Monel

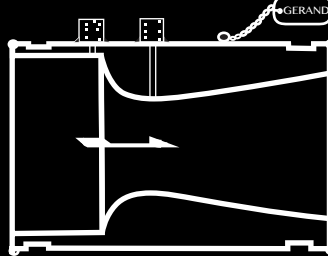
**Dual LPM/GPM Scales Available

VENTURI STYLES

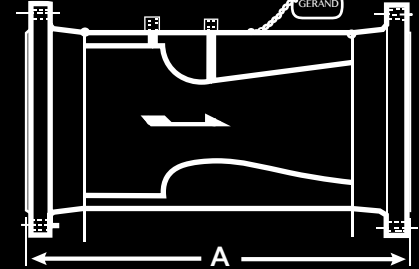
BUTTWELD



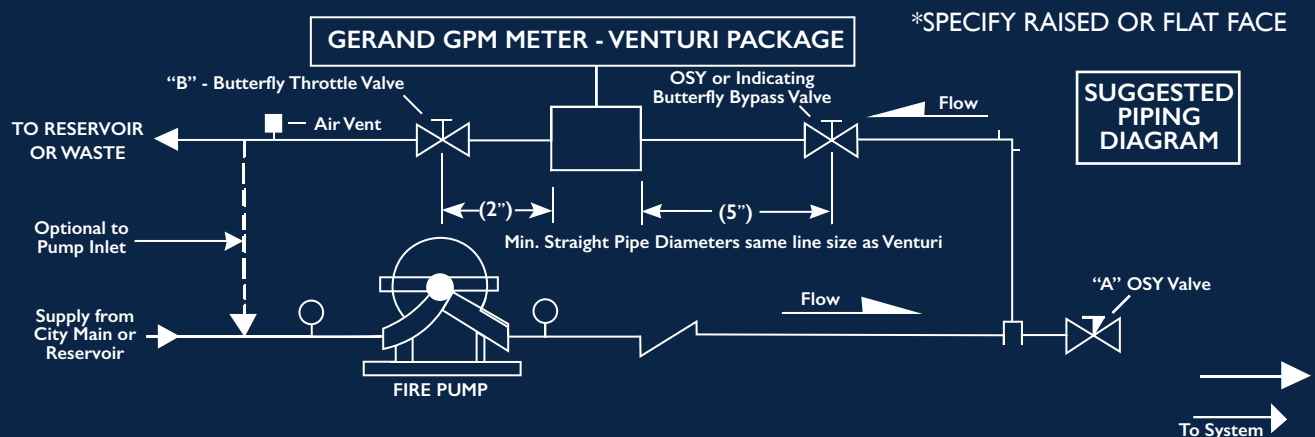
GROOVED



FLANGED



OPERATING INSTRUCTIONS



1. Close system OSY valve "A"
2. Open by-pass valve and "B" butterfly throttle valve
3. Purge meter, located on venturi, as follows:
 - a) Open station shut-off valves on venturi & vent valves attached to meter. When a steady stream of water passes through hose, meter is purged of air.
 - b) Close the vent valves after purging.

4. Start the fire pump, and read meter in GPM.
5. Refer to pump GPM requirement and adjust throttle valve to meet the requirement.
6. After the test, open valve "A" and close the by-pass and "B" valves.





MECHANICAL INDUSTRIES CO.

Vendor Ref. No.

Contractor Ref. No

Project Name:

Contractor Job No.

Air Release Valve

0	SUBMITTED FOR APPROVAL				
Rev	Description	Prepared	Checked	Approved	Date

► Simple, Reliable and Accurate



Figure A



- Ductile Iron Body
- Stainless Steel Trim and Float
- Easily serviced without removal from pipeline
- Available Pressure Ratings: 175 and 300
- Engineered for drip tight seal at low pressures

CLA-VAL Series 34 Fire Protection System Air Release Valves are designed to vent entrained air that collects at high points in a pipeline. This valve continuously eliminates air from a system by releasing small quantities of air before large air pockets can occur. In many installations, continuing accumulations of air in the pipeline (lacking air release valves); cause flow capacity to slowly decrease; power consumption slowly increases; un-noticeable at first, until flow drops dramatically, even stopping due to air blocks in the piping.

Another problem resulting from excessive air accumulation is unexplained pipeline rupture. These ruptures are passed off as the result of ground settling or defective pipe, where as in reality its large air pockets that greatly increase pressure surges (normally occurring) when flow stops and starts causing the rupture. During normal pipeline operation, air accumulation at the high point will displace the liquid within the air valve and lower the water level in relation to the float. As level of the liquid lowers, where the float is no longer buoyant, the float drops and opens the valve orifice seat and permitting accumulated air to be exhausted to atmosphere. After air is released, the liquid level in the air valve rises and closes the valve orifice seat. This cycle automatically repeats as air accumulates inside the air release valve, thereby preventing the formation of air pockets.

► INSTALLATION

Series 34 Fire Protection System Air Release Valves are typically installed at high-points in pipelines and at regular intervals, of approximate 1/2 mile, along uniform grade line pipe.

Mount the unit in the vertical position on top of the pipeline with an isolation valve installed below each valve in the event servicing is required. A vault with adequate air venting and drainage is recommended.

Note:

Vacuum check valves can be supplied on the discharge of all size air release valves to prevent air re-entering the system; during negative pressure conditions.

► PURCHASE SPECIFICATIONS

The fire protection system air release valve shall be of the float operated, simple lever or compound lever design, and capable of automatically releasing accumulated air from a fluid system while the system is pressurized and operating.

An adjustable designed orifice button shall be used to seal the valve discharge port with drip-tight shut-off. The orifice diameter must be sized for use within a given operating pressure range to insure maximum air venting capacity.

The float shall be of all stainless steel construction and guaranteed to withstand the designed system surge pressure without failure. The body and the cover shall be ductile iron and valve internal parts shall be stainless steel and Viton TM or Buna-N ® (standard) for water tight shut-off.

The air release valve shall be manufactured per ANSI/AWWA C512-04 Series 34 from CLA-VAL.

► PRODUCT SPECIFICATIONS

Sizes:

1/2", 3/4", 1"

Pressure Ratings: (see note)

175 UL/FM

300 UL

Note: Specify when operating pressure below 7 mhd (10 psi)

Temperature Range:

Water to 180°F

Materials:

Body and Cover: Ductile Iron ASTM 536 65-45-12

Float:

Stainless Steel

Internal Parts:

Stainless Steel

Seal:

Viton™ or Buna-N® (Standard)



CLA-VAL Series 34

Fire Protection System Air Release Valve

► AIR RELEASE VALVE SIZING

Air release valve sizing requires determining the volume of air that must be released from pipeline high points during normal operation and the diameter of the pipeline. Series 34 Fire Protection System Air Release Valves are primarily used to continuously release pockets of air (as they develop) from high point, hence it is not critical to determine exact volume of air to be released.

See chart on page 3 for sizing based on venting capacity.

Air Release Valve Sizing Chart For Water Pipelines

Figure A	Model No.	Inlet Size	Outlet Size	Orifice Size	GPM	MWP	Height	Width	Wt. (lbs.)
	UL Listed • FM Approved 3450-AR332 3475-AR332 3410-AR332	1/2", 3/4", 1"	1/2"	3/32"	200 -2200	175	5-7/8"	3-3/4"	6
	FM Approved 3450-AR116.3 3475-AR116.3 3410-AR116.3	1/2", 3/4", 1"	1/2"	1/16"	200 -2200	300	5-7/8"	3-3/4"	6

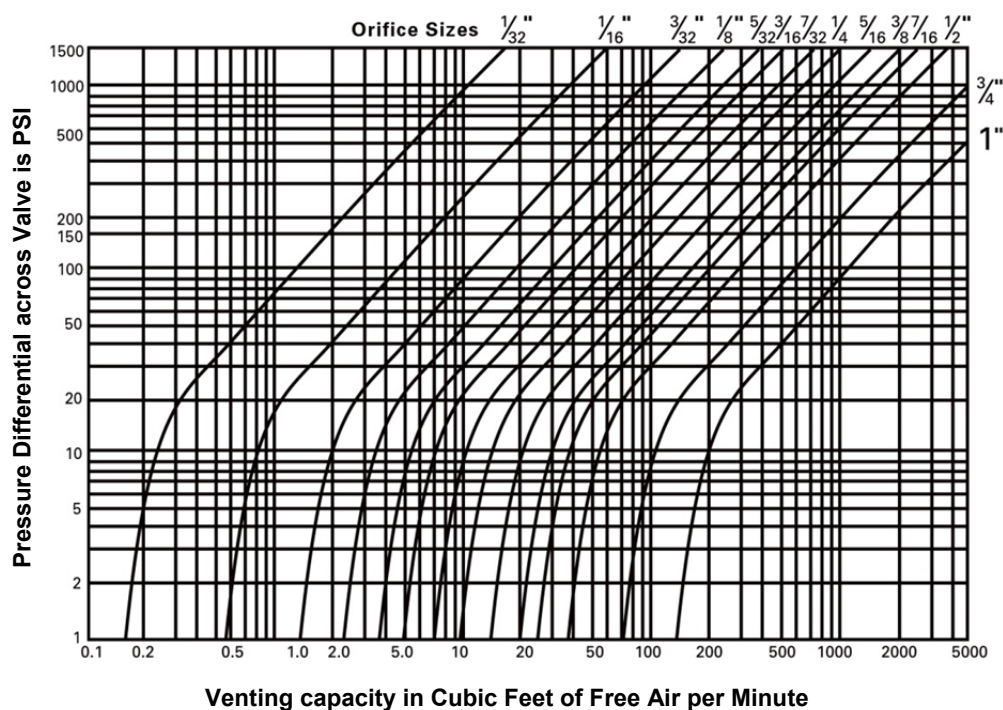


Figure A



This product complies with the California No-Lead Requirement

► VENTING CAPACITY GRAPH FOR AIR RELEASE VALVES



► VALVE SELECTION BASED ON VENTING CAPACITY

Follow these steps to select and size an air release valves when a specific venting capacity is required:

- Enter graph with required system pressure and venting capacity
- Read off nearest orifice diameter to intersection of pressure and capacity lines on graph
- Enter table above with orifice diameter and select valve that can use this orifice diameter with the corresponding pressure



Figure A

► SERIES 34 FIRE PROTECTION SYSTEM AIR RELEASE VALVE TECHNICAL DATA

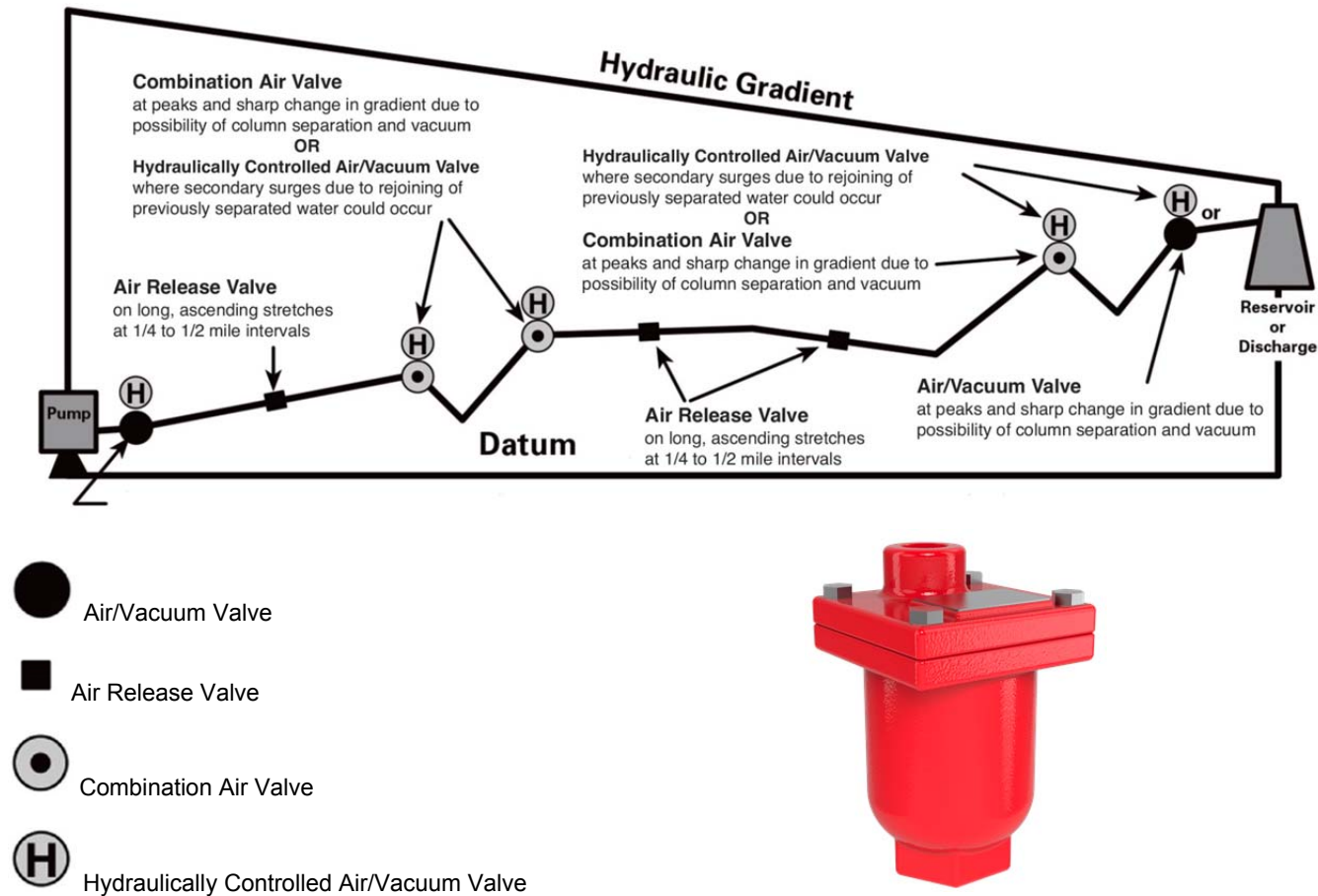


Figure A

► INSTALLATION TIPS

- The effectiveness of Series 34 Fire Protection System Air Release Valve is dependent upon it being located at appropriate highpoints in a pipeline and at uniform intervals of approximately 2500 feet on horizontal pipelines.
- There are four variables that can cause an air pocket to form slightly downstream of the true high point in a piping system:
 - Severity of the slope adjacent to the high point or change of gradient
 - Velocity of the liquid
 - Texture of the inside surface of the pipe being used
 - Viscosity of the fluid

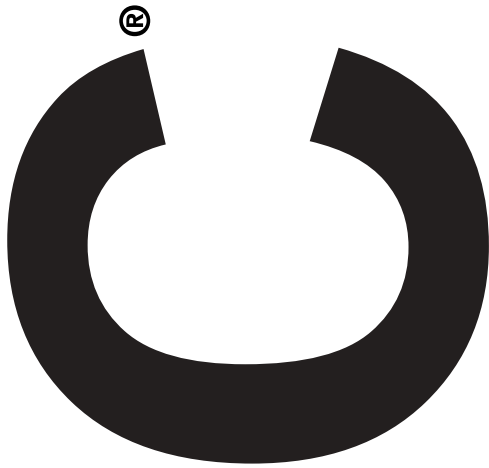
It is recommended where an air pocket can form slightly downstream of the high point, to install additional Series 34 Fire Protection System Air Release Valves at this point.
- CLA-VAL has available, upon request, a Slide Rule Air Valve Calculator. It will greatly reduce the amount of time to size valves for pipeline service.

► OTHER TYPICAL APPLICATIONS INCLUDE:

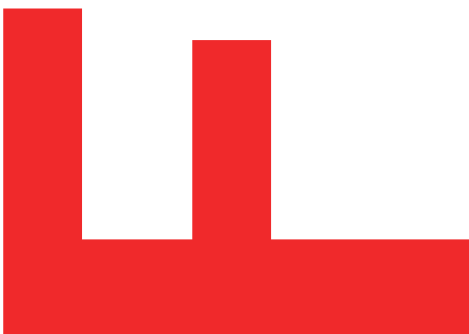
- Centrifugal pumps
- Hydropneumatic tanks
- Enclosed systems
- Sewage lines

► WHEN ORDERING, PLESASE SPECIFY:

- Model number
- Inlet size (NPT)
- Inlet pressure rating
- Orifice size



FIRE PROTECTION PRODUCTS



FWIC

Born to Protect
Effective 2021

ABOUT US

Sensor Tech, a Vision World Engineering LLC Group of company having core business in production of Extinguishers, Hose Reel & Hoses, Control Valves, Hydrants and Accessories for Fire Protection Applications.

Our group is employed with more than 1200 young and energetic Engineer's and Work force, executing various project in Oil and Gas, Marine and MEP Sectors since 1995 onwards.

Sensor Tech is totally committed to improving Quality, Health, Environmental standards. We adopt stringent Quality measure to ensure the products are of high standards as per the recommendation of International Standards.

We provide complete support and solution including Design, Installation, Commissioning of various system and services which meets the highest possible standards with Local and International Code and Standards.

We have built up a strong brand name **FWIC & WETPLUG** (UL, FM, LPCB & KM Listed) Supplying for Fire-fighting Industry, Oil and Gas, Water Works, Sewage and Marine Sectors in large quantity. FWIC & WETPLUG products are manufactured according to International Standards and are sold worldwide with our Group Headquarters at Dubai.

Sensor Tech is associated with globally renowned international companies in the safety industry such as Justrite Safety Group (Checkers Safety, Linebacker Cable Management, Monster Motion Safety, Notrax & Tufftrak.)

All our safety products are manufactured with 100% recycled materials to support Global Sustainability Policy. Recycling saves wastage, resources and energy; Hence, recycled products are important to achieve sustainability. With the sustainable product, Sensor Tech delivers go green products and a carbon free environment.

We welcome feedback on any topic and if you have any queries that are not answered on this website, simply email us.

A VISION WORLD ENGINEERING GROUP



GLOBAL ACCREDITATION

FWIC Valves has been consistently maintaining ISO 9001 Quality management system certified by TUV Rheinland of Germany.

GLOBAL CERTIFICATION

The company's reputation for quality and reliability is globally acclaimed. Its innovative fire protection and fire fighting products are certified by international bodies like UL, FM, LPCB, KM.

INDEX

Valves

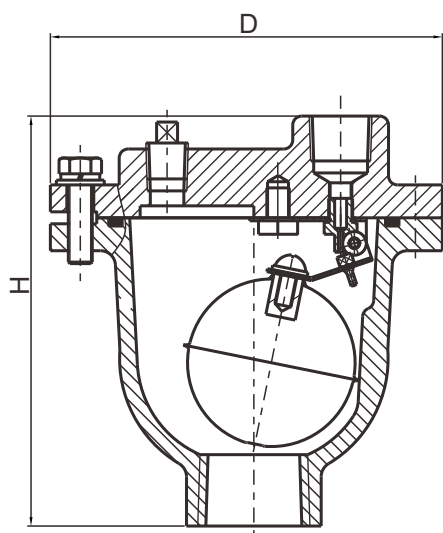
NRS Gate Valve Flange Ends 2" to 12" (UL &FM)	04
NRS Gate Valve Flange Ends 14" to 24" (UL &FM)	05
Indicator Post - Under Ground Type 4" to 12" (UL &FM)	06
Indicator Post - Under Ground Type 14" to 24" (UL &FM)	07
Indicator Post - Wall Type 4" to 12" (UL &FM)	08
NRS Gate Valve Grooved Ends 2" to 12" (UL &FM)	09
NRS Gate Valve Flange to Grooved Ends 2" to 12" (UL &FM)	10
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Air Release Valve

Screwed Ends

Model No: ST9011-200

Working pressure
200PSI



Connection Ends
NPT/BSPT/BSPP

Materials List

Part	Material	ASTM Spec.
Body	Ductile Iron	A536 65-45-12
Cover	Ductile Iron	A536 65-45-12
Level	Stainless Steel	AISI 304
Seat Ring	Stainless Steel	AISI 304
Float	Stainless Steel	AISI 304
Float Arm	Stainless Steel	AISI 304
Orifice Button	Viton	Commercial

Dimensions

DN		Inlet	Outlet	Orifice	D	H
mm	inch					
15	1/2	15	15	1.6	125	137
20	3/4	20	15	1.6	125	137
25	1	25	15	1.6	125	137

	Vendor Ref. No.	
	Vendor Doc. No.	
		Contractor Ref. No
Project Name:		Contractor Job No.

Pressure Gauge

0	SUBMITTED FOR APPROVAL				
Rev	Description	Prepared	Checked	Approved	Date

Bourdon Tube Pressure Gauges Standard Series Type 111.10SP

WIKA Datasheet 111.10SP

Applications

- Fire sprinkler systems
- Suitable for all media that will not obstruct the pressure system or attack copper alloy parts

Product Features

- UL-listed (UL-393), United States and Canada
- Factory Mutual (FM) approved
- Reliable and economical



Bourdon Tube Pressure Gauge Type 111.10SP

Specifications

Design

EN 837-1 & ASME B40.100

Sizes

4" (100 mm)

Accuracy class

± 3/2/3% of span (ASME B40.100 Grade B)

Ranges

0/80 psi (5,5 bar), retard to 250 psi (17 bar), air
0/300 psi (20 bar), water
0/400 psi (28 bar), water
0/600 psi (40 bar), water

Working pressure

Steady: 3/4 of full scale value
Fluctuating: 2/3 of full scale value
Short time: full scale value

Operating temperature

Ambient: -40°F to 140°F (-40°C to 60°C)
Media: 140°F (+60°C) maximum

Temperature error

Additional error when temperature changes from reference temperature of 68°F (20°C) ±0.4% of span for every 18°F (10°K) rising or falling.

Bourdon tube

Material: copper alloy
C-shape

Pressure connection

Material: copper alloy
1/4" NPT lower mount (LM)

Movement

Copper alloy

Dial

White aluminum with stop pin; black and red lettering

Pointer

Black aluminum

Case

Black polycarbonate

Window

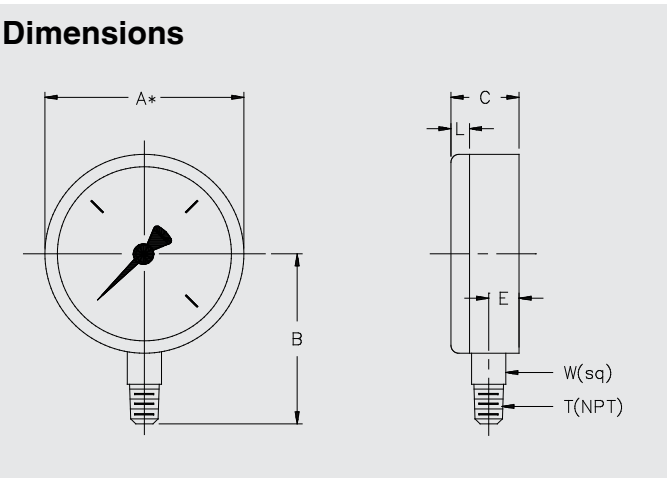
Snap-in clear polycarbonate

Approvals

UL listed (UL-393)
Factory Mutual

Optional Extras
(not all options are UL or FM approved)

- Brass restrictor
- Black-painted steel case
- Custom dial layout
- Other dual scales in combination with psi are available:
bar, kPa, MPa, kg/cm²



Size		A	B	C	E	L	T	W	Weight
4"	mm	100	71	30	11.5	3.75		14	
	in	4.0	2.79	1.18	0.45	0.15	1/4"	0.55	0.35 lb.

Ordering information
Pressure gauge model / Nominal size / Scale range / Size of connection / Optional extras required
Specifications and dimensions given in this leaflet represent the state of engineering at the time of printing.
Modifications may take place and materials specified may be replaced by others without prior notice.

Bourdon tube pressure gauge Model 111.11, welding gauge to ISO 5171

WIKA data sheet PM 01.03



for further approvals
see page 2

Applications

- For equipment and plants for welding, cutting and allied processes

Special features

- Design per ISO 5171
- Pressure relief in case back
- Reliable and cost-effective



Bourdon tube pressure gauge model 111.11

Description

Design

ISO 5171

Nominal size in mm

40, 50, 63

Accuracy class

2.5

Scale ranges

Welding engineering standard ranges for oxygen and acetylene to ISO 5171, as well as 0 ... 1 to 0 ... 400 bar to EN 837-1

Pressure limitation

Steady: 3/4 x full scale value

Fluctuating: 2/3 x full scale value

Short time: Full scale value

Permissible temperature

Ambient: -20 ... +60 °C

Medium: +60 °C maximum

Temperature effect

When the temperature of the measuring system deviates from the reference temperature (+20 °C): max. $\pm 0.4 \text{ } \%/10 \text{ K}$ of the span

Standard version

Process connection

Copper alloy, lower mount (LM), with restrictor

NS 40: G 1/8 B (male), 14 mm flats

NS 50,63: G 1/4 B (male), 14 mm flats

Pressure element

Copper alloy (with acetylene, max. 70 % copper content),
C-type or helical type

Movement

Copper alloy

Dial

Plastic, white, with pointer stop pin

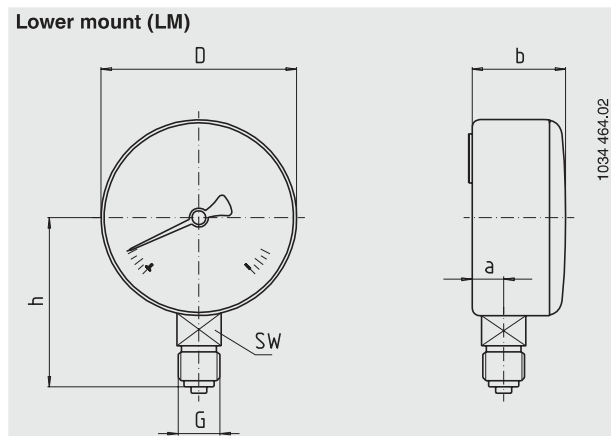
Black lettering

Pointer

Plastic, black

Dimensions in mm

Standard version



NS	Dimensions in mm						Weight in kg
	a	b	D	G	h ±1	SW	
40	9.5	26	39	G ⅛ B	36	14	0.09
50	9.5	28	49	G ¼ B	45	14	0.11
63	9.5	28	62	G ¼ B	53.5	14	0.15

Process connection per EN 837-1 / 7.3

Ordering information

Model / Nominal size / Scale range / Connection size / Options

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The specifications given in this document represent the state of engineering at the time of publishing.
We reserve the right to make modifications to the specifications and materials.

Case

Steel, brass-coloured,
with pressure relief in case back

Window

Polycarbonate, snap-fitted in case

Options

- Other process connection
- Sealings (model 910.17, see data sheet AC 09.08)
- Case brass or stainless steel
- Slip-on bezel
- Back mount (BM)
- Acetylene pressure gauge for pressure regulators for manifold systems per ISO 7291 (BAM tested)

CE conformity

Pressure equipment directive

97/23/EC, PS > 200 bar, module A, pressure accessory

Approvals

- GOST, metrology/measurement technology, Russia
- GOST-R, import certificate, Russia
- CRN, safety (e.g. electr. safety, overpressure, ...), Canada

Certificates ¹⁾

- 2.2 test report per EN 10204 (e.g. state-of-the-art manufacturing, material proof, indication accuracy)
- 3.1 inspection certificate per EN 10204 (e.g. indication accuracy)

1) Option

Approvals and certificates, see website



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www.wika.de

	Vendor Ref. No.	
	Vendor Doc. No.	
		Contractor Ref. No.
Project Name:	Contractor Job No.	

Gear Drive

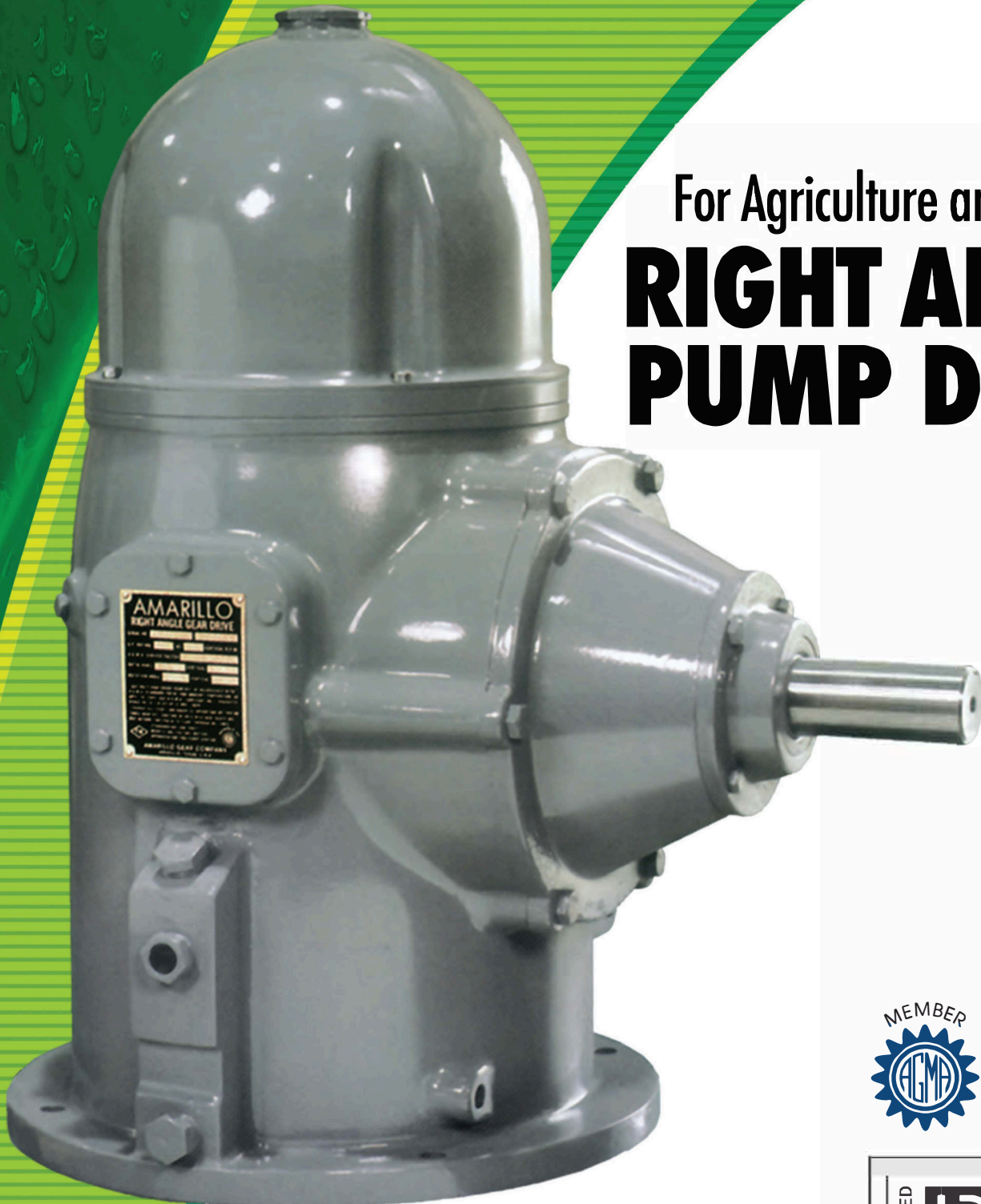
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Rev	Description	Prepared	Checked	Approved	Date

Amarillo® Gear Company LLC



For Agriculture and Industry

RIGHT ANGLE PUMP DRIVE



A Marmon |
Berkshire Hathaway
Company



SELECTION OF THE PROPER DRIVE

MODEL DESIGNATION: The model number designates the basic horsepower rating at 1760 RPM pump speed. The number is preceded by one of the following letter designations to define the type of drive:

- SL Standard Hollow Shaft Drive with Opposed Thrust Capacity
- S Standard Hollow Shaft Drive with Standard Thrust Capacity
- SH Standard Hollow Shaft Drive with Heavy Thrust Capacity

EFFICIENCY: Through the use of high quality gears and bearings, transmission efficiency ranges from 94% to 98% varying with speed, horsepower and thrust. Actual efficiency values will be furnished upon request.

GEARS: All drives are furnished with spiral bevel gears, designed in accordance with AGMA (American Gear Manufacturers Association) standards for both strength and surface durability, employing a minimum service factor of 1.50 at rated horsepower.

RATIO SELECTION - SEE PRICE LIST FOR RATIO AVAILABILITY

(Speeds shown are for nominal ratios. Actual ratios may vary by up to 3%)

VERTICAL SHAFT RPM	SPEED INCREASERS - RATIO AND INPUT SPEED						
	1:1	10:11	5:6	3:4	2:3	4:7	1:2
720	720	655	600	540	480	411	360
870	870	791	725	653	580	497	435
960	960	873	800	720	640	549	480
1160	1160	1055	967	870	773	663	580
1460	1460	1327	1217	1095	973	834	730
1760	1760	1600	1467	1320	1173	1006	880
3460	3460	3145	2883	2595	2307	1977	1730

VERTICAL SHAFT RPM	SPEED DECREASERS - RATIO AND INPUT SPEED								
	11:10	6:5	5:4	4:3	3:2	7:4	2:1	5:2	3:1
720	792	864	900	960	1080	1260	1440	1800	2160
870	957	1044	1088	1160	1305	1523	1740	2175	2610
960	1056	1152	1200	1280	1440	1680	1920	2400	2880
1160	1276	1392	1450	1547	1740	2030	2320	2900	3480
1460	1606	1752	1825	1947	2190	2555	2920	3650	---
1760	1936	2112	2200	2347	2640	3080	3520	---	---

HORSEPOWER AND THRUST RATINGS

MODEL	Vertical Shaft Speed (RPM)	H.P. Rating	DOWNTHRUST CAPACITY IN POUNDS					
			Type SL		Type S		Type SH	
			Min.	Cont.	Min.	Cont.	Min.	Cont.
30	1160	22	0	978	797	2358		
	1460	26	0	901	759	2173		
	1760	30	0	850	700	2050		
40	1160	30	0	1495	1138	4600	1138	6900
	1460	35	0	1378	1055	4240	1055	6360
	1760	40	0	1300	1000	4000	1000	6000
60A	960	39	0	2074	1490	6222	1490	8540
	1160	45	0	1955	1422	5865	1422	8050
	1460	53	0	1802	1331	5406	1331	7420
80A	1760	60	0	1700	1250	5100	1250	7000
80A	960	52	0	3904	2085	7564	2085	11224
	1160	60	0	3680	1991	7130	1991	10580
	1460	70	0	3392	1846	6572	1846	9752
100A	1760	80	0	3200	1750	6200	1750	9200
100A	960	65	0	3904	2085	7564	2085	11224
	1160	75	0	3680	1991	7130	1991	10580
	1460	88	0	3392	1856	6572	1856	9752
125A	1760	100	0	3200	1750	6200	1750	9200
125A	960	82	0	5002	2673	8174	2673	12688
	1160	93	0	4715	2567	7705	2567	11960
	1460	110	0	4346	2387	7102	2387	11024
150A	1760	125	0	4100	2250	6700	2250	10400
150A	720	80	0	6750	3564	11070	3564	17010
	960	98	0	6100	3234	10004	3234	15372
	1160	112	0	5750	3086	9430	3086	14490
200A	1460	132	0	5300	2864	8692	2864	13356
	1760	150	0	5000	2700	8200	2700	12600
200A	720	108	0	6750	3564	12150	3564	18225
	960	130	0	6100	3218	10980	3218	16470
	1160	150	0	5750	3072	10350	3072	15525
	1460	176	0	5300	2864	9540	2864	14310
	1760	200	0	5000	2700	9000	2700	13500

Cont. = Continuous Thrust Rating

MODEL	Vertical Shaft Speed (RPM)	H.P. Rating	DOWNTHRUST CAPACITY IN POUNDS					
			Type SL		Type S		Type SH	
			Min.	Cont.	Min.	Cont.	Min.	Cont.
250	720	134			0	17500	0	22275
	960	164			0	15860	0	20130
	1160	187			0	14950	0	18975
	1460	219			0	13780	0	17490
	1760	250			0	13000	0	16500
300	720	162			0	17550	0	22275
	960	195			0	15860	0	20130
	1160	225			0	14950	0	18975
	1460	264			0	13780	0	17490
	1760	300			0	13000	0	16500
350	720	187			0	17550	0	22275
	960	229			0	15860	0	20130
	1160	261			0	14950	0	18975
	1460	307			0	13780	0	17490
	1760	350			0	13000	0	16500
450A	720	241	0	8100	4631	25650	4631	33750
	960	294	0	7320	4175	23180	4175	30500
	1160	336	0	6900	3979	21850	3979	28750
	1460	395	0	6360	3713	20140	3713	26500
	1760	450	0	6000	3500	19000	3500	25000
500A	720	267	0	8100	5544	28350	5544	36450
	960	327	0	7320	5005	25620	5005	32940
	1160	373	0	6900	4779	24150	4779	31050
	1460	439	0	6360	4455	22260	4455	28620
	1760	500	0	6000	4200	21000	4200	27000
600A	720	321	0	10800	5940	36450	5940	43200
	960	393	0	9760	5363	32940	5363	39040
	1160	448	0	9200	5121	31050	5121	36800
	1460	526	0	8480	4774	28620	4774	33920
	1760	600	0	8000	4500	27000	4500	32000
750A	720	401	0	10800	6600	36450	6600	45225
	870	458	0	10080	6177	34020	6177	42210
	960	491	0	9760	5964	32940	5964	40870
	1160	560	0	9200	5695	31050	5695	38525
	1460	658	0	8480	5304	28620	5304	35510
1000G	1760	750	0	8000	5000	27000	5000	33500
1000G	720	535	0	10800	6600	36450	6600	45225
	870	611	0	10080	6177	34020	6177	42210
	960	654	0	9760	5964	32940	5964	40870
	1160	747	0	9200	5695	31050	5695	38525
	1460	877	0	8480	5304	28620	5304	35510
	1760	1000	0	8000	5000	27000	5000	33500

STANDARD COUPLING DIMENSIONS (INCH)

NOM-INAL	ACTUAL	GIB KEYWAY	BY	BZ	XL
3/4	.751	3/16 X 3/32	10-32	1 3/8	9/32
7/8	.876	1/4 X 1/8	10-32	1 3/8	9/32
1	1.001	1/4 X 1/8	10-32	1 3/8	9/32
1 3/16	1.188	1/4 X 1/8	1/4 -20	1 3/4	9/32
1 1/4	1.251	1/4 X 1/8	1/4 -20	1 3/4	9/32
1 1/4	1.251	3/8 X 3/16	1/4 -20	1 3/4	9/32
1 7/16	1.438	3/8 X 3/16	1/4 -20	2 1/8	9/32
1 1/2	1.501	3/8 X 3/16	1/4 -20	2 1/8	9/32
1 11/16	1.688	3/8 X 3/16	1/4 -20	2 1/2	9/32
1 3/4	1.751	3/8 X 3/16	1/4 -20	2 1/2	9/32
1 15/16	1.938	1/2 X 1/4	1/4 -20	2 1/2	9/32
2	2.001	1/2 X 1/4	1/4 -20	2 1/2	9/32
2 3/16	2.188	1/2 X 1/4	3/8 -16	3 1/4	9/32
2 1/4	2.251	1/2 X 1/4	3/8 -16	3 1/4	9/32
2 7/16	2.438	5/8 X 5/16	3/8 -16	3 1/4	9/32
2 1/2	2.501	5/8 X 5/16	3/8 -16	3 1/4	9/32
2 11/16	2.688	5/8 X 5/16	3/8 -16	3 3/4	9/32
2 3/4	2.751	5/8 X 5/16	3/8 -16	3 3/4	9/32
2 15/16	2.938	3/4 X 3/8	3/8 -16	3 3/4	7/16

TABLE OF DIMENSIONS STANDARD DRIVE (INCH)

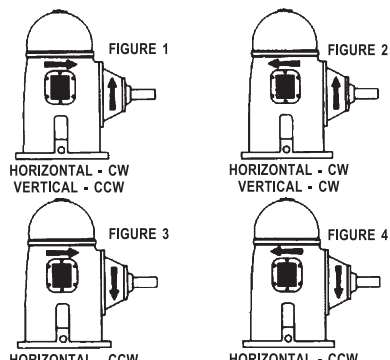
Model	D	N	Horizontal Shaft U			Type SL		Type S		Type SH		AJ	AK	BB	BD	BE	BF	XA	XB	XC	XD	XE	XF	XG	XH	XJ	XK	XV	XW	** BX MAX.
			Nom-inal	Actual	Keyway	AG	CD	AG	CD	AG	CD																			
30	6 3/4	2 3/8	1 1/4	1.249	5/16 X 5/32	16 1/4	13 3/4	16 1/4	13 3/4	17 1/4	14 3/4	9 1/8	8.250	3/16	10	5/8	7/16	10 7/8	-	--	1 5/16	3/8	3/8	5/16	--	--	--	--	--	1
40AB	8 3/4	4 3/8	1 1/2	1.499	3/8 X 3/16	22	18 1/4	22	18 1/4	--	--	9 1/8, 14 1/4	8.250, 13.500	1/4	16 1/2	13/16	7/8, 1 1/8	15 5/8	-	--	1 3/4	1/2	1/2	1 1/4	2	2 1/4	3/8	0	6 3/8	1 1/4
60A	11 1/2	4 1/4	1 1/2	1.499	3/8 X 3/16	28	23 5/16	28	23 5/16	29 1/4	24 9/16	14 3/4	13.500	1/4	16 1/2	3/4	1 1/8	16 3/4	-	--	2	3/4	3/4	1 5/8	3	2	3/8	3 3/8	4 1/4	1 1/2
80A	11 1/2	4 1/4	1 7/8	1.874	3/8 X 3/16	29 1/4	24 9/16	28	23 5/16	29 3/8	24 1 1/16	14 3/4	13.500	1/4	16 1/2	3/4	1 1/8	16 3/4	-	--	2	3/4	3/4	1 5/8	3	2	3/8	3 3/8	4 1/4	1 1/2
100A	11 1/2	4 1/4	1 7/8	1.874	3/8 X 3/16	29 1/4	24 9/16	28	23 5/16	29 3/8	24 1 1/16	14 3/4	13.500	1/4	16 1/2	3/4	1 1/8	16 3/4	-	--	2	3/4	3/4	1 5/8	3	2	3/8	3 3/8	4 1/4	1 1/2
125A	11 1/2	4 1/4	1 7/8	1.874	3/8 X 3/16	29 1/4	24 9/16	29 1/4	24 9/16	29 3/8	24 1 1/16	14 3/4	13.500	1/4	16 1/2	3/4	1 1/8	16 3/4	-	--	2	3/4	3/4	1 5/8	3	2	3/8	3 3/8	4 1/4	1 1/2
150A	11 1/2	4 1/2	2 1/16	2.436	5/8 X 5/16	29 3/8	25 1/8	29 3/8	25 1/8	31 1/8	26	14 3/4	13.500	1/4	16 1/2	3/4	1 1/8	18 3/4	-	--	2 1/4	3/4	3/4	1 5/8	3	2	3/8	3 3/8	4 1/4	1 1/16
200A	13 3/4	5 1/4	2 1/16	2.436	5/8 X 5/16	34 1 1/16	30 3/16	34 1 1/16	30 3/16	35 5/16	30 3 1/16	18 1/4	13.500	1/4	20	1 1/8	1 1/8	20 3/4	14 3/4	5/8-11-NC	3	3/4	3/4	2 1/8	4 1/2	2 5/8	1/2	5	5	2
250	13 3/4	5 1/4	2 15/16	2.936	3/4 X 3/8	--	--	34 1 1/16	30 3/16	36 5/16	31 13/16	18 1/4	13.500	1/4	20	1 1/8	1 1/8	22 3/8	14 3/4	5/8-11-NC	3	3/4	3/4	2 1/8	4 1/2	2 5/8	1/2	5	5	2 3/16
* 300	13 3/4	5 1/4	2 15/16	2.936	3/4 X 3/8	--	--	34 1 1/16	30 3/16	36 5/16	31 13/16	18 1/4	13.500	1/4	20	1 1/8	1 1/8	22 3/8	14 3/4	5/8-11-NC	3	3/4	3/4	2 1/8	4 1/2	2 5/8	*	*	*	2 3/16
* 350	13 3/4	5 1/4	2 15/16	2.936	3/4 X 3/8	--	--	34 1 1/16	30 3/16	36 5/16	31 13/16	18 1/4	13.500	1/4	20	1 1/8	1 1/8	22 3/8	14 3/4	5/8-11-NC	3	3/4	3/4	2 1/8	4 1/2	2 5/8	*	*	*	2 3/16
450A	16	6	2 15/16	2.936	3/4 X 3/8	42 7/8	36 7/8	43 1/4	38	45 3/4	38 1/4	23	13.500	1/4	24 1/2	1 1/8	1 3/8	+25 1/2	14 3/4	5/8-11-NC	3	3/4	3/4	1 13/16	4 1/2	2 3/4	3/4	7 3/4	7 3/4	2 7/16
500A	16	6	3 1/8	3.124	3/4 X 3/8	42 7/8	36 7/8	43 1/4	38	45 3/4	38 1/4	23	13.500	1/4	24 1/2	1 1/8	1 3/8	+25 1/2	14 3/4	5/8-11-NC	3	3/4	3/4	1 13/16	4 1/2	2 3/4	3/4	7 3/4	7 3/4	2 7/16
600A	16	6	3 3/4	3.749	7/8 X 7/16	42 7/8	36 7/8	43 1/4	38	45 3/4	38 1/4	23	13.500	1/4	24 1/2	1 1/8	1 3/8	+25 1/2	14 3/4	5/8-11-NC	3	3/4	3/4	1 13/16	4 1/2	2 3/4	3/4	7 3/4	7 3/4	2 7/16
750A	18	6	3 3/4	3.749	7/8 X 7/16	48	41 3/8	50	42	50	42 9/16	23	13.500	1/4	24 1/2	1 1/8	1 3/8	+26 3/4	14 3/4	5/8-11-NC	3	1	1	1 13/16	6	2 7/8	3/4	8 1/4	8 1/4	2 7/16
1000G	21	8	4	3.998	1 X 1/2	62 1/4	50 1/4	62 1/4	50 1/4	62 1/4	50 1/4	28 3/4	22.000	1/4	30 1/2	1 1/4	1 3/8	36 7/8	26	3/4-10-NC	3 3/4	3/4	3/4	2 5/16	6 1/4	3 3/8	3/4	8	8 1/2	2 5/16

*"XA" dimensions shown apply to 1:1 and speed increasing ratios only. Request certified drawing for others.

*Models 300 and 350 furnished with external heat exchanger.

**Contact factory for maximum coupling bore for Fig. 2 or Fig. 3 rotation with 1:2 or 1:3 ratio.

RATIOS AND ROTATIONS: The ratio of a drive is defined as the ratio of the horizontal input speed to vertical output speed. For example, a 2:1 ratio would have a horizontal speed of twice the vertical speed. There are four rotational schemes available as shown in figures 1, 2, 3, and 4. Figure 1 is denoted as standard rotation. Figures 2, 3, and 4 are special rotation, being manufactured only on order, and are not subject to cancellation without charge for completed parts.



CW - Clockwise; CCW - Counterclockwise.

HORSEPOWER AND THRUST BEARING RATINGS

Vertical Shaft R.P.M.	Percent of Rated Horsepower	Percent of Thrust Capacity	Vertical Shaft R.P.M.	Percent of Rated Horsepower	Percent of Thrust Capacity
430	37%	160%	*2000	107%	96%
580	46%	145%	*2200	112%	93%
690	52%	137%	*2400	117%	90%
720	53%	135%	*2600	122%	88%
870	61%	126%	*2800	128%	86%
960	65%	122%	*3000	134%	84%
1160	75%	115%	*3460	146%	80%
1460	88%	106%	*3600	150%	79%
1760	100%	100%			

* Cooling coils should be specified for models 40, 60A, and 80A operating at speeds above 1760 rpm. Consult with the factory on all applications when the vertical speeds exceed 1760 rpm. Maximum allowable cooling water pressure for cooling coils is 100 psi and heat exchanger is 150 psi.

An Introduction To Our Company

In 1934, Amarillo Gear Company began designing and manufacturing Spiral Bevel Right Angle Gear Drives primarily for the irrigation industry. Because of the reliable, efficient and economic operation of these drives, they met with widespread acceptance.

Today, we manufacture the largest selections of Right Angle Gear Drives available. Our standard models include a large assortment of drives in a wide range of ratios and various configurations. They are highly adaptable to many applications in many different industries.

One reason for the continued growth and acceptance of Amarillo Gear Drives is their consistent quality - not only in the materials used, but in their workmanship as well.

We would welcome the opportunity to supply our product for your requirements.

FEATURES:

Cooling coils are available on Models 40, 60A, and 80A, at additional cost, and are standard on Model 100A and above. Non-reverse clutches are standard on all drives. Marine options are available upon request.

Our rigid castings are designed to insure correct alignment. Gears are case hardened alloy steel, lapped in pairs. All drives have positive oil pressure distribution systems. All bearings used in construction are name brand and high quality, with proven reputations for reliability; providing bearing life exceeding AGMA recommendations.



All standard hollow shaft gear drives through Model 1200 are approved by FACTORY MUTUAL for use with vertical fire pumps.

SPECIAL DRIVES

Drives listed in this catalog may also be available with additional options. Please contact the factory for availability and pricing of these options. For applications that require power ratings larger than listed in this catalog, please visit our website at www.amarillogear.com, under the tabs for Large Pump and Large Flood. Literature for these larger models can be selected directly from the website.

Amarillo Gear Company reserves the right to make improvement modifications to our gear drives that may change the given dimensions. The dimensions shown in this brochure may not exactly reflect the dimensions of the gear drives currently being offered. Request a Certified Dimensional Print for construction use.

WEIGHTS AND BOX DIMENSIONS

MODEL	NET WEIGHT (lbs.)	DOMESTIC SKID (lbs)	EXPORT BOX		EXPORT BOX Length	DIMENSIONS (inches)		VOLUME CUBIC FEET
			Pounds	Kilograms		Width	Height	
30	92	110	125	57	22	14	21	4
40A	220	240	275	125	27	15	27	6
40B	230	260	310	141	29	18	27	8
60A	325	350	390	177	29	19	34	11
80A	345	370	410	186	29	19	34	11
100A, 125A	365	390	430	195	29	19	34	11
150A	430	450	505	229	31	19	36	12
200A	630	675	810	368	35	24	42	20
250, 300, 350	760	810	900	408	38	24	40	21
450A	1340	1420	1620	735	44	32	52	42
500A	1370	1450	1650	748	44	32	52	42
600A	1420	1465	1665	755	44	32	52	42
750A	1915	1890	2165	982	45	32	57	48
1000G	2900	3055	3310	1501	58	37	74	92

To view Amarillo's complete warranty terms, please visit www.amarillogear.com