# INSTRUCTIONS MANUAL

*Keep for future use!*

## POLYUREA SPRAY SYSTEM

Serial Number:


**VR COATINGS PVT.LTD.**

**OFFICE: J-138, MIDC PUNE – 411 026, INDIA.**

TEL : + 91 - 20 - 69180136 / 27130331

E-MAIL: vrcoatings@eth.net

**Factory: Plot No.136, Sector No.7, PCNTDA, Bhosari, Pune – 411 026, INDIA.**

TEL: + 91 – 20 - 69180106

E-MAIL: service@vrcoatings.com

Mr. Pascal D'souza (Technical Director)

+91- 9822655891

# INSTRUCTIONS MANUAL

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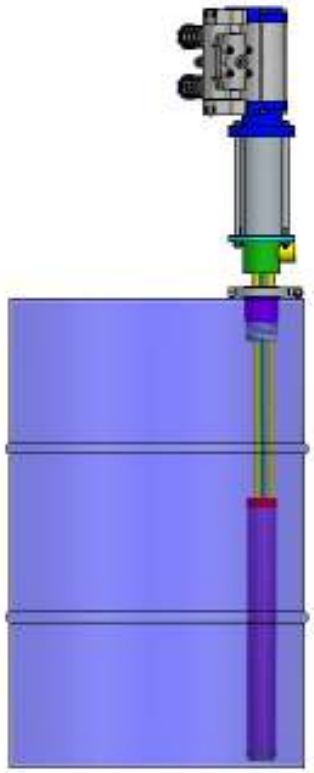

200 LTRS. BARREL TRANSFER PUMP

Serial Number:


**VR COATINGS PVT.LTD.**

**OFFICE: J-138, MIDC PUNE – 411 026, INDIA.**

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# CONTENT

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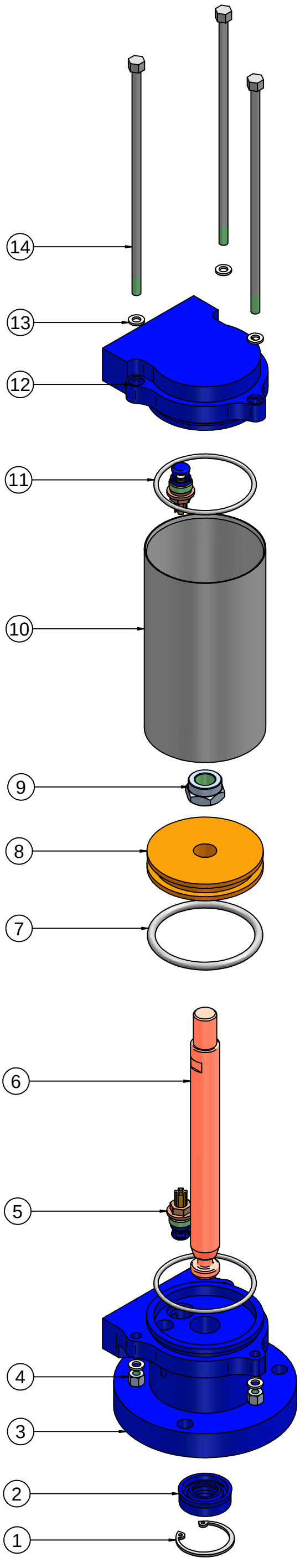
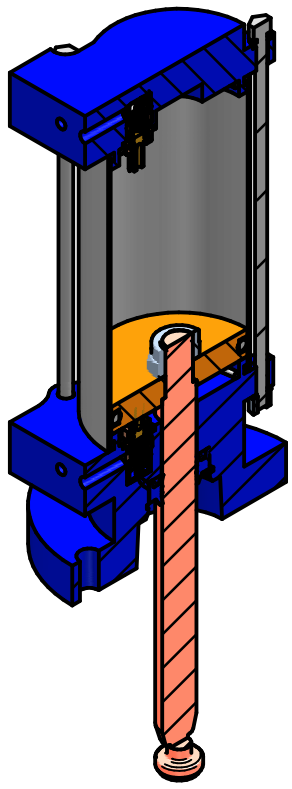
# TECHNICAL SPECIFICATION

## POLYUREA SPRAY SYSTEM - 2K/270/110X2

| | |
|---|---|
| **Type** | **2K/270/110x2** |
| **Mixing Ratio** | **1 :1** |
| **Transfer Ratio** | **55:1** |
| **Output Per Cycle** | **220 cc** |
| **Air motor Piston Ø** | **270 mm** |
| **Spray Volume @ 40 cycles/min** | **8.8 ltr/min** |
| **Air In Max** | **6 bar** |
| **Max. Pressure** | **330 bar** |
| **Air consumption N ltr @ 40 cycles/min** | **3850** |
| **Inline Heaters** | **7kw x 2nos.** |
| **Temperature Range** | **Up to 100˚ C** |
| **Power Supply** | **415 VAC-3 phone 50 Hz 5 wire R-Y-B-N-E copper flexible 6sq.mm x 5 core cable for incoming feeder** |



| | PART NAME | OLD PART NO. | NEW PART NO. |
|---|---|---|---|
| A | AIR SEAL | 01 080 012 00 | 01 080 012 57 |

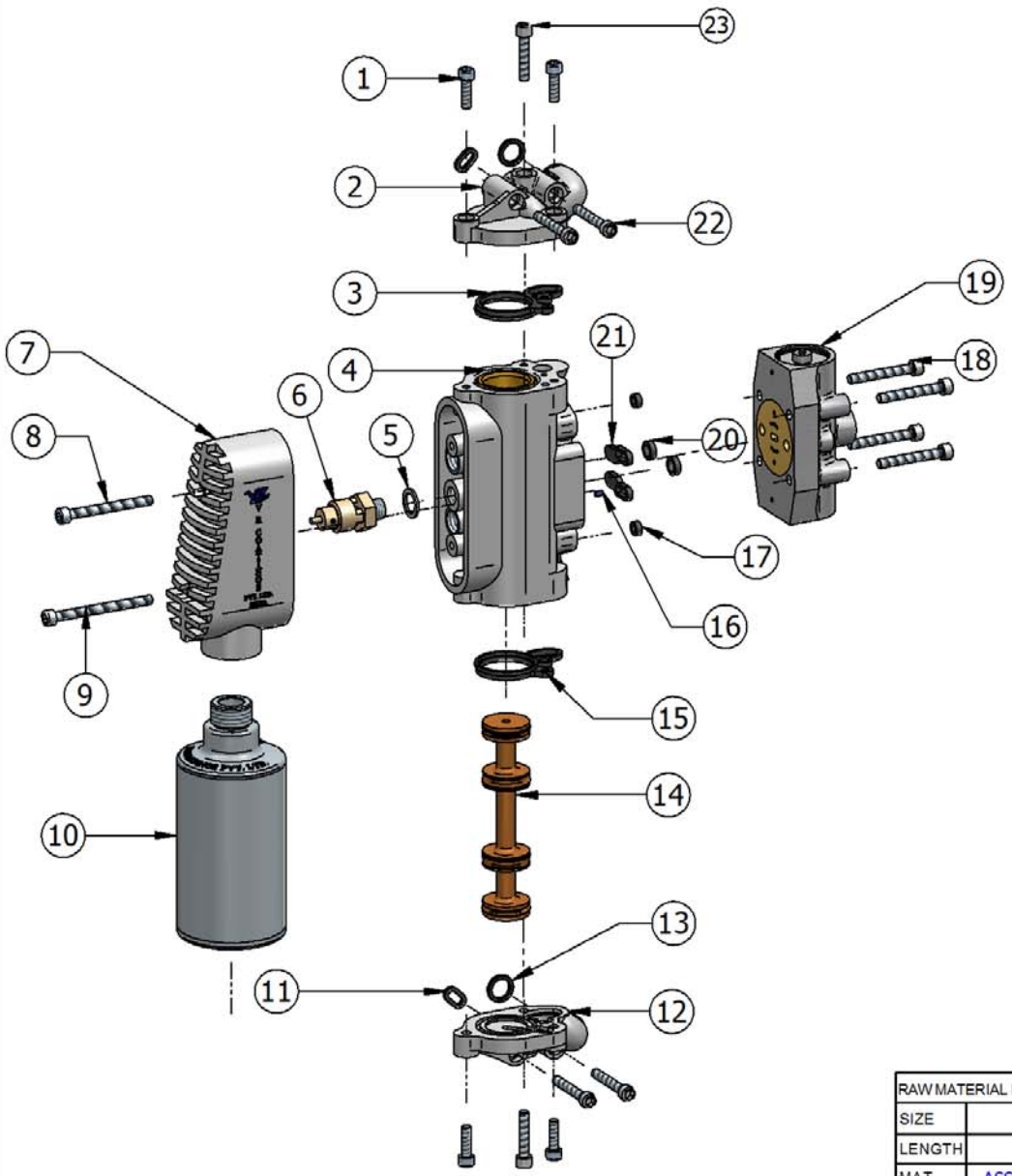
(DIRECTLY REPLACIBLE)

(NOTE : W& T ITEMS ARE SOLD WITH SERVICE KIT ONLY)

| | | | | | |
|---|---|---|---|---|---|
| | 01 080 700 00 | SERVICE KIT | – | – | SET |
| | 02 080 010 31 | GASKET | – | – | 2 |
| 14 | 01 080 003 19 | STUD | 3 | | – |
| 13 | 20 011 037 19 | WASHER M6 | 6 | | – |
| 12 | 01 080 001 02 | TOP CASTING | 1 | | – |
| 11 | 01 080 010 25 | O-RING | 2 | Y | 2 |
| 10 | 01 080 004 01 | CYLINDER | 1 | | – |
| 9 | 01 080 006 19 | NUT | 1 | | – |
| 8 | 01 080 008 01 | PISTON DISC | 1 | | – |
| 7 | 01 080 007 25 | O-RING | 1 | Y | 1 |
| 6 | 01 080 009 19 | PISTON | 1 | | – |
| 5 | 61 110 008 00 | SENSING VALVE | 2 | Y | 2 |
| 4 | 15 207 008 19 | NUT (M6X1) | 3 | | – |
| 3 | 01 080 011 02 | BOTTOM CASTING | 1 | | – |
| 2 | 01 080 012 57 | AIR SEAL | 1 | Y | 1 |
| 1 | 01 080 014 07 | CIRCLIP | 1 | | – |
| SR.NO. | PART NO. | PART NAME | QTY. | W&T | |

Note: Gasket shown in assembly dwg of Control Block

| | | | | | |
|---|---|---|---|---|---|
| RAW MATERIAL DESCRIPTION | | NOTE: | | | |
| SIZE | | | | | |
| LENGTH | | ALL DIMN. ARE IN MM UNLESS OTHERWISE STATED. FOR OPEN TOLERANCE AND SURFACE ROUGHNESS SEE STANDARD CHART DD-01/CH-01. REMOVE SHARP CORNERS. INCASE OF DOUBT ASK. | | | |
| MAT. | | | | | |
| VR COATINGS PVT.LTD. J-138, MIDC, BHOSARI, PUNE-411 026 INDIA | | DRN. | CKD. | APPD. | PART NAME: AIR MOTOR D 80 S 120 |
| | SIGN | ROHIT | Albert | NVD | |
| | DATE | | | | PART NO.: 01 080 000 00 |
| | SCALE | NOT TO SCALE | | | |




NOTE : W & T ITEMS ARE SOLD WITH SERVICE KIT ONLY.

| | 02 081 700 01 | SERVICE KIT | - | - | SET |
|---|---|---|---|---|---|
| 23 | 15 330 008 19 | ALLEN BOLT(M6X30) | 2 | | - |
| 22 | 15 340 008 19 | ALLEN BOLT M6 | 4 | | - |
| 21 | 02 081 021 57 | MID BLOCK GASKET | 2 | Y | 2 |
| 20 | 02 081 022 57 | MID BLOCK GASKET | 2 | Y | 2 |
| 19 | 02 081 001 00 | SIDE BLOCK ASSEMBLY | 1 | | - |
| 18 | 15 345 008 19 | ALLEN BOLT (M6X45) | 4 | | - |
| 17 | 02 081 023 57 | MID BLOCK GASKET | 2 | Y | 2 |
| 16 | 02 080 021 22 | PIN Ø3 X 5 | 1 | Y | 1 |
| 15 | 02 081 042 57 | BOTTTOM GASKET | 1 | Y | 1 |
| 14 | 02 081 003 00 | SLIDER ASSEMBLY | 1 | Y | 1 |
| 13 | 02 081 026 57 | MID BLOCK GASKET | 2 | Y | - |
| 12 | 02 081 029 02 | BOTTOM BLOCK | 1 | | - |
| 11 | 02 081 025 57 | MID BLOCK GASKET | 2 | Y | 2 |
| 10 | 02 081 036 00 | SILENCER ASSLY (TIGER) | 1 | | - |
| 9 | 15 370 008 19 | ALLEN BOLT(M6x70L) | 1 | | - |
| 8 | 15 360 008 19 | ALLEN BOLT (M6X60) | 1 | | - |
| 7 | 02 081 031 02 | TIGER CB CAP | 1 | | - |
| 6 | 20 043 000 00 | AIR SAFETY VALVE 1/4' | 1 | | - |
| 5 | 19 002 001 19 | WASHER 1/4" | 1 | | - |
| 4 | 02 081 044 00 | MIDDLE BLOCK ASM. | 1 | | - |
| 3 | 02 081 043 57 | TOP GASKET | 1 | Y | 1 |
| 2 | 02 081 027 02 | TOP BLOCK | 1 | | - |
| 1 | 15 320 008 19 | ALLEN BOLT M6X20 | 4 | | - |
| SR NOS. | PART NO. | PART NAME | QTY. | W & T | SERVICE KIT QTY. |

| | | | |
|---|---|---|---|
| RAW MATERIAL DESCRIPTION | NOTE: | TIGER NEW CONTROL BLOCK | |
| SIZE | | | |
| LENGTH | | ALL DIMN. ARE IN MM UNLESS OTHERWISE STATED. FOR OPEN TOLERANCE AND SURFACE ROUGHNESS SEE STANDARD CHART DD-01/CH-01. REMOVE SHARP CORNERS. INCASE OF DOUBT ASK. | |
| MAT. | ASSEMBLY | | |

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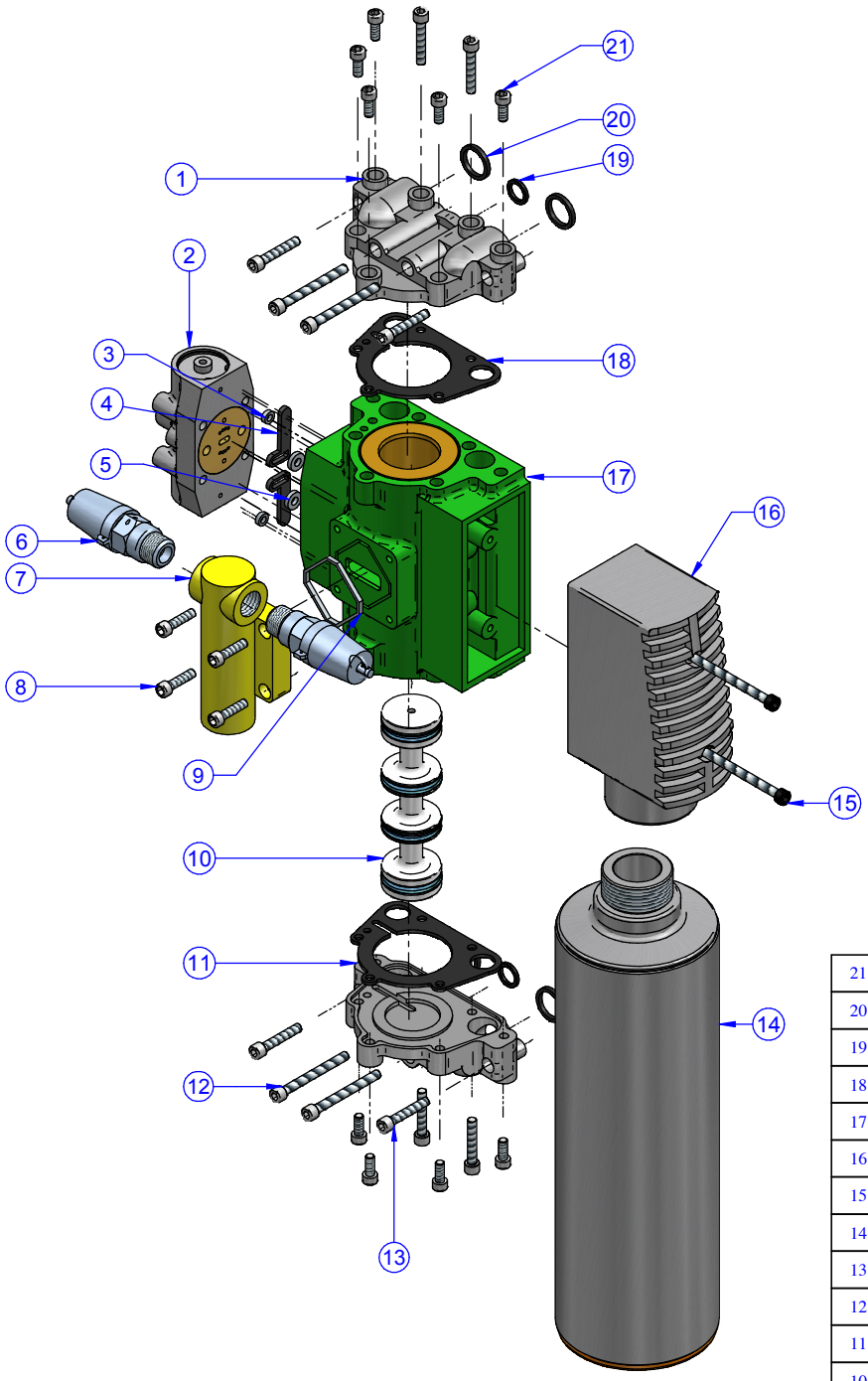
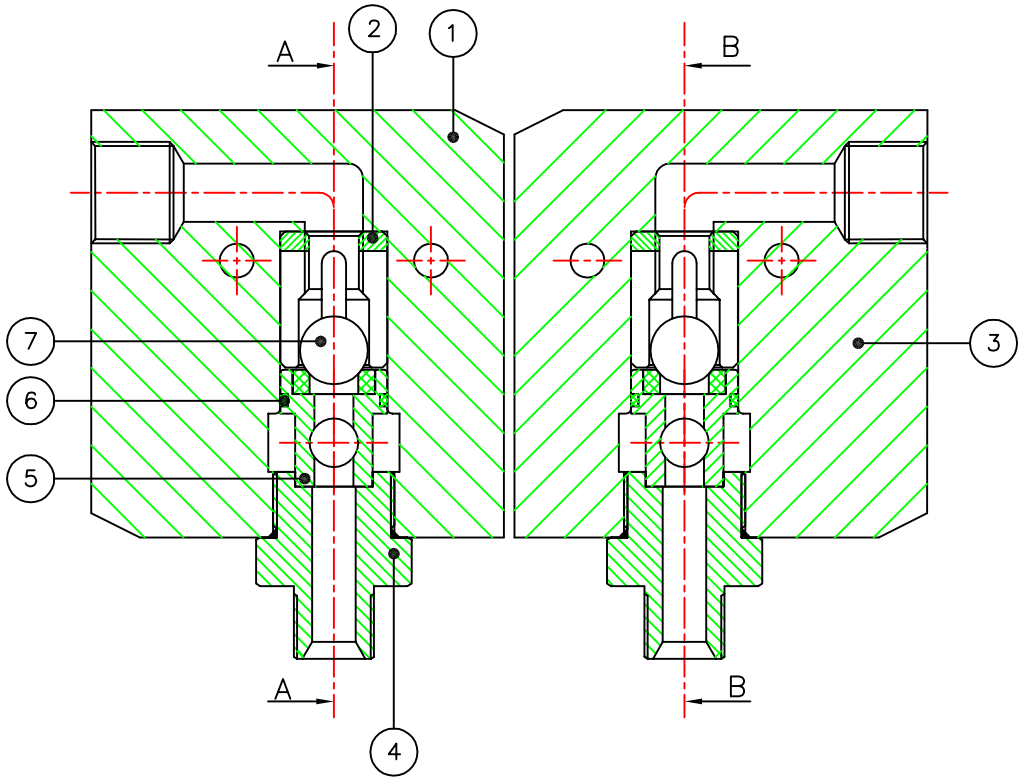
INDIA

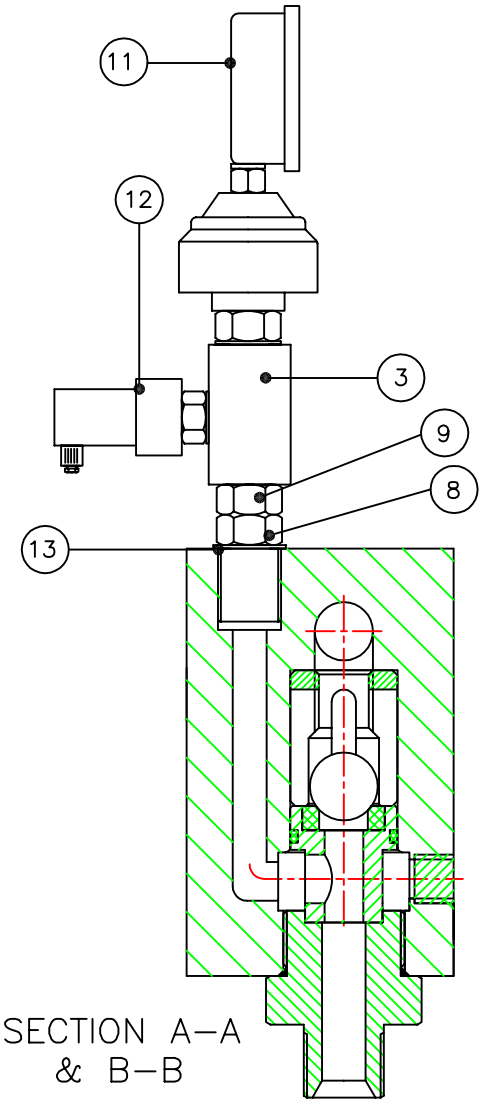
| | DRN. | CKD. | APPD. | | |
|---|---|---|---|---|---|
| SIGN | ROHIT | RAJIV | NVD | PART NAME | CONTROL BLOCK |
| DATE | | | | PART NO. | 02 081 000 01 |
| SCALE | NOT TO SCALE | | | | |




| SR NO. | PART NO. | PART NAME | QTY. | W&T |
|---|---|---|---|---|
| 21 | 15 315 008 07 | ALLEN BOLT M6X15 | 10 | - |
| 20 | 02 300 040 57 | ROUND GASKET | 4 | Y |
| 19 | 02 081 026 57 | MID BLOCK GASKET | 2 | Y |
| 18 | 02 300 042 57 | GASKET | 2 | Y |
| 17 | 02 300 045 00 | MID BLOCK ASSEMBLY | 1 | - |
| 16 | 02 300 009 02 | SILENCER CAP | 1 | - |
| 15 | 15 375 008 37 | ALLEN BOLT | 2 | - |
| 14 | 02 230 011 00 | SILENCER ASSLY | 1 | - |
| 13 | 15 335 008 07 | ALLEN BOLT(M6X35) | 8 | - |
| 12 | 15 360 008 07 | ALLAN BOLT(M6X60) | 4 | - |
| 11 | 02 300 036 02 | BOTTOM BLOCK | 1 | - |
| 10 | 02 300 024 00 | SLIDER ASSEMBLY | 1 | Y |
| 9 | 02 300 066 57 | SQUARE GASKET | 1 | Y |
| 8 | 15 322 008 07 | ALLEN BOLT M6 x 22 | 4 | - |
| 7 | 02 300 004 02 | INLET BLOCK | 1 | - |
| 6 | 20 026 000 00 | AIR SAFTEY VALVE 1/2" | 2 | - |
| 5 | 02 300 064 57 | ROUND LARGE GASKET | 2 | Y |
| 4 | 02 300 043 57 | GASKET | 2 | Y |
| 3 | 02 300 065 57 | ROUND SMALL GASKET | 2 | Y |
| 2 | 02 081 001 00 | SIDE BLOCK ASSEMBLY | 1 | - |
| 1 | 02 300 035 02 | TOP BLOCK | 1 | - |
| | 02 300 700 04 | SERVICE KIT | - | SET |

| | | | | | |
|---|---|---|---|---|---|
| RAW MATERIAL DESCRIPTION | | NOTE: | | | |
| SIZE | | | | | |
| LENGTH | | ALL DIMN. ARE IN MM UNLESS OTHERWISE STATED. FOR OPEN TOLERANCE AND SURFACE ROUGHNESS SEE STANDARD CHART DD-01/CH-01. REMOVE SHARP CORNERS. INCASE OF DOUBT ASK. | | | |
| MAT. | ASSEMBLY | | | | |
| VR COATINGS PVT.LTD. J-138, MIDC, BHOSARI, PUNE-411 026 INDIA | | DRN. | CKD. | APPD. | PART NAME: RHINO CONTROL BLOCK ASSEMBLY |
| | SIGN | NIKHIL | RAJIV | NVD | |
| | DATE | | | | PART NO. 02 300 000 04 |
| | SCALE | NOT TO SCALE | | | |




SECTION A–A
& B–B

| S.NO. | PART NAME | PART NUMBER | QTY. | W & T |
|---|---|---|---|---|
| 13 | WASHER 1/4" | 19 001 002 19 | 11 | |
| 12 | PRESSURE TRANSMITTER | 98 014 400 10 WKA | 2 | |
| 11 | PRESSURE GAUGE | 13 018 001 00 | 2 | |
| 10 | PRESSURE GAUGE MOUNTING BLOCK | 17 013 126 19 | 2 | |
| 9 | CONNECTOR | 14 001 001 19 | 2 | |
| 8 | SWIVEL ¼" BSP | 51 101 000 02 | 2 | |
| 7 | BALL 14 | 04 210 013 05 | 2 | |
| 6 | PACKING RING | 17 005 016 21 | 2 | Y |
| 5 | SEAT ADAPTER | 17 005 032 00 | 2 | |
| 4 | CONNECTOR | 17 013 040 07 | 2 | |
| 3 | OUTLET MANIFOLD | 17 013 042 08 | 1 | |
| 2 | BALL GUIDE | 04 210 017 17 | 3 | |
| 1 | OUTLET MANIFOLD | 17 013 313 08 | 1 | |

PARTS LIST

| | |
|---|---|
| RAW MATERIAL DESCRIPTION | |
| SIZE | |
| LENGTH | |
| MAT. | ASSEMBLY |

NOTE:

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INDIA

| | DRN. | APPD. |
|---|---|---|
| SIGN | Albert | |
| DATE | | |
| SCALE | NOT TO SCALE | |

PART NAME OUTLET MANIFOLD ASSEMBLY

PART NO. 17 013 312 00

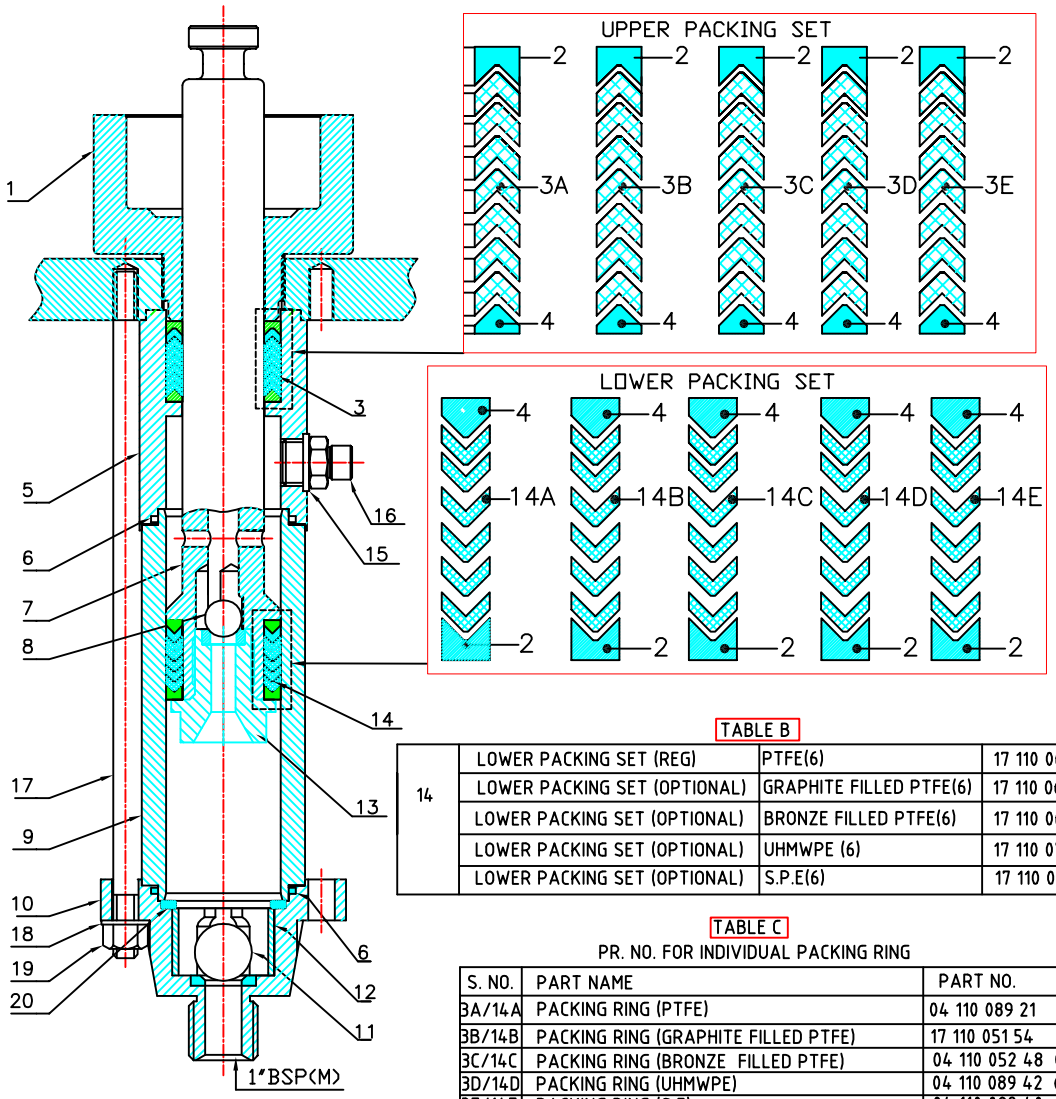








TABLE A

| | | | | |
|---|---|---|---|---|
| 3 | UPPER PACKING SET (REG) | PTFE(7) | 04 110 106 00 | ⓒⒹ |
| | UPPER PACKING SET (OPTIONAL) | GRAPHITE FILLED PTFE(7) | 04 110 107 00 | ⓒⒹ |
| | UPPER PACKING SET (OPTIONAL) | BRONZE FILLED PTFE(7) | 04 110 108 00 | ⓒⒹ |
| | UPPER PACKING SET (OPTIONAL) | UHMWPE (7) | 04 110 112 00 | Ⓓ |
| | UPPER PACKING SET (OPTIONAL) | S.E (7) | 04 110 114 00 | Ⓓ |

| | | | | | |
|---|---|---|---|---|---|
| 3E/14E | SERVICE KIT-4(OPTIONAL)(UPPER-S.E ) (LOWER -S.E) | 17 110 709 00 | - | Y | SET |
| 3D/14D | SERVICE KIT-3(OPTIONAL)(UPPER-UHMWPE ) (LOWER -UHMWPE) | 17 110 708 00 | - | Y | SET |
| 3C/14C | SERVICE KIT-2(OPTIONAL)(UPPER-BRONZE FILLED PTFE)(LOWER -BRONZE FILLED PTFE) | 17 110 710 00 | - | Y | SET |
| 3B/14B | SERVICE KIT-1(OPTIONAL)(UPPER-GRAPHITE FILLED PTFE)(LOWER -GRAPHITE FILLED PTFE) | 17 110 704 00 | - | Y | SET |
| 3A/14A | SERVICE KIT(REG.)(UPPER-PTFE)(LOWER -PTFE) | 17 110 700 00 | - | Y | SET |
| S. NO. | PACKING SET KIT | SERVICE KIT NO. | QTY | W&T | SERVICE KIT QTY |

TABLE B

| | | | |
|---|---|---|---|
| 14 | LOWER PACKING SET (REG) | PTFE(6) | 17 110 062 00 Ⓒ |
| | LOWER PACKING SET (OPTIONAL) | GRAPHITE FILLED PTFE(6) | 17 110 064 00 Ⓒ |
| | LOWER PACKING SET (OPTIONAL) | BRONZE FILLED PTFE(6) | 17 110 066 00 ⒸⒷ |
| | LOWER PACKING SET (OPTIONAL) | UHMWPE (6) | 17 110 070 00 Ⓓ |
| | LOWER PACKING SET (OPTIONAL) | S.P.E(6) | 17 110 071 00 Ⓓ |

TABLE C

PR. NO. FOR INDIVIDUAL PACKING RING

| S. NO. | PART NAME | PART NO. |
|---|---|---|
| 3A/14A | PACKING RING (PTFE) | 04 110 089 21 |
| 3B/14B | PACKING RING (GRAPHITE FILLED PTFE) | 17 110 051 54 |
| 3C/14C | PACKING RING (BRONZE FILLED PTFE) | 04 110 052 48 Ⓑ |
| 3D/14D | PACKING RING (UHMWPE) | 04 110 089 42 Ⓓ |
| 3E/14E | PACKING RING (S.E) | 04 110 089 40 Ⓓ |

| | | | | |
|---|---|---|---|---|
| 20 | WASHER | 04 110 021 19 | 1 | |
| 19 | NUT | 15 210 014 07 | 4 | |
| 18 | WASHER | 19 002 014 07 | 4 | |
| 17 | STUD | 04 110 019 17 | 4 | |
| 16 | CONNECTOR | SEE NOTE | 1 | |
| Ⓒ 15 | WASHER | 19 002 003 19 | 1 | |
| ⒹⒷ Ⓐ 14 | LOWER PACKING SET | REFER TABLE B | 1 | Y |
| Ⓐ 13 | PISTON SEAT | 04 110 069 00 | 1 | |
| 12 | BALL GUIDE | 04 110 012 19 | 1 | |
| 11 | BALL | 04 070 013 19 | 1 | Y |
| 10 | SUCTION SEAT | 04 110 011 00 | 1 | |
| 9 | CYLINDER | 04 110 010 19 | 1 | |
| 8 | BALL 12 | 04 070 016 05 | 1 | |
| 7 | PISTON ROD | 17 110 008 19 | 1 | |
| 6 | PACKING RING | 04 110 007 21 | 2 | Y |
| 5 | SPACER | 04 110 006 19 | 1 | |
| Ⓒ 4 | MALE PACKING CAP | 17 110 068 19 | 2 | |
| ⒹⒷ Ⓐ 3 | UPPER PACKING SET | REFER TABLE A | 1 | Y |
| Ⓒ 2 | FEMALE PACKING CAP | 17 110 067 19 | 2 | |
| 1 | OIL CUP | 17 110 001 17 | 1 | |
| S.NO. | PART NAME | PART NUMBER | QTY. | W & T |

PARTS LIST

| Rev. | AMMENDMENT | Date | Appd. |
|---|---|---|---|
| D | UHMWPE ,S.E.PACKING SET ADDED, | 29/07/15 | |
| C | PACKING SET NO. CHANGE, WASHER PART NO. CHANGE | 10/06/15 | |
| B | GRAHITE FILLED PTFE AND BRONZE FILLED PTFE PACKING SET NEWLY ADDED | 24/08/14 | |
| B | MIDDDLE PACKING CAP(04 110 014 19) REMOVED FROM LOWER PAKING SET, LOWER PACKING RING QTY. 4 CHANGED TO 5 | 24/08/14 | |
| A | PISTON SEAT PART NO. CHANGED AND PACKING MATERIAL CARBON FL PTFE CHANGED TO BR FL PTFE | 12/06/06 | |

RAW MATERIAL DESCRIPTION
SIZE
LENGTH
MAT. ASSEMBLY

NOTE: CONNECTOR FOR BASE PUMP 14 003 002 19
CONNECTOR FOR ACTIVATOR PUMP 17 013 058 19

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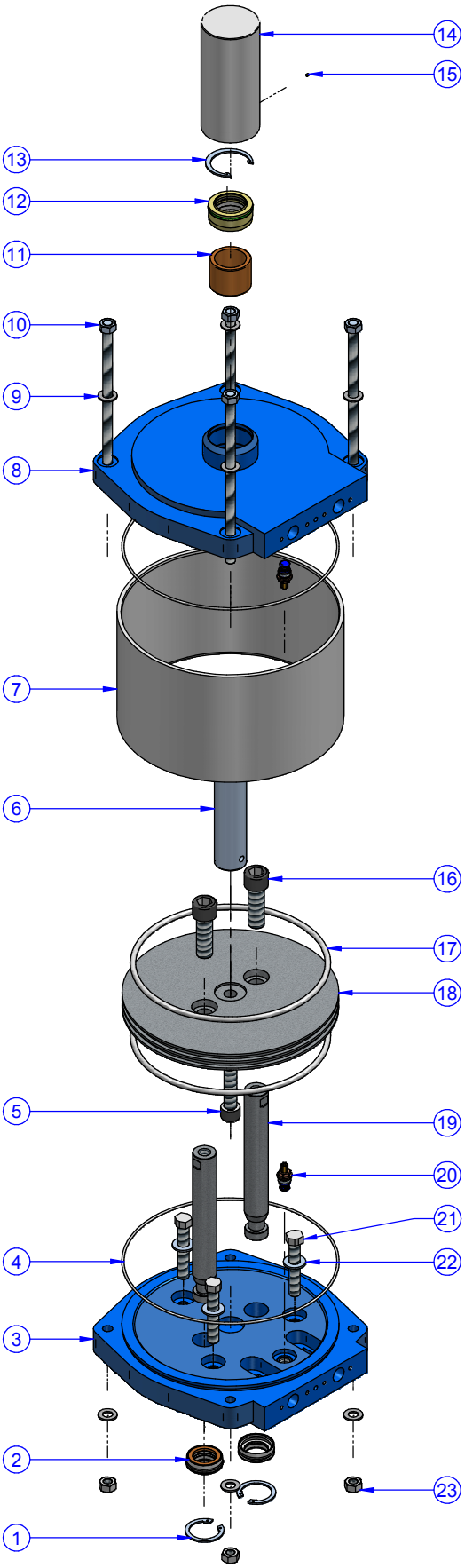
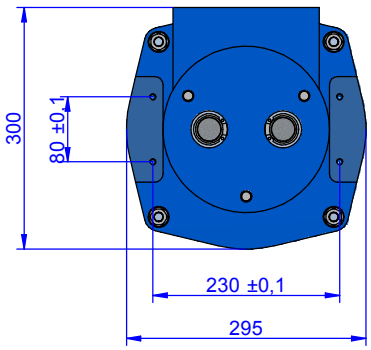
INDIA

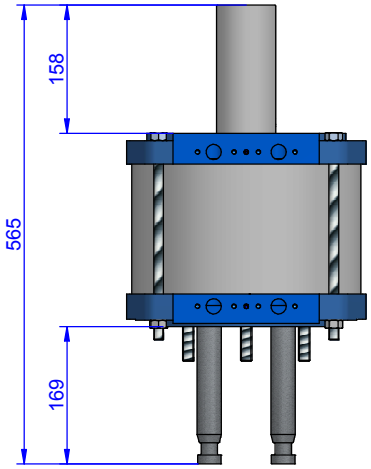
| | DRN. | CKD. | APPD. |
|---|---|---|---|
| SIGN | RENU | | |
| DATE | | | |
| SCALE | NOT TO SCALE | | |

PART NAME HYDRAULIC PART 110

PART NO. 17 110 000 00




| SR. NO. | PART NO. | PART NAME | QTY. | W & T |
|---|---|---|---|---|
| 23 | 15 211 015 07 | NUT M 12 | 4 | |
| 22 | 19 002 011 19 | WASHER M14 | 3 | |
| 21 | 17 350 009 17 | BOLT M14X2 | 3 | |
| 20 | 61 110 008 00 | SENSING VALVE | 2 | Y |
| 19 | 17 300 003 19 | PISTON ROD | 2 | |
| 18 | 17 271 003 07 | PISTON DISC | 1 | |
| 17 | 01 270 003 25 | O RING | 2 | Y |
| 16 | 15 360 021 07 | ALLEN BOLT M20X60 | 2 | |
| 15 | 15 603 025 07 | GRUB SCREW M3 X 0.5 | 1 | |
| 14 | 17 300 007 07 | COVER | 1 | |
| 13 | 01 230 013 07 | INTERNAL CIRCLIP B55 | 1 | |
| 12 | 01 230 011 00 | AIR SEAL | 1 | Y |
| 11 | 17 300 005 16 | BUSH | 1 | |
| 10 | 01 230 002 00 | STUD | 4 | |
| 9 | 19 002 015 07 | WASHER | 8 | |
| 8 | 17 271 001 02 | TOP CASTING | 1 | |
| 7 | 01 270 002 19 | CYLINDER | 1 | |
| 6 | 17 300 006 19 | TOP PISTON ROD | 1 | |
| 5 | 15 360 017 07 | BOLT M16X60 | 1 | |
| 4 | 01 270 005 25 | O RING | 2 | Y |
| 3 | 17 271 002 02 | BOTTOM CASTING | 1 | |
| 2 | 01 110 018 00 | AIR SEAL | 2 | Y |
| 1 | 01 110 022 07 | CIRCLIP | 2 | |

RAW MATERIAL DESCRIPTION
SIZE
LENGTH
MAT. ASSEMBLY

NOTE:
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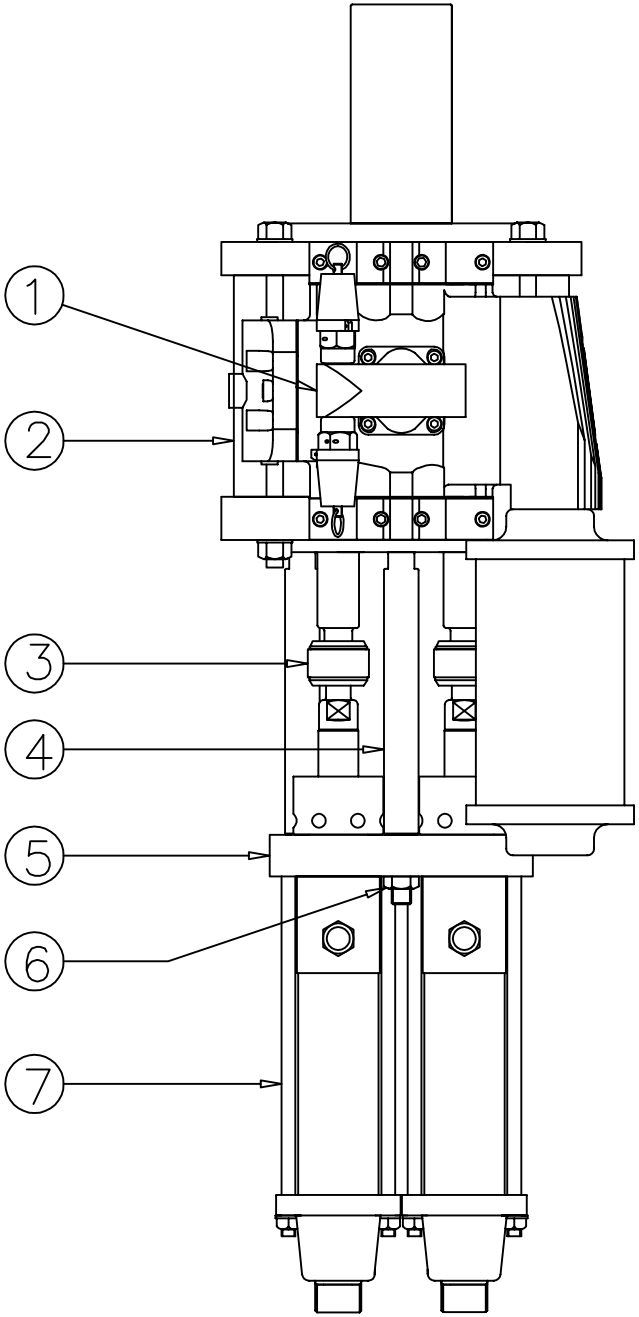
INDIA

| | DRN. | CKD. | APPD. |
|---|---|---|---|
| SIGN | | ALBERT | |
| DATE | | | |
| SCALE | NOT TO SCALE | | |

PART NAME: AIR MOTOR
PART NO.: 17 271 000 00




| S.NO. | PART NAME | PART NUMBER | QTY. |
|---|---|---|---|
| 7 | HYDRAULIC PART 110 | 17 110 000 00 | 2 |
| 6 | NUT M14 | 15 111 011 07 | 3 |
| 5 | TOP FLANGE | 17 014 001 17 | 1 |
| 4 | TIE ROD | 17 010 007 17 | 3 |
| 3 | COUPLING | 17 110 003 00 | 2 |
| 2 | AIR MOTOR 2K 270 | 17 271 000 00 | 1 |
| 1 | CONTROL BLOCK | 02 300 000 04 | 1 |

PARTS LIST

| RAW MATERIAL DESCRIPTION | |
|---|---|
| SIZE | |
| LENGTH | |
| MAT. | |

NOTE:

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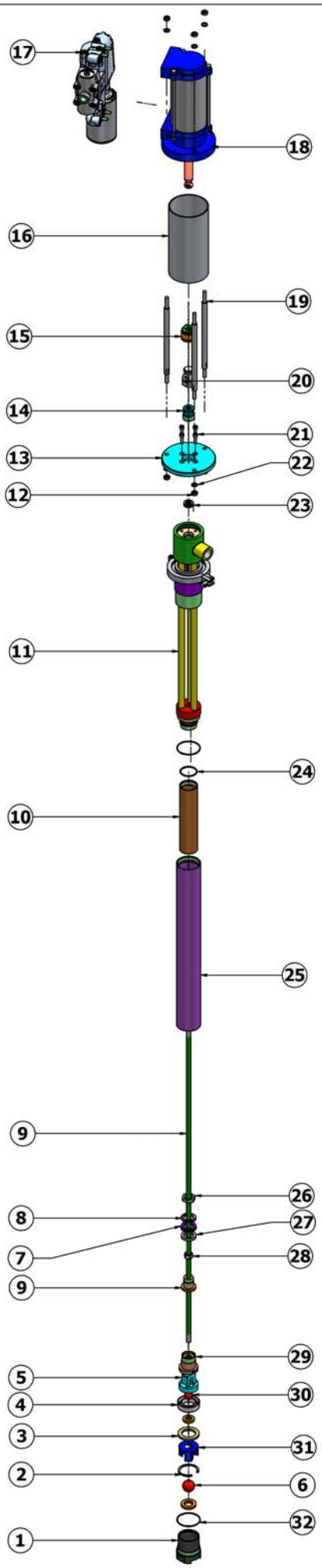
INDIA

| | DRN. | APPD. |
|---|---|---|
| SIGN | Albert | |
| DATE | 01-10-08 | |
| SCALE | NOT TO SCALE | |

PART NAME TWO COMPONENT 270/110 X2 -1:1

PART NO. 17 531 000 02




| SR. NO. | PART NUMBER | PART NAME | QTY. | W & T |
|---|---|---|---|---|
| 32 | 29 003 019 21 | PACKING RING | 2 | Y |
| 31 | 29 003 036 19 | BALL GUIDE 28 | 1 | |
| 30 | 33 275 031 19 | BALL Φ19 MM | 1 | |
| 29 | 29 003 039 00 | SEAT HOLDER | 1 | |
| 28 | 15 110 014 07 | NUT M10 | 1 | |
| 27 | 29 003 028 19 | SEAL WASHAR | 1 | |
| 26 | 29 003 029 19 | LOCK NUT | 1 | |
| 25 | 29 003 009 19 | CYLINDER OUTER | 1 | |
| 24 | 29 003 020 21 | PACKING RING | 1 | Y |
| 23 | 33 275 009 00 | PACKING SET | 1 | Y |
| 22 | 29 003 050 07 | WASHAR M8 | 6 | |
| 21 | 15 320 008 07 | ALLEN BOLT M6X20 | 4 | |
| 20 | 29 003 049 19 | CONNECTING ROD | 1 | |
| 19 | 29 003 069 19 | TIE ROD | 3 | |
| 18 | 01 080 000 00 | AIR MOTOR 080 S120 | 1 | |
| 17 | 02 081 000 01 | CONTROL BLOCK | 1 | |
| 16 | 48 031 082 00 | OIL CUP COVER | 1 | |
| 15 | 09 001 000 00 | COUPLING ASSEMBLY | 1 | |
| 14 | 29 003 008 17 | CUP NUT | 1 | |
| 13 | 29 003 067 01 | FLANGE | 1 | |
| 12 | 15 210 009 07 | NUT (M8) | 6 | |
| 11 | 29 003 041 00 | OUTLET HOUSING ASSEMBLY | 1 | |
| 10 | 29 003 010 19 | CYLENDER INNER | 1 | |
| 9 | 29 003 045 00 | SHAFT | 1 | |
| 8 | 29 003 031 21 | SEAL WASHER | 1 | Y |
| 7 | 29 003 026 21 | SEAL UPPER | 1 | Y |
| 6 | 04 070 013 19 | BALL Φ28 MM | 1 | Y |
| 5 | 29 003 021 19 | PISTON HOLDER | 1 | |
| 4 | 29 003 025 21 | SEAL | 1 | Y |
| 3 | 29 003 024 19 | SEAT WASHAR | 1 | |
| 2 | 29 003 047 19 | INTRENAL CIRCLIP B45 | 1 | |
| 1 | 29 003 040 00 | SUCTION SEAT | 1 | |

RAW MATERIAL DESCRIPTION
SIZE
LENGTH
MAT.

NOTE:

ALL DIMN. ARE IN MM UNLESS OTHERWISE STATED. FOR OPEN TOLERANCE AND SURFACE ROUGHNESS SEE STANDARD CHART DD-01/CH-01. REMOVE SHARP CORNERS. INCASE OF DOUBT ASK.

VR COATINGS PVT.LTD.
J-138, MIDC, BHOSARI, PUNE-411 026
INDIA

| | DRN. | CKD. | APPD. |
|---|---|---|---|
| SIGN | ANIL | ALBERT | NVD |
| DATE | | | |
| SCALE | NOT TO SCALE | | |

PART NAME: **BARREL PUMP 4.5:1**

PART NO.: **29 009 000 03**

| SR.NOS. | PART NO. | PART NAME | Qty. | W&T |
|---|---|---|---|---|
| 16 | 41 006 008 00 | CABLE GLAND | 1 | |
| 15 | 15 390 008 07 | ALLEN BOLT | 4 | |
| 14 | 41 011 021 01 | CAP | 1 | |
| 13 | 41 011 016 19 | PLUG 1/2" | 7 | |
| 12 | 41 011 018 04 | PACKING RING | 7 | |
| 11 | 41 011 017 04 | PACKING RING | 13 | |
| 10 | 41 011 015 19 | PLUG M22 X 1.5 | 13 | |
| 9 | 41 005 124 00 | HEATER ELEMENT | 1 | Y |
| 8 | 41 011 010 01 | SCREWED PLATE | 1 | |
| 7 | 41 011 013 00 | RTD SENSOR 3/8" | 1 | |
| 6 | 41 011 012 04 | RTD SENSOR BODY | 1 | |
| 5 | 41 011 006 01 | HEATER BODY | 1 | |
| 4 | 41 011 005 19 | CONNECTOR M26 X 1.5 X 3/4" | 2 | |
| 3 | 41 011 014 19 | DISTANCE PIECE | 1 | |
| 2 | 15 315 008 19 | ALLEN BOLT M6X15 | 8 | |
| 1 | 41 011 009 01 | SCREWED PLATE | 1 | |

| REV. | DESCRIPTION | DATE | APPD. |
|---|---|---|---|
| A | SR.NO. 14,15 & 16 ADDED | 03/08/16 | |

AMMENDMENTS

| | |
|---|---|
| RAW MATERIAL DESCRIPTION | NOTE: |
| SIZE | |
| LENGTH | |
| MAT. | |

ALL DIMN. ARE IN MM UNLESS OTHERWISE STATED. FOR OPEN TOLERANCE AND SURFACE ROUGHNESS SEE STANDARD CHART DD-01/CH-01. REMOVE SHARP CORNERS. INCASE OF DOUBT ASK.

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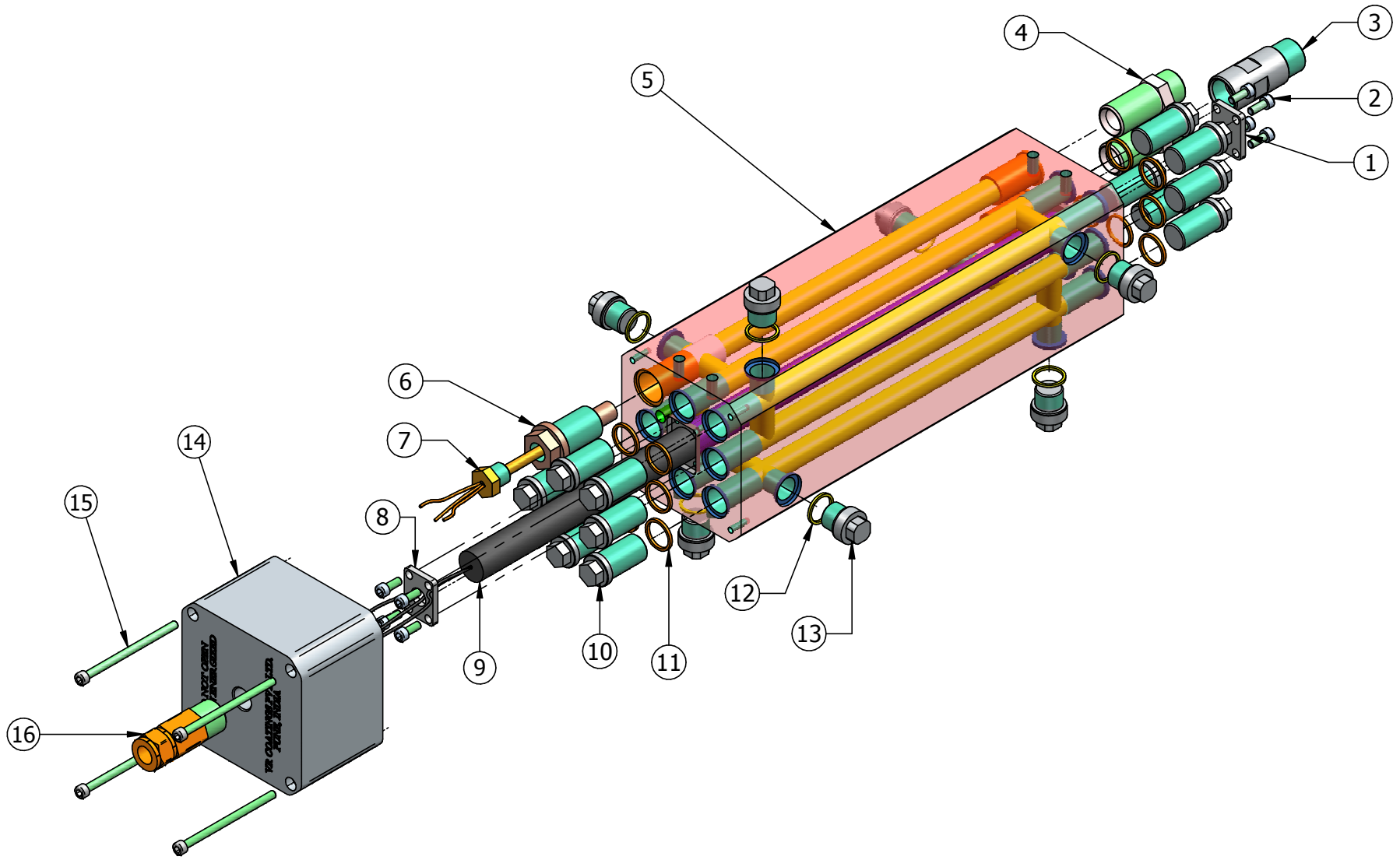
INDIA

| | DRN. | CKD. | APPD. |
|---|---|---|---|
| SIGN | OMKAR | ALBERT | NVD |
| DATE | | | |
| SCALE | NOT TO SCALE | | |

| | |
|---|---|
| PART NAME | HEATER 7.6 KW WITHOUT CONTROL PANEL |
| PART NO. | 41 011 000 00 |




| REV. | DESCRIPTION | DATE | APPD. |
|---|---|---|---|
| A | SR.NO. 14,15 & 16 ADDED | 03/08/16 | |

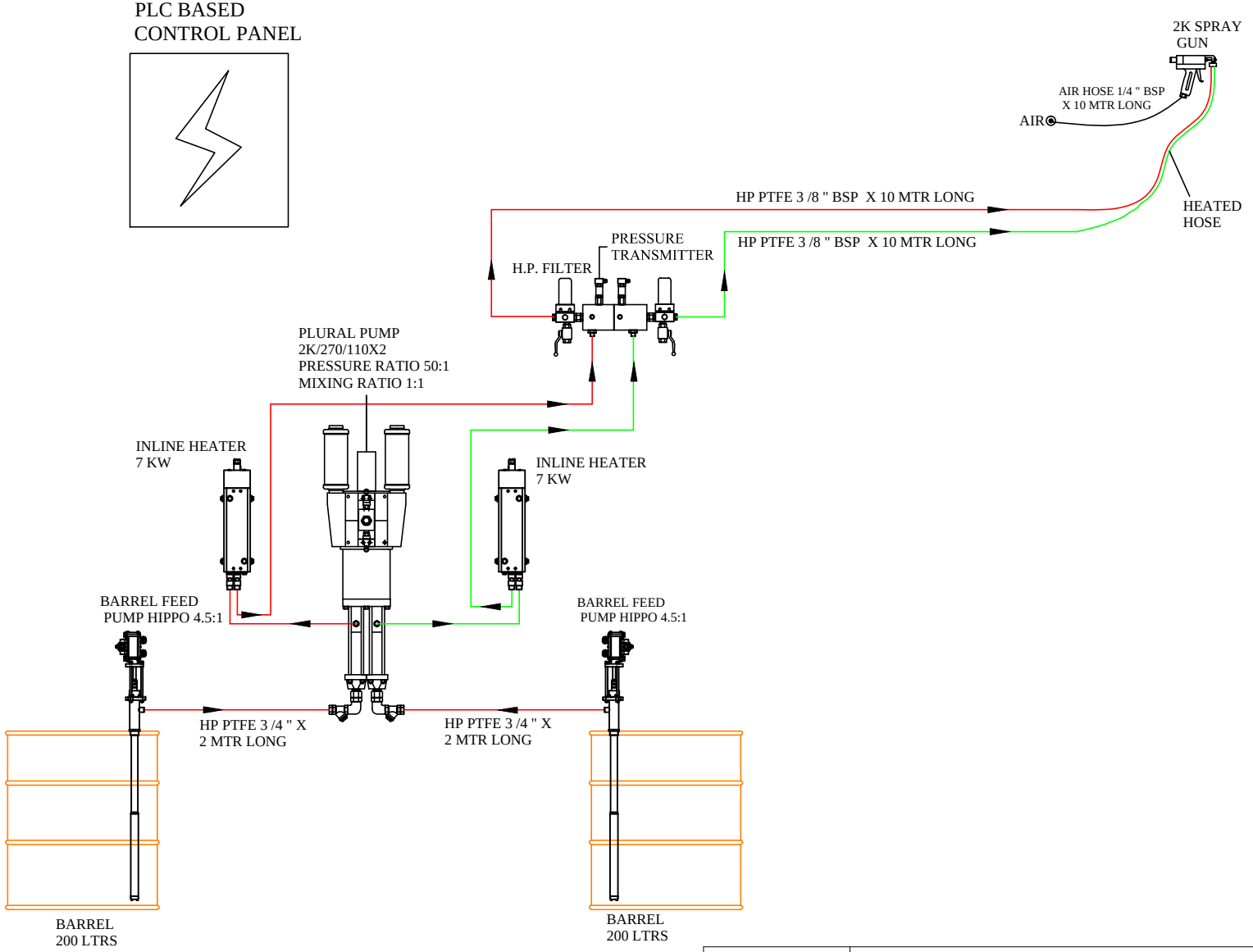
AMMENDMENTS

| | |
|---|---|
| RAW MATERIAL DESCRIPTION | NOTE: |
| SIZE | |
| LENGTH | ALL DIMN. ARE IN MM UNLESS OTHERWISE STATED. FOR OPEN TOLERANCE AND SURFACE ROUGHNESS SEE STANDARD CHART DD-01/CH-01. REMOVE SHARP CORNERS. INCASE OF DOUBT ASK. |
| MAT. | |

VR COATINGS PVT.LTD.
J-138, MIDC, BHOSARI, PUNE-411 026
INDIA

| | DRN. | CKD. | APPD. | | |
|---|---|---|---|---|---|
| SIGN | OMKAR | ALBERT | NVD | PART NAME | HEATER 7.6 KW WITHOUT CONTROL PANEL |
| DATE | | | | PART NO. | 41 011 000 00 |
| SCALE | NOT TO SCALE | | | | |

WEB SITE – http://www.vrcoatings.com
E–MAIL – vfdsouza@vsnl.com




| | |
|---|---|
| QUOTATION NUMBER | NOTE: |
| | ALL DIMN. ARE IN MM UNLESS OTHERWISE STATED. |

VR COATINGS
J-138, MIDC, BHOSARI
PUNE-411026 (INDIA)
TEL : (020) 7122331
FAX : (020) 7121891

| | DRN. | APPD. | | |
|---|---|---|---|---|
| SIGN | MAYANK | | PROJECT NAME | POLYUREA SPRAY SYSTEM |
| DATE | | | CUSTOMER NAME | TORNADO |
| SCALE | NOT TO SCALE | | | |

# WARRANTY

VR Coatings warrants all equipments manufactured by us, as long as it is bearing original identification plate, to be free from defects in material and workmanship for a period of twelve months from ex-works date. VR Coatings will repair or replace any part of the equipment proven defective. The warranty applies only when the equipment is installed, operated and maintained in accordance with VR Coatings written recommendations.

Warranty claims found to be defective shall be verified and confirmed by VR Coatings.

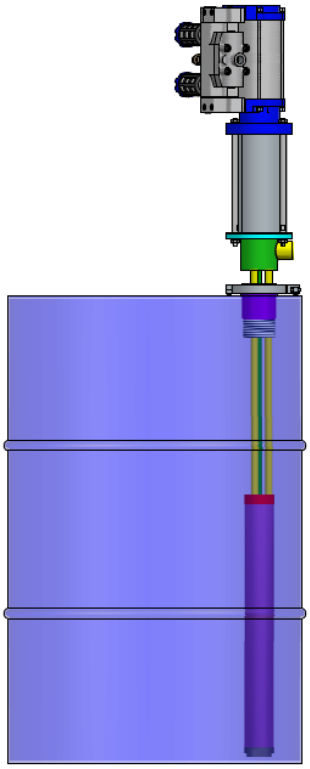
Our warranty does not cover and VR Coatings shall not be liable for any malfunction, damages, or fair wear and tear caused by faulty installation, misuse, abrasion, corrosion, inadequate or improper maintenance, negligence, tempering, accident or incorporation of non VR Coatings parts, non observance of VR Coatings recommendations.

This warranty only consists of replacing the parts returned to our plant prepaid transportation and proven defective by us. If inspection of the equipment /part does not disclose any defect in material or workmanship, repairs will be made at a reasonable charge, which may include the cost of parts, labor and transportation. VR Coatings shall not be liable for any losses resulting from a production breakdown.

Any bought out material in the equipment, which is sold but not manufactured by VR Coatings, will be subject to the manufacturer's warranty. VR Coatings will provide purchaser with reasonable assistance in making any claim for breach of these warranties.

# INSTRUCTIONS MANUAL

*Keep for future use!*



## 200 LTRS. BARREL TRANSFER PUMP

Serial Number:


*VR COATINGS PVT.LTD.*

OFFICE: J-138, MIDC PUNE – 411 026, INDIA.
TEL : + 91 - 20 - 30781022 / 27130331.
E-MAIL: vrcoatings@eth.net
Factory: Plot No.136, Sector No.7, PCNTDA,
Bhosari, Pune – 411 026, INDIA.
TEL: + 91 – 20 - 30781034
E-MAIL: service@vrcoatings.com
Mr. Pascal D'souza (Technical Director)
+91- 9822655891

# INSTRUCTIONS MANUAL

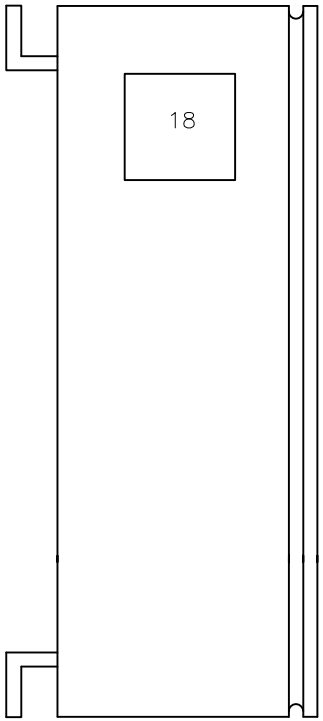
*Keep for future use!*

## POLYUREA SPRAY SYSTEM

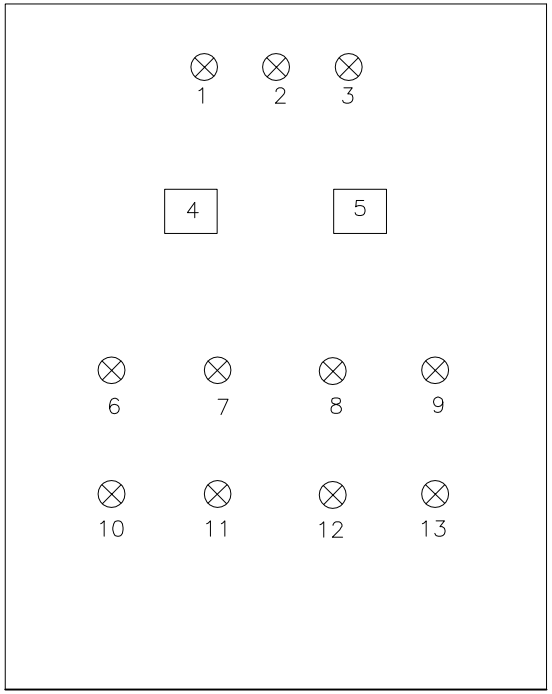
Serial Number:


*VR COATINGS PVT.LTD.*

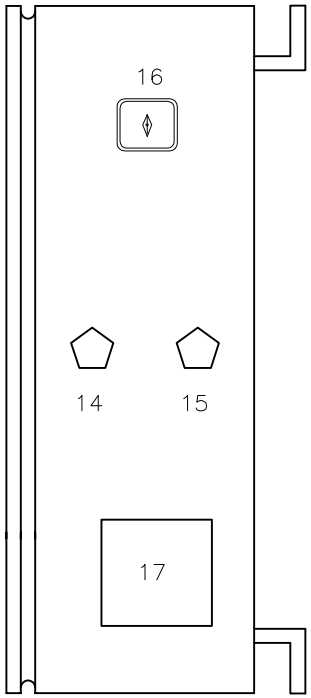
OFFICE: J-138, MIDC PUNE – 411 026, INDIA.
TEL : + 91 - 20 - 69180136 / 27130331
E-MAIL: vrcoatings@eth.net
Factory: Plot No.136, Sector No.7, PCNTDA,
Bhosari, Pune – 411 026, INDIA.
TEL: + 91 – 20 - 69180106
E-MAIL: service@vrcoatings.com
Mr. Pascal D'souza (Technical Director)
+91- 9822655891




L.H.S. VIEW




FRONT VIEW

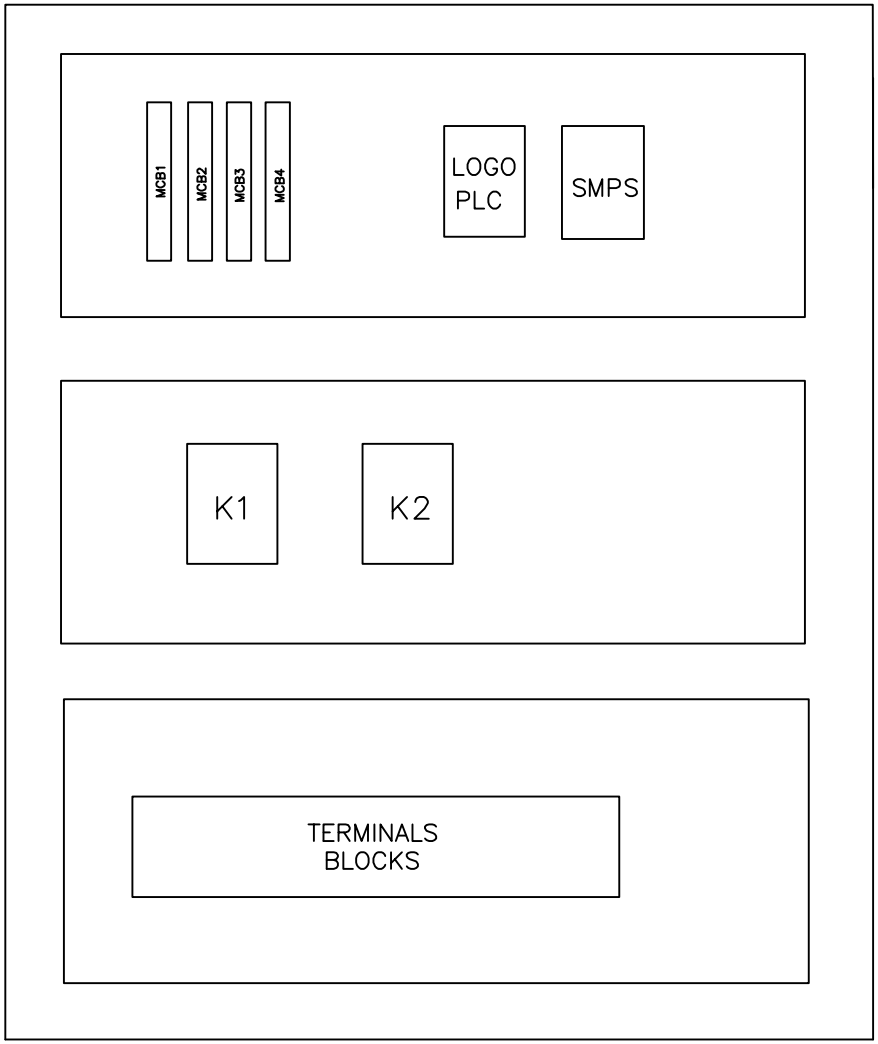



R.H.S. VIEW

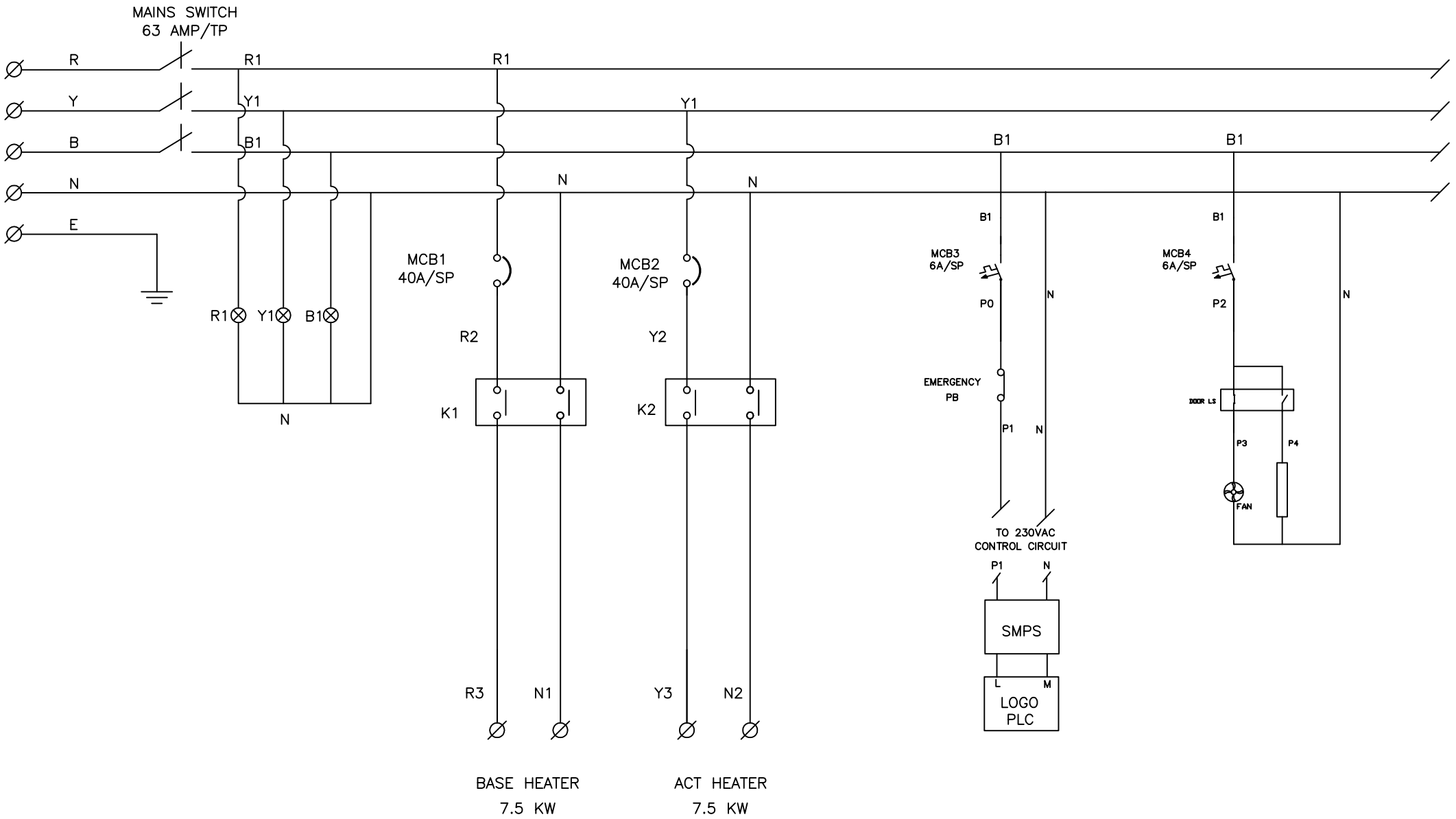
LEGENDS:

1: 'R' PHASE INDICATOR RED LED
2: 'Y' PHASE INDICATOR YELLOW LED
3: 'B' PHASE INDICATOR BLUE LED
4: BASE HEATER TIC
5: ACT HEATER TIC
6: MONITORING ON/OFF SW
7: SPRAY ON/OFF SW
8: FAULT ACK PB
9: MIMIC HOOTER
10: BASE HEATER ON/OFF SW
11: ACT. HEATER ON/OFF SW
12: SPARE
13: EMERGENCY PB
14: SOLENOID VALVE CONNECTOR
15: PRS. MONITOR CONNECTOR
16: MAIN SWITCH
17: FILTER
18: FAN + FILTER

| | | | |
|---|---|---|---|
| DRAWN BY : SURESH | | TITLE: G.A. DRAWING | V.R.COATINGS PVT LTD |
| PRINT DATE: 07.06.2014 | | PROJECT: 7.5 KW HEATER SYSTEM | DWG. NO: = + 1/5 |




| | | | |
|---|---|---|---|
| DRAWN BY : SURESH | | TITLE: WIRING DIAGRAM FOR 230VAC CONTROL | V.R. COATINGS PVT LTD, PUNE |
| PRINT DATE: 07.06.2014 | | PROJECT: 7.5 KW HEATER SYSTEM | DWG. NO: = + 2/5 |

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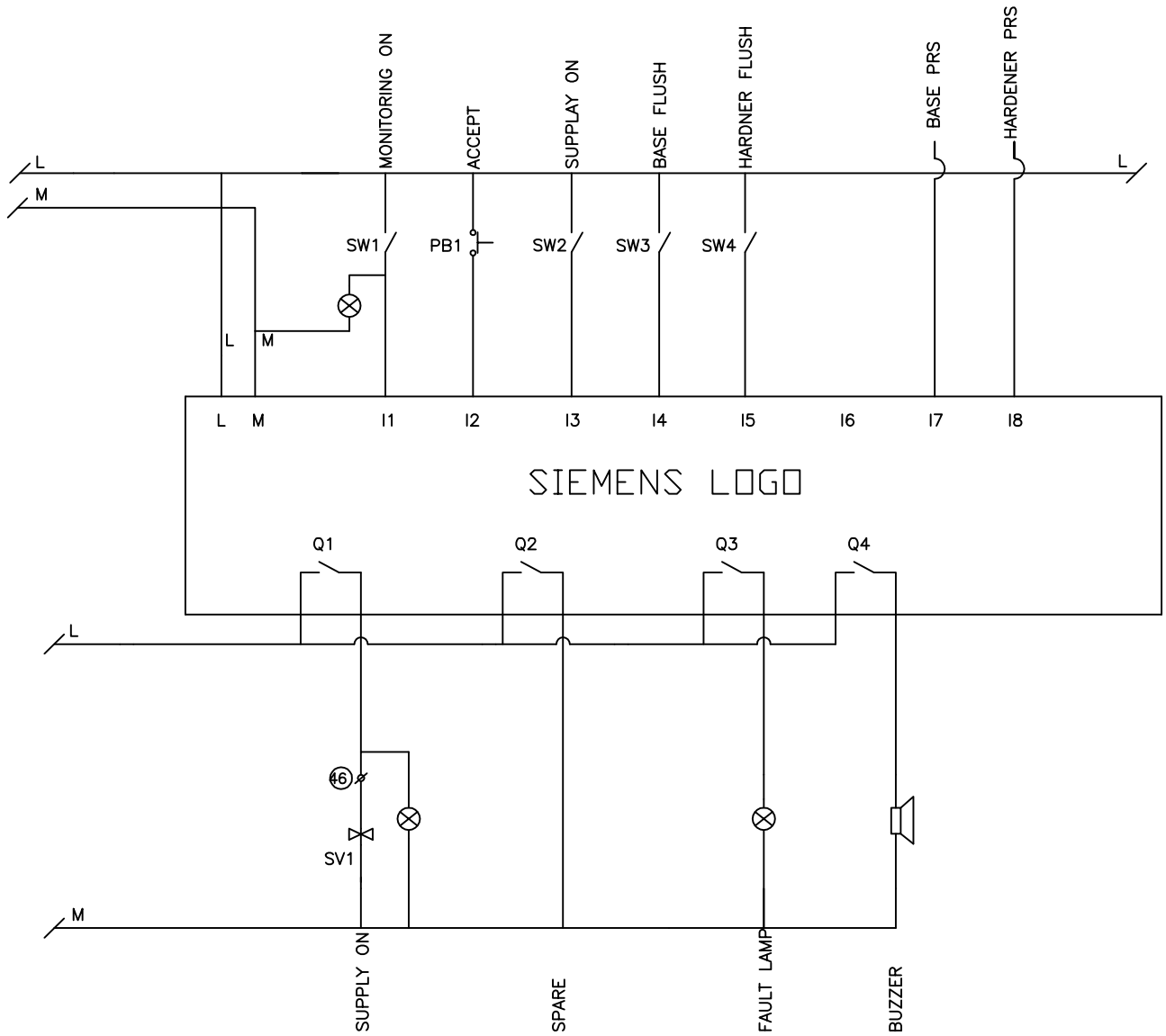
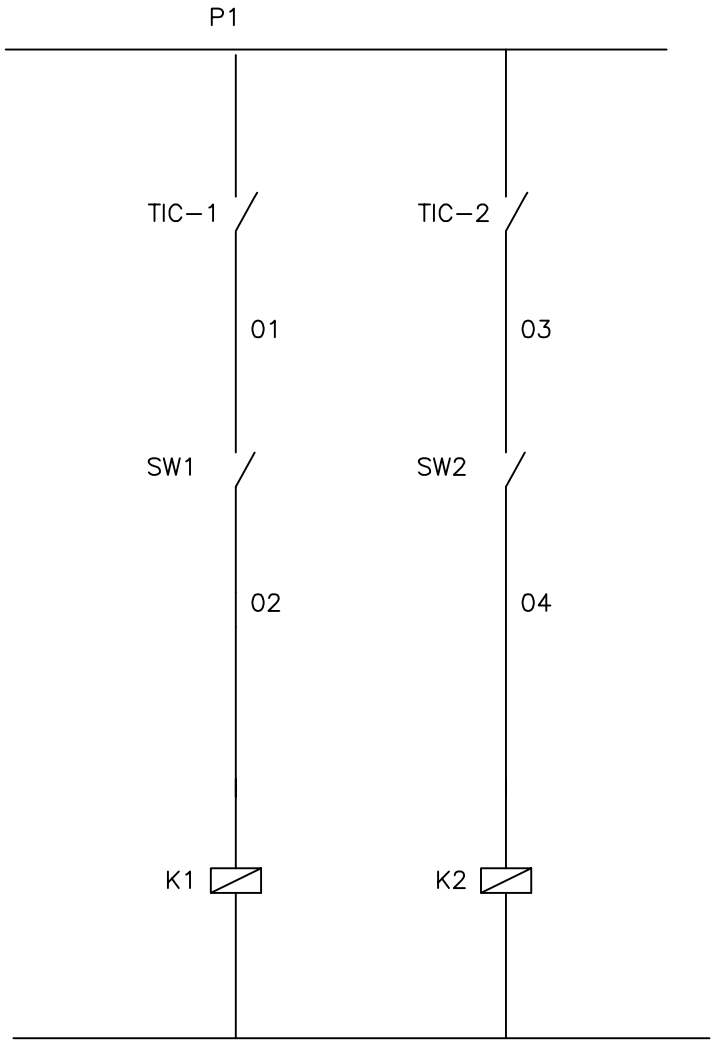
|---|---|---|---|
| DRAWN BY : SURESH | | TITLE: WIRING DIAGRAM FOR 230VAC CONTROL | V.R. COATINGS PVT LTD, PUNE |
| PRINT DATE: 07.06.2014 | | PROJECT: 7.5 KW HEATER SYSTEM | DWG. NO: 3/5 |

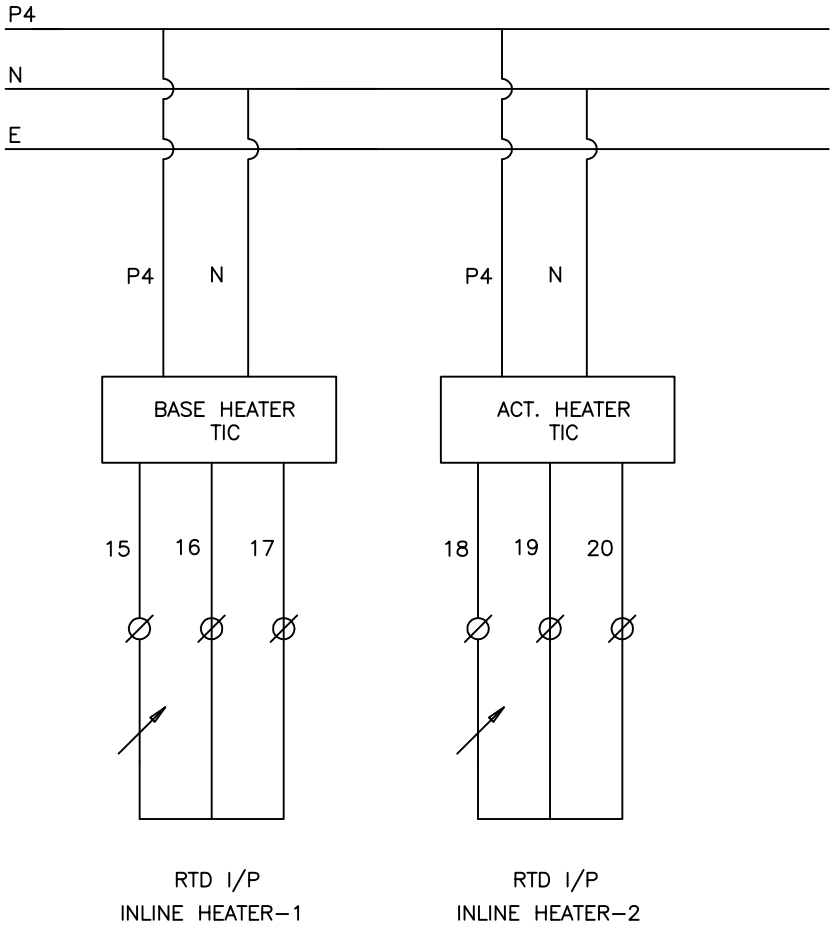



| | | | |
|---|---|---|---|
| DRAWN BY : SURESH | | TITLE: WIRING DIAGRAM FOR 230VAC CONTROL | V.R. COATINGS PVT LTD, PUNE |
| PRINT DATE: 07.06.2014 | | PROJECT: 7.5 KW HEATER SYSTEM | DWG. NO: = + 4/5 |




BASE HEATER
7.5 KW

ACT. HEATER
7.5 KW




RTD I/P
INLINE HEATER–1

RTD I/P
INLINE HEATER–2

| | | | |
|---|---|---|---|
| DRAWN BY : SURESH | | TITLE: HEATED HOSE POWER CIRCUIT. | V.R.COATINGS PVT LTD |
| PRINT DATE: 07.06.2014 | | PROJECT: 7.5 KW HEATER SYSTEM | DWG. NO: = + 5/5 |

# ***ELECTRICAL SAFETY INSTRUCTIONS***


- Avoid contact with ***energized electrical circuits***
- Disconnect the power source before servicing or repairing electrical equipment.
- Use only tools and equipment with non-conducting handles when working on electrical devices
- Never use metallic pencils or rulers, or wear rings or metal watchbands when working with electrical equipment. This rule is very easy to forget, especially when you are showing some electrical part pointing with metallic pencil.
- If water or a chemical is spilled onto equipment, shut off power at the main switch or circuit breaker and unplug the equipment.
- Do not store "***highly flammable liquids"*** near electrical equipment.
- Do not wear loose clothing or ties near electrical equipment.
- In case of PLC used in panel, keep the power supply ON for at least two hours in a week.
- Make sure all electric cords are tucked away, neat and tidy.
- Always use caution when working near electricity.

**VR COATINGS PVT.LTD.**
J-138,MIDC PUNE-411 026
INDIA. TEL:(020)27130331,27130196
FAX:(020)30781051
E-MAIL:vrcoatings@eth.net

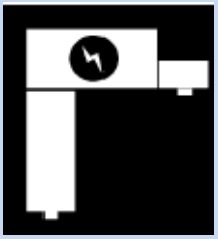
No Contractual Document. Specification and features subject to change without notice.

# HEATER 7.6 KW.

## PAINT WITHOUT CONTROL PANEL

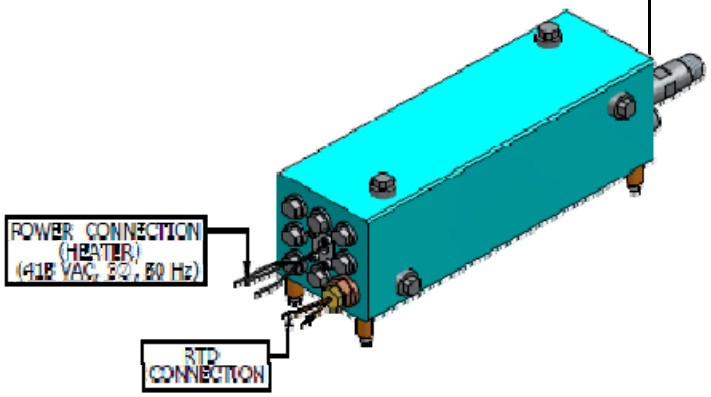
**Maxi. Inbound Pressure - 400 bar**

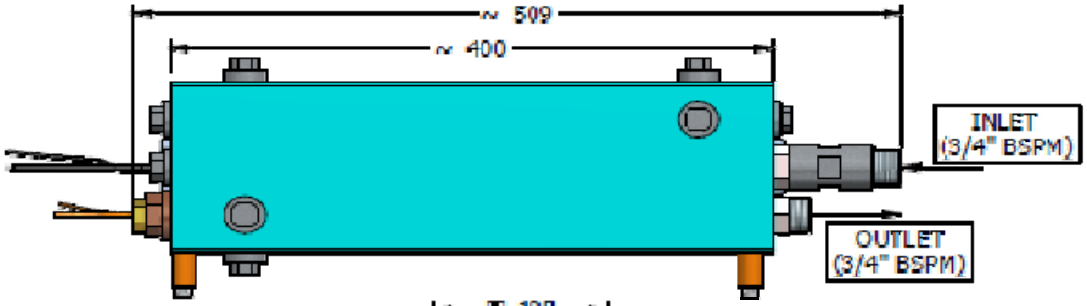


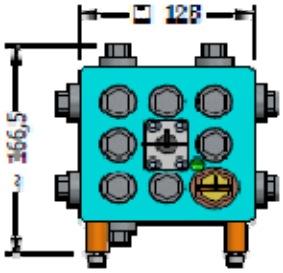


DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE STATED

| PART NO. | REF. |
|---|---|
| 41 011 000 00 | PAGE 00 |
| WEAR AND TEAR KIT FOR COMPLETE HEATING UNIT — 41 011 700 00 | PAGE 00 |




## TECHNICAL SPECIFICATION

| | |
|---|---|
| Maximum Inbound Pressure | : 400 bar |
| Capacity | : 7.6 KW |
| Power Supply | : 415 VAC,3}, 50Hz |
| Inlet, Outlet Port | : 3/4" BSP(M) |
| Temperature Range | : 100˚C |
| Wetted Parts | : Aluminum, 304 Stainless Steel, PTFE. |

# INPUT/OUTPUT LIST

## INPUT

| | |
|---|---|
| I1 | Pressure Monitoring On/Off |
| I2 | Fault Ack PB |
| I3 | Supply On/Off sw |
| I4 | Flush 1 sw |
| I5 | Flush 2 sw |
| I6 | Spare |
| I7 | Base pressure input |
| I8 | Act pressure input |

## OUTPUT

| | |
|---|---|
| Q1 | Supply Solenoid valve |
| Q2 | Flush solenoid valve |
| Q3 | Flt Lamp |
| Q4 | Hooter |

# NOTES

# NOTES

# OPERATION PROCESS

Power ON the Main switch. Check that all MCB's are switched ON.
Also check that all settings of temperature indicator controllers are as per requirement.
Select the "Base Heater" switch to ON position, tank heaters for base becomes ON.
Select the "Act. Heater" switch to ON position, tank heaters for activator becomes ON.

## ***AUTO MODE:-***

Select the Auto/Manual switch to Auto mode.

**Spray Operation (Paint):-**

- Select the "Spray" selector switch to ON position. Spray solenoid valve becomes ON and spray cycle starts.
- Do not select the flush switch during spray operation. Fault occurs but spray cycle do not get disturbed.

**Flush Operation (Solvent):-**

- Select the "Base Flush" selector switch to ON position. Base flush solenoid valve becomes ON and base flush cycle starts.
- Select the "Act Flush" selector switch to ON position. Activator flush solenoid valve becomes ON and activator flush cycle starts.
- Spray selector switch must be OFF if flush cycle is ON.

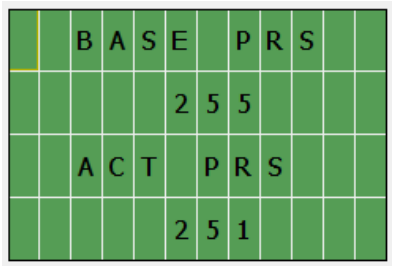
**Pressure Monitoring:-**

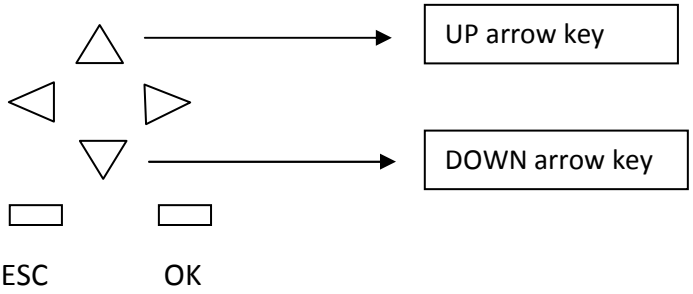
- Select the "Pressure Monitoring" selector switch to ON position. Whenever pressure rises or falls down beyond set limits, pressure fault occurs. Hooter sounds and fault lamp glows.
- Press Fault Ack pushbutton to silence the hooter and acknowledge the fault.

**PRESSURE SETTING ON PLC:-**

1) On PLC display, set the values for high pressure, low pressure for both Base (paint) and Solvent.
2) When actual pressure deviates from these set ranges of pressure values, pressure fault occurs. (Pressure monitoring switch should be ON).

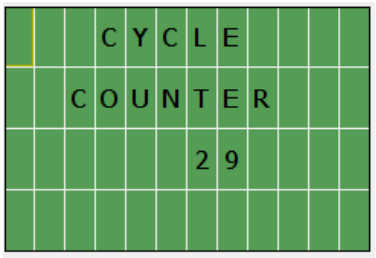
When control panel is powered up. Following screen appears.

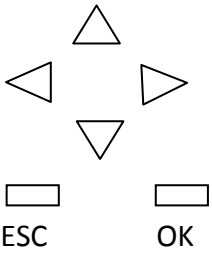



The screen shows the actual pressure for Base and Activator. This is only readable message screen and cannot be edited.

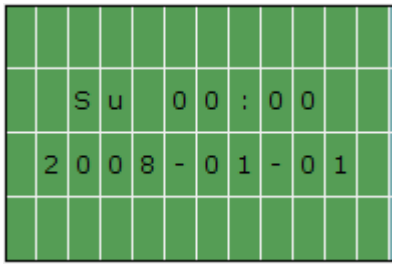
Press “Down arrow key” to display job counter screen. Following screen appears.

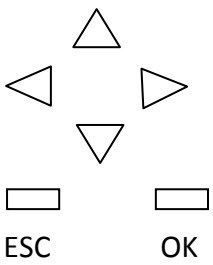



The screen shows job counter display. This is optional arrangement, if there is requirement to have record of jobs sprayed in auto cycle. The counter gets incremented by 1 for each auto cycle. To reset the counter, press “Right arrow key and ESC key” simultaneously.

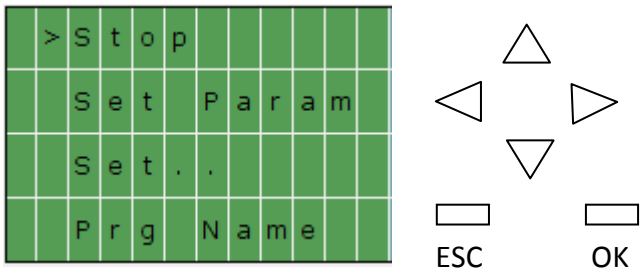
Now press “Down arrow key”, following screen appears.



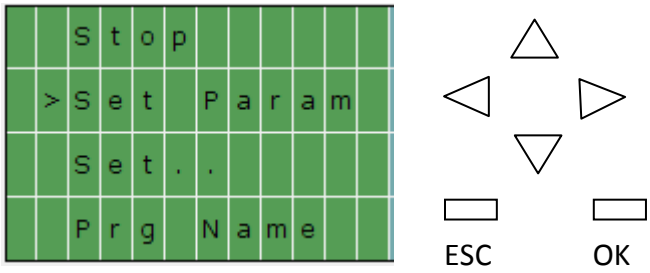




The screen shows date and time in blinking mode. Both are settable parameter.

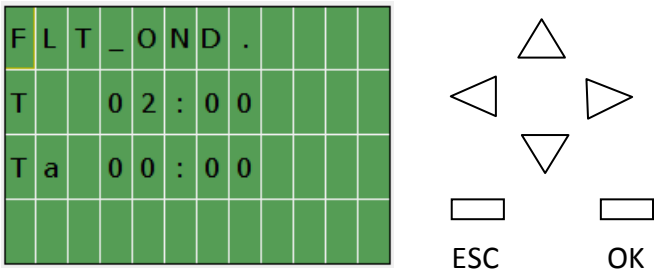
Press “ESC” key to enter setting screen which is shown as under.




Using “Down arrow key”, move the cursor to “set Param” function key. Following screen appears.



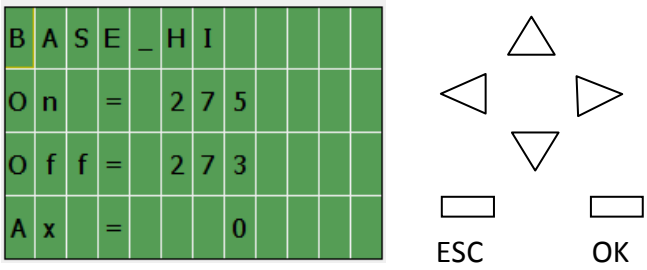

Press OK key of HMI to move to next screen shown as below.




Fault On delay timer can be set at this screen. The timer starts whenever a fault occurs. If the fault remains till the completion of this timer, fault lamp glows and hooter sounds.

Press Fault Ack pushbutton to silence the hooter and acknowledge the fault.

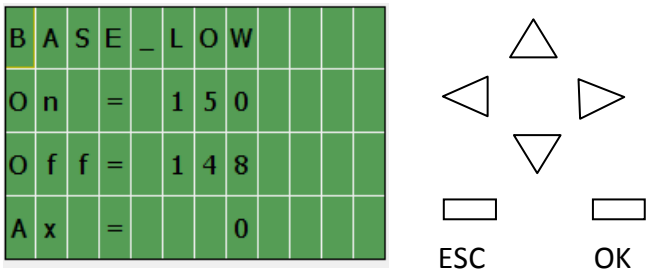
Press ‘up’ arrow key, following screen appears.



High limit for base pressure can be set at the parameter “On”.

For Ex:- Let the high limit for base pressure is set at “275” bar. When pressure goes beyond 275bar, fault occurs. Fault gets cleared only if pressure comes below “273”bar (Off parameter). The pressure limit can be changed using up/down arrow keys.

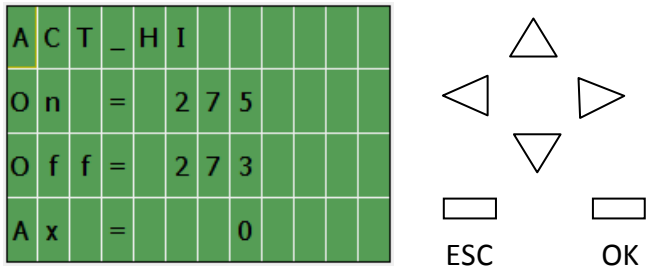
Press ‘up’ arrow key, following screen appears.




Low limit for base pressure can be set at the parameter “Off”.

For Ex:- Let the low limit for base pressure is set at “148” bar. When pressure falls below 148bar, fault occurs. Fault gets cleared only if pressure resumes above “150”bar (On parameter). The pressure limit can be changed using up/down arrow keys.

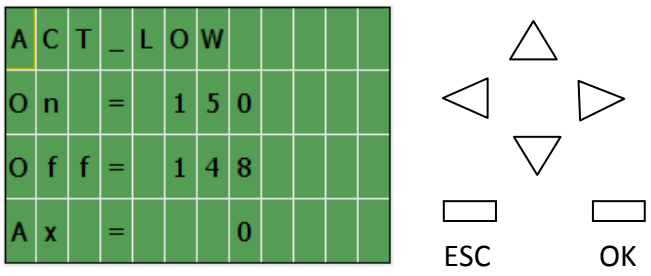
Press ‘up’ arrow key, following screen appears.




High limit for activator pressure can be set at the parameter “On”.

For Ex:- Let the high limit for act pressure is set at “275” bar. When pressure goes beyond 275bar, fault occurs. Fault gets cleared only if pressure comes below “273”bar (Off parameter). The pressure limit can be changed using up/down arrow keys.

Press ‘up’ arrow key, following screen appears.

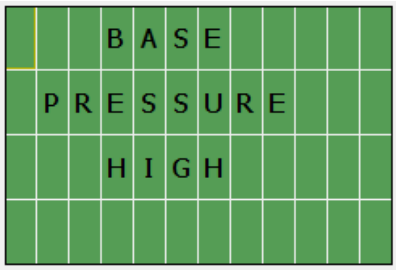



Low limit for activator pressure can be set at the parameter “Off”.

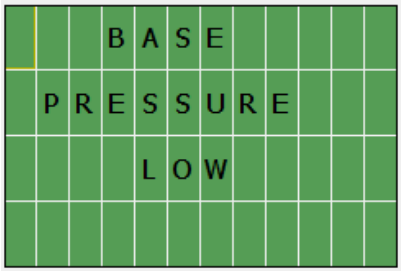
For Ex:- Let the low limit for base pressure is set at “148” bar. When pressure falls below 148bar, fault occurs. Fault gets cleared only if pressure resumes above “150”bar (On parameter). The pressure limit can be changed using up/down arrow keys.

**FAULT MESSAGES:-**

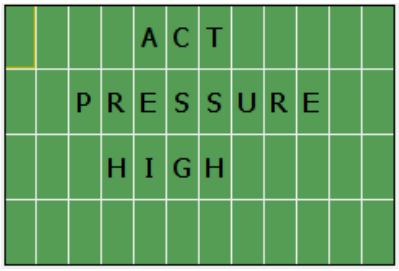
- If base pressure rises beyond the set pressure limit, Base pressure high message gets displayed as shown below.



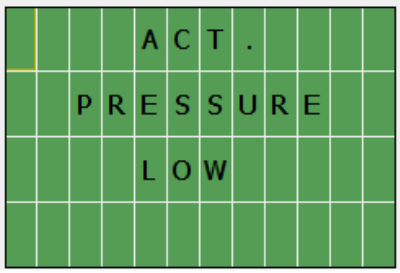

- If base pressure falls below the set pressure limit, Base pressure low message gets displayed as shown below.



- If activator pressure rises beyond the set pressure limit, activator pressure high message gets displayed as shown below.

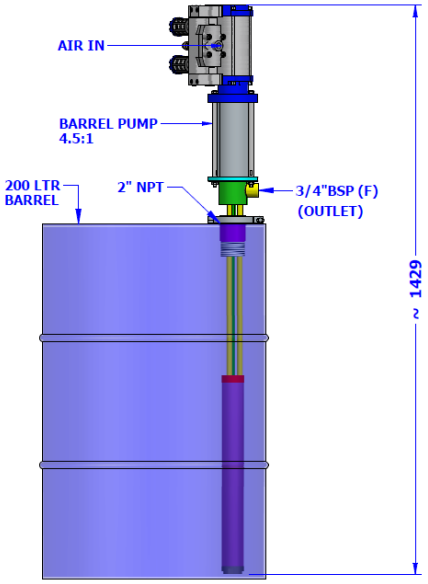



- If activator pressure falls below the set pressure limit, activator pressure low message gets displayed as shown below.

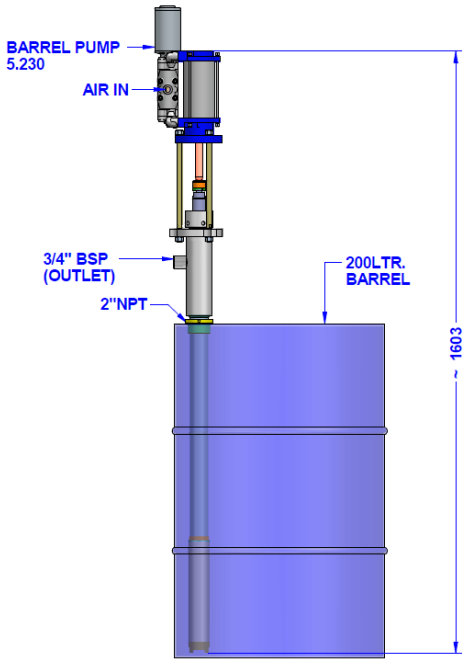


# TYPICAL INSTALLATION

**Barrel Transfer Pump 4.5:1**
**(For Moisture Sensitive Material)**




**Barrel Length Pump 5.230**
**(For General Liquid)**




## INSTALLATION

1.Screw the bung adapter tightly into the bunghole of the drum.
2.Install an air line filter on air line to remove harmful dirt and moisture from the compressed air supply.
3.Connect air supply to the pump.
4. Always connect a ground wire to the air motor.
The pump installation is complete.

## OPERATION

### Daily startup procedures

1. Connect air supply to the Transfer pump.
2. Turn on the main air supply.
3. Slowly increase the air pressure by air regulator until the transfer pump run slowly.

Use the Air regulator to control the pump speed.

**Daily shutdown procedures**

1. Slowly decrease the air pressure until zero.
2. Disconnect the air line.

**<u>For extended period shutdown</u>**

Flush, disassemble and thoroughly clean the Transfer pump before storing in a dry place.

## MAINTANANCE

**WARNING:** TO AVOID PERSONAL INJURY, ALWAYS DISCONNECT THE AIR COUPLER AND RELIVE ALL THE AIR AND HYDRAULIC PRESSURES BEFORE SERVICING THE PUMP.

**Disassembly**

1. Place the transfer pump in a vice.
2. Remove the suction seat.

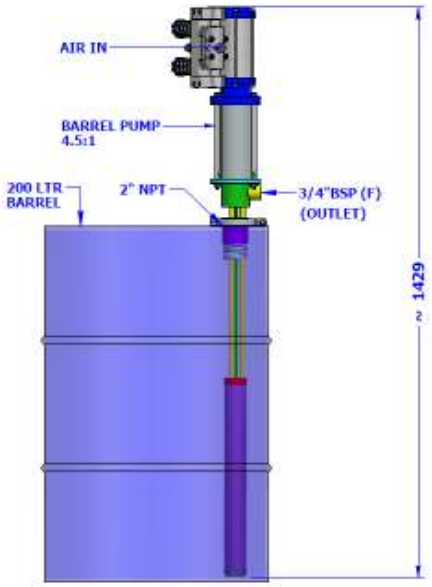
If the unit requires more than installation of a repair kit, it is usually quicker and least expensive to send the unit in for repair.

# TROUBLE SHOOTING

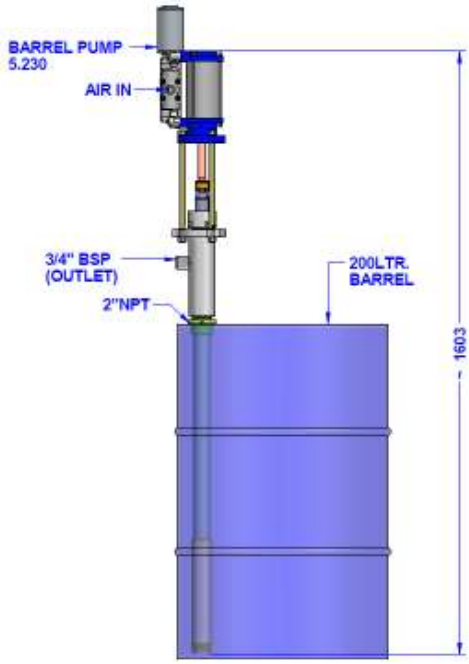
| MALFUNCTION | Pump does not start/stops during operation | Pump does not suck or only insufficien tly | Spray pressure too low | Pump operates irregularly | Pump operates although spray gun is closed | Pump transp orts materi al into the rinsing agent | Regulator frozen |
|---|---|---|---|---|---|---|---|
| **AIRMOTOR** | Press sensing valve provided on control block Clean regulator, replace defective parts if necessary | | | Clean regulator, replace defective parts if necessary | | | Compressed air too moist, stroke frequency too high, ambient temperature too low. |
| **HYDRAULIC PART** | | Not sufficiently ventilated, loose suction connection | | Not sufficiently ventilated, loose suction connection | Not sufficiently ventilated, loose suction connection | | |
| **SUCTION AND TRANSFER VALVE** | | Worn or blocked, replace defective parts | | Worn or blocked, replace defective parts | Replace worn or defective parts | | |
| **PACKINGS** | | Leaking piston and packing | | Leaking piston and packing | | Leakin g packing | |
| **FILTER** | Filter mesh blocked, check where and clean out | Filter mesh blocked, check where and clean out | Filter mesh blocked, check where and clean out | | Drain valve open. | | |
| **COMPRESSED AIR LINE** | Volume flow too low, air pressure too low. | | Volume flow too low, air pressure too low. | | | | |
| **MATERIAL HOSE** | Blocked, check where and clean out | Blocked, check where and clean out | Blocked, check where and clean out | | | | |

# TYPICAL INSTALLATION

**Barrel Transfer Pump 4.5:1**
**(For Moisture Sensitive Material)**




**Barrel Length Pump 5.230**
**(For General Liquid)**




## INSTALLATION

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1. Slowly decrease the air pressure until zero.
2. Disconnect the air line.

**<u>For extended period shutdown</u>**

Flush, disassemble and thoroughly clean the Transfer pump before storing in a dry place.

**MAINTANANCE**

**WARNING:** TO AVOID PERSONAL INJURY, ALWAYS DISCONNECT THE AIR COUPLER AND RELIVE ALL THE AIR AND HYDRAULIC PRESSURES BEFORE SERVICING THE PUMP.

**Disassembly**

1. Place the transfer pump in a vice.
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|---|---|---|---|---|---|---|---|
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| **PACKINGS** | | Leaking piston and packing | | Leaking piston and packing | | Leakin g packing | |
| **FILTER** | Filter mesh blocked, check where and clean out | Filter mesh blocked, check where and clean out | Filter mesh blocked, check where and clean out | | Drain valve open. | | |
| **COMPRESSED AIR LINE** | Volume flow too low, air pressure too low. | | Volume flow too low, air pressure too low. | | | | |
| **MATERIAL HOSE** | Blocked, check where and clean out | Blocked, check where and clean out | Blocked, check where and clean out | | | | |

# OPERATION

1) I3 "ON" == Q1 ON

2) I4 "ON" == Q2A ON

3) I5 "ON" == Q2B ON

4) I1 "ON" == PRS MONOTORING ON
   FOR LP[ OR HP " Q3 AND Q4"ON
   FLT ACK === Q4 OFF
   I1 "OFF" === Q3 ALSO OFF

5) I3 AND I4 "ON" == Q4 ON (HOOTER)

6) I3 AND I5 "ON" == Q4 ON

## ***PREVENTIVE MAINTENANCE (ELECTRICAL)***

- Keep the electrical control panel and junction boxes free from any debris and dust.
- Electrical connections should not be loosened. It may leads to spark.
- Identify components running hot or not according to specifications: Transformers, motors, bearings and wires almost always run hot before they fail. Predictive maintenance can avoid asset failure.
- Make sure that mounting fasteners and locking is secure.
- Check for wear of wiring insulation.
- Repair or replace the terminal blocks that are damaged or corroded.
- Make sure that all lamps are functioning well.
- Check the physical condition, operation and functionality of the Breakers, switches and component parts.
- Pitted contacts shall be replaced.
- Visually inspect for physical damage, moisture, overheating and cleanliness.
- Inspect and remove dust from busses, connectors, supports and Enclosure surfaces. A vacuum cleaner or dry compressed air may be used.
- Identify loose connections: Loose connections can cause power fluctuations to devices, devices to operate erratically and uneven load distribution between wires.

OP292-V04

# selec

**TC513A / TC513AX / TC221A / TC203AX / TC303A / TC303AX**

**Operating Instructions**


## SPECIFICATIONS

**Display**
3 digit, 7 segment digital display
**LED Indications**
R: Control output ON
**Keys**
3 keys for digital setting

**INPUT SPECIFICATIONS**
**Input Signal**
Thermocouple (J,K,T,R,S) / RTD (Pt100)
**Sampling time**
250 ms
**Input Filter (FTC)**
0.2 to 10.0 sec
**Resolution**
Fixed 1° resolution
**Temperature Unit**
°C / °F selectable
**Indication Accuracy**
For TC inputs: 0.25% of FS ±1°
For R & S inputs: 0.5% of F.S ± 2°
(20 min of warm up time for TC input)
For RTD inputs: 0.1% of FS ±1°

**FUNCTIONAL SPECIFICATIONS**
**Control Method**
1) PID control with auto tuning
2) ON-OFF control
**Proportional Band (P)**
1 to 400°
**Integral Time (I)**
0.0 to 99.9 min
**Derivative Time (D)**
0 to 999 sec
**Cycle Time**
0.1 to 99.9 sec
**Hysteresis Width**
0.1 to 99.9°
**Manual Reset Value**
-19.9 to 19.9°

**CONTROL OUTPUT** (Relay or SSR user selectable)*
**Relay contact (SPST)** (For TC513A,TC221A,TC303A)
10 A @ 250V AC / 30V DC, resistive
**Relay contact (SPDT)** (For TC513AX, TC203AX, TC303AX)
10 A @ 250V AC / 30V DC, resistive
**SSR Drive Output (Voltage Pulse)**
12V DC, 50 mA

* Not applicable for TC513A,TC221A,TC303A

**POWER SUPPLY**
**Supply Voltage**
85 to 270V AC/DC (AC: 50 or 60 Hz )
OPTIONAL - 24V AC/DC
**Power Consumption**
5 VA max @230V AC
**Temperature**
Operating: 0 to 50°C ; Storage: -20 to 75°C
**Humidity (non-condensing)**
95% RH
**Weight**
TC513A/TC513AX : 129 gms
TC221A/TC203AX : 180 gms
TC303A/TC303AX : 240 gms

## SAFETY PRECAUTIONS

All safety related codifications, symbols and instructions that appear in this operating manual or on the equipment must be strictly followed to ensure the safety of the operating personnel as well as the instrument.

If the equipment is not handled in a manner specified by the manufacturer it might impair the protection provided by the equipment.

Read complete instructions prior to installation and operation of the unit.

**WARNING:** Risk of electric shock.

### WIRING GUIDELINES

**WARNING:**
1. To prevent the risk of electric shock power supply to the equipment must be kept OFF while doing the wiring arrangement. Do not touch the terminals while power is being supplied.
2. To eliminate electromagnetic interference use short wire with adequate ratings; twists of the same in equal size shall be made. For the input and output signal lines, be sure to use shielded wires and keep them away from each other.
3. Cable used for connection to power source, must have a cross section of 1mm$^2$ or greater. These wires shall have insulation capacity made of at least 1.5kV.
4. When extending the thermocouple lead wires, always use thermocouple compensation wires for wiring. For the RTD type, use a wiring material with a small lead resistance (5Ω max per line) and no resistance differentials among three wires.
5. A better anti-noise effect can be expected by using standard power supply cable for the instrument.

### MAINTENANCE

1 The equipment should be cleaned regularly to avoid blockage of ventilating parts.
2. Clean the equipment with a clean soft cloth . Do not use Isopropyl alcohol or any other cleaning agent.

### INSTALLATION GUIDELINES

1. This equipment, being built-in-type, normally becomes a part of main control panel and in such case the terminals do not remain accessible to the end user after installation and internal wiring.

2 Do not allow pieces of metal, wire clippings, or fine metallic fillings from installation to enter the product or else it may lead to a safety hazard that may in turn endanger life or cause electrical shock to the operator.

3. Circuit breaker or mains switch must be installed between power source and supply terminals to facilitate power 'ON' or 'OFF' function. However this switch or breaker must be installed in a convenient position normally accessible to the operator.
4. Use and store the temperature controller within the specified ambient temperature and humidity ranges as mentioned in this manual.

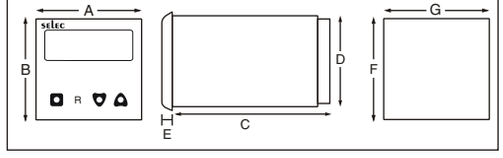
## CAUTION

1. When powering up for the first time, disconnect the output connections.
2. Fuse Protection: The unit is normally supplied without a power switch and fuses. Make wiring so that the fuse is placed between the mains power supply switch and the controller. (2 pole breaker fuse- rating: 275V AC,1A for electrical circuitry is highly recommended)
3. Since this is a built-in-type equipment (finds place in main control panel), its output terminals get connected to host equipment. Such equipment shall also comply with basic EMI/EMC and other safety requirements like BSEN61326-1 and BSEN61010 respectively.
4. Thermal dissipation of equipment is met through ventilation holes provided on chassis of equipment. Such ventilation holes shall not be obstructed else it can lead to a safety hazard.
5. The output terminals shall be strictly loaded to the manufacturer specified values/range.

## MECHANICAL INSTALLATION

NEW

| Outline dimensions (in mm) | Panel cutout dimensions (in mm) |
|---|---|



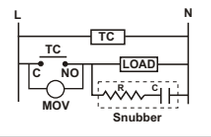
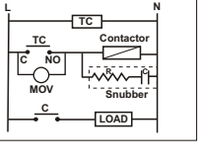

| MODELS / DIM | A | B | C | D | E | F | G |
|---|---|---|---|---|---|---|---|
| TC513A/TC513AX | 52 | 52 | 94 | 45 | 4 | 46 | 46 |
| TC221A/TC203AX | 72 | 72 | 83.7 | 67 | 4.5 | 69 | 69 |
| TC303A/TC303AX | 96 | 96 | 73 | 90.5 | 5 | 92 | 92 |

1. Prepare the panel cutout with proper dimensions as shown above.
2. Remove the clamp from the controller and push the controller into the panel cutout. Insert the clamp from the rear side until the main unit is securely fit into the panel.
3. The equipment in its installed state must not come in close proximity to any heating sources, caustic vapors, oils, steam, or other unwanted process by-products.
4. Use the specified size of crimp terminals (M3.5 screws) to wire the terminal block. Tighten the screws on the terminal block using the tightening torque within the range of 1.2 N.m.
5. Do not connect anything to unused terminals.

**EMC Guidelines:**
1. Use proper input power cables with shortest connections and twisted type.
2. Layout of connecting cables shall be away from any internal EMI source.

### LOAD CONNECTIONS

1. The service life of the output relays depends on the switching capacity and switching conditions. Consider the actual application conditions and use the product within the rated load and electrical service life.
2. Although the relay output is rated at 10 amps it is always necessary to use an interposing relay or contactor that will switch the load. This avoids damage to the controller in the event of a fault short developing on the power output circuit.
3. Always use a separate fused supply for the "power load circuit"and do not take this from the live and neutral terminals supplying power to the controller.

| For load current less than 0.5A | For bigger loads, use interposing relay / contactor |
|---|---|
|  |  |



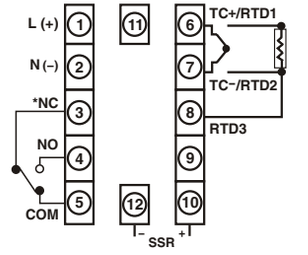
### ELECTRICAL PRECAUTIONS DURING USE

Electrical noise generated by switching of inductive loads can create momentary disruption, erratic display, latch up, data loss or permanent damage to the instrument.

**To reduce noise:**

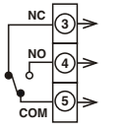
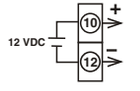
a) Use of snubber circuits across loads as shown above, is recommended.
b) Use separate shielded wires for inputs.

## TERMINAL CONNECTIONS



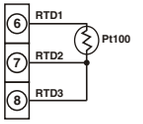

*NC contact valid only for TC513AX

**Control Output**

| Relay Output | SSR Drive Output |
|---|---|
|  |  |



**Measured Value Input**

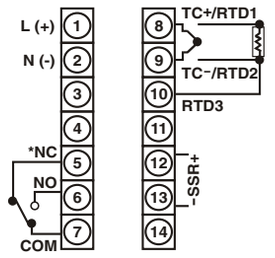
| Thermocouple (J, K, T, R, S) | RTD (Pt100) |
|---|---|
|  |  |
| Connect thermocouple sensor according to polarity shown. | For 2-wire RTD input short terminals 7 and 8 |



**For TC513A/TC513AX**

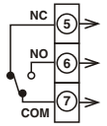
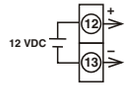
## TERMINAL CONNECTIONS

### For TC221A/TC203AX

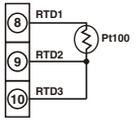



*NC contact valid only for TC203AX

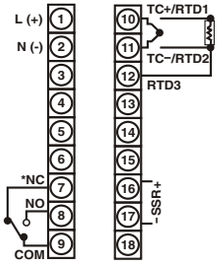
**Control Output**

| Relay Output | SSR Drive Output |
|---|---|
|  |  |

**Measured Value Input**

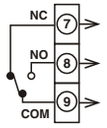
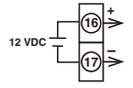
| Thermocouple (J, K, T, R, S) | RTD (Pt100) |
|---|---|
|  |  |
| Connect thermocouple sensor according to polarity shown. | For 2-wire RTD input short terminals 9 and 10. |

### For TC303A/TC303AX

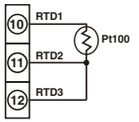



*NC contact valid only for TC303AX

**Control Output**

| Relay Output | SSR Drive Output |
|---|---|
|  |  |

**Measured Value Input**

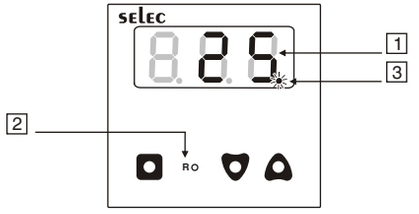
| Thermocouple (J, K, T, R, S) | RTD (Pt100) |
|---|---|
|  |  |
| Connect thermocouple sensor according to polarity shown. | For 2-wire RTD input short terminals 11 and 12 |

**WARNING: Please check the power supply voltage and controllers output type ordered (with reference to the order code) before installation.**

**Use only the correct thermocouple wire or compensating cable from the probe to instrument terminals avoiding joints in the cable if possible.**
**Failure to use the correct wire type will lead to inaccurate readings.**

**Ensure that the input sensor connected at the terminals and the input type set in the temperature controller configuration are the same.**

## FRONT PANEL DESCRIPTION




| | |
|---|---|
| 1 Process-value (PV) / Parameter name display | 1) Displays a process value (PV).<br>2) Displays the parameter symbols at parameter setting mode for 1 sec and then parameter values.<br>3) Displays PV error conditions. (refer Table 2) |
| Set-value (SV) | 4) Displays a set value (SV) when key pressed. |
| 2 Control output indication | The LED is lite when the control output is ON |
| 3 Tune | Auto tune: Decimal point blinks with faster speed. |

## FRONT KEYS DESCRIPTION

| Functions | Key press |
|---|---|
| **Online** | |
| To view Level 1 | Press key for 3 seconds. |
| To view Level 2 | Press key for 3 seconds. |
| To view Protection Level | Press + keys for 3 seconds. |
| To view and change setpoint value | Press to view the setpoint. Press + / key to change the setpoint. |
| **Programming Mode** | |
| To view parameters on the same level. | Or key once to view the next or previous function in operational menu. |
| To increase or decrease the value of a particular parameter. | + to increase and + to decrease the function value. **Note:** Parameter value will not alter when respective level is locked. |

NOTE: The unit will auto exit programming mode after 30 seconds of inactivity.

**OR**

By pressing the or or + keys for 3 sec.

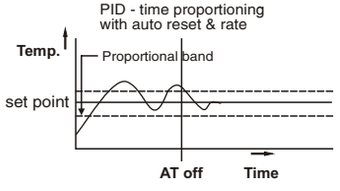
## USER GUIDE

**1. Display Bias:**
This function is used to adjust the PV value in cases where it is necessary for PV value to agree with another recorder or indicator, or when the sensor cannot be mounted in correct location.

**2. Filter Time Constant**
The input filter is used to filter out quick changes that occur to the process variable in a dynamic or quick responding application which causes erratic control. The digital filter also aids in controlling processes where the electrical noise affects the input signal. Larger the value of FTC entered, greater the filter added and the slower the controller reacts to the process and vice versa.

**3. Auto tuning:**
The Auto-tuning function automatically computes and sets the proportional band (P), integral time (I),Derivative time (D), ARW% and cycle time (CY.T) as per process characteristics.

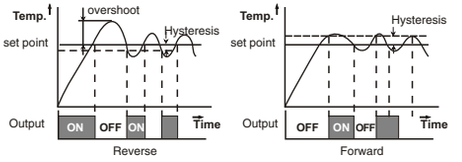
- ***Decimal point of LSD flashes at faster speed while auto-tuning is being performed.***
- ***At the completion of Auto-tuning, the decimal point stops blinking.***



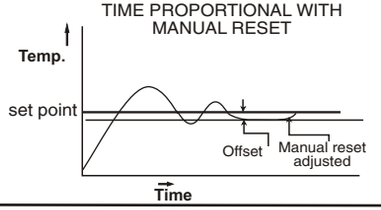

- If the power goes OFF before auto-tuningis completed, auto-tuning will be restarted at next power ON.
- If auto-tuning is not completed after 3-4 cycles, the auto-tuning is suspected to fail. In this case, check the wiring & parameters such as the control action, input type, etc.
- Carry out the auto-tuning again, if there is a change in set point or process parameters.

**4. ON/OFF control action (For Reverse Mode):**
The relay is 'ON' up to the set temperature and cuts 'OFF' above the set temperature. As the temperature of the system drops, the relay is switched 'ON' at a temperature slightly lower than the set point.

**HYSTERESIS:**
The difference between the temperature at which relay switches 'ON' and at which the relay switches 'OFF' is the hysteresis or dead band.




**5. Manual Reset (for PID control & I=0):**
After some time the process temperature settles at some point and there is a difference between the set temperature & the controlled temperature. This difference can be removed by setting the manual reset value equal & opposite to the offset.




## CALIBRATION ACCURACY DECLARATION

Product is tested & calibrated by automatic technique. The calibration of this instrument is done as per following accuracy :

For TC inputs: 0.25% of FS ±1°
For R & S inputs: 0.5% of F.S ± 2°
(20 min of warm up time for TC input)
For RTD inputs: 0.1% of FS ±1°

**Sources calibrated against:**
Kusam-meco, model 405, Sr.No.:104446

**Initial calibration is valid for 18 months after the Month/Year of manufacturing which is mentioned on order code label.**

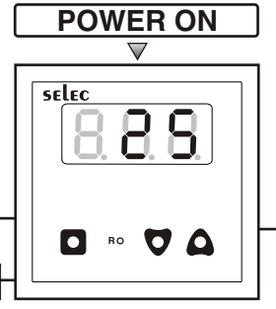
## CONFIGURATION INSTRUCTIONS

**KEY FUNCTIONS**

- ▲ ⇨ Press for 3 sec to enter Level 2
- Press once to view next parameter in configuration menu
- ▼ ⇨ Press for 3 sec to enter Level 1
- Press once to view previous parameter in configuration menu
- ▲ + ▼ ⇨ Press for 3 sec to enter protection Level
- ■ + ▲ or ■ + ▼ ⇨ Allows the user to increase or decrease associated parameter value
- ▲ or ▼ or ▲ + ▼ ⇨ To exit configuration menu press any of these keys for 3 sec

## OPERATIONAL MENU

*REQUIRED PARAMETER SETTING IS SHOWN IN LEVEL 1 DISPLAY CONDITION COLUMN*




**Level 1**

| Display (For 1sec) | Description | Default Value | Range | Display Condition |
|---|---|---|---|---|
| inP | Input type (Refer Table 1) | J | J/K/T/R/S/RTD | RTD — |
| Unt | Temperature unit | °C | °C/°F | C — |
| SP.L | Set point low limit | -199 | Min range of sensor selected to SP.H | 00 — |
| SP.H | Set point high limit | 750 | SP.L to Max range of sensor selected | 100 — |
| FtC | Filter time constant (Refer user guide) | 1.0 | 0.2 to10.0 sec | 1.0 — |
| Act | Control action | rE | RE/FD | rE — |
| Cnt | Control logic | PId | PID/ONF | ONF — |
| Any | Anti reset windup% | 25 | 1 to 100 % | For CNT=PID |
| rSt | Factory default (Reset all) | no | NO/YES | NO — |

**Level 2**

| Display (For 1sec) | Description | Default Value | Range | Display Condition |
|---|---|---|---|---|
| tUn | Tune (Refer user guide) | OFF | OFF/ON | For CNT=PID |
| P | Proportional band | 10 | 1 to 400° | For CNT=PID |
| I | Integral time | 2.0 | 0.0 to 99.9 min | For CNT=PID |
| d | Derivative time | 30 | 0 to 999 sec | For CNT=PID |
| Cy.A | Cycle time mode | AUt | AUT/US.F | For CNT=PID |
| Cy.t | Cycle time | 15.0 | 0.1 to 99.9 sec | For CNT=PID |
| HyS | Hysteresis | 1.0 | 0.1 to 99.9° | For CNT=ONF |
| oAn.P | Manual reset (Refer user guide) | 0.0 | -19.9 to 19.9° | For CNT=PID & I=0 |
| dS.b | Display bias (Refer user guide) | 0.0 | -19.9 to 19.9° | — |

**Protection Level**

| Display (For 1sec) | Description | Default Value | Range | Display Condition |
|---|---|---|---|---|
| SP | Lock setpoint | UnL | UNK/LCK | — |
| LU1 | Lock Level 1 | UnL | UNK/LCK | — |
| LU2 | Lock Level 2 | UnL | UNK/LCK | — |

**Note**

1. Locking parameters (LV1 or LV2 or SP) will not permit change in the value of respective level parameters.
2. Continuos operation of ■ +▲/▼keys for SP or other parameters makes Update speed faster in 3 stages after 3 seconds.

**Programming Setpoint (Online):** Default: 50

Range: SP.L to SP.H

To view setpoint: Press the ■ key.
To increase/decrease setpoint: Press ■ +▲/▼keys.

### INPUT RANGES (Table 1)

**FOR RTD**

| Input | | Ranges |
|---|---|---|
| Pt100 | °C | -150 to 850 |
| | °F | -199 to 999 |

**FOR THERMOCOUPLE**

| Input | | Ranges |
|---|---|---|
| J | °C | -199 to 750 |
| | °F | -199 to 999 |
| K | °C | -199 to 999 |
| | °F | -199 to 999 |
| T | °C | -199 to 400 |
| | °F | -199 to 750 |
| R & S | °C | 0 to 999 |
| | °F | 32 to 999 |

### ERROR DISPLAY (Table 2)

When an error has occured, the display indicates error codes as given below.

| Error | Meaning | Control Output Status |
|---|---|---|
| S.br | Sensor break / Over range condition | OFF |
| S.rE | Sensor reverse / Under range condition | OFF |


**Selec Controls Pvt. Ltd.**

(Specifications are subject to change, since development is a continuous process)

**Telephone: +91-22-40394200 / 40394202**
**Fax: +91-22-28471733**
**Toll free: 1800 227 353**
**Website: www.selec.com**
**Email: sales@selec.com**

# TECHNICAL SPECIFICATIONS

## Barrel Transfer Pump

| | |
|---|---|
| Part No. | 29 009 000 03 |
| Output (Continuous duty) | 21 Ltrs/Min |
| Output (Intermediate duty) | 42 Ltrs/Min |
| Cycles per ltrs. | 5 |
| Cycle per Gal. | 19 |
| Pressure ratio | 4.5:1 |
| Stroke Length | 120 mm |
| Air motor Piston ϕ | 80mm |
| Air inlet pressure max | 6 Bar |

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| Air inlet pressure max | 6 Bar |

# TECHNICAL SPECIFICATION

## POLYUREA SPRAY SYSTEM - 2K/270/110X2

| | |
|---|---|
| **Type** | **2K/270/110x2** |
| **Mixing Ratio** | **1 :1** |
| **Transfer Ratio** | **55:1** |
| **Output Per Cycle** | **220 cc** |
| **Air motor Piston Ø** | **270 mm** |
| **Spray Volume @ 40 cycles/min** | **8.8 ltr/min** |
| **Air In Max** | **6 bar** |
| **Max. Pressure** | **330 bar** |
| **Air consumption N ltr @ 40 cycles/min** | **3850** |
| **Inline Heaters** | **7kw x 2nos.** |
| **Temperature Range** | **Up to 100˚ C** |
| **Power Supply** | **415 VAC-3 phone 50 Hz 5 wire R-Y-B-N-E copper flexible 6sq.mm x 5 core cable for incoming feeder** |

# WARNING AND SAFETY INSTRUCTIONS

EQUIPMENT IS FOR PROFESSIONAL USE ONLY

## ⚠ WARNING

HIGH PRESSURE DEVICE FOR PROFESSIONAL USE ONLY
Read and understand instruction manual before use and maintenance. Observe on warnings.

Do not use spray materials containing reactive solvents with equipment containing aluminum, galvanized or zinc coated wetted parts. e.g. Dichloromethane and ethylene chloride can chemically react with aluminum and galvanized or zinc coated parts and cause explosion hazard.

## ⚠ WARNING

**Do not process flammable, explosive, toxic or otherwise hazardous materials without first performing an appropriate hazard analysis.**

VR Coatings cannot be an expert in the chemical and biological properties of the infinite number of materials that could be processed in this machine. As sold by VR Coatings, this machine is not designed to safely process hazardous materials unless additional precautions are not taken.
Before processing any material that are (or can react to become) flammable, explosive, toxic or otherwise hazardous, the user must perform a thorough hazard analysis and risk assessment of the entire process and determine the best way to deal with the hazard(s) identified, including contingency plans for dealing with processing errors and object conditions.

**It is compulsory to**
**-know the product and possible hazards.**
**-store the product to be used in the appropriate areas.**
**-keep the product used during dispensing in a suitable container.**
**-Dispose the product according to the regulation of hazardous products in force in the country where the product is used.**
**-Wear protective equipment designed for that use.**
**-wear glasses, gloves, shoes clothes and mask for breath.**

## ⚠ WARNING

SKIN INJECTION HAZARD. Protect hands and body from high-pressure fluids. Relieve pressure before disconnecting hydraulic or other lines and tighten all connections before applying pressure. In case of accidental skin injection, seek immediate" Surgical Treatment". Failure to follow this warning can result in amputation or serious injury.

- NEVER attempt to force the flow of fluid backward through the gun with your finger, hand or hand-held object against the gun nozzle.

- Before flushing system, always remove spray tip and adjust fluid pressure to lowest possible setting.

WARNING: The paint hose can develop leaks from wear, kinking, abuse etc. A leak is capable of injecting fluid into the skin; therefore the paint hose should be inspected before use. NEVER attempt to plug a hose with any part of your body, adhesive tape or any other makeshift device. Do not attempt to repair a spray hose. Instead, replace it with a new-grounded hose. You must see to it that the following points are followed for hoses, accessories or any other hardware:

- Comply with manufacturer's recommendations.
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An air pressure safety valve forms an integral part of the air motor or air regulator and must not be altered or tampered with.

**⚠ WARNING**

**COMPONENT RUPTURE** The system is capable of producing high pressure all components in the system must have a maximum working pressure capacity, not less than the pressure rating of the pump.
**SERVICING** Before servicing, cleaning or removing any part, always shut off power source, carefully release pressure in fluid portions of the system and set safety locks on guns and equipment

**⚠ WARNING**

High velocity flow of material through equipment may create static electricity. All equipment being sprayed must be properly grounded to prevent sparking, which may cause fire or explosion.

Due to static electricity potential generated by the high velocity of fluid through the pump, hose and tip, sparking may occur and the system may be hazardous. This can result in an explosion and/or fire, if every part of the spray equipment is not properly grounded. Be sure that both the object being sprayed and the airless equipment are grounded. This can be done by attaching a static wire to water piping or building structural members known to be earthen. If the hose does not contain a static electricity conductor, a static wire must be attached from the spray gun to the earth.

## ⚠ CAUTION

Before any adjustment, inspection, maintenance, cleaning, removing work always shut off the power source, carefully release pressure in fluid of the system and set safety locks on guns.

## ⚠ CAUTION

FLUSHING/CLEANING

Always flush the unit into a separate metal container with the spray tip removed and the gun held firmly against the side of container to assure proper grounding and prevent static discharge, which could cause serious bodily injury.

## ⚠ CAUTION

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- NEVER attempt to force the flow of fluid backward through the gun with your finger, hand or hand-held object against the gun nozzle.

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Before any adjustment, inspection, maintenance, cleaning, removing work always shut off the power source, carefully release pressure in fluid of the system and set safety locks on guns.

## ⚠ CAUTION

FLUSHING/CLEANING

Always flush the unit into a separate metal container with the spray tip removed and the gun held firmly against the side of container to assure proper grounding and prevent static discharge, which could cause serious bodily injury.

## ⚠ CAUTION

**FINGURE OR HANDS PINCH HAZARD. KEEP HANDS CLEAR OF MOVING PARTS COUPLING AND PISTONS**

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**An airless spray gun requires that fluid be introduced to it at very high pressure. Fluids under high pressure, from spray or leaks, can penetrate the skin and inject substantial quantities of toxic fluid into the body. If not promptly and properly treated, the injury can cause tissue death or gangrene and may result in serious, permanent disability or amputation of the wounded part. Therefore extreme caution must be exercised when using any airless spray equipment.**

**IF YOU ARE INJECTED, SEE A PHYSICIAN IMMIDIATELY. DO NOT TREAT AS A SIMPLE CUT!**
**<u>NOTE TO PHYSICIAN</u>:**
Injection into the skin is a serious, traumatic injury. It is important to treat the injury surgically as soon as possible. Do not delay treatment to research toxicity. Toxicity is concerned with some exotic coatings injected directly in to the bloodstream. Consultation with a plastic surgeon or a reconstructive hand surgeon may be advised

- NEVER attempt to force the flow of fluid backward through the gun with your finger, hand or hand-held object against the gun nozzle.

- Before flushing system, always remove spray tip and adjust fluid pressure to lowest possible setting.

WARNING: The paint hose can develop leaks from wear, kinking, abuse etc. A leak is capable of injecting fluid into the skin; therefore the paint hose should be inspected before use. NEVER attempt to plug a hose with any part of your body, adhesive tape or any other makeshift device. Do not attempt to repair a spray hose. Instead, replace it with a new grounded hose. You must see to it that the following points are followed for hoses, accessories or any other hardware :

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**SERVICING** Before servicing, cleaning or removing any part, always shut off power source, carefully release pressure in fluid portions of the system and set safety locks on guns and equipment

**PRESSURE RELEASE PROCEDURE**
A **Set trigger safely in a locked position.**
B **Shut off pump( Close main air supply valve and back-off air regulator ).**
C **Release fluid pressure from entire system (Open drain valve) and trigger gun.**
D **Reset trigger safely in a locked position.**

## ⚠ WARNING

High velocity flow of material through equipment may create static electricity. All equipment being sprayed must be properly grounded to prevent sparking, which may cause fire or explosion.

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## ⚠ CAUTION

Before any adjustment, inspection, maintenance, cleaning, removing work always shut off the power source, carefully release pressure in fluid of the system and set safety locks on guns.

ALWAYS follow the coating or solvent manufacturer's safety precautions and warnings. Never spray flammable material near open flames, pilot lights or any other source of ignition.

If you experience any static sparking or slight shock while using the equipment, stop spraying immediately. Check the entire system for proper grounding. Do not use the system again until the problem has been corrected.
Follow material supplier's instructions carefully and ensure adequate ventilation of working area to prevent health hazards.

## ⚠ CAUTION

### FLUSHING/CLEANING

Always flush the unit into a separate metal container with the spray tip removed and the gun held firmly against the side of container to assure proper grounding and prevent static discharge, which could cause serious bodily injury.

## ⚠ CAUTION

**FINGURE OR HANDS PINCH HAZARD. KEEP HANDS CLEAR OF MOVING PARTS COUPLING AND PISTONS**

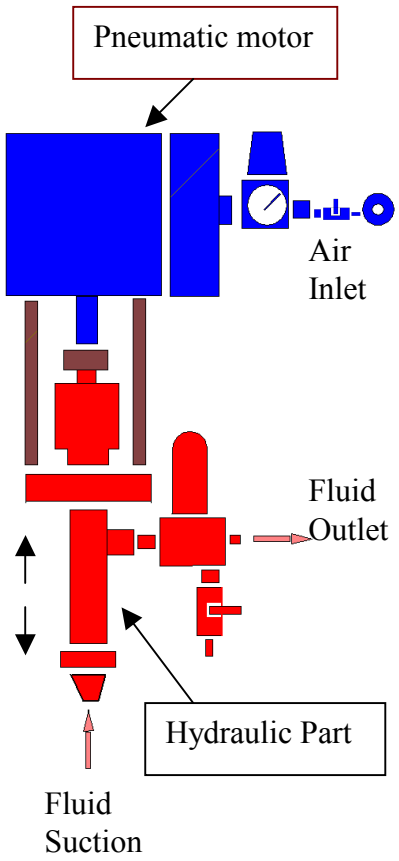
Before servicing/removing any part always shut off power source and release pressure in fluid portions of the system.

## ⚠ CAUTION

DO NOT START PUMP IF GUARD IS NOT AT "UP"POSITION.
TO SET "UP"POSITION-hold by hands push upward till it locks in ball catch.
TO SET "DOWN"POSITION-Push downward**.**
**FINGURE OR HANDS PINCH HAZARD.KEEP HANDS CLEAR.** Before servicing/removing any part always shut off power source and release pressure in fluid portions of the system.

# OPERATING INSTRUCTIONS

## GENERAL DESCRIPTION:




**Pneumatic piston Pumps** are made for spraying, Dispensing, and transferring of various types of liquid/semi solid. Theses pumps are mainly used for airless/air assisted spraying of coating materials and dispensing /transferring of paints, oil, ink, sealants adhesives, wax, grease, solvents etc. and incorporate the following essential parts:
Airless Pump : Pneumatic motor with Control Unit, Hydraulic parts, Suction device, mounting plate ,etc.
Accessories: HP (High Pressure) hose, HP Filter, Trolley, Spray gun, Spray nozzle, etc.
Optional : Circulating unit, special accessories depending on applications.

The various pump versions are identified as follows:
e.g.: TIGER 30.150
Double stroke Volume in CC (150)
The above is intended to obtain the following data: s

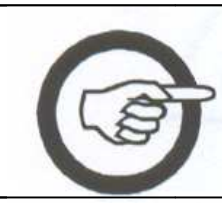
Material Pressure :Pressure Input x Transmission Ratio

Displaced Volume :Double Stroke Volume x No. Of double stroke/ min. E.g. 50 double strokes/min.)

The pump works double acting and self-priming and serves to transfer the spray material to the spray gun by making it pass through a filter and a high pressure hose. Its differential piston, which is located in the hydraulic portion of the pump, moves upwards and downwards in the working cylinder (1 cycle = 1 double stroke = 1 upward and 1 downward stroke). The displacement piston features a layer of hard chrome of about 200 microns to protect against wear. The suction and delivery ball valve feature tungsten carbide seat.

The pump is equipped with an oil cup containing a solvent, which is intended to lubricate the piston and to prevent paint residues from incrustation. The packing need to be readjusted manually by tightening the upper packing take up nut which is designed as oil cup.

The actual spray performance depends on both spray nozzle size and selected spray pressure; increased material flow results in both spray nozzle size and air consumption.



Make sure that pump does not work too fast and / or too long when idling in order to prevent damage to sealing and valves.

All airless spraying units are equipped with capacity sieving filters. There are different mesh sizes to match according to the airless nozzle. Please see **Nozzle Chart** for appropriate type of nozzle.
In case of high delivery transfer pumps separate filters cartridge type or bag type can be used. Filter size depends upon the fluid, which is handled, and application requirements.

## TWO COMPONENT HOT AIRLESS SPRAY EQUIPMENT -

Two Component Spray Equipment are used where curing time is very fast ranging from few seconds to several minutes and spraying through standard airless pump is not possible.

For High Performance Protective Coatings which are solvent free and fast curing Two Components Epoxy or PU Coating tar modified or tar free, Two Component Hot Airless Spraying Equipment is a must.

## TWO COMPONENT HOT AIRLESS EQUIPMENT CONSIST OF -

1. Plural Component High Pressure Pump
2. Mixing Block
3. Mixers – Static / Dynamic
4. Flush Pump
5. Heating System
6. Feed pump and supply system
7. Monitoring and control system
8. Spray Guns

## 1. PLURAL COMPONENT HIGH PRESSURE PUMP

This is the core part of Two Component System. It is like a standard Airless Spray Equipment except two or three hydraulic cylinders driven by single common Air Motor.

## 2. MIXING BLOCK / MANIFOLD

Both the components that are individually metered and delivered by Two Component Pump are mixed in this Mixing Block incorporated with numbers of Non Return Valves. Return Line from the Mixing Block goes back to the tank in case of circulated system.

## 3. MIXERS

When fluids are pumped through mixer they are progressively divided and recombined to get mixed. Diameter and length of the mixer depends upon material specifications.

## 4. FLUSH PUMP

This is the standard Airless High Pressure Pump with pressure ratio ranging from 40:1 to 60:1 and output per cycle from 70 to 110cc used in Two Component Systems to rinse the whole system. Selection of flush pump depends on material to be flushed and hose lengths.

## 5. HEATED SYSTEM

This may consist of inline fluid heaters, heated supply containers, heated hoses. VR Coatings offers high pressure inline fluid heaters to heat each individual component to the required temperature. Oil heated Jacketed Containers up to 200 ltr. capacity is also offered by VR Coatings to preheat the component individually as per material specification. It has power up to 12KW and temperature range up to 100°C. This is controlled and monitored by PID based Control Panel.

For long hose lengths materials which have to be sprayed at high temperature, the spray hoses must be heated / insulated. VR Coatings offers hot water system to heat the hose and also provide electrical heated hose. In some cases insulated hose can

be used instead of heated hose again depending on application, material specification and ambient temperature.

## 6. FEED PUMP AND SUPPLY SYSTEM

Feeding pumps are used to feed the component from supply tank to Two Component pump. VR Coatings offers various feed pumps from its standard transfer pump range depending on the material specifications.

Separate feed pumps can be used to transfer material from supplier's drum to supply containers of Two Component System. Drumpress with Hoisting Unit can be used for transferring high viscous materials.

Agitators may also be used depending upon the application and type of the material. VR Coatings offers electrical driven high torque agitator for viscous material. Pneumatic agitators are also available where torque requirement is less.

## 7. MONITORING AND CONTROL SYSTEM

The monitoring system is required for safeguarding against incorrect mixing ratio for Two Component System. When pressure exceeds or drops surpassing the tolerance setting that are set by operator, while spraying the system automatically shut downs. When there is malfunctioning in the system and is manifested by surpassing set limits the system automatically switches off. These malfunctions may be because of internal / external leakage's, material deficiency, damaged seal etc. Automatic 'switching off' of the system prevents incorrect mixing ratio and reworks.

## 8. SPRAY GUNS

Trigger operated and insulated handle spray guns are used to apply coatings manually. For automatic spraying pneumatically operated automatic guns are used.

## OTHER ACCESSORIES

A flexible HP hose serves as connection between pump and spray gun. Its inside wall consists of either Nylon or Teflon; it also contains an electrical conductor in order to permit electrostatic charges to discharge through the grounded pump.

**⚠ WARNING**

**COMPONENT RUPTURE** The system is capable of producing high pressure, all components in the system must have a maximum working pressure capacity not less than the pressure rating of the pump.

A large number of different nozzles are available. See **Nozzle Chart**.

## MOUNTING OF ANY AIRLESS PUMP

Any pumping unit should be installed in a way to make it easily accessible for cleaning and maintenance purposes.

In the case of wall mounting, assure that pump is vertically installed and fastened by using the holes on the mounting plate.

All pumps are equipped with a grounding point. It is compulsory that the ground lead be connected to this point.

**⚠ WARNING**

High velocity flow of material through equipment may create static electricity. All equipment being sprayed must be properly grounded to prevent sparking, which may cause a fire or explosion.

Make sure that sufficient compressed air is available when connecting the pump to the air supply net.

Insure inside diameter of the connection tube between compressed air delivery point and airless unit is sufficient for required capacity.

## COMMISSIONING AND OPERATING

### 1. General Information

Present pump is suitable for any kind of coatings/ material such as primers, basic coats, lacquers, dispersion paints, caustics, bituminous mastics etc.,

Depending on their physical and chemical characteristics, other types of spray media can be used e.g. cements, fillers, deadening agents and so forth.

Two component paints, PU material, PES material, acid hardening material or other media containing filler such as asbestos, ground cork and silicates require special attention prior to use.

We do not recommend the application of coarse bodied or abrasive fluids using the airless method. These would include sand filled wall coatings, coatings with coarse fibrous, various types of adhesives.

**⚠ WARNING**

**Do not process** flammable, explosive, toxic or otherwise **hazardous materials without first performing an appropriate hazard analysis.**
**It is compulsory to**
**-know the product and possible hazards.**
**-store the product to be used in the appropriate areas.**
**-keep the product used during dispensing in a suitable container.**
**-Dispose the product according to the regulation of hazardous products in force in the country where the product is used.**
**-Wear protective equipment designed for that use.**
**-wear glasses, gloves, shoes clothes and mask for breath.**

2. In case of doubt, please contact for correct equipment recommendations.

**Setting up**

- Hold oil cup/coupling guard by hand and push downwards in versions provided with this type of guard.
- Check for top lubricant to maximum level in pump lubrication chamber or oil-cup or packing take-up nut.
- Lift oilcup guard in upward direction till it locks in ball catch.

**⚠ CAUTION**

FINGURE OR HANDS PINCH HAZARD. KEEP HANDS CLEAR. Before servicing/removing any part always shut off power source and release pressure in fluid portions of the system.
Ensure coupling guard is always at UP position while pump is working.

- Check high-pressure filter screen element. Mesh opening should be smaller than bore tip size used.
- The Table below should be used as a guideline only. We suggest that you do not use any filter element when spraying materials containing fibrous.

| **Mesh size an element marking (opening)** | **Tip size** | **Coating material to be sprayed** |
|---|---|---|
| M 200<br>084 mm/ 0.0033'') | < 0.3 mm<br>0.011" | Clear lacquer, varnishes, and hammer tone. |
| M 150<br>mm/0.0039") | >0.3 mm<br>0.011'' | Primer, filler, red oxide. |
| M 100<br>mm/0.0057) | >0.3 mm<br>0.011'' | Primer, filler, red oxide. |
| M 70<br>(0.250 mm/0.0098") | >0.5 mm<br>0.016'' | Iron mica, red oxide. |
| M 50<br>(0.320 mm/0.0125") | >0.6 mm<br>0.023'' | Latex paint, bodied coatings. |

- Connect high-pressure fluid hose and gun and connect air supply to air regulator.

| ⚠ CAUTION | |
|---|---|
|  | **Have Trigger Lock engaged at all times when not spraying/in use.** |

## Grounding

Connect the other end of the grounding wire provided on machine to the earth ground. Always use electrically conductive hoses.

## Flushing Of Complete Two Component System.

The unit has been factory tested using an oil emulsion. To avoid contamination of the coating material to be sprayed, be sure the emulsion is flushed from the system before spray operation begins by using a compatible solvent.

**Do as follows:**

- Close main air supply valve and back-off all air regulators.
- Close drain valve located at high-pressure filter at outlet manifold..
- Insert suction hose and tube or fluid end into compatible solvent.
- Place drain hoses from drain valves into container, open both drain Valves, if system having return lines open return line valves instead of drain valves and put line ends in container

**Note:** If system is already loaded with both components then take two separate containers to collect drain.

- Open main air supply valve and slowly open-air regulators to max. 2 bar (30 psi) of feed pumps. open air regulator of main plural component pump to max 2 bar.

**Note:** Pump cycles slowly and circulates fluid via drain hose or return line back into the container.

- Close Drain valves/return line valves. Point gun into container ensuring contact between gun and metal container- then trigger the gun.

**Note:** The pump will cycle slowly and circulate fluid via gun back into the container.

- Close gun and increase air regulator setting of two component pump to maximum pressure allowed. Check all connections for leaks.

**Note:** Maximum fluid pressure will vary according to the model of pump selected.

- Close main air supply valve and back-off air regulator.

- Open drain valves / return line valves relieve system pressure completely. Finally trigger the gun again shortly to ensure that there is no pressure retained in the fluid hose

**⚠ CAUTION**

CAUTION : drain valves, return valves, supply valves shall be always closed or opened simultaneously of both components: otherwise system will unbalance and raise high pressure In one line.

- Remove suction hose and tube or fluid end from solvent container, wipe clean . Point gun into the container, ensuring good contact with the container Trigger the Gun .Slowly open-air regulators to max. 2 bar (30 psi) of feed pumps. open air regulator of main plural component pump to max 2 bar .Remove complete solvent via gun and return lines

**⚠ CAUTION**

FLUSHING/CLEANING

Always flush the unit into a separate metal container with the spray tip removed and the gun held firmly against the side of container to assure proper grounding and prevent static discharge which could cause serious bodily injury.

**MATERIAL LOADING AND OPERATING.**

- Take individual components to be mixed and sprayed in respective feed containers, manually or by separate transfer pumps or (if material is highly viscous) may be by drumpress unit.
- Close Drain valves on filters at outlet manifold.
- Open return line valves. Increase feed pumps air pressure gradually till material flows properly. Collect return material in separate containers instead of main feed tank till its solvent free.
- Start flushing pump loaded with compatible solvent and keeps pressurized for immediate flushing of mixed material whenever required.
- Before opening supply valves, open flush valve and flush for few seconds. Close flushing Valve. Close return line valves and

- open supply line valves and Trigger the spray gun. Take mixed material in a separate container and increase pressure till you

get proper mixing and atomization. Insure the pressures on the pressure gauges are stable before applying on substrate.

**NOTE :**

- There is pressure difference in upward and downward stroke due to use of feed pumps. As well as difference in both component pressures because of typical and efficient mixing block design.
- Set upper and lower pressure limits on either the gauges or pressure controllers provided for monitoring.
- Upper pressure limit shall be about 20 bar more than the stall pressure and lower limit shall be below about 20 bar than lowest working/spraying pressure. These parameters can be varied depending upon material specifications and application.

NOTE: Do not stop while spraying when pot life is very short. If you Stop, immediately close supply lines open return lines and flush the mixed material.

- Start monitoring system by switching on the monitoring switch on the control panel.
- Automatic switching off closes supply valves, opens return lines and flush valve and fault indication lamp will glow. Operator has to immediately flush the mixed material. Switch off monitoring. Identify and rectify the problem and start the system again as mentioned above.

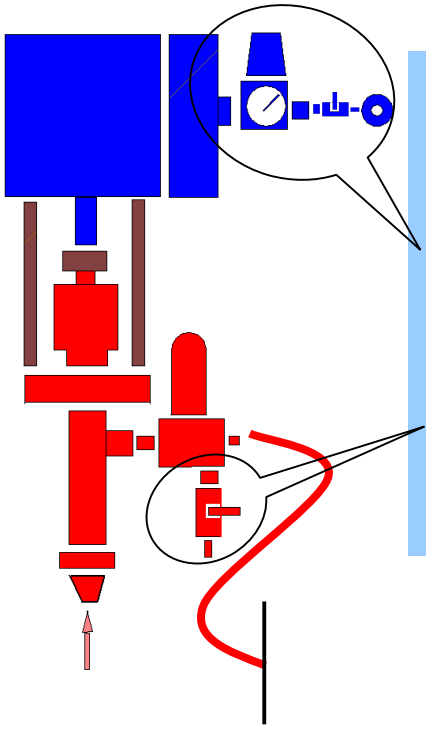
## OPERATING REMOTE PNEUMATIC CONTROLLS.

- Refer circuit diagram of pneumatic control panel.
- To switch on supply valves and to switch off return line valves or vice versa. Operated hand lever of 3/2 way DC valve as shown in figure on Pneumatic Panel.
- To switch on flushing operate hand lever of 3/2 way DC valve as shown in figure. Flushing valve will only operate when supply line valves are closed and return line valves are open.

**NOTE** : Immediately flush the mixed material when you STOP Spraying

# TROUBLE SHOOTING CHART RELATED TO MIXING.

| PROBLEM | CAUSE | SOLUTION |
|---|---|---|
| **Mixing ratio incorrect** | Return line valve leaking | Check and clean valve seats, if worn out replace. |
| | | Insure sufficient air pressure to valves. |
| | | Check pneumatic circuit. |
| | External leakages through joints | Tighten the joints. Replace worn out sealings |
| | Hydraulic Part valve seat leakages | Remove and clean valve seats. |
| | Feeding Container empty | Refill the container |
| | | |
| Solvent is mixing in sprayed material. | Flushing valve leaking | Check and clean valve seats. Replace if there are worn out parts. Check & clean non return valves in mixing block. |
| Spray pressure is low at high air inlet pressure | Choking in fluid line filters | Check filters. Clean the filter and replace element if necessary. |
| | Choking in hoses | Replace choked hoses. |
| | Choking in mixing block | Clean the mixing block and service it. |
| | Choking in Static Mixer | Clean or replace. |
| | Required material temperature not achieved | Circulate the heated material till required temperature reaches . |
| | | Check whether any heating element is failed. Correct it or replace. |
| | | |
| Mixed Material is not flushing out | Hardened material in the mixing block or in the static mixer or in the hose and gun | Clean the mixing block with compatible solvent; service it as necessary. Clean static mixer, gun and hose. Replace hose if cleaning not possible. |
| | Solvent pump pressure is low | Increase pump air pressure |
| | Flushing valve not opening fully | Insure sufficient air pressure to valve. |
| | Solvent container empty | Refill the solvent supply. |
| | The solvent in compatible with the material | Change to a compatible solvent |
| | | |



**PRESSURE RELEASE PROCEDURE**

A **Set trigger safely in a locked position.**

B **Shut off pump( Close main air supply valve and back-off air regulator ).**

C **Release fluid pressure from entire system Open drain valve and trigger gun.**

D **Reset trigger safely in a locked position.**

**Spray Pattern Control**

**⚠ CAUTION**

Have Gun **Trigger Lock** engaged at all times when not actually spraying.

When installing **spray tip** be sure that **Gasket** is correctly used between gun tip and spray tip.With Gun in the "**Open"**(triggered) position, increase the air regulator setting until the correct spray pattern is achieved.

**Note:** Use the lowest air pressure possible that will give proper fluid atomization and spray pattern.Excessive or higher pressures show no improved result, but will cause reduced system component life, and will waste material.

**POST-OPERATIONAL HANDLING:**

Actuate gun in order to evacuate pressure from pump. Remove nozzle and clean it.

Lacquer may remain in the pump up to 48 hours. This should however be avoided when using two component materials or any other material liable to self-cure quickly.

Incase of protracted downtimes, evacuate pump, refill with solvent and leave as such. Clean HP filter if necessary.

- **Shut Down Procedure**
  Flush the mixed material, shut-off flush valve. Actuate gun in order to evacuate pressure from pump. Follow Procedure as listed under "**Flushing**", however use regular **Recommended lubricating oil** without additives instead of solvent, if the pump is to be put into storage.
  Back-off (relief) air regulator completely.
  Close main airs supply valve.

**MAINTENANCE:**

- Daily - if compressed air is wet - drain oil and water separator with pressure on and blow out water at least twice daily.
- Check fog oiler for correct adjustment (droplet metering) and oil s level. Refill if required.
  **Note:** Severe operating conditions may cause frosting of Air motor. To prevent, fill fog oiler with mixture of 50:50 regular Recommended lubricating oil and Glycol.

- Check or top-up level of lubricant in pump packing take-up nut.
  **Note:** Change lubricant every 50 hours of operation, earlier in oil cup pumps. Discoloration of lubricant indicates packing wear or failure. This will affect pump performance. If necessary, renew upper packing set.
- Clean and inspect filter elements in filter screen housing and high-pressure filter at least daily, based on quality of product to be sprayed.
- Do not kink or bend high-pressure fluid hose to less than four-inch radius.
- Loosen threaded connections or hose couplings of the unit or system only when essential. This will help prevent hardened materials getting into the system, which could malfunction.

- Displacement piston in lowest (DOWN) position at all times to prevent material from hardening on the fluid piston or rod.

# TECHNICAL SPECIFICATIONS

| Name | Type | Ratio | Output/ cycle(cc) | Air motor piston ϕ mm | Stroke length mm | Approximate Weight (kg) | Recommended spray volume/ minute (lt.) | Air inlet pressure Max (bar | Output Pressure Max. (bar) | Air consumption N lt./ min. Max. |
|---|---|---|---|---|---|---|---|---|---|---|
| **TIGER** | 30.70 | 30:1 | 70 | 110 | 120 | 19 | 3.5 | 8 | 240 | 900 |
| | 40.110 | 40:1 | 110 | 160 | 120 | 24 | 5.5 | 8 | 320 | 1900 |
| | 12.150 | 12:1 | 150 | 110 | 120 | 22 | 7.5 | 6 | 72 | 900 |
| | 28.20 | 28:1 | 20 | 80 | 70 | 15 | 2 | 6 | 168 | 450 |
| | 30.150 | 30:1 | 150 | 160 | 120 | 23 | 6 | 8 | 240 | 1900 |
| | 28.40 | 28:1 | 40 | 80/110 | 120/70 | 17 | 2 | 6 | 168 | 450 |
| | 60.70 | 60:1 | 70 | 160 | 120 | 21 | 3.5 | 6 | 360 | 1400 |
| | 16.70 | 16:1 | 70 | 80 | 120 | 17 | 3.5 | 8 | 128 | 450 |
| | 12.150 | 12:1 | 150 | 110 | 120 | 24 | 7.5 | 6 | 720 | 900 |
| **RHINO** | 45.210 | 45:1 | 210 | 230 | 120 | 62 | 5.5 | 6 | 270 | 3000 |
| | 60.150 | 60:1 | 150 | 230 | 120 | | 6 | 6 | 360 | 3000 |
| | 30.275 | 30:1 | 275 | 230 | 120 | 62 | 10 | 6 | 280 | 3000 |
| | 45.275 | 45:1 | 275 | 270 | 120 | 70 | 7.5 | 6 | 270 | 4000 |
| | 60.210 | 60:1 | 210 | 210 | 120 | 70 | 5.5 | 6 | 360 | 3000 |
| | 55.275 | 55:1 | 275 | 300 | 120 | 67 | 7.5 | 6 | 330 | 5000 |
| | 75.210 | 75:1 | 210 | 300 | 120 | 67 | 5.5 | 6 | 450 | 5000 |
| **HIPPO** | 4.90 | 4:1 | 90 | 60 | 70 | 8 | 1.8 | 6 | 24 | 100 |
| | 2.900 | 2:1 | 900 | 110 | 120 | 28 | 30 | 6 | 12 | 480 |
| | 5.900 | 5:1 | 900 | 160 | 120 | 30 | 30 | 6 | 30 | 4000 |
| | 3.400 | 3:1 | 400 | 080 | 120 | 22 | 15 | 6 | 18 | 300 |
| **ELEPHANT** | 04.2000 | 4:1 | 2000 | 230 | 120 | 78 | 40 | 6 | 24 | 1200 |
| | 04.3400 | 4:1 | 3400 | 230 | 200 | | 70 | 6 | 24 | 2000 |
| | 02.4000 | 2:1 | 4000 | 230 | 120 | 105 | 80 | 6 | 12 | 1200 |
| | 02.6500 | 2:1 | 6500 | 230 | 200 | 110 | 130 | 6 | 12 | 2000 |

## CHEETAH

| Type | 2k -350 / 79X79X150 | 2k –350 / 110x110x110 | 2k –350 / 110x110x79 | 2k –350 / 110x110x58 | 2k –350 / 150x150x32 |
|---|---|---|---|---|---|
| Mixing Ratio * | 1:1 | 2:1 | 3:1 | 4:1 | 10:1 |
| Transfer Ratio * | 70:1 | 65:1 | 70:1 | 75:1 | 60:1 |
| Output per Cycle | 300 cc | 340 cc | 300 cc | 280 cc | 332 cc |
| Air Motor Piston | 350 mm | 350 mm | 350 mm | 350 mm | 350 mm |
| Stroke Length | 120 mm | 120 mm | 120 mm | 120 mm | 120 mm |
| Recommended Spray Vol/Min | 7.5 ltr. | 8.5 ltr. | 7.5 ltr. | 7 ltr. | 8 ltr. |
| Air Inlet Pressure Max. | 6 bar | 6 bar | 6 bar | 6 bar | 6 bar |
| Output Pressure Max. | 420 bar | 390 bar | 420 bar | 450 bar | 360 bar |
| Air Consumption N ltr./min Max. | 6800 | 6800 | 6800 | 6800 | 6800 |

*Other ratios on request

# TROUBLE SHOOTING

| MALFUNCTION | Pump does not start/stops during operation | Pump does not suck or only insufficien tly | Spray pressure too low | Pump operates irregularly | Pump operates although spray gun is closed | Pump trans ports mater ial into the rinsin g agent | Regulator frozen |
|---|---|---|---|---|---|---|---|
| **AIMOTOR** | Press sensing valve provided on control block Clean regulator, replace defective parts if necessary | | | Clean regulator, replace defective parts if necessary | | | Compressed air too moist, stroke frequency too high,ambient temperature too low. |
| **HYDRAULIC PART** | | Not sufficiently ventilated, loose suction connection | | Not sufficiently ventilated, loose suction connection | Not sufficiently ventilated, loose suction connection | | |
| **SUCTION AND TRANSFER VALVE** | | Worn or blocked, replace defective parts | | Worn or blocked, replace defective parts | Replace worn or defective parts | | |
| **PACKINGS** | | Leaking piston and packing | | Leaking piston and packing | | Leaki ng packi ng | |
| **FILTER** | Filter mesh blocked, check where and clean out | Filter mesh blocked, check where and clean out | Filter mesh blocked, check where and clean out | | Drain valve open. | | |
| **COMPRESSED AIR LINE** | Volume flow too low, air pressure too low. | | Volume flow too low, air pressure too low. | | | | |
| **PRESSURE REGULATOR VALVE (AIR)** | Air pressure too low | | Air pressure too low | | | | |
| **SUCTION SET** | | Filter mesh blocked | | Filter mesh blocked | Filter mesh blocked | | |
| **MATERIAL HOSE** | Blocked, check where and clean out | Blocked, check where and clean out | Blocked, check where and clean out | | | | |
| **ATOMIZER** | Orifice of spray cap blocked | | Orifice spray too large | | | | |
| **MATERIAL BEING USED** | Viscosity too high | | | | | | |

# INDEX

# WARRANTY

VR Coatings warrants all equipments manufactured by us, as long as it is bearing original identification plate, to be free from defects in material and workmanship for a period of one year from ex-works date. VR Coatings will repair or replace any part of the equipment proven defective. The warranty applies only when the equipment is installed, operated and maintained in accordance with VR Coatings written recommendations.

Warranty claims found to be defective shall be verified and confirmed by VR Coatings.

Our warranty does not cover and VR Coatings shall not be liable for any malfunction, damages, or fair wear and tear caused by faulty installation, misuse, abrasion, corrosion, inadequate or improper maintenance, negligence, tempering, accident or incorporation of non VR Coatings parts, non observance of VR Coatings recommendations.

This warranty only consists of replacing the parts returned to our plant prepaid transportation and proven defective by us. If inspection of the equipment /part does not discloses any defect in material or workmanship, repairs will be made at a reasonable charge, which charges may includes the cost of parts, labor and transportation. VR Coatings shall not be liable for any losses resulting from a production breakdown.

Material bought in equipment, which is sold but not manufactured by VR Coatings, will be subject to the manufacturer's warranty. VR Coatings will provide purchaser with reasonable assistance in making any claim for breach of these warranties.

| Date of sales |
|---|

# NOTES

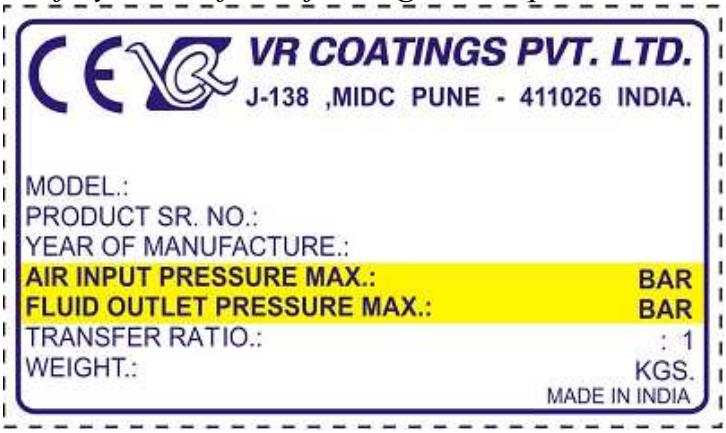
# SAFETY LABELS AND NAMEPLATE


Label on pump label no.W.01


Label on pump provided with coupling guard Label no.W.02


Label on pump provided without coupling guard Label no.W.03

*Safety labels free of charge on request*




Name Plate

# WARNING AND SAFETY INSTRUCTIONS

EQUIPMENT IS FOR PROFESSIONAL USE ONLY

**⚠ WARNING**

HIGH PRESSURE DEVICE FOR PROFESSIONAL USE ONLY
Read and understand instruction manual before use and maintenance. Observe on warnings.

Do not use spray materials containing reactive solvents with equipment containing aluminum, galvanized or zinc coated wetted parts. e.g. Dichloromethane and ethylene chloride can chemically react with aluminum and galvanized or zinc coated parts and cause explosion hazard.

**⚠ WARNING**

**Do not process flammable, explosive, toxic or otherwise hazardous materials without first performing an appropriate hazard analysis.**

VR Coatings cannot be an expert in the chemical and biological properties of the infinite number of materials that could be processed in this machine. As sold by VR Coatings, this machine is not designed to safely process hazardous materials unless additional precautions are not taken.
Before processing any material that are(or can react to become) flammable, explosive, toxic or otherwise hazardous, the user must perform a thorough hazard analysis and risk assessment of the entire process and determine the best way to deal with the hazard(s) identified, including contingency plans for dealing with processing errors and object conditions.

**It is compulsory to**
**-Know the product and possible hazards.**
**-Store the product to be used in the appropriate areas.**
**-Keep the product used during dispensing in a suitable container.**
**-Dispose the product according to the regulation of hazardous products in force in the country where the product is used.**
**-Were protective equipment designed for that use.**
**-Were glasses, gloves, shoes clothes and mask for breath.**

## ⚠ WARNING

SKIN INJECTION HAZARD. Protect hands and body from high pressure fluids. Relieve pressure before disconnecting hydraulic or other lines and tighten all connections before applying pressure. In case of accidental skin injection, seek immediate" Surgical Treatment". Failure to follow this warning can result in amputation or serious injury.

**An airless spray gun requires that fluid be introduced to it at very high pressure. Fluids under high pressure, from spray or leaks, can penetrate the skin and inject substantial quantities of toxic fluid into the body. If not promptly and properly treated, the injury can cause tissue death or gangrene and may result in serious, permanent disability or amputation of the wounded part. Therefore extreme caution must be exercised when using any airless spray equipment.**

**IF YOU ARE INJECTED, SEE A PHYSICIAN IMMIDIATELY. DO NOT TREAT AS A SIMPLE CUT!**
**<u>NOTE TO PHYSICIAN</u>:**
Injection into the skin is a serious, traumatic injury. It is important to treat the injury surgically as soon as possible. Do not delay treatment to research toxicity. Toxicity is concerned with some exotic coatings injected directly in to the bloodstream. Consultation with a plastic surgeon or a reconstructive hand surgeon may be advised

- NEVER attempt to force the flow of fluid backward through the gun with your finger, hand or hand-held object against the gun nozzle.

- Before flushing system, always remove spray tip and adjust fluid pressure to lowest possible setting.

WARNING: The paint hose can develop leaks from wear, kinking, abuse etc. A leak is capable of injecting fluid into the skin; therefore the paint hose should be inspected before use. NEVER attempt to plug a hose with any part of your body, adhesive tape or any other makeshift device. Do not attempt to repair a spray hose. Instead, replace it with a new grounded hose. You must see to it that the following points are followed for hoses, accessories or any other hardware:

- Comply with manufacturer's recommendations.

- Withstand the pressure ranges with correct safety factor.

- Must not show any leaks, kinks, sign of wear and should be factory fitted and pressure tested.

An air pressure safety valve forms an integral part of the air motor or air regulator and must not be altered or tampered with.

## ⚠ WARNING

**COMPONENT RUPTURE** The system is capable of producing high pressure all components in the system must have a maximum working pressure capacity, not less than the pressure rating of the pump.
**SERVICING** Before servicing, cleaning or removing any part, always shut off power source, carefully release pressure in fluid portions of the system and set safety locks on guns and equipment

**PRESSURE RELEASE PROCEDURE**
A **Set trigger safely in a locked position.**
B **Shut off pump (**Close **main air supply valve and back-off air regulator).**
C **Release fluid pressure from entire system (Open drain valve) and trigger gun.**
D **Reset trigger safely in a locked position.**

## ⚠ WARNING

High velocity flow of material through equipment may create static electricity. All equipment being sprayed must be properly grounded to prevent sparking, which may cause fire or explosion.

Due to static electricity potential generated by the high velocity of fluid through the pump, hose and tip, sparking may occur and the system may be hazardous. This can result in an explosion and/or fire, if every part of the spray equipment is not properly grounded. Be sure that both the object being sprayed and the airless equipment are grounded. This can be done by attaching a static wire to water piping or building structural members known to be earthen. If the hose does not contain a static electricity conductor, a static wire must be attached from the spray gun to the earth.

## ⚠ CAUTION

Before any adjustment, inspection, maintenance, cleaning, removing work always shut off the power source, carefully release pressure in fluid of the system and set safety locks on guns.

ALWAYS follow the coating or solvent manufacturer's safety precautions and warnings. Never spray flammable material near open flames, pilot lights or any other source of ignition.

If you experience any static sparking or slight shock while using the equipment, stop spraying immediately. Check the entire system for proper grounding. Do not use the system again until the problem has been corrected.
Follow material supplier's instructions carefully and ensure adequate ventilation of working area to prevent health hazards.

## ⚠ CAUTION

### FLUSHING/CLEANING

Always flush the unit into a separate metal container with the spray tip removed and the gun held firmly against the side of container to assure proper grounding and prevent static discharge, which could cause serious bodily injury.

## ⚠ CAUTION

**FINGURE OR HANDS PINCH HAZARD. KEEP HANDS CLEAR OF MOVING PARTS COUPLING AND PISTONS**

Before servicing/removing any part always shut off power source and release pressure in fluid portions of the system.

## ⚠ CAUTION

DO NOT START PUMP IF GUARD IS NOT AT "UP"POSITION.
TO SET "UP"POSITION-hold by hands push upward till it locks in ball catch.
TO SET "DOWN"POSITION-Push downward**.**
**FINGURE OR HANDS PINCH HAZARD. KEEP HANDS CLEAR.** Before servicing/removing any part always shut off power source and release pressure in fluid portions of the system.

## ⚠ CAUTION

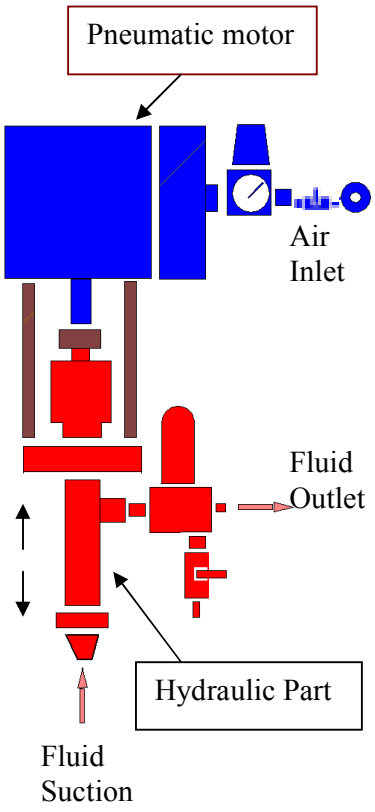
Ensure that temperature of hot fluid used in the equipment shall not exceed 80% of the self-ignition temperature of the gases/solvent vapour in explosive atmosphere, in which equipment is used.

## ⚠ CAUTION

Check the compatibility of the solvent used in the equipment with the materials of wetted parts.

# OPERATING INSTRUCTIONS

## GENERAL DESCRIPTION:




**Pneumatic piston Pumps** are made for spraying, Dispensing, and transferring of various types of liquid/semi solid. Theses pumps are mainly used for airless/air assisted spraying of coating materials and dispensing /transferring of paints, oil, ink, sealants adhesives, wax, grease, solvents etc. and incorporate the following essential parts:
Airless Pump : Pneumatic motor with Control Unit, Hydraulic parts, Suction device, mounting plate ,etc.
Accessories: HP (High Pressure) hose, HP Filter, Trolley, Spray gun, Spray nozzle, etc.
Optional : Circulating unit, special accessories depending on applications.

The various pump versions are identified as follows:
e.g.: TIGER 30.150
Double stroke Volume in CC (150)
The above is intended to obtain the following data: s

Material Pressure : Pressure Input x Transmission Ratio

Displaced Volume : Double Stroke Volume x No. Of double stroke/ min. E.g. 50 double strokes/min.)

The pump works double acting and self-priming and serves to transfer the spray material to the spray gun by making it pass through a filter and a high pressure hose. Its differential piston, which is located in the hydraulic portion of the pump, moves upwards and downwards in the working cylinder (1 cycle = 1 double stroke = 1 upward and 1 downward stroke). The displacement piston features a layer of hard chrome of about 200 microns to protect against wear. The suction and delivery ball valve feature tungsten carbide seat.

The pump is equipped with an oil cup containing a solvent, which is intended to lubricate the piston and to prevent paint residues from incrustation. The packing need to be readjusted manually by tightening the upper packing take up nut which is designed as oil cup.

The actual spray performance depends on both spray nozzle size and selected spray pressure; increased material flow results in both spray nozzle size and air consumption.

Make sure that pump does not work too fast and / or too long when idling in order to prevent damage to sealing and valves.

All airless spraying units are equipped with capacity sieving filters. There are different mesh sizes to match according to the airless nozzle. Please see **Nozzle Chart** for appropriate type of nozzle.
In case of high delivery transfer pumps separate filters cartridge type or bag type can be used. Filter size depends upon the fluid, which is handled, and application requirements.

**TWO COMPONENT HOT AIRLESS SPRAY EQUIPMENT-**

Two Component Spray Equipment are used where curing time is very fast ranging from few seconds to several minutes and spraying through standard airless pump is not possible.

For high performance protective coatings which are solvent free and fast curing two components Epoxy or PU coating tar modified or tar free, two component hot airless spraying equipment is a must.

**TWO COMPONENT HOT AIRLESS EQUIPMENT CONSIST OF-**

1. Plural component high pressure pump
2. Mixing block
3. Mixers-Static/Dynamic
4. Flush pump
5. Heating system
6. Feed pump and supply system
7. Monitoring and control system
8. Spray guns

## 1. PLURAL COMPONENT HIGH PRESSURE PUMP

This is the core part of two component system. It is like standard airless spray equipment except two or three hydraulic cylinders driven by single common air motor.

## 2. MIXING BLOCK / MANIFOLD

Both the components that are individually metered and delivered by two component pump are mixed in this mixing block incorporated with numbers of non return valves. Return line from the mixing block goes back to the tank in case of circulated system.

## 3. MIXERS

When fluids are pumped through mixer they are progressively divided and recombined to get mixed. Diameter and length of the mixer depends upon material specifications.

## 4. FLUSH PUMP

This is the standard airless high pressure pump with pressure ratio ranging from 40:1 to 60:1 and output per cycle from 70 to 110cc used in two component system to rinse the whole system. Selection of flush pump depends on material to be flushed and hose lengths.

## 5. HEATED SYSTEM

This may consist of inline fluid heaters, heated supply containers, heated hoses. VR Coatings offers high pressure Inline fluid heaters to heat each individual component to the required temperature. Oil heated jacketed containers up to 200 ltr. capacity is also offered by VR Coatings to preheat the component individually as per material specification. It has power up to 12KW and temperature range up to 100°C. This is controlled and monitored by PID based control panel.

For long hose lengths materials which have to be sprayed at high temperature, the spray hoses must be heated/ insulated. VR Coatings offers hot water system to heated/ insulated. VR Coatings offers hot water system to

heat the hose and also provide electrical heated hose. In some cases insulated hose can be used instead of heated hose again depending on application, material specification and ambient temperature.

## 6. FEED PUMP AND SUPPLY SYSTEM

Feeding pump are used to feed the component from supply tank to two component pump. VR Coatings offers various feed pumps from its standard transfer pump range depending on the material specifications.

Separate feed pumps can be used to transfer material from Suppliers drum to supply containers of Two Component System. Drumpress with Hoisting unit can be used for transferring high viscous materials.

Agitators may also be used depending upon the application and type of the material. VR Coatings offers electrical driven high torque agitator for viscous material. Pneumatic agitators are also available where torque requirement is less.

## 7. MONITORING AND CONTROL SYSTEM

The monitoring system is required for safeguarding against incorrect mixing ratio for Two Component System. When pressure exceeds or drops surpassing the tolerance setting that are set by operator, while spraying the system automatically shut downs. When there is malfunctioning in the system and is manifested by surpassing set limits the system automatically switches off. These malfunctions may be because of internal/ external leakages, material deficiency, damaged seal etc. Automatic ‘switching off’ of the system prevents incorrect mixing ratio and reworks.

## 8. SPRAY GUNS

Trigger operated and insulated handle spray guns are used to apply coatings manually. For automatic spraying pneumatically operated automatic guns are used.

## OTHER ACCESSORIES

A flexible HP hose serves as connection between pump and spray gun. Its inside wall consists of either Nylon or Teflon; it also contains an electrical conductor in order to permit electrostatic charges to discharge through the grounded pump.

**⚠ WARNING**

**COMPONENT RUPTURE** The system is capable of producing high pressure; all components in the system must have a maximum working pressure capacity not less than the pressure rating of the pump.

A large number of different nozzles are available. See **Nozzle Chart**.

## MOUNTING OF ANY AIRLESS PUMP

Any pumping unit should be installed in a way to make it easily accessible for cleaning and maintenance purposes.

In the case of wall mounting, assure that pump is vertically installed and fastened by using the holes on the mounting plate.

All pumps are equipped with a grounding point. It is compulsory that the ground lead be connected to this point.

**⚠ WARNING**

High velocity flow of material through equipment may create static electricity. All equipment being sprayed must be properly grounded to prevent sparking, which may cause a fire or explosion.

Make sure that sufficient compressed air is available when connecting the pump to the air supply net.

Insure inside diameter of connection tube between compressed air delivery point and airless unit is sufficient for required capacity.

## COMMISSIONING AND OPERATING

### 1. General Information

Present pump is suitable for any kind of coatings/ material such as primers, basic coats, lacquers, dispersion paints, caustics, bituminous mastics etc.,

Depending on their physical and chemical characteristics, other types of spray media can be used e.g. cements, fillers, deadening agents and so forth.

Two component paints, PU material, PES material, acid hardening material or other media containing filler such as asbestos, ground cork and silicates require special attention prior to use.

We do not recommend the application of coarse bodied or aggressive fluids using the airless method. These would include sand filled wall coatings, coatings with coarse fibrous, various types of adhesives.

## ⚠ WARNING

**Do not process** flammable, explosive, toxic or otherwise **hazardous materials without first performing an appropriate hazard analysis.**
**It is compulsory to**
**-know the product and possible hazards.**
**-store the product to be used in the appropriate areas.**
**-keep the product used during dispensing in a suitable container.**
**-Dispose the product according to the regulation of hazardous products in force in the country where the product is used.**
**-Wear protective equipment designed for that use.**
**-wear glasses, gloves, shoes clothes and mask for breath.**

2. In case of doubt, please contact for correct equipment recommendations.

**Setting up**

- Hold oil cup/coupling guard by hand and push downwards in versions provided with this type of guard.
- Check for top lubricant to maximum level in pump lubrication chamber or oil-cup or packing take-up nut.
- Lift oil cup guard in upward direction till it locks in ball catch.

## ⚠ CAUTION

FINGURE OR HANDS PINCH HAZARD. KEEP HANDS CLEAR. Before servicing/removing any part always shut off power source and release pressure in fluid portions of the system.
Ensure coupling guard is always at UP position while pump is working.

- Check high-pressure filter screen element. Mesh opening should be smaller than bore tip size used.
- The Table below should be used as a guideline only. We suggest that you do not use any filter element when spraying materials containing fibrous.

| Mesh size an element marking (opening) | Tip size | Coating material to be sprayed |
|---|---|---|
| M 200<br>(0.084 mm/ 0.0033'') | < 0.3 mm<br>0.011" | Clear lacquers, varnishes, and hammer tone. |
| M 150<br>(0.099mm/0.0039") | >0.3 mm<br>0.011'' | Primer, filler, red oxide. |
| M 100<br>(0.145mm/0.0057) | >0.3 mm<br>0.011'' | Primer, filler, red oxide. |
| M 70<br>(0.250 mm/0.0098") | >0.5 mm<br>0.016'' | Iron mica, red oxide. |
| M 50<br>(0.320 mm/0.0125") | >0.6 mm<br>0.023'' | Latex paint, bodied coatings. |

- Connect high-pressure fluid hose and gun and connect air supply to air regulator.

**⚠ CAUTION**

**Have Trigger Lock engaged at all times when not spraying/in use.**

**Grounding**

Connect the other end of the grounding wire provided on machine to the earth ground. Always use electrically conductive hoses.

**Flushing of Complete Two Component System**

The unit has been factory tested using an oil emulsion. To avoid contamination of the coating material to be sprayed, be sure the emulsion is flushed from the system before spray operation begins by using a compatible solvent.

**Do as follows:**

- Close main air supply valve and back-off air regulator.
- Close drain valve located at high-pressure filter manifold.
- Insert suction hose and tube or fluid end into compatible solvent.

- Place drain hoses from drain valves into container, open both drain Valves, if system having return lines open return line valves instead of drain valves and put line ends in container
  **Note:** If system is already loaded with both components then take two separate containers to collect drain.
- Open main air supply valve and slowly open-air regulators to max. 2 bar (30 psi) of feed pumps. Open air regulator of main plural component pump to max 2 bar.
  **Note:** Pump cycles slowly and circulates fluid via drain hose or return line back into the container.
- Close Drain valves/ return line valve. Point gun into container ensuring contact between gun and metal container then trigger the gun.
  **Note:** The pump will cycle slowly and circulate fluid via gun back into the container.
- Close gun and increase air regulator setting of two component pump to maximum pressure allowed. Check all connections for leaks.
  Note: Maximum fluid pressure will vary according to the model of pump selected.
- Close main air supply valve and back-off air regulator.
- Open drain valves/ return line valve relieve system pressure completely. Finally trigger the gun again shortly to ensure that there is no pressure retained in the fluid hose.

**⚠ CAUTION**

CAUTION : drain valves, return valves, supply valves shall be always closed or opened simultaneously of both components: otherwise system will unbalance and raise high pressure In one line.

- Remove suction hose and tube or fluid end from solvent container, wipe clean. Point gun into the container, ensuring good contact with the container Trigger the gun. Slowly open air regulators to max. 2 bar (30 psi) of feed pumps. Open air regulators to main plural component pump to max 2 bar. Remove complete solvent via gun and return lines+

**⚠ CAUTION**

## FLUSHING/CLEANING

Always flush the unit into a separate metal container with the spray tip removed and the gun held firmly against the side of container to assure proper grounding and prevent static discharge which could cause serious bodily injury.

## MATERIAL LOADING AND OPERATING

- Take individual components to be mixed and sprayed in respective feed containers, manually or separate transfer pump or (if material is highly viscous) may be by drumpress unit.
- Close drain valves on filters at outlet manifold.
- Open the return valves. Increase feed pumps air pressure gradually till material flows properly. Collect return material in separate containers instead of main feed tank till its solvent free.
- Start flushing pump loaded with compatible solvent and keeps pressurized for immediate flushing of mixed material whenever required.
- Before opening supply valves, open flush valve and flush for few seconds. Close flushing valve. Close return line valves and open supply line valves and Trigger the spray gun. Take mixed material in a separate container and increase till you get proper mixing and atomization. Insure the pressures on the pressure gauges are stable before applying on substrate.

**NOTE:**

- There is pressure difference in upward and downward stroke due to use of feed pumps. As well as difference in both component pressures because of typical and efficient mixing block design.
- Set upper and lower pressure limits on the gauges or pressure controllers provided for monitoring.
- Upper pressure limit shall be about 20 bar more than the stall pressure and lower limit shall be below about 20 bar than lowest working/spraying pressure. These parameters can be varied depending upon material specifications and application.

**Note**: Do not stop while spraying when pot life is very short. If you stop, immediately close supply lines open return lines and flush the mixed material.

Note: Do not stop while spraying when pot life is very short. If you stop, immediately close supply lines open return lines and flush the mixed material.

- Start monitoring system by switching on the monitoring switch on the control panel.
- Automatic switching off closes supply valves, open return lines and flush valve and indication lamp will glow. Operator has to immediately flush the mixed material. Switch off monitoring. Identify and rectify the problem and start the system again as mentioned above.

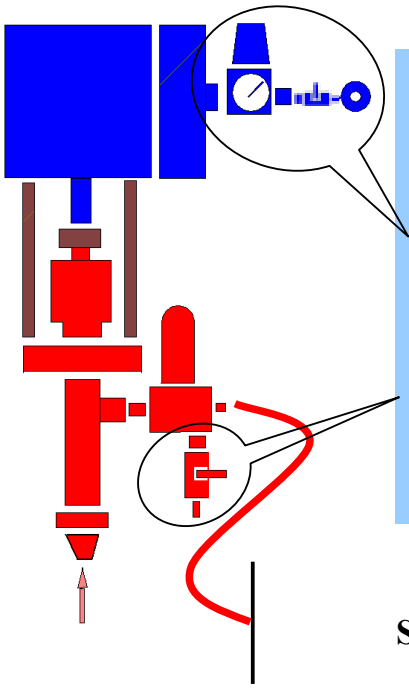
**OPERATING REMOTE PNEUMATIC CONTROLLS**

- Refer circuit diagram of pneumatic control panel.
- To switch on supply valves and to switch off return line valves or vice versa. Operated hand lever of 3/2 way DC valve as shown in figure on pneumatic panel.
- To switch on flushing operate hand lever of 3/2 way DC valve as shown in figure. Flushing valve will only operate when supply line valves are closed and return line valves are open.

**Note**: Immediately flush the mixed material when you STOP spraying

# TROUBLE SHOOTING CHART RELATED TO MIXING

| PROBLEM | CAUSE | SOLUTION |
|---|---|---|
| Mixing ratio incorrect | Return line valve leaking | Check and clean valve seats, if worn out replace. |
| | | Insure sufficient air pressure to valves. |
| | | Check pneumatic circuit. |
| | External leakages through joints | Tighten the joints. Replace worn out sealing's |
| | Hydraulic part valve seat leakages | Remove and clean valve seats |
| | Feeding container empty | Refill the container |
| | | |
| Solvent is mixing in sprayed material | Flushing valve leaking | Check and clean valve seats. Replace if there are worn out parts. Check & clean non return valves in mixing block. |
| Spray pressure is low at high air inlet pressure | Choking in fluid line filters | Check filters. Clean the filter and replace element if necessary. |
| | Choking in hoses | Replace choked hoses. |
| | Choking in static mixer | Clean or replace |
| | Required material temperature not achieved | Circulate the heated material till required temperature reaches |
| | | Check whether any heating element is failed. Correct it or replace. |
| | | |
| Mixed material is not flushing out | Hardened material in the mixing block or in the static mixer or in the hose and gun | Clean the mixing block with compatible solvent, Service it as necessary. Clean static mixer, gun and hose. Replace hose if cleaning not possible. |
| | Solvent pump pressure is low | Increase pump air pressure |
| | Flushing valve not opening fully | Insure sufficient air pressure to valve |
| | Solvent container empty | Refill the solvent supply |
| | The solvent in compatible with the material | Change to a compatible solvent |



## PRESSURE RELEASE PROCEDURE

A **Set trigger safely in a locked position.**

B **Shut off pump( Close main air supply valve and back-off air regulator ).**

C **Release fluid pressure from entire system**
**Open drain valve and**
**trigger gun.**
D **Reset trigger safely in a locked position.**

## Spray Pattern Control

**⚠ CAUTION**

Have Gun **Trigger Lock** engaged at all times when not actually spraying.

When installing **spray tip** be sure that **Gasket** is correctly used between gun tip and spray tip. With Gun in the "**Open"** (triggered) position, increase the air regulator setting until the correct spray pattern is achieved.

**Note:** Use the lowest air pressure possible that will give proper fluid atomization and spray pattern. Excessive or higher pressures show no improved result, but will cause reduced system component life, and will waste material.

## POST-OPERATIONAL HANDLING:

Actuate gun in order to evacuate pressure from pump. Remove nozzle and clean it.
Lacquer may remain in the pump unto 48 hours. This should however be avoided when using two component materials or any other material liable to self-cure quickly.
Incase of protracted downtimes, evacuate pump, refill with solvent and leave as such. Clean HP filter if necessary.

- **SHUT DOWN PROCEDURE**

  Flush the mixed material, shut-off flush valve. Actuate gun in order to evacuate pressure from pump. Follow procedure as listed under "Flushing", however use regular Recommended lubricating oil without additives instead of solvent, if the pump is to be put into storage.
  Back-off (relief) air regulator completely.
  Close main airs supply valve.

**MAINTENANCE:**

- Daily - if compressed air is wet - drain oil and water separator with pressure on and blow out water at least twice daily.
- Check fog oiler for correct adjustment (droplet metering) and oil s level. Refill if required.
  **Note:** Severe operating conditions may cause frosting of Air motor. To prevent, fill fog oiler with mixture of 50:50 regular recommended lubricating oil and Glycol.
  Check or top-up level of lubricant in pump packing take-up nut & tighten oil cup if required.
  **Note:** Change lubricant every 50 hours of operation, earlier in oil cup pumps. Discoloration of lubricant indicates packing wear or failure. This will affect pump performance. If necessary, renew upper packing set.
- Clean and inspect filter elements in filter screen housing and high-pressure filter at least daily, based on quality of product to be sprayed.
- Do not kink or bend high-pressure fluid hose to less than four-inch radius.
- Loosen threaded connections or hose couplings of the unit or system only when essential. This will help prevent hardened materials getting into the system, which could malfunction.

- Displacement piston in lowest (DOWN) position at all times to prevent material from hardening on the fluid piston or rod.

# Technical Specifications

| Name | Type | Ratio | Output/cycle(cc) | Air motor piston ϕ mm | Stroke length mm | Approximate Weight (kg) | Recommended spray volume/ minute (lt.) | Air inlet pressure Max. (bar) | Output Pressure Max. (bar) | Air consumption N lt./ min. Max. |
|---|---|---|---|---|---|---|---|---|---|---|
| **TIGER** | 30.70 | 30:1 | 70 | 110 | 120 | 19 | 3.5 | 8 | 240 | 900 |
| | 40.110 | 40:1 | 110 | 160 | 120 | 24 | 5.5 | 8 | 320 | 1900 |
| | 12.150 | 12:1 | 150 | 110 | 120 | 22 | 7.5 | 6 | 72 | 900 |
| | 28.20 | 28:1 | 20 | 80 | 70 | 15 | 2 | 6 | 168 | 450 |
| | 30.150 | 30:1 | 150 | 160 | 120 | 23 | 6 | 8 | 240 | 1900 |
| | 28.40 | 28:1 | 40 | 80/110 | 120/70 | 17 | 2 | 6 | 168 | 450 |
| | 60.70 | 60:1 | 70 | 160 | 120 | 21 | 3.5 | 6 | 360 | 1400 |
| | 16.70 | 16:1 | 70 | 80 | 120 | 17 | 3.5 | 8 | 128 | 450 |
| | 12.150 | 12:1 | 150 | 110 | 120 | 24 | 7.5 | 6 | 720 | 900 |
| | 14.20 | 14.1 | 20 | 60 | 70 | 13 | 1.2 | 6 | 84 | 250 |
| | 14.40 | 14.1 | 40 | 60 | 120 | 15 | 1.2 | 6 | 84 | 250 |
| **RHINO** | 45.210 | 45:1 | 210 | 230 | 120 | 62 | 5.5 | 6 | 270 | 3000 |
| | 60.150 | 60:1 | 150 | 230 | 120 | 60 | 6 | 6 | 360 | 3000 |
| | 30.275 | 30:1 | 275 | 230 | 120 | 62 | 10 | 6 | 280 | 3000 |
| | 45.275 | 45:1 | 275 | 270 | 120 | 70 | 7.5 | 6 | 270 | 4000 |
| | 60.210 | 60:1 | 210 | 210 | 120 | 70 | 5.5 | 6 | 360 | 3000 |
| | 55.275 | 55:1 | 275 | 300 | 120 | 67 | 7.5 | 6 | 330 | 5000 |
| | 75.210 | 75:1 | 210 | 300 | 120 | 67 | 5.5 | 6 | 450 | 5000 |
| | 75.275 | 75:1 | 275 | 350 | 120 | 67 | 7.5 | 6 | 450 | 5000 |
| **HIPPO** | 4.90 | 4:1 | 90 | 60 | 70 | 8 | 1.8 | 6 | 24 | 100 |
| | 2.900 | 2:1 | 900 | 110 | 120 | 28 | 30 | 6 | 12 | 480 |
| | 5.900 | 5:1 | 900 | 160 | 120 | 30 | 30 | 6 | 30 | 4000 |
| | 3.400 | 3:1 | 400 | 080 | 120 | 22 | 15 | 6 | 18 | 300 |
| **ELEPHANT** | 4.2000 | 4:1 | 2000 | 230 | 120 | 78 | 40 | 6 | 24 | 1200 |
| | 4.3400 | 4:1 | 3400 | 230 | 200 | | 70 | 6 | 24 | 2000 |
| | 2.4000 | 2:1 | 4000 | 230 | 120 | 105 | 80 | 6 | 12 | 1200 |
| | 2.6500 | 2:1 | 6500 | 230 | 200 | 110 | 130 | 6 | 12 | 2000 |

**CHEETAH**

| Type | 2k-350/ 79x79x150 | 2k-350/ 110x110x110 | 2k-350 / 110x110x79 | 2k-350/ 110x110x58 | 2k-350/ 150x150x32 |
|---|---|---|---|---|---|
| Mixing Ratio* | 1:1 | 2:1 | 3:1 | 4:1 | 10:1 |
| Transfer Ratio* | 70:1 | 65:1 | 70:1 | 75:1 | 60:1 |
| Output per cycle | 300 cc | 340 cc | 300 cc | 280 cc | 332 cc |
| Air Motor Piston | 350 mm | 350 mm | 350 mm | 350 mm | 350 mm |
| Stroke Length | 120 mm | 120 mm | 120 mm | 120 mm | 120 mm |
| Recommended spray Vol/min | 7.5ltr. | 8.5ltr. | 7.5 ltr. | 7 ltr. | 8 ltr. |
| Air Inlet Pressure Max. | 6 bar | 6 bar | 6 bar | 6 bar | 6 bar |
| Output Pressure Max. | 420 bar | 390 bar | 420 bar | 450 bar | 360 bar |
| Air consumption N ltr./min Max. | 6800 | 6800 | 6800 | 6800 | 6800 |

# TROUBLE SHOOTING

| MALFUNCTION | Pump does not start/stops during operation | Pump does not suck or only insufficien tly | Spray pressure too low | Pump operates irregularly | Pump operates although spray gun is closed | Pump trans ports mater ial into the rinsin g agent | Regulator frozen |
|---|---|---|---|---|---|---|---|
| **AIMOTOR** | Clean regulator, replace defective parts if necessary | | | Clean regulator, replace defective parts if necessary | | | Compressed air too moist, stroke frequency too high, ambient temperature too low. |
| **HYDRAULIC PART** | | Not sufficiently ventilated, loose suction connection | | Not sufficiently ventilated, loose suction connection | Not sufficiently ventilated, loose suction connection | | |
| **SUCTION AND TRANSFER VALVE** | | Worn or blocked, replace defective parts | | Worn or blocked, replace defective parts | Replace worn or defective parts | | |
| **PACKINGS** | | Leaking piston and packing | | Leaking piston and packing | | Leaki ng packi ng | |
| **FILTER** | Filter mesh blocked, check where and clean out | Filter mesh blocked, check where and clean out | Filter mesh blocked, check where and clean out | | Drain valve open. | | |
| **COMPRESSED AIR LINE** | Volume flow too low, air pressure too low. | | Volume flow too low, air pressure too low. | | | | |
| **PRESSURE REGULATOR VALVE (AIR)** | Air pressure too low | | Air pressure too low | | | | |
| **SUCTION SET** | | Filter mesh blocked | | Filter mesh blocked | Filter mesh blocked | | |
| **MATERIAL HOSE** | Blocked, check where and clean out | Blocked, check where and clean out | Blocked, check where and clean out | | | | |
| **ATOMIZER** | Orifice of spray cap blocked | | Orifice spray too large | | | | |
| **MATERIAL BEING USED** | Viscosity too high | | | | | | |

# WARRANTY

VR Coatings warrants all equipments manufactured by us, as long as it is bearing original identification plate, to be free from defects in material and workmanship for a period of one year from ex-works date. VR Coatings will repair or replace any part of the equipment proven defective. The warranty applies only when the equipment is installed, operated and maintained in accordance with VR Coatings written recommendations.

Warranty claims found to be defective shall be verified and confirmed by VR Coatings.

Our warranty does not cover and VR Coatings shall not be liable for any malfunction, damages, or fair wear and tear caused by faulty installation, misuse, abrasion, corrosion, inadequate or improper maintenance, negligence, tempering, accident or incorporation of non VR Coatings parts, non observance of VR Coatings recommendations.

This warranty only consists of replacing the parts returned to our plant prepaid transportation and proven defective by us. If inspection of the equipment /part does not discloses any defect in material or workmanship, repairs will be made at a reasonable charge, which charges may includes the cost of parts, labor and transportation. VR Coatings shall not be liable for any losses resulting from a production breakdown.

Material bought in equipment, which is sold but not manufactured by VR Coatings, will be subject to the manufacturer's warranty. VR Coatings will provide purchaser with reasonable assistance in making any claim for breach of these warranties.

# NOTES

# INDEX

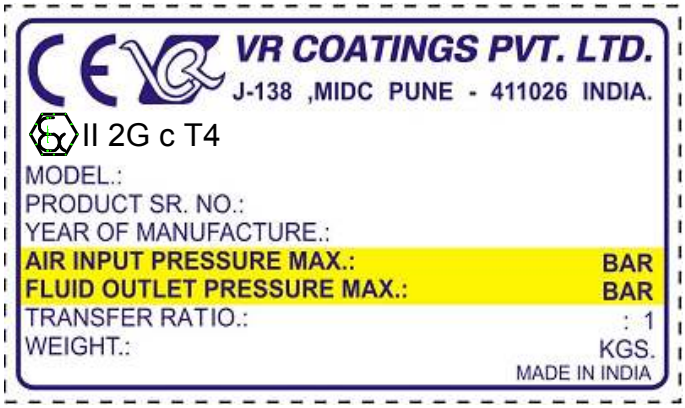
# SAFETY LABELS AND NAMEPLATE


Label on pump label no.W.01


Label on pump provided without coupling guard Label no.W.02


Label on pump provided with coupling guard Label no.W.03

*Safety labels free of charge on request*



# INSTRUCTIONS MANUAL

*Keep for future use!*

## POLYUREA SPRAY SYSTEM

Serial Number:


**VR COATINGS PVT.LTD.**

**OFFICE: J-138, MIDC PUNE – 411 026, INDIA.**

TEL : + 91 - 20 - 69180136 / 27130331

E-MAIL: vrcoatings@eth.net

**Factory: Plot No.136, Sector No.7, PCNTDA, Bhosari, Pune – 411 026, INDIA.**

TEL: + 91 – 20 - 69180106

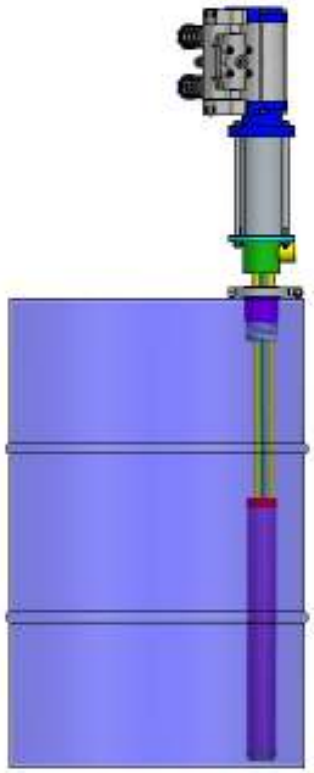
E-MAIL: service@vrcoatings.com

Mr. Pascal D'souza (Technical Director)

+91- 9822655891

# INSTRUCTIONS MANUAL

*Keep for future use!*



200 LTRS. BARREL TRANSFER PUMP

Serial Number:


**VR COATINGS PVT.LTD.**

**OFFICE: J-138, MIDC PUNE – 411 026, INDIA.**

TEL : + 91 - 20 - 69180136 / 27130331.

E-MAIL: vrcoatings@eth.net

**Factory: Plot No.136, Sector No.7, PCNTDA,**

**Bhosari, Pune – 411 026, INDIA.**

TEL: + 91 – 20 - 69180106

E-MAIL: service@vrcoatings.com

Mr. Pascal D'souza (Technical Director)

+91- 9822655891

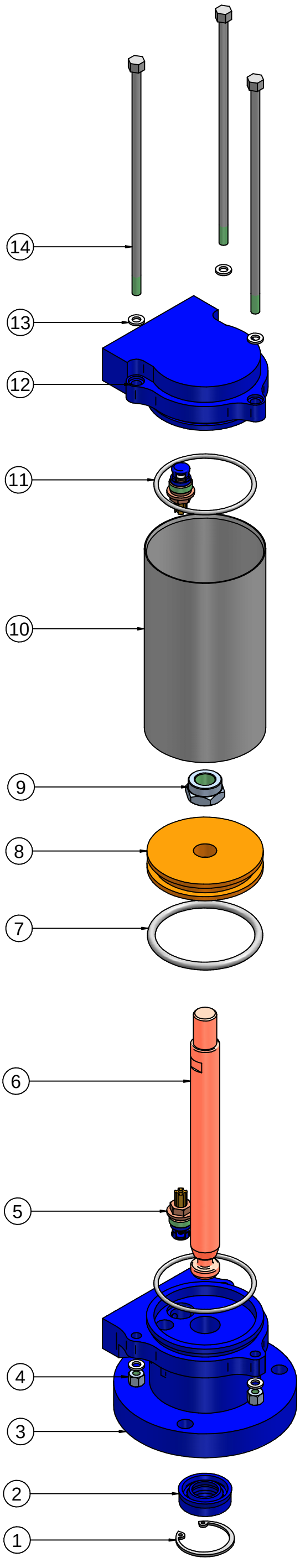
# CONTENT

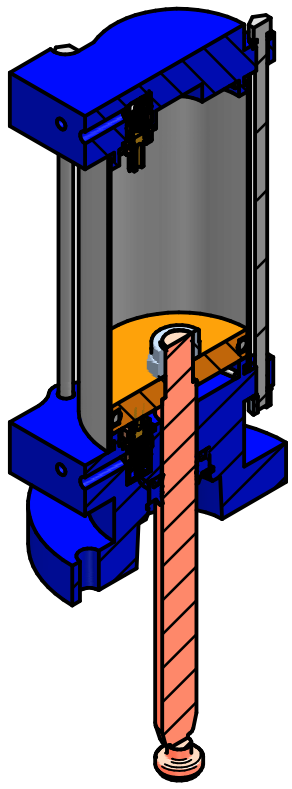
# CONTENT

# TECHNICAL SPECIFICATION

## POLYUREA SPRAY SYSTEM - 2K/270/110X2

| | |
|---|---|
| **Type** | **2K/270/110x2** |
| **Mixing Ratio** | **1 :1** |
| **Transfer Ratio** | **55:1** |
| **Output Per Cycle** | **220 cc** |
| **Air motor Piston Ø** | **270 mm** |
| **Spray Volume @ 40 cycles/min** | **8.8 ltr/min** |
| **Air In Max** | **6 bar** |
| **Max. Pressure** | **330 bar** |
| **Air consumption N ltr @ 40 cycles/min** | **3850** |
| **Inline Heaters** | **7kw x 2nos.** |
| **Temperature Range** | **Up to 100˚ C** |
| **Power Supply** | **415 VAC-3 phone 50 Hz 5 wire R-Y-B-N-E copper flexible 6sq.mm x 5 core cable for incoming feeder** |



| | PART NAME | OLD PART NO. | NEW PART NO. |
|---|---|---|---|
| A | AIR SEAL | 01 080 012 00 | 01 080 012 57 |

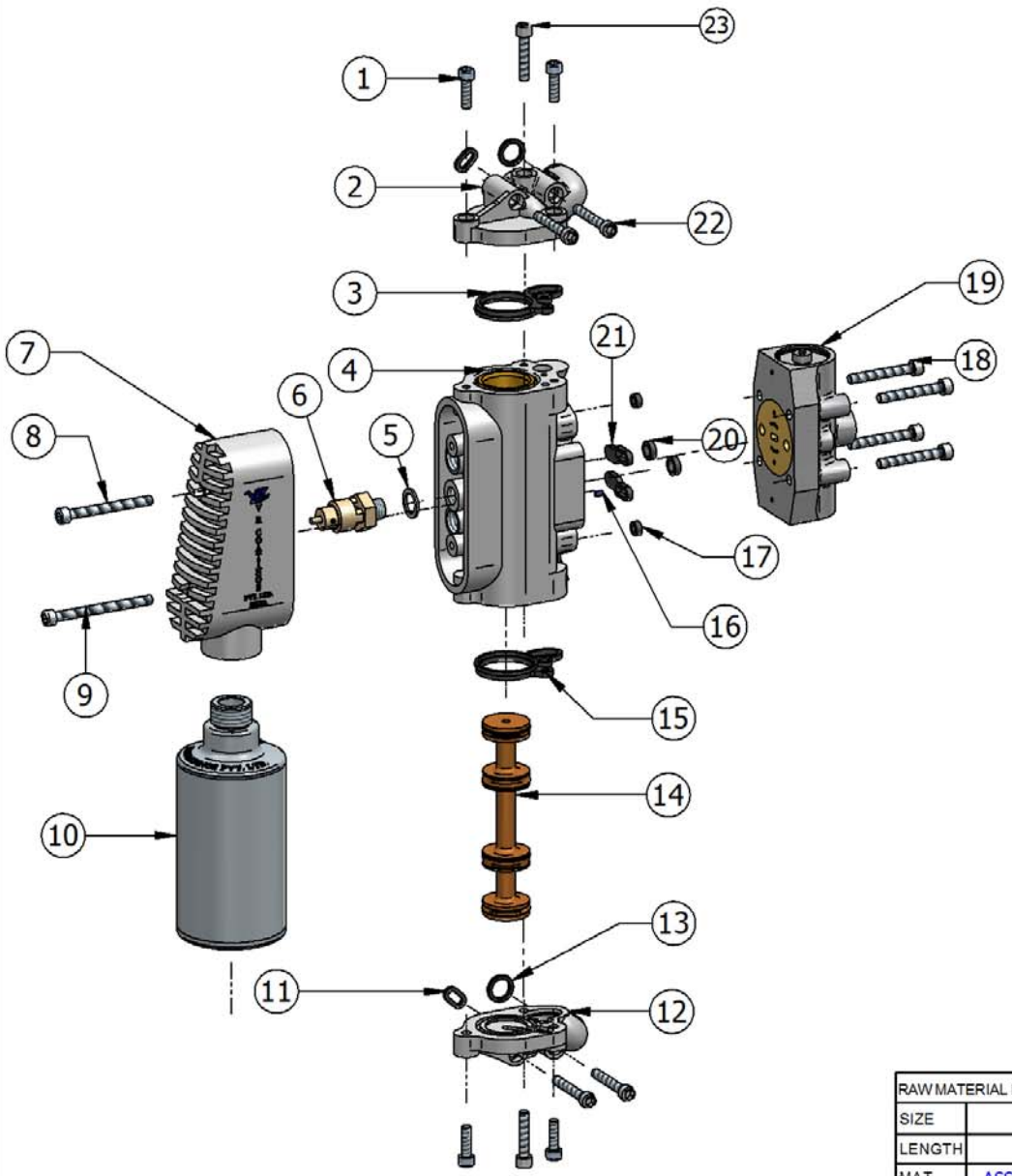
(DIRECTLY REPLACIBLE)

(NOTE : W& T ITEMS ARE SOLD WITH SERVICE KIT ONLY)

| | | | | | |
|---|---|---|---|---|---|
| | 01 080 700 00 | SERVICE KIT | – | – | SET |
| | 02 080 010 31 | GASKET | – | – | 2 |
| 14 | 01 080 003 19 | STUD | 3 | | – |
| 13 | 20 011 037 19 | WASHER M6 | 6 | | – |
| 12 | 01 080 001 02 | TOP CASTING | 1 | | – |
| 11 | 01 080 010 25 | O-RING | 2 | Y | 2 |
| 10 | 01 080 004 01 | CYLINDER | 1 | | – |
| 9 | 01 080 006 19 | NUT | 1 | | – |
| 8 | 01 080 008 01 | PISTON DISC | 1 | | – |
| 7 | 01 080 007 25 | O-RING | 1 | Y | 1 |
| 6 | 01 080 009 19 | PISTON | 1 | | – |
| 5 | 61 110 008 00 | SENSING VALVE | 2 | Y | 2 |
| 4 | 15 207 008 19 | NUT (M6X1) | 3 | | – |
| 3 | 01 080 011 02 | BOTTOM CASTING | 1 | | – |
| 2 | 01 080 012 57 | AIR SEAL | 1 | Y | 1 |
| 1 | 01 080 014 07 | CIRCLIP | 1 | | – |
| SR.NO. | PART NO. | PART NAME | QTY. | W&T | |

Note: Gasket shown in assembly dwg of Control Block

| | | | | | |
|---|---|---|---|---|---|
| RAW MATERIAL DESCRIPTION | | NOTE: | | | |
| SIZE | | | | | |
| LENGTH | | ALL DIMN. ARE IN MM UNLESS OTHERWISE STATED. FOR OPEN TOLERANCE AND SURFACE ROUGHNESS SEE STANDARD CHART DD-01/CH-01. REMOVE SHARP CORNERS. INCASE OF DOUBT ASK. | | | |
| MAT. | | | | | |
| VR COATINGS PVT.LTD. J-138, MIDC, BHOSARI, PUNE-411 026 INDIA | | DRN. | CKD. | APPD. | PART NAME: AIR MOTOR D 80 S 120 |
| | SIGN | ROHIT | Albert | NVD | |
| | DATE | | | | PART NO.: 01 080 000 00 |
| | SCALE | NOT TO SCALE | | | |




NOTE : W & T ITEMS ARE SOLD WITH SERVICE KIT ONLY.

| | 02 081 700 01 | SERVICE KIT | - | - | SET |
|---|---|---|---|---|---|
| 23 | 15 330 008 19 | ALLEN BOLT(M6X30) | 2 | | - |
| 22 | 15 340 008 19 | ALLEN BOLT M6 | 4 | | - |
| 21 | 02 081 021 57 | MID BLOCK GASKET | 2 | Y | 2 |
| 20 | 02 081 022 57 | MID BLOCK GASKET | 2 | Y | 2 |
| 19 | 02 081 001 00 | SIDE BLOCK ASSEMBLY | 1 | | - |
| 18 | 15 345 008 19 | ALLEN BOLT (M6X45) | 4 | | - |
| 17 | 02 081 023 57 | MID BLOCK GASKET | 2 | Y | 2 |
| 16 | 02 080 021 22 | PIN Ø3 X 5 | 1 | Y | 1 |
| 15 | 02 081 042 57 | BOTTTOM GASKET | 1 | Y | 1 |
| 14 | 02 081 003 00 | SLIDER ASSEMBLY | 1 | Y | 1 |
| 13 | 02 081 026 57 | MID BLOCK GASKET | 2 | Y | - |
| 12 | 02 081 029 02 | BOTTOM BLOCK | 1 | | - |
| 11 | 02 081 025 57 | MID BLOCK GASKET | 2 | Y | 2 |
| 10 | 02 081 036 00 | SILENCER ASSLY (TIGER) | 1 | | - |
| 9 | 15 370 008 19 | ALLEN BOLT(M6x70L) | 1 | | - |
| 8 | 15 360 008 19 | ALLEN BOLT (M6X60) | 1 | | - |
| 7 | 02 081 031 02 | TIGER CB CAP | 1 | | - |
| 6 | 20 043 000 00 | AIR SAFETY VALVE 1/4' | 1 | | - |
| 5 | 19 002 001 19 | WASHER 1/4" | 1 | | - |
| 4 | 02 081 044 00 | MIDDLE BLOCK ASM. | 1 | | - |
| 3 | 02 081 043 57 | TOP GASKET | 1 | Y | 1 |
| 2 | 02 081 027 02 | TOP BLOCK | 1 | | - |
| 1 | 15 320 008 19 | ALLEN BOLT M6X20 | 4 | | - |
| SR NOS. | PART NO. | PART NAME | QTY. | W & T | SERVICE KIT QTY. |

| | | | |
|---|---|---|---|
| RAW MATERIAL DESCRIPTION | NOTE: | TIGER NEW CONTROL BLOCK | |
| SIZE | | | |
| LENGTH | | ALL DIMN. ARE IN MM UNLESS OTHERWISE STATED. FOR OPEN TOLERANCE AND SURFACE ROUGHNESS SEE STANDARD CHART DD-01/CH-01. REMOVE SHARP CORNERS. INCASE OF DOUBT ASK. | |
| MAT. | ASSEMBLY | | |

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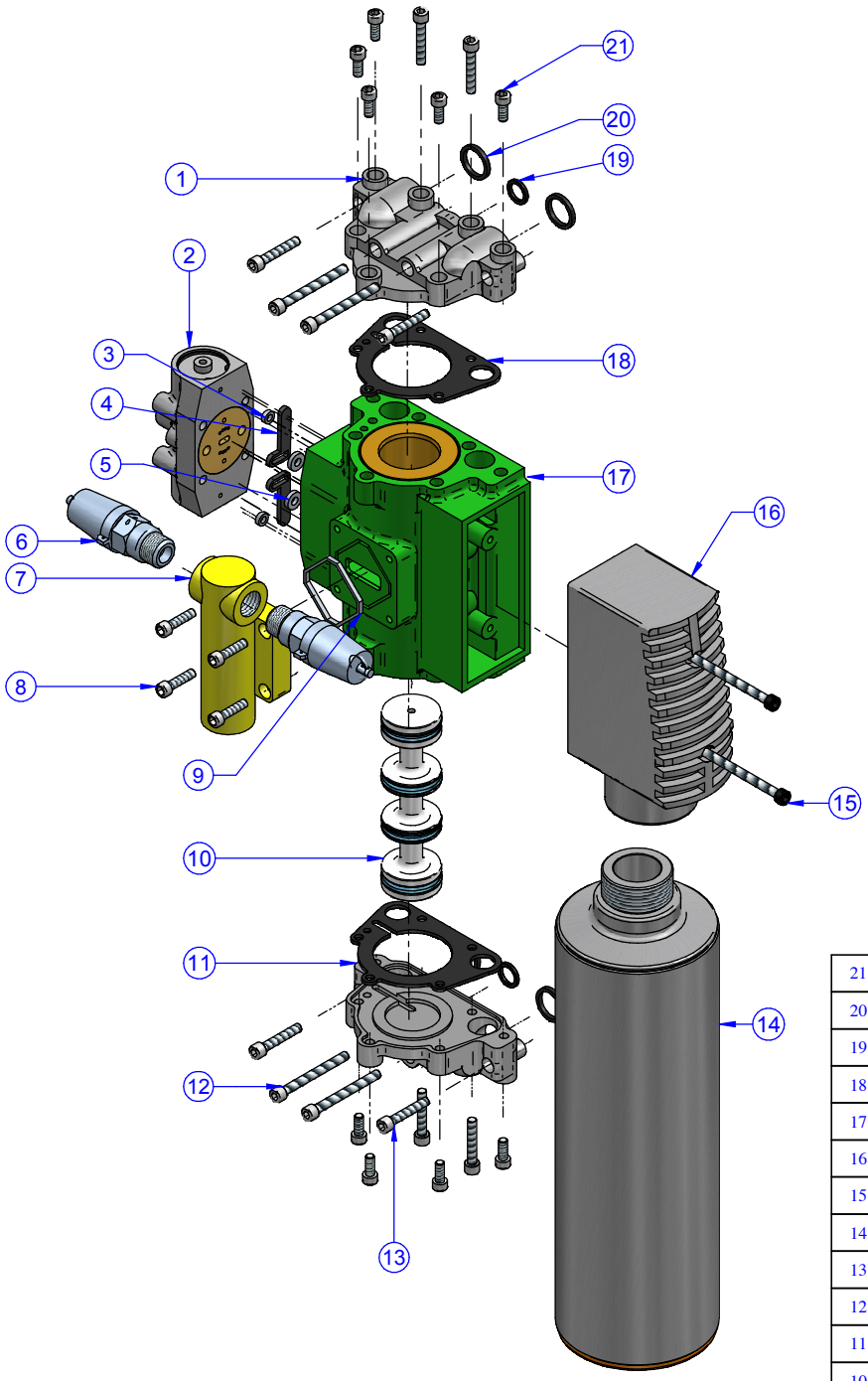
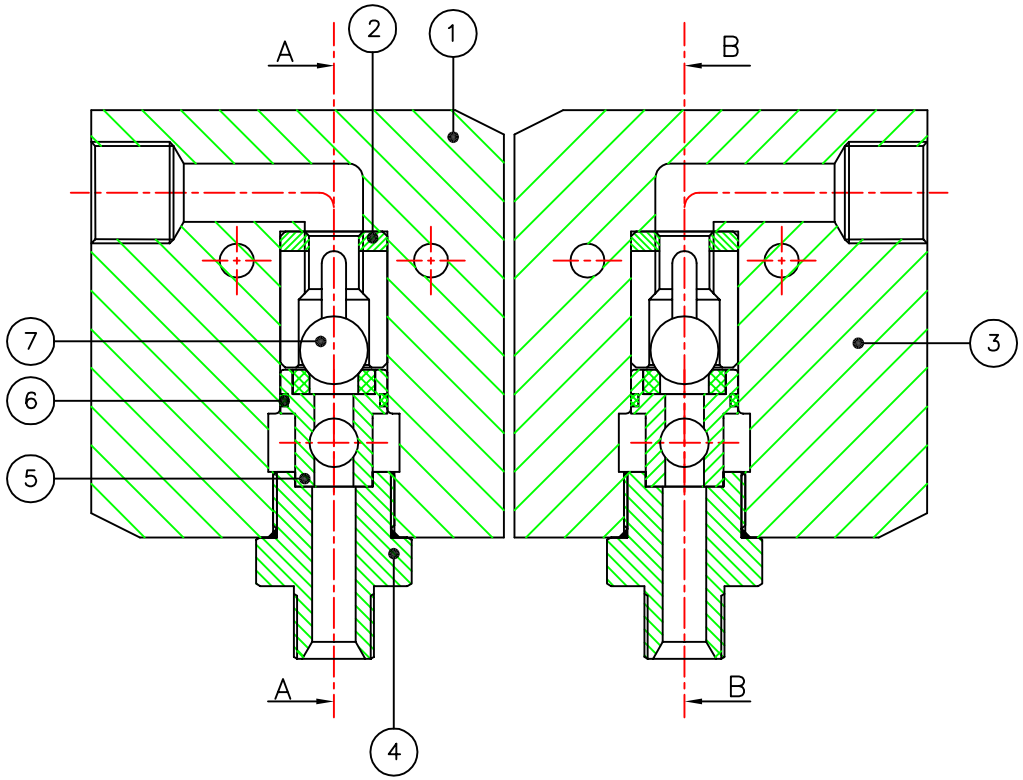
INDIA

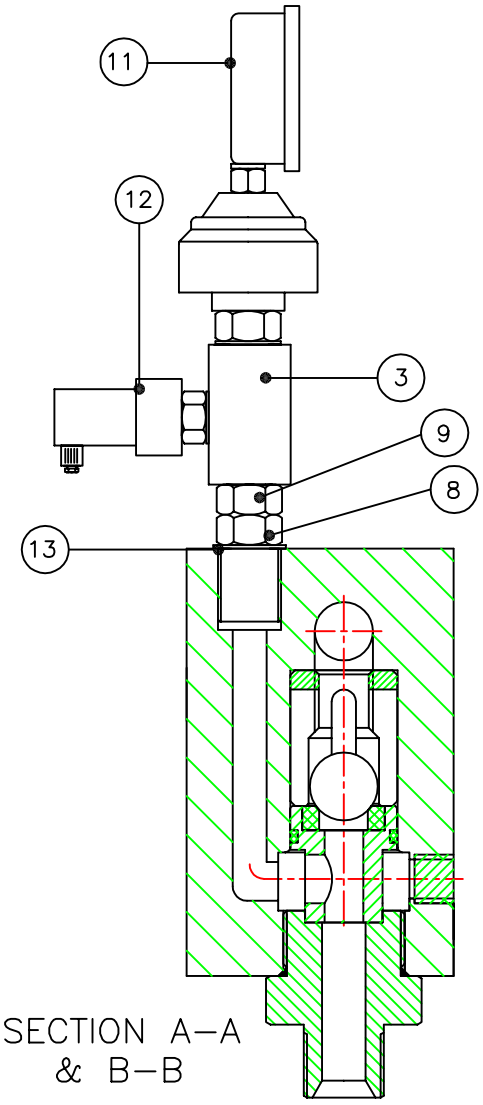
| | DRN. | CKD. | APPD. | | |
|---|---|---|---|---|---|
| SIGN | ROHIT | RAJIV | NVD | PART NAME | CONTROL BLOCK |
| DATE | | | | PART NO. | 02 081 000 01 |
| SCALE | NOT TO SCALE | | | | |




| SR NO. | PART NO. | PART NAME | QTY. | W&T |
|---|---|---|---|---|
| 21 | 15 315 008 07 | ALLEN BOLT M6X15 | 10 | - |
| 20 | 02 300 040 57 | ROUND GASKET | 4 | Y |
| 19 | 02 081 026 57 | MID BLOCK GASKET | 2 | Y |
| 18 | 02 300 042 57 | GASKET | 2 | Y |
| 17 | 02 300 045 00 | MID BLOCK ASSEMBLY | 1 | - |
| 16 | 02 300 009 02 | SILENCER CAP | 1 | - |
| 15 | 15 375 008 37 | ALLEN BOLT | 2 | - |
| 14 | 02 230 011 00 | SILENCER ASSLY | 1 | - |
| 13 | 15 335 008 07 | ALLEN BOLT(M6X35) | 8 | - |
| 12 | 15 360 008 07 | ALLAN BOLT(M6X60) | 4 | - |
| 11 | 02 300 036 02 | BOTTOM BLOCK | 1 | - |
| 10 | 02 300 024 00 | SLIDER ASSEMBLY | 1 | Y |
| 9 | 02 300 066 57 | SQUARE GASKET | 1 | Y |
| 8 | 15 322 008 07 | ALLEN BOLT M6 x 22 | 4 | - |
| 7 | 02 300 004 02 | INLET BLOCK | 1 | - |
| 6 | 20 026 000 00 | AIR SAFTEY VALVE 1/2" | 2 | - |
| 5 | 02 300 064 57 | ROUND LARGE GASKET | 2 | Y |
| 4 | 02 300 043 57 | GASKET | 2 | Y |
| 3 | 02 300 065 57 | ROUND SMALL GASKET | 2 | Y |
| 2 | 02 081 001 00 | SIDE BLOCK ASSEMBLY | 1 | - |
| 1 | 02 300 035 02 | TOP BLOCK | 1 | - |
| | 02 300 700 04 | SERVICE KIT | - | SET |

| | | | | | |
|---|---|---|---|---|---|
| RAW MATERIAL DESCRIPTION | | NOTE: | | | |
| SIZE | | | | | |
| LENGTH | | ALL DIMN. ARE IN MM UNLESS OTHERWISE STATED. FOR OPEN TOLERANCE AND SURFACE ROUGHNESS SEE STANDARD CHART DD-01/CH-01. REMOVE SHARP CORNERS. INCASE OF DOUBT ASK. | | | |
| MAT. | ASSEMBLY | | | | |
| VR COATINGS PVT.LTD. J-138, MIDC, BHOSARI, PUNE-411 026 INDIA | | DRN. | CKD. | APPD. | PART NAME: RHINO CONTROL BLOCK ASSEMBLY |
| | SIGN | NIKHIL | RAJIV | NVD | |
| | DATE | | | | PART NO. 02 300 000 04 |
| | SCALE | NOT TO SCALE | | | |




SECTION A–A
& B–B

| S.NO. | PART NAME | PART NUMBER | QTY. | W & T |
|---|---|---|---|---|
| 13 | WASHER 1/4" | 19 001 002 19 | 11 | |
| 12 | PRESSURE TRANSMITTER | 98 014 400 10 WKA | 2 | |
| 11 | PRESSURE GAUGE | 13 018 001 00 | 2 | |
| 10 | PRESSURE GAUGE MOUNTING BLOCK | 17 013 126 19 | 2 | |
| 9 | CONNECTOR | 14 001 001 19 | 2 | |
| 8 | SWIVEL ¼" BSP | 51 101 000 02 | 2 | |
| 7 | BALL 14 | 04 210 013 05 | 2 | |
| 6 | PACKING RING | 17 005 016 21 | 2 | Y |
| 5 | SEAT ADAPTER | 17 005 032 00 | 2 | |
| 4 | CONNECTOR | 17 013 040 07 | 2 | |
| 3 | OUTLET MANIFOLD | 17 013 042 08 | 1 | |
| 2 | BALL GUIDE | 04 210 017 17 | 3 | |
| 1 | OUTLET MANIFOLD | 17 013 313 08 | 1 | |

PARTS LIST

| | |
|---|---|
| RAW MATERIAL DESCRIPTION | |
| SIZE | |
| LENGTH | |
| MAT. | ASSEMBLY |

NOTE:

ALL DIMN. ARE IN MM UNLESS OTHERWISE STATED. FOR OPEN TOLERANCE AND SURFACE ROUGHNESS SEE STANDARD CHART DD–01/CH–01. REMOVE SHARP CORNERS. INCASE OF DOUBT ASK.

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INDIA

| | DRN. | APPD. |
|---|---|---|
| SIGN | Albert | |
| DATE | | |
| SCALE | NOT TO SCALE | |

PART NAME OUTLET MANIFOLD ASSEMBLY

PART NO. 17 013 312 00

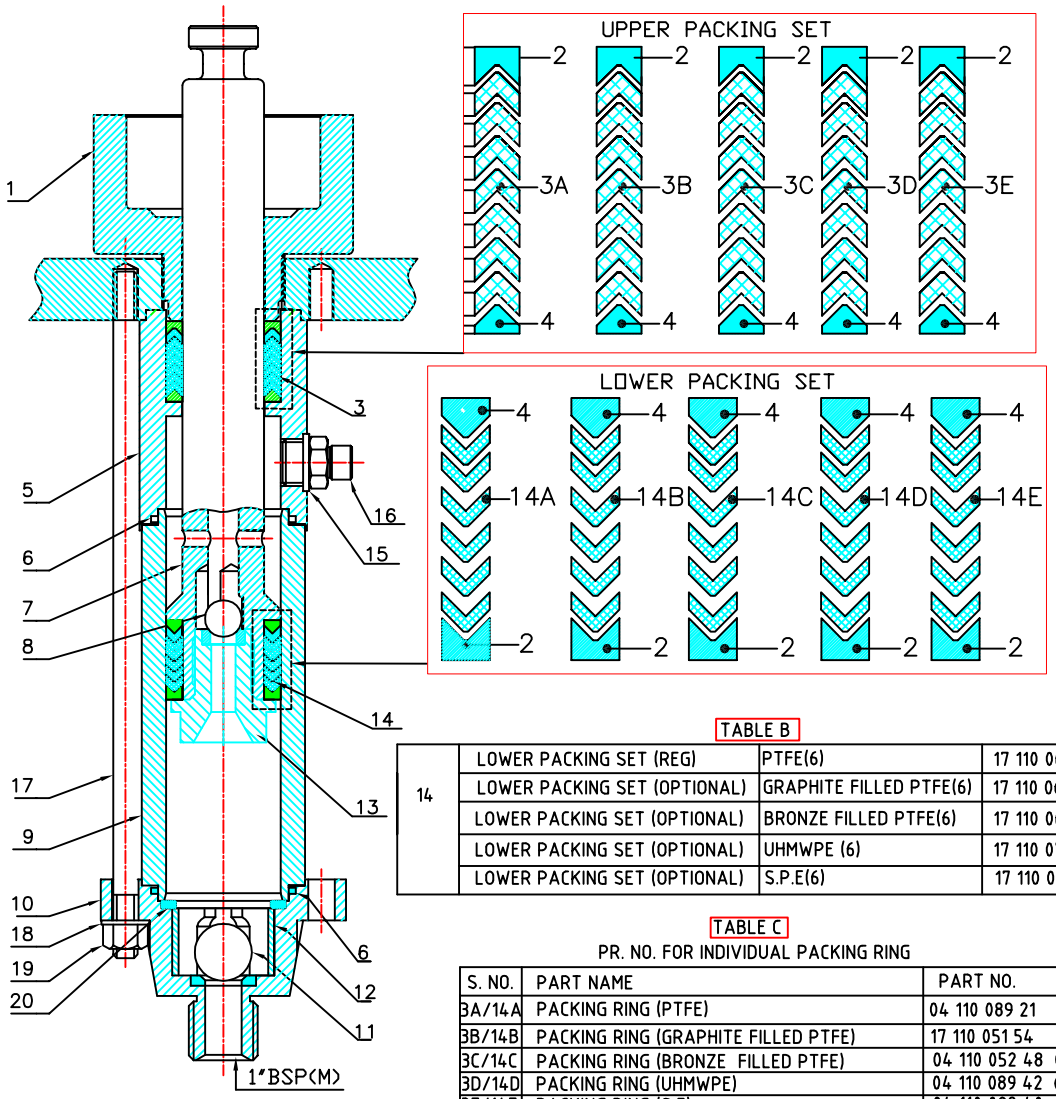








TABLE A

| | | | | |
|---|---|---|---|---|
| 3 | UPPER PACKING SET (REG) | PTFE(7) | 04 110 106 00 | ⓒⒹ |
| | UPPER PACKING SET (OPTIONAL) | GRAPHITE FILLED PTFE(7) | 04 110 107 00 | ⓒⒹ |
| | UPPER PACKING SET (OPTIONAL) | BRONZE FILLED PTFE(7) | 04 110 108 00 | ⓒⒹ |
| | UPPER PACKING SET (OPTIONAL) | UHMWPE (7) | 04 110 112 00 | Ⓓ |
| | UPPER PACKING SET (OPTIONAL) | S.E (7) | 04 110 114 00 | Ⓓ |

| | | | | | |
|---|---|---|---|---|---|
| 3E/14E | SERVICE KIT-4(OPTIONAL)(UPPER-S.E ) (LOWER -S.E) | 17 110 709 00 | - | Y | SET |
| 3D/14D | SERVICE KIT-3(OPTIONAL)(UPPER-UHMWPE ) (LOWER -UHMWPE) | 17 110 708 00 | - | Y | SET |
| 3C/14C | SERVICE KIT-2(OPTIONAL)(UPPER-BRONZE FILLED PTFE)(LOWER -BRONZE FILLED PTFE) | 17 110 710 00 | - | Y | SET |
| 3B/14B | SERVICE KIT-1(OPTIONAL)(UPPER-GRAPHITE FILLED PTFE)(LOWER -GRAPHITE FILLED PTFE) | 17 110 704 00 | - | Y | SET |
| 3A/14A | SERVICE KIT(REG.)(UPPER-PTFE)(LOWER -PTFE) | 17 110 700 00 | - | Y | SET |
| S. NO. | PACKING SET KIT | SERVICE KIT NO. | QTY | W&T | SERVICE KIT QTY |

TABLE B

| | | | |
|---|---|---|---|
| 14 | LOWER PACKING SET (REG) | PTFE(6) | 17 110 062 00 Ⓒ |
| | LOWER PACKING SET (OPTIONAL) | GRAPHITE FILLED PTFE(6) | 17 110 064 00 Ⓒ |
| | LOWER PACKING SET (OPTIONAL) | BRONZE FILLED PTFE(6) | 17 110 066 00 ⒸⒷ |
| | LOWER PACKING SET (OPTIONAL) | UHMWPE (6) | 17 110 070 00 Ⓓ |
| | LOWER PACKING SET (OPTIONAL) | S.P.E(6) | 17 110 071 00 Ⓓ |

TABLE C

PR. NO. FOR INDIVIDUAL PACKING RING

| S. NO. | PART NAME | PART NO. |
|---|---|---|
| 3A/14A | PACKING RING (PTFE) | 04 110 089 21 |
| 3B/14B | PACKING RING (GRAPHITE FILLED PTFE) | 17 110 051 54 |
| 3C/14C | PACKING RING (BRONZE FILLED PTFE) | 04 110 052 48 Ⓑ |
| 3D/14D | PACKING RING (UHMWPE) | 04 110 089 42 Ⓓ |
| 3E/14E | PACKING RING (S.E) | 04 110 089 40 Ⓓ |

| | | | | |
|---|---|---|---|---|
| 20 | WASHER | 04 110 021 19 | 1 | |
| 19 | NUT | 15 210 014 07 | 4 | |
| 18 | WASHER | 19 002 014 07 | 4 | |
| 17 | STUD | 04 110 019 17 | 4 | |
| 16 | CONNECTOR | SEE NOTE | 1 | |
| Ⓒ 15 | WASHER | 19 002 003 19 | 1 | |
| ⒹⒷ Ⓐ 14 | LOWER PACKING SET | REFER TABLE B | 1 | Y |
| Ⓐ 13 | PISTON SEAT | 04 110 069 00 | 1 | |
| 12 | BALL GUIDE | 04 110 012 19 | 1 | |
| 11 | BALL | 04 070 013 19 | 1 | Y |
| 10 | SUCTION SEAT | 04 110 011 00 | 1 | |
| 9 | CYLINDER | 04 110 010 19 | 1 | |
| 8 | BALL 12 | 04 070 016 05 | 1 | |
| 7 | PISTON ROD | 17 110 008 19 | 1 | |
| 6 | PACKING RING | 04 110 007 21 | 2 | Y |
| 5 | SPACER | 04 110 006 19 | 1 | |
| Ⓒ 4 | MALE PACKING CAP | 17 110 068 19 | 2 | |
| ⒹⒷ Ⓐ 3 | UPPER PACKING SET | REFER TABLE A | 1 | Y |
| Ⓒ 2 | FEMALE PACKING CAP | 17 110 067 19 | 2 | |
| 1 | OIL CUP | 17 110 001 17 | 1 | |
| S.NO. | PART NAME | PART NUMBER | QTY. | W & T |

PARTS LIST

| Rev. | AMMENDMENT | Date | Appd. |
|---|---|---|---|
| D | UHMWPE ,S.E.PACKING SET ADDED, | 29/07/15 | |
| C | PACKING SET NO. CHANGE, WASHER PART NO. CHANGE | 10/06/15 | |
| B | GRAHITE FILLED PTFE AND BRONZE FILLED PTFE PACKING SET NEWLY ADDED | 24/08/14 | |
| B | MIDDDLE PACKING CAP(04 110 014 19) REMOVED FROM LOWER PAKING SET, LOWER PACKING RING QTY. 4 CHANGED TO 5 | 24/08/14 | |
| A | PISTON SEAT PART NO. CHANGED AND PACKING MATERIAL CARBON FL PTFE CHANGED TO BR FL PTFE | 12/06/06 | |

RAW MATERIAL DESCRIPTION
SIZE
LENGTH
MAT. ASSEMBLY

NOTE: CONNECTOR FOR BASE PUMP 14 003 002 19
CONNECTOR FOR ACTIVATOR PUMP 17 013 058 19

ALL DIMN. ARE IN MM UNLESS OTHERWISE STATED. FOR OPEN TOLERANCE AND SURFACE ROUGHNESS SEE STANDARD CHART DD-01/CH-01. REMOVE SHARP CORNERS. INCASE OF DOUBT ASK.

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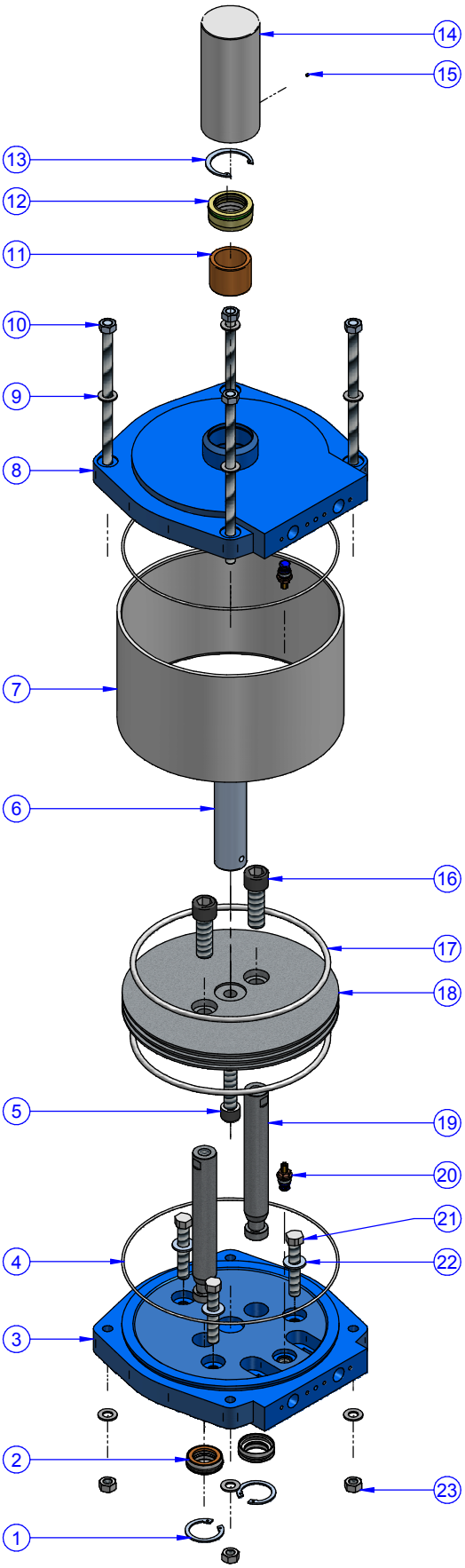
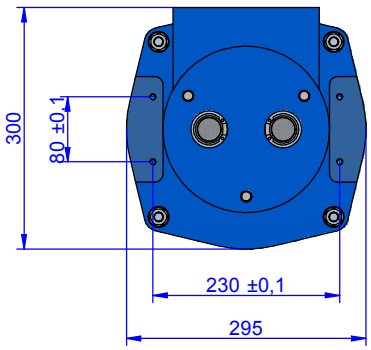
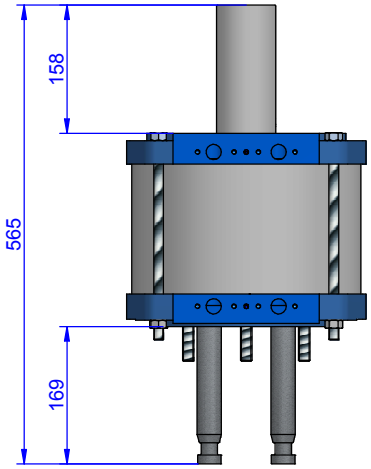
| | DRN. | CKD. | APPD. |
|---|---|---|---|
| SIGN | RENU | | |
| DATE | | | |
| SCALE | NOT TO SCALE | | |

PART NAME HYDRAULIC PART 110

PART NO. 17 110 000 00




| SR. NO. | PART NO. | PART NAME | QTY. | W & T |
|---|---|---|---|---|
| 23 | 15 211 015 07 | NUT M 12 | 4 | |
| 22 | 19 002 011 19 | WASHER M14 | 3 | |
| 21 | 17 350 009 17 | BOLT M14X2 | 3 | |
| 20 | 61 110 008 00 | SENSING VALVE | 2 | Y |
| 19 | 17 300 003 19 | PISTON ROD | 2 | |
| 18 | 17 271 003 07 | PISTON DISC | 1 | |
| 17 | 01 270 003 25 | O RING | 2 | Y |
| 16 | 15 360 021 07 | ALLEN BOLT M20X60 | 2 | |
| 15 | 15 603 025 07 | GRUB SCREW M3 X 0.5 | 1 | |
| 14 | 17 300 007 07 | COVER | 1 | |
| 13 | 01 230 013 07 | INTERNAL CIRCLIP B55 | 1 | |
| 12 | 01 230 011 00 | AIR SEAL | 1 | Y |
| 11 | 17 300 005 16 | BUSH | 1 | |
| 10 | 01 230 002 00 | STUD | 4 | |
| 9 | 19 002 015 07 | WASHER | 8 | |
| 8 | 17 271 001 02 | TOP CASTING | 1 | |
| 7 | 01 270 002 19 | CYLINDER | 1 | |
| 6 | 17 300 006 19 | TOP PISTON ROD | 1 | |
| 5 | 15 360 017 07 | BOLT M16X60 | 1 | |
| 4 | 01 270 005 25 | O RING | 2 | Y |
| 3 | 17 271 002 02 | BOTTOM CASTING | 1 | |
| 2 | 01 110 018 00 | AIR SEAL | 2 | Y |
| 1 | 01 110 022 07 | CIRCLIP | 2 | |

RAW MATERIAL DESCRIPTION
SIZE
LENGTH
MAT. ASSEMBLY

NOTE:
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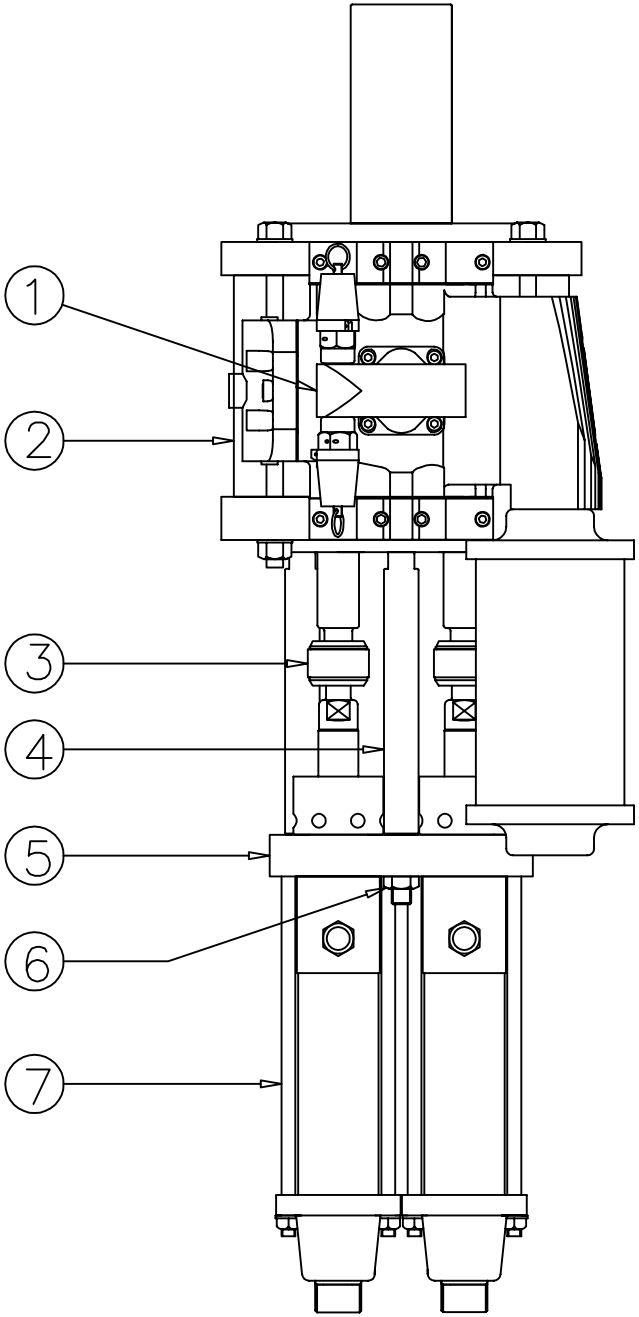
INDIA

| | DRN. | CKD. | APPD. |
|---|---|---|---|
| SIGN | | ALBERT | |
| DATE | | | |
| SCALE | NOT TO SCALE | | |

PART NAME: AIR MOTOR
PART NO.: 17 271 000 00




| S.NO. | PART NAME | PART NUMBER | QTY. |
|---|---|---|---|
| 7 | HYDRAULIC PART 110 | 17 110 000 00 | 2 |
| 6 | NUT M14 | 15 111 011 07 | 3 |
| 5 | TOP FLANGE | 17 014 001 17 | 1 |
| 4 | TIE ROD | 17 010 007 17 | 3 |
| 3 | COUPLING | 17 110 003 00 | 2 |
| 2 | AIR MOTOR 2K 270 | 17 271 000 00 | 1 |
| 1 | CONTROL BLOCK | 02 300 000 04 | 1 |

PARTS LIST

| RAW MATERIAL DESCRIPTION | |
|---|---|
| SIZE | |
| LENGTH | |
| MAT. | |

NOTE:

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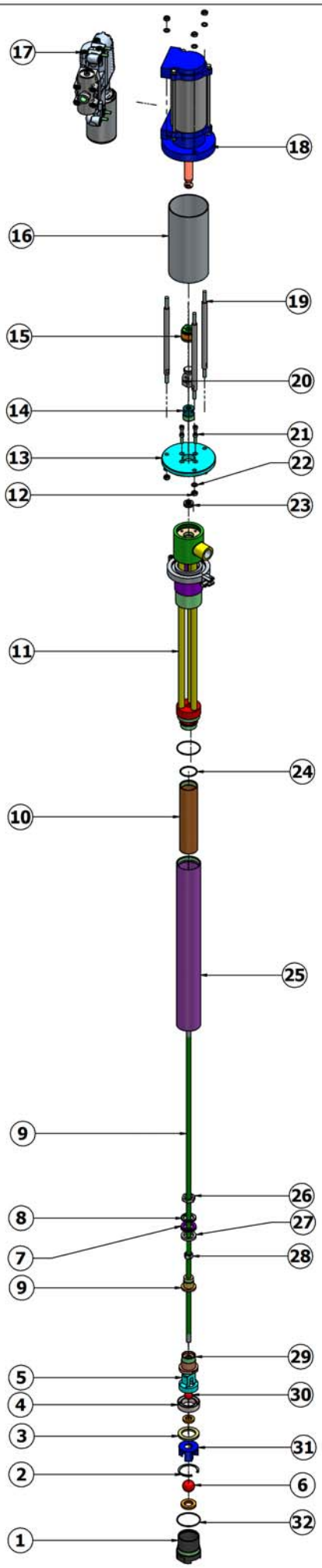
INDIA

| | DRN. | APPD. |
|---|---|---|
| SIGN | Albert | |
| DATE | 01-10-08 | |
| SCALE | NOT TO SCALE | |

PART NAME TWO COMPONENT 270/110 X2 -1:1

PART NO. 17 531 000 02




| SR. NO. | PART NUMBER | PART NAME | QTY. | W & T |
|---|---|---|---|---|
| 32 | 29 003 019 21 | PACKING RING | 2 | Y |
| 31 | 29 003 036 19 | BALL GUIDE 28 | 1 | |
| 30 | 33 275 031 19 | BALL Φ19 MM | 1 | |
| 29 | 29 003 039 00 | SEAT HOLDER | 1 | |
| 28 | 15 110 014 07 | NUT M10 | 1 | |
| 27 | 29 003 028 19 | SEAL WASHAR | 1 | |
| 26 | 29 003 029 19 | LOCK NUT | 1 | |
| 25 | 29 003 009 19 | CYLINDER OUTER | 1 | |
| 24 | 29 003 020 21 | PACKING RING | 1 | Y |
| 23 | 33 275 009 00 | PACKING SET | 1 | Y |
| 22 | 29 003 050 07 | WASHAR M8 | 6 | |
| 21 | 15 320 008 07 | ALLEN BOLT M6X20 | 4 | |
| 20 | 29 003 049 19 | CONNECTING ROD | 1 | |
| 19 | 29 003 069 19 | TIE ROD | 3 | |
| 18 | 01 080 000 00 | AIR MOTOR 080 S120 | 1 | |
| 17 | 02 081 000 01 | CONTROL BLOCK | 1 | |
| 16 | 48 031 082 00 | OIL CUP COVER | 1 | |
| 15 | 09 001 000 00 | COUPLING ASSEMBLY | 1 | |
| 14 | 29 003 008 17 | CUP NUT | 1 | |
| 13 | 29 003 067 01 | FLANGE | 1 | |
| 12 | 15 210 009 07 | NUT (M8) | 6 | |
| 11 | 29 003 041 00 | OUTLET HOUSING ASSEMBLY | 1 | |
| 10 | 29 003 010 19 | CYLENDER INNER | 1 | |
| 9 | 29 003 045 00 | SHAFT | 1 | |
| 8 | 29 003 031 21 | SEAL WASHER | 1 | Y |
| 7 | 29 003 026 21 | SEAL UPPER | 1 | Y |
| 6 | 04 070 013 19 | BALL Φ28 MM | 1 | Y |
| 5 | 29 003 021 19 | PISTON HOLDER | 1 | |
| 4 | 29 003 025 21 | SEAL | 1 | Y |
| 3 | 29 003 024 19 | SEAT WASHAR | 1 | |
| 2 | 29 003 047 19 | INTRENAL CIRCLIP B45 | 1 | |
| 1 | 29 003 040 00 | SUCTION SEAT | 1 | |

RAW MATERIAL DESCRIPTION
SIZE
LENGTH
MAT.

NOTE:

ALL DIMN. ARE IN MM UNLESS OTHERWISE STATED. FOR OPEN TOLERANCE AND SURFACE ROUGHNESS SEE STANDARD CHART DD-01/CH-01. REMOVE SHARP CORNERS. INCASE OF DOUBT ASK.

VR COATINGS PVT.LTD.
J-138, MIDC, BHOSARI, PUNE-411 026
INDIA

| | DRN. | CKD. | APPD. |
|---|---|---|---|
| SIGN | ANIL | ALBERT | NVD |
| DATE | | | |
| SCALE | NOT TO SCALE | | |

PART NAME: **BARREL PUMP 4.5:1**

PART NO.: **29 009 000 03**

| SR.NOS. | PART NO. | PART NAME | Qty. | W&T |
|---|---|---|---|---|
| 16 | 41 006 008 00 | CABLE GLAND | 1 | |
| 15 | 15 390 008 07 | ALLEN BOLT | 4 | |
| 14 | 41 011 021 01 | CAP | 1 | |
| 13 | 41 011 016 19 | PLUG 1/2" | 7 | |
| 12 | 41 011 018 04 | PACKING RING | 7 | |
| 11 | 41 011 017 04 | PACKING RING | 13 | |
| 10 | 41 011 015 19 | PLUG M22 X 1.5 | 13 | |
| 9 | 41 005 124 00 | HEATER ELEMENT | 1 | Y |
| 8 | 41 011 010 01 | SCREWED PLATE | 1 | |
| 7 | 41 011 013 00 | RTD SENSOR 3/8" | 1 | |
| 6 | 41 011 012 04 | RTD SENSOR BODY | 1 | |
| 5 | 41 011 006 01 | HEATER BODY | 1 | |
| 4 | 41 011 005 19 | CONNECTOR M26 X 1.5 X 3/4" | 2 | |
| 3 | 41 011 014 19 | DISTANCE PIECE | 1 | |
| 2 | 15 315 008 19 | ALLEN BOLT M6X15 | 8 | |
| 1 | 41 011 009 01 | SCREWED PLATE | 1 | |

| REV. | DESCRIPTION | DATE | APPD. |
|---|---|---|---|
| A | SR.NO. 14,15 & 16 ADDED | 03/08/16 | |

AMMENDMENTS

| | |
|---|---|
| RAW MATERIAL DESCRIPTION | NOTE: |
| SIZE | |
| LENGTH | |
| MAT. | |

ALL DIMN. ARE IN MM UNLESS OTHERWISE STATED. FOR OPEN TOLERANCE AND SURFACE ROUGHNESS SEE STANDARD CHART DD-01/CH-01. REMOVE SHARP CORNERS. INCASE OF DOUBT ASK.

VR COATINGS PVT.LTD.
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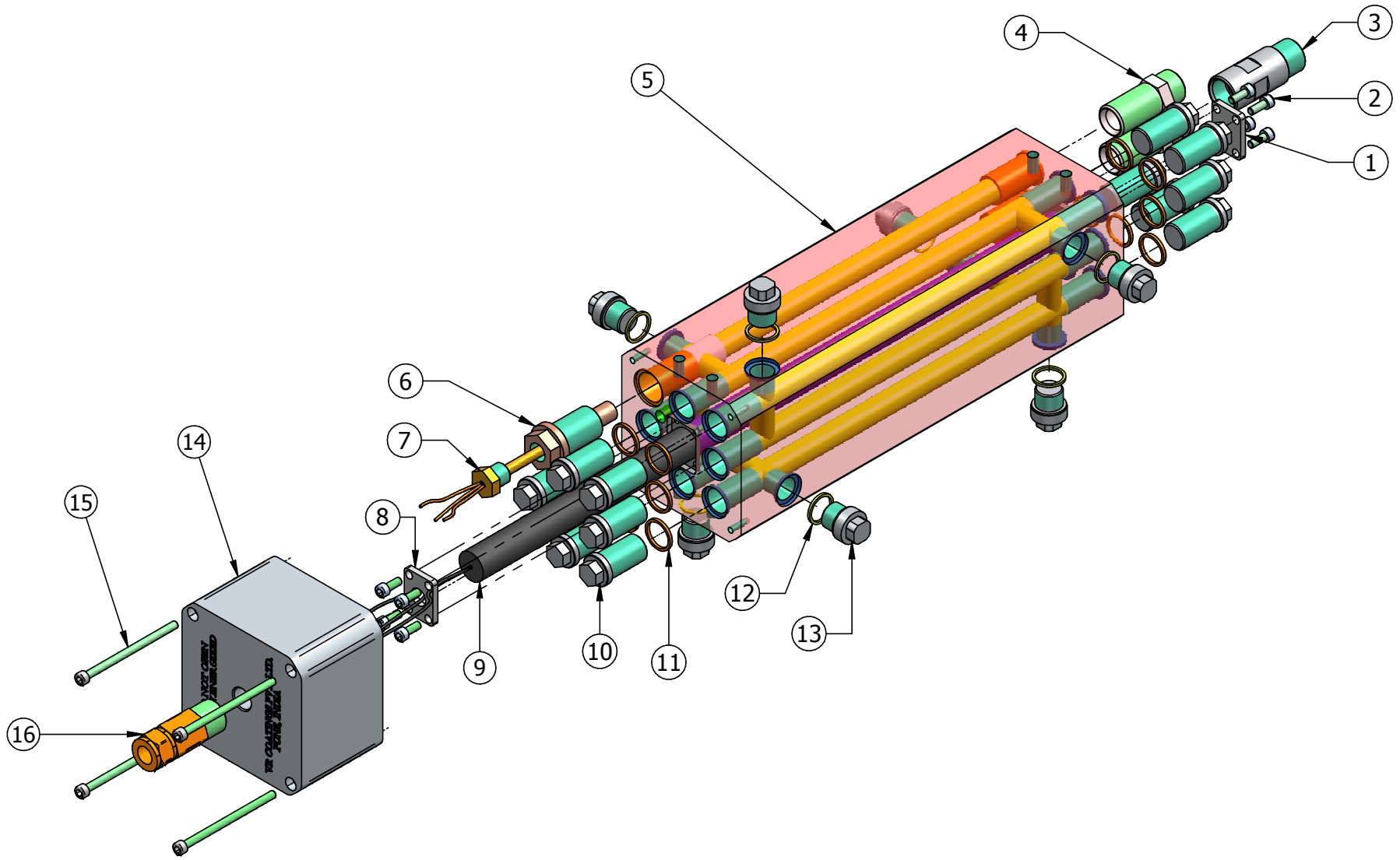
INDIA

| | DRN. | CKD. | APPD. |
|---|---|---|---|
| SIGN | OMKAR | ALBERT | NVD |
| DATE | | | |
| SCALE | NOT TO SCALE | | |

| | |
|---|---|
| PART NAME | HEATER 7.6 KW WITHOUT CONTROL PANEL |
| PART NO. | 41 011 000 00 |




| REV. | DESCRIPTION | DATE | APPD. |
|---|---|---|---|
| A | SR.NO. 14,15 & 16 ADDED | 03/08/16 | |

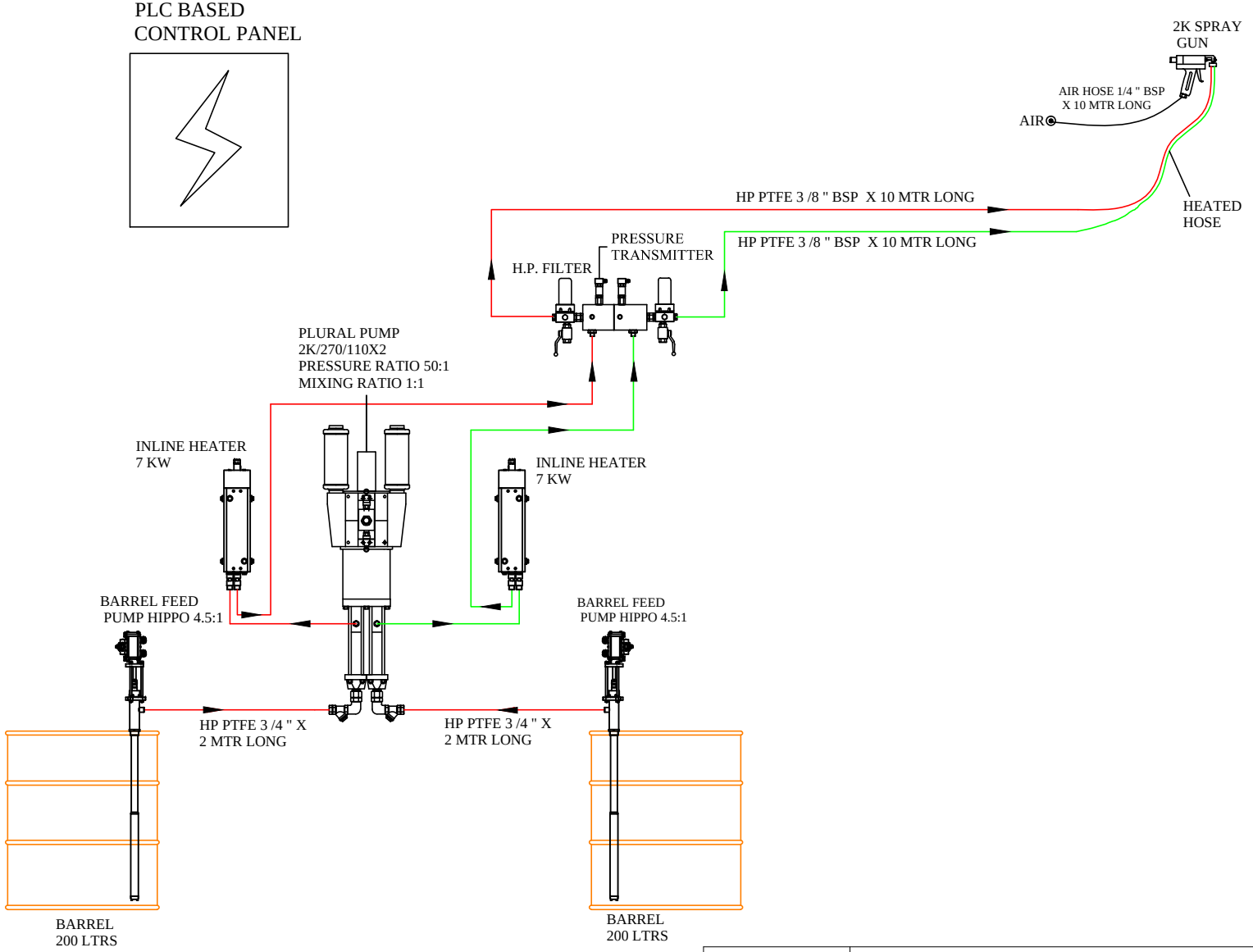
AMMENDMENTS

| | |
|---|---|
| RAW MATERIAL DESCRIPTION | NOTE: |
| SIZE | |
| LENGTH | ALL DIMN. ARE IN MM UNLESS OTHERWISE STATED. FOR OPEN TOLERANCE AND SURFACE ROUGHNESS SEE STANDARD CHART DD-01/CH-01. REMOVE SHARP CORNERS. INCASE OF DOUBT ASK. |
| MAT. | |

VR COATINGS PVT.LTD.
J-138, MIDC, BHOSARI, PUNE-411 026
INDIA

| | DRN. | CKD. | APPD. | | |
|---|---|---|---|---|---|
| SIGN | OMKAR | ALBERT | NVD | PART NAME | HEATER 7.6 KW WITHOUT CONTROL PANEL |
| DATE | | | | PART NO. | 41 011 000 00 |
| SCALE | NOT TO SCALE | | | | |

WEB SITE – http://www.vrcoatings.com
E–MAIL – vfdsouza@vsnl.com




| | |
|---|---|
| QUOTATION NUMBER | NOTE: |
| | ALL DIMN. ARE IN MM UNLESS OTHERWISE STATED. |

VR COATINGS
J-138, MIDC, BHOSARI
PUNE-411026 (INDIA)
TEL : (020) 7122331
FAX : (020) 7121891

| | DRN. | APPD. | | |
|---|---|---|---|---|
| SIGN | MAYANK | | PROJECT NAME | POLYUREA SPRAY SYSTEM |
| DATE | | | CUSTOMER NAME | TORNADO |
| SCALE | NOT TO SCALE | | | |

# WARRANTY

VR Coatings warrants all equipments manufactured by us, as long as it is bearing original identification plate, to be free from defects in material and workmanship for a period of twelve months from ex-works date. VR Coatings will repair or replace any part of the equipment proven defective. The warranty applies only when the equipment is installed, operated and maintained in accordance with VR Coatings written recommendations.

Warranty claims found to be defective shall be verified and confirmed by VR Coatings.

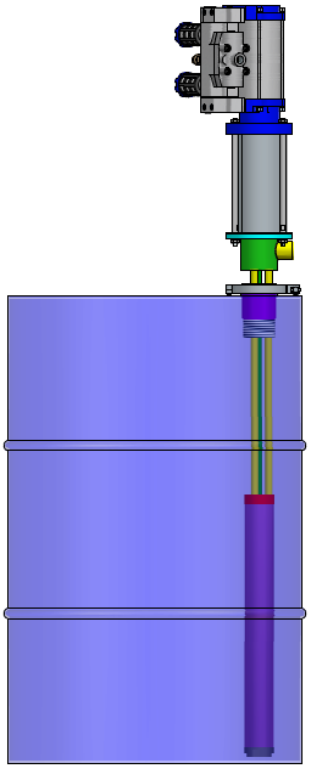
Our warranty does not cover and VR Coatings shall not be liable for any malfunction, damages, or fair wear and tear caused by faulty installation, misuse, abrasion, corrosion, inadequate or improper maintenance, negligence, tempering, accident or incorporation of non VR Coatings parts, non observance of VR Coatings recommendations.

This warranty only consists of replacing the parts returned to our plant prepaid transportation and proven defective by us. If inspection of the equipment /part does not disclose any defect in material or workmanship, repairs will be made at a reasonable charge, which may include the cost of parts, labor and transportation. VR Coatings shall not be liable for any losses resulting from a production breakdown.

Any bought out material in the equipment, which is sold but not manufactured by VR Coatings, will be subject to the manufacturer's warranty. VR Coatings will provide purchaser with reasonable assistance in making any claim for breach of these warranties.

# INSTRUCTIONS MANUAL

*Keep for future use!*



## 200 LTRS. BARREL TRANSFER PUMP

Serial Number:


*VR COATINGS PVT.LTD.*

OFFICE: J-138, MIDC PUNE – 411 026, INDIA.
TEL : + 91 - 20 - 30781022 / 27130331.
E-MAIL: vrcoatings@eth.net
Factory: Plot No.136, Sector No.7, PCNTDA,
Bhosari, Pune – 411 026, INDIA.
TEL: + 91 – 20 - 30781034
E-MAIL: service@vrcoatings.com
Mr. Pascal D'souza (Technical Director)
+91- 9822655891

# INSTRUCTIONS MANUAL

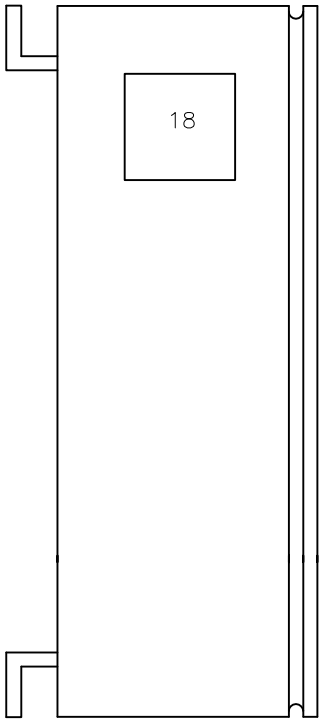
*Keep for future use!*

## POLYUREA SPRAY SYSTEM

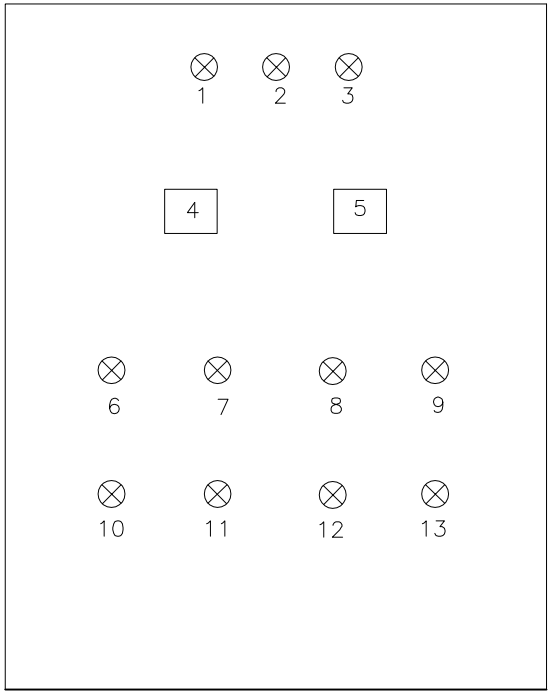
Serial Number:


*VR COATINGS PVT.LTD.*

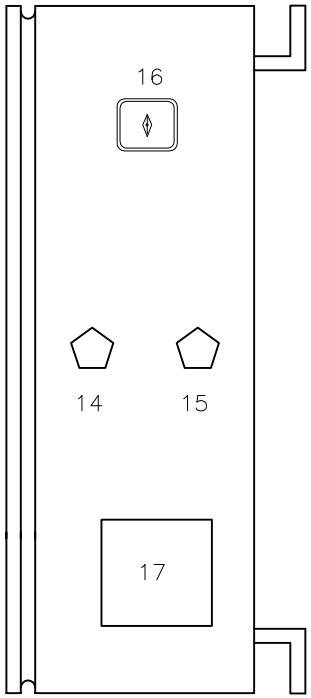
OFFICE: J-138, MIDC PUNE – 411 026, INDIA.
TEL : + 91 - 20 - 69180136 / 27130331
E-MAIL: vrcoatings@eth.net
Factory: Plot No.136, Sector No.7, PCNTDA,
Bhosari, Pune – 411 026, INDIA.
TEL: + 91 – 20 - 69180106
E-MAIL: service@vrcoatings.com
Mr. Pascal D'souza (Technical Director)
+91- 9822655891




L.H.S. VIEW




FRONT VIEW

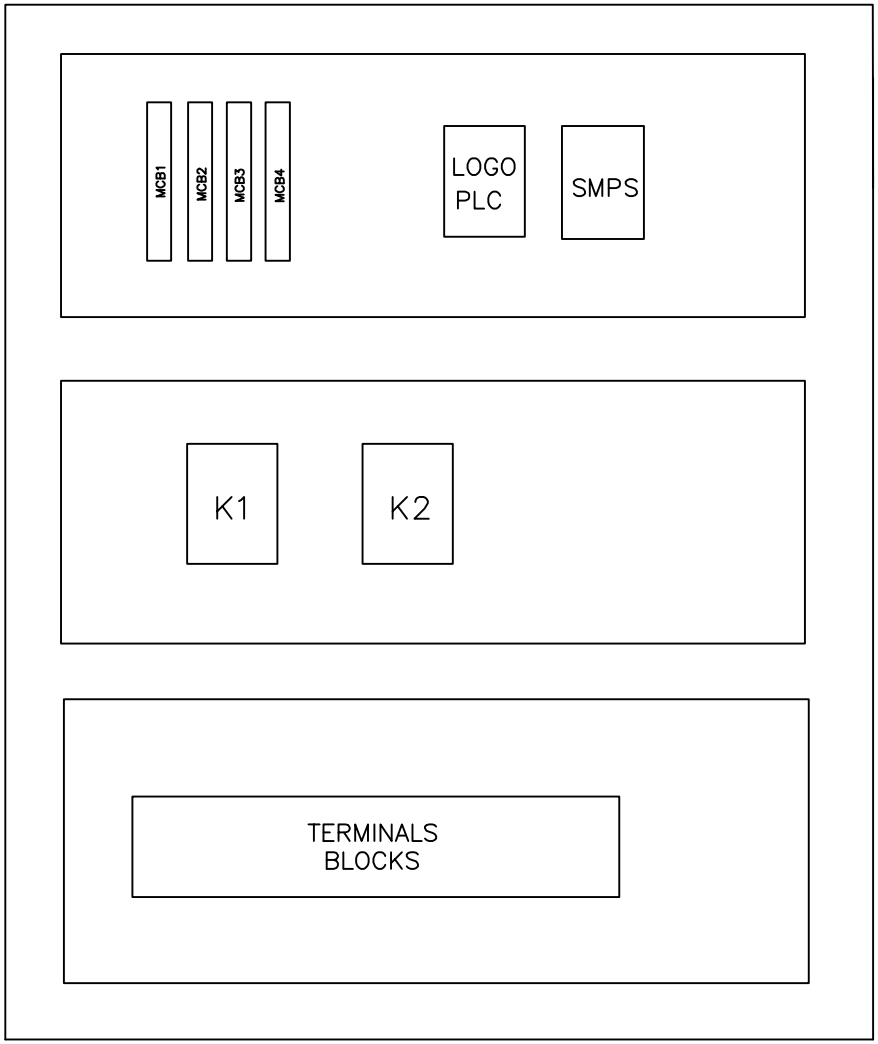



R.H.S. VIEW

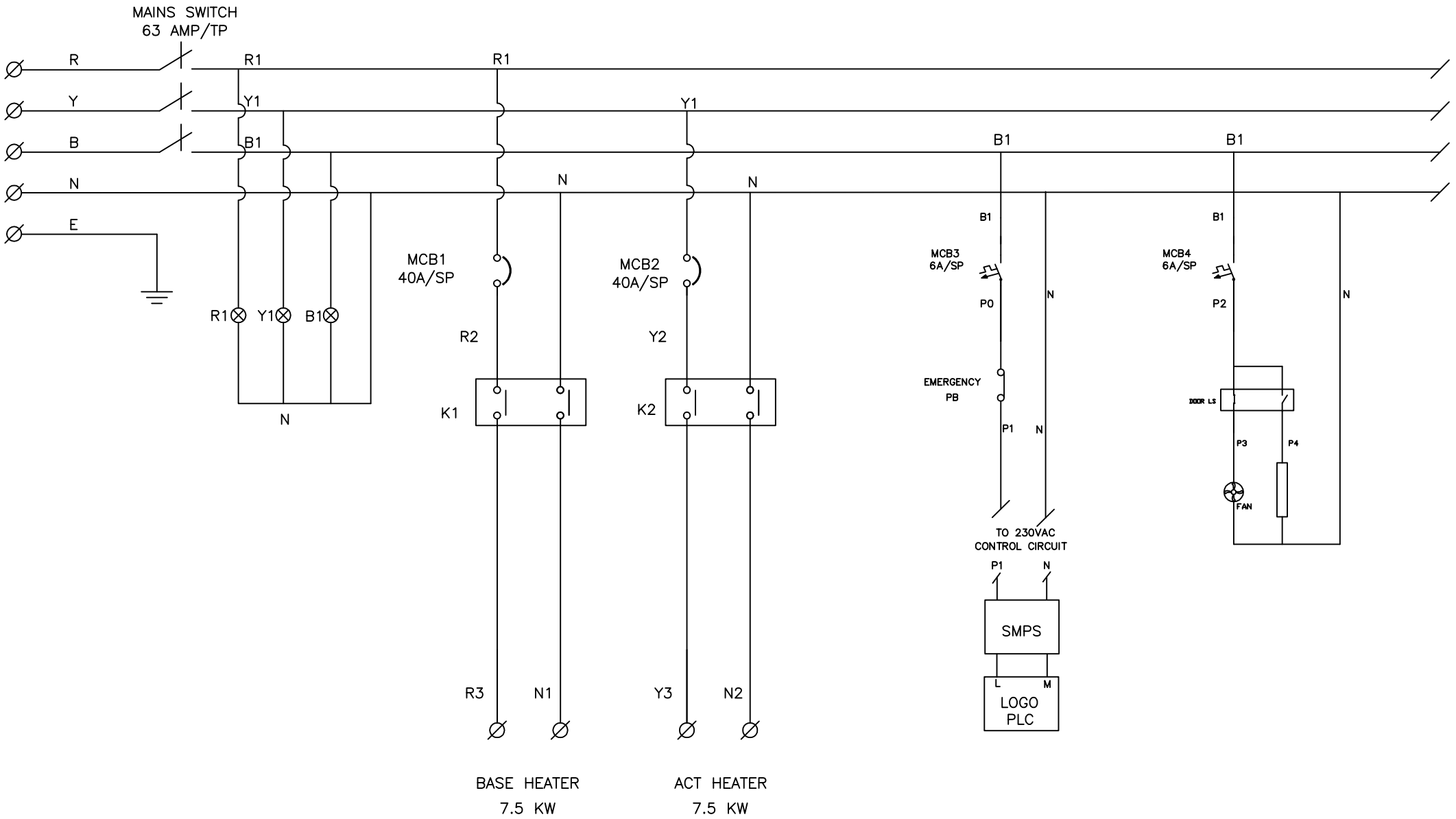
LEGENDS:

1: 'R' PHASE INDICATOR RED LED
2: 'Y' PHASE INDICATOR YELLOW LED
3: 'B' PHASE INDICATOR BLUE LED
4: BASE HEATER TIC
5: ACT HEATER TIC
6: MONITORING ON/OFF SW
7: SPRAY ON/OFF SW
8: FAULT ACK PB
9: MIMIC HOOTER
10: BASE HEATER ON/OFF SW
11: ACT. HEATER ON/OFF SW
12: SPARE
13: EMERGENCY PB
14: SOLENOID VALVE CONNECTOR
15: PRS. MONITOR CONNECTOR
16: MAIN SWITCH
17: FILTER
18: FAN + FILTER

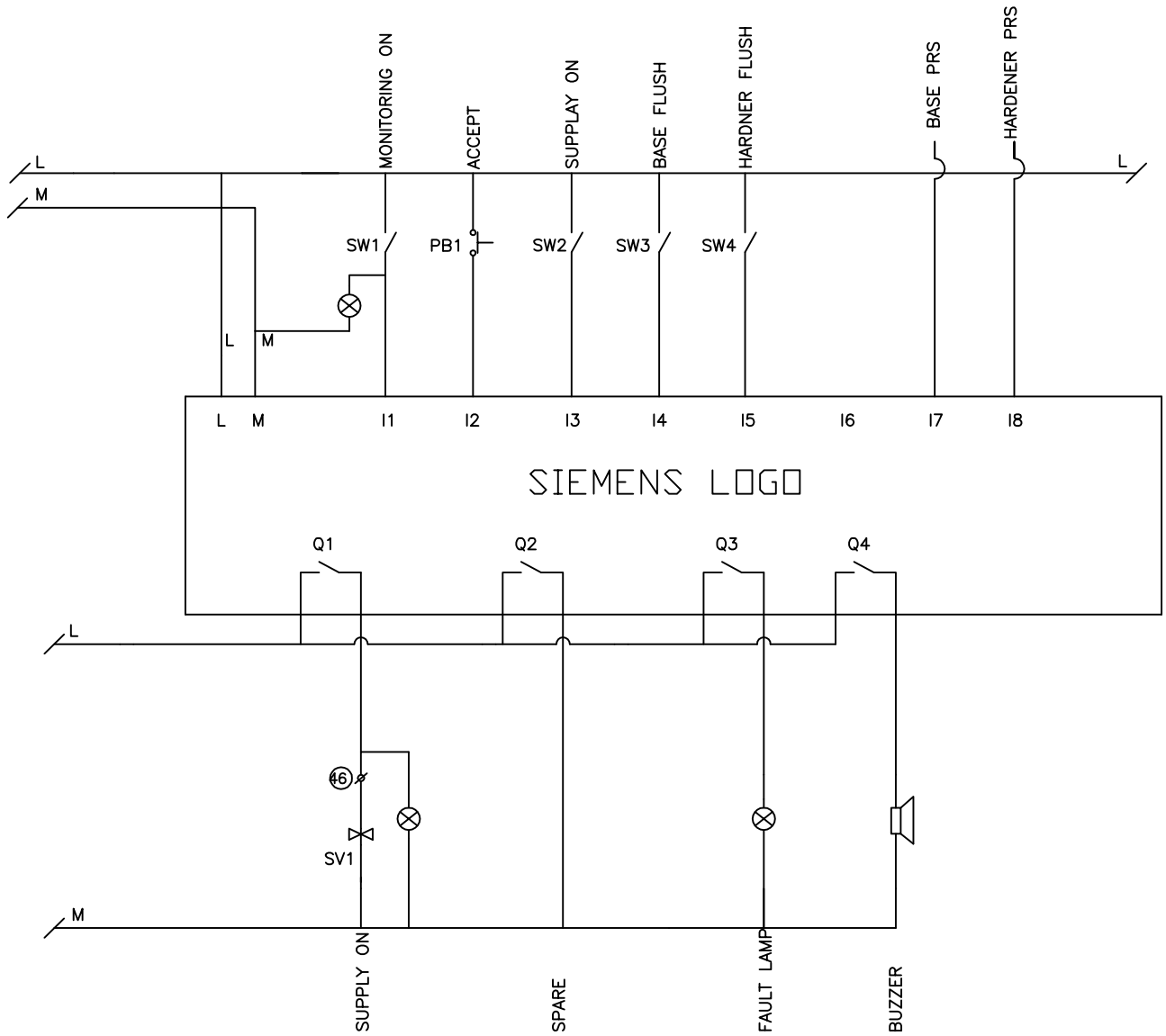
| | | | |
|---|---|---|---|
| DRAWN BY : SURESH | | TITLE: G.A. DRAWING | V.R.COATINGS PVT LTD |
| PRINT DATE: 07.06.2014 | | PROJECT: 7.5 KW HEATER SYSTEM | DWG. NO: = + 1/5 |



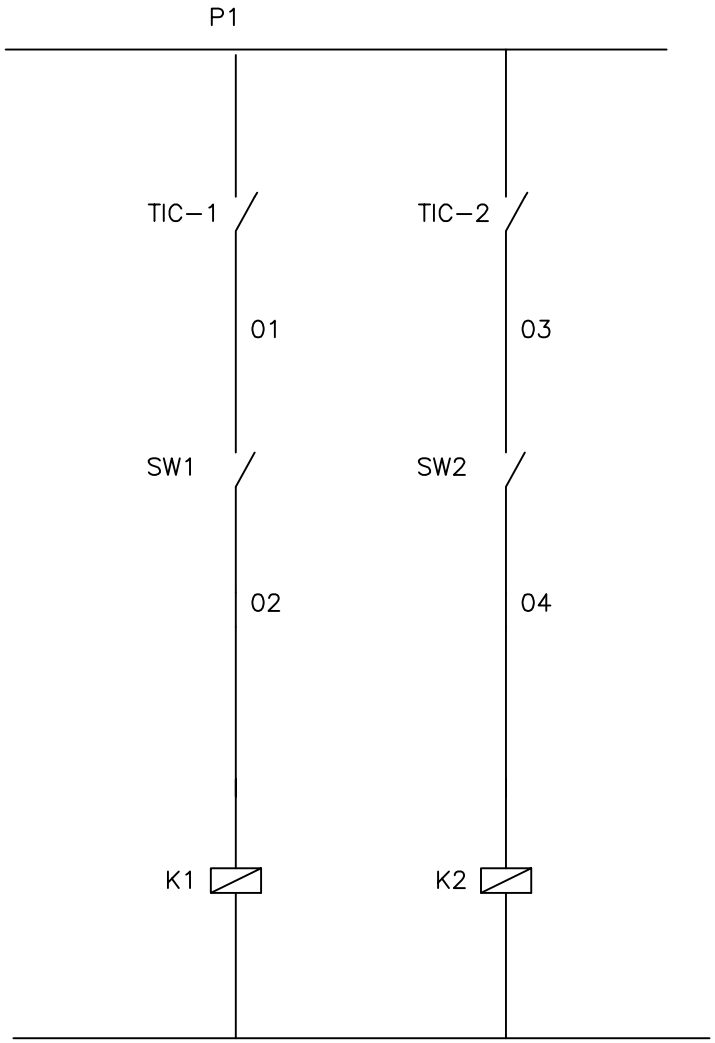

| | | | |
|---|---|---|---|
| DRAWN BY : SURESH | | TITLE: WIRING DIAGRAM FOR 230VAC CONTROL | V.R. COATINGS PVT LTD, PUNE |
| PRINT DATE: 07.06.2014 | | PROJECT: 7.5 KW HEATER SYSTEM | DWG. NO: = + 2/5 |




| | | | |
|---|---|---|---|
| DRAWN BY : SURESH | | TITLE: WIRING DIAGRAM FOR 230VAC CONTROL | V.R. COATINGS PVT LTD, PUNE |
| PRINT DATE: 07.06.2014 | | PROJECT: 7.5 KW HEATER SYSTEM | DWG. NO: 3/5 |

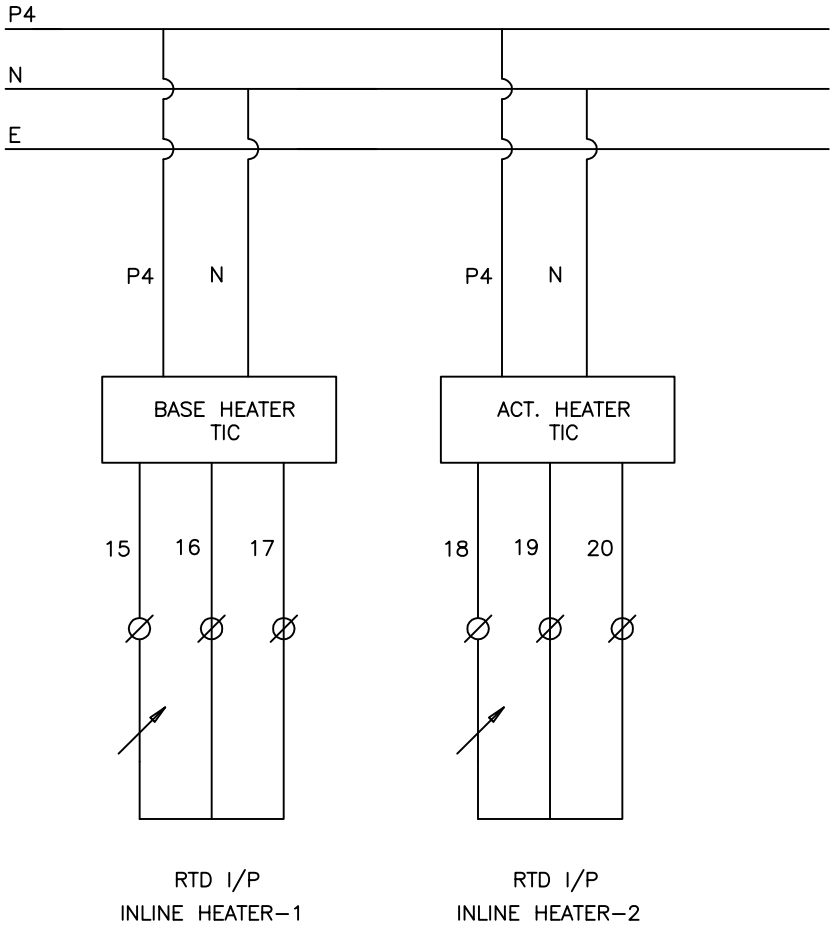



| | | | |
|---|---|---|---|
| DRAWN BY : SURESH | | TITLE: WIRING DIAGRAM FOR 230VAC CONTROL | V.R. COATINGS PVT LTD, PUNE |
| PRINT DATE: 07.06.2014 | | PROJECT: 7.5 KW HEATER SYSTEM | DWG. NO: = + 4/5 |




BASE HEATER
7.5 KW

ACT. HEATER
7.5 KW




RTD I/P
INLINE HEATER–1

RTD I/P
INLINE HEATER–2

| | | | |
|---|---|---|---|
| DRAWN BY : SURESH | | TITLE: HEATED HOSE POWER CIRCUIT. | V.R.COATINGS PVT LTD |
| PRINT DATE: 07.06.2014 | | PROJECT: 7.5 KW HEATER SYSTEM | DWG. NO: = + 5/5 |

# ***ELECTRICAL SAFETY INSTRUCTIONS***


- Avoid contact with ***energized electrical circuits***
- Disconnect the power source before servicing or repairing electrical equipment.
- Use only tools and equipment with non-conducting handles when working on electrical devices
- Never use metallic pencils or rulers, or wear rings or metal watchbands when working with electrical equipment. This rule is very easy to forget, especially when you are showing some electrical part pointing with metallic pencil.
- If water or a chemical is spilled onto equipment, shut off power at the main switch or circuit breaker and unplug the equipment.
- Do not store "***highly flammable liquids"*** near electrical equipment.
- Do not wear loose clothing or ties near electrical equipment.
- In case of PLC used in panel, keep the power supply ON for at least two hours in a week.
- Make sure all electric cords are tucked away, neat and tidy.
- Always use caution when working near electricity.

**VR COATINGS PVT.LTD.**
J-138,MIDC PUNE-411 026
INDIA. TEL:(020)27130331,27130196
FAX:(020)30781051
E-MAIL:vrcoatings@eth.net

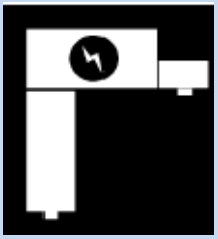
No Contractual Document. Specification and features subject to change without notice.

# HEATER 7.6 KW.

## PAINT WITHOUT CONTROL PANEL

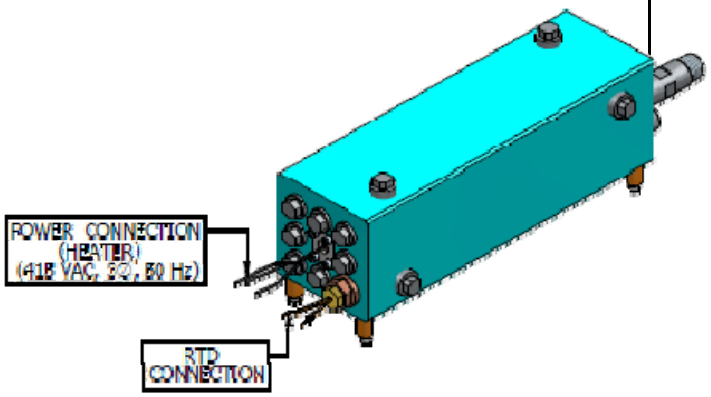
**Maxi. Inbound Pressure - 400 bar**

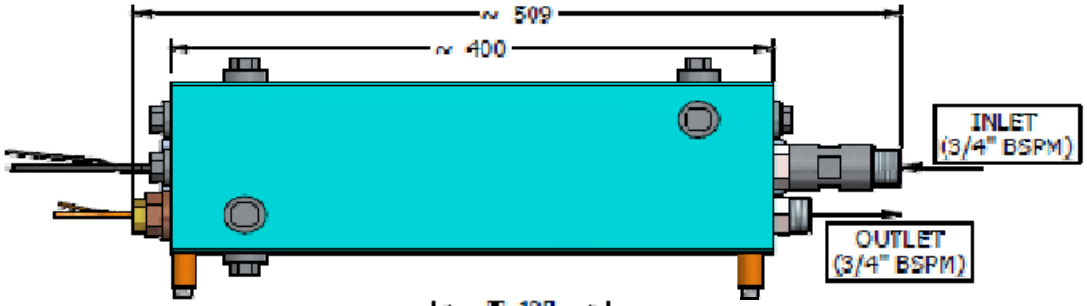


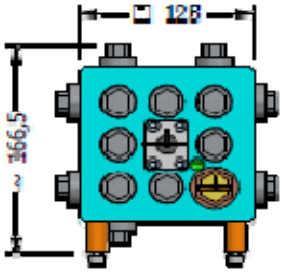


DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE STATED

| PART NO. | REF. |
|---|---|
| 41 011 000 00 | PAGE 00 |
| WEAR AND TEAR KIT FOR COMPLETE HEATING UNIT — 41 011 700 00 | PAGE 00 |




## TECHNICAL SPECIFICATION

| | |
|---|---|
| Maximum Inbound Pressure | : 400 bar |
| Capacity | : 7.6 KW |
| Power Supply | : 415 VAC,3}, 50Hz |
| Inlet, Outlet Port | : 3/4" BSP(M) |
| Temperature Range | : 100˚C |
| Wetted Parts | : Aluminum, 304 Stainless Steel, PTFE. |

# INPUT/OUTPUT LIST

## INPUT

| | |
|---|---|
| I1 | Pressure Monitoring On/Off |
| I2 | Fault Ack PB |
| I3 | Supply On/Off sw |
| I4 | Flush 1 sw |
| I5 | Flush 2 sw |
| I6 | Spare |
| I7 | Base pressure input |
| I8 | Act pressure input |

## OUTPUT

| | |
|---|---|
| Q1 | Supply Solenoid valve |
| Q2 | Flush solenoid valve |
| Q3 | Flt Lamp |
| Q4 | Hooter |

# NOTES

# NOTES

# OPERATION PROCESS

Power ON the Main switch. Check that all MCB's are switched ON.
Also check that all settings of temperature indicator controllers are as per requirement.
Select the "Base Heater" switch to ON position, tank heaters for base becomes ON.
Select the "Act. Heater" switch to ON position, tank heaters for activator becomes ON.

## ***AUTO MODE:-***

Select the Auto/Manual switch to Auto mode.

**Spray Operation (Paint):-**

- Select the "Spray" selector switch to ON position. Spray solenoid valve becomes ON and spray cycle starts.
- Do not select the flush switch during spray operation. Fault occurs but spray cycle do not get disturbed.

**Flush Operation (Solvent):-**

- Select the "Base Flush" selector switch to ON position. Base flush solenoid valve becomes ON and base flush cycle starts.
- Select the "Act Flush" selector switch to ON position. Activator flush solenoid valve becomes ON and activator flush cycle starts.
- Spray selector switch must be OFF if flush cycle is ON.

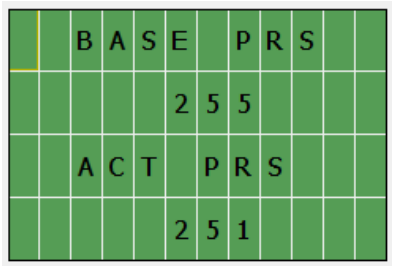
**Pressure Monitoring:-**

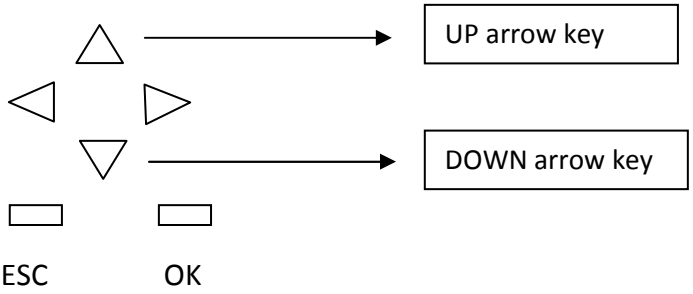
- Select the "Pressure Monitoring" selector switch to ON position. Whenever pressure rises or falls down beyond set limits, pressure fault occurs. Hooter sounds and fault lamp glows.
- Press Fault Ack pushbutton to silence the hooter and acknowledge the fault.

**PRESSURE SETTING ON PLC:-**

1) On PLC display, set the values for high pressure, low pressure for both Base (paint) and Solvent.
2) When actual pressure deviates from these set ranges of pressure values, pressure fault occurs. (Pressure monitoring switch should be ON).

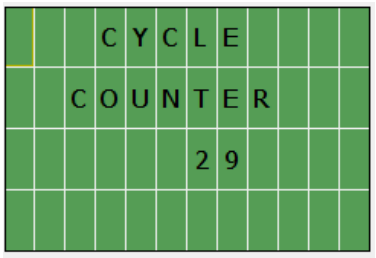
When control panel is powered up. Following screen appears.

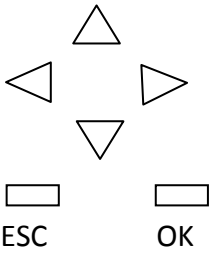



The screen shows the actual pressure for Base and Activator. This is only readable message screen and cannot be edited.

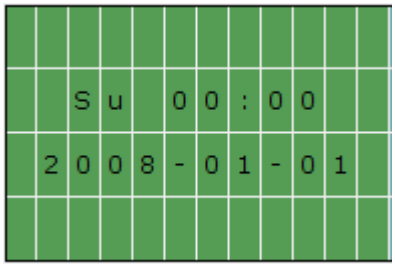
Press “Down arrow key” to display job counter screen. Following screen appears.

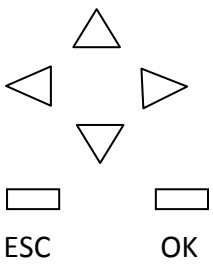



The screen shows job counter display. This is optional arrangement, if there is requirement to have record of jobs sprayed in auto cycle. The counter gets incremented by 1 for each auto cycle. To reset the counter, press “Right arrow key and ESC key” simultaneously.

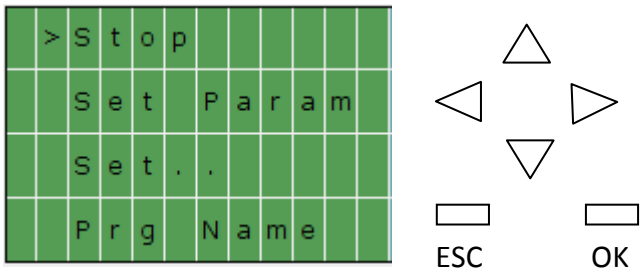
Now press “Down arrow key”, following screen appears.



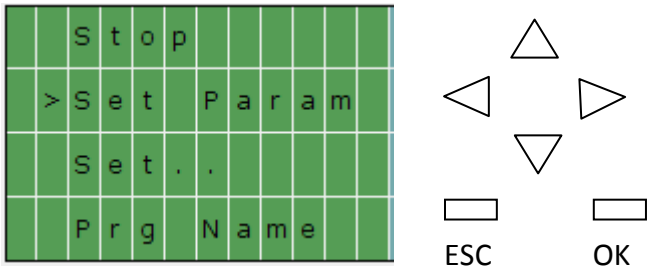




The screen shows date and time in blinking mode. Both are settable parameter.

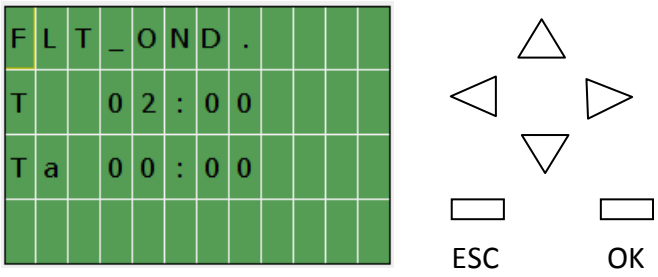
Press “ESC” key to enter setting screen which is shown as under.




Using “Down arrow key”, move the cursor to “set Param” function key. Following screen appears.



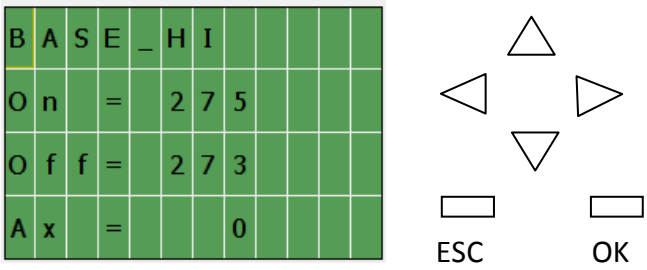

Press OK key of HMI to move to next screen shown as below.




Fault On delay timer can be set at this screen. The timer starts whenever a fault occurs. If the fault remains till the completion of this timer, fault lamp glows and hooter sounds.

Press Fault Ack pushbutton to silence the hooter and acknowledge the fault.

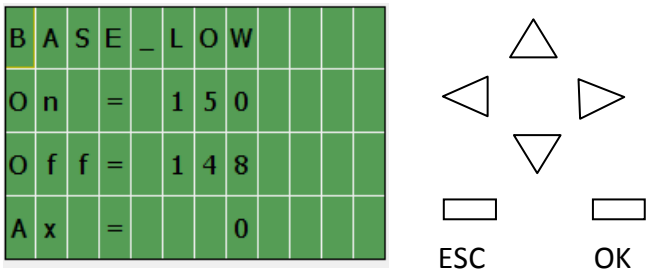
Press ‘up’ arrow key, following screen appears.



High limit for base pressure can be set at the parameter “On”.

For Ex:- Let the high limit for base pressure is set at “275” bar. When pressure goes beyond 275bar, fault occurs. Fault gets cleared only if pressure comes below “273”bar (Off parameter). The pressure limit can be changed using up/down arrow keys.

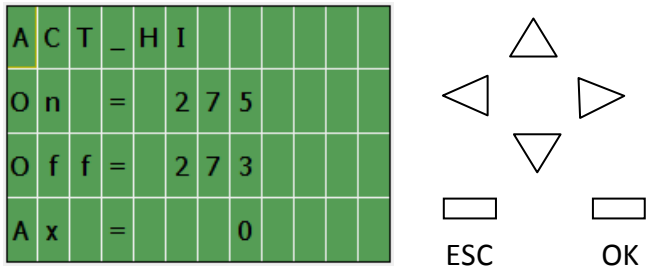
Press ‘up’ arrow key, following screen appears.




Low limit for base pressure can be set at the parameter “Off”.

For Ex:- Let the low limit for base pressure is set at “148” bar. When pressure falls below 148bar, fault occurs. Fault gets cleared only if pressure resumes above “150”bar (On parameter). The pressure limit can be changed using up/down arrow keys.

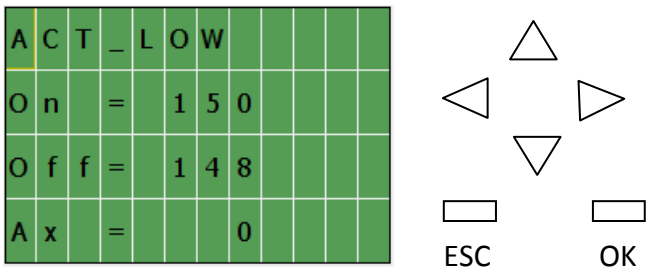
Press ‘up’ arrow key, following screen appears.




High limit for activator pressure can be set at the parameter “On”.

For Ex:- Let the high limit for act pressure is set at “275” bar. When pressure goes beyond 275bar, fault occurs. Fault gets cleared only if pressure comes below “273”bar (Off parameter). The pressure limit can be changed using up/down arrow keys.

Press ‘up’ arrow key, following screen appears.

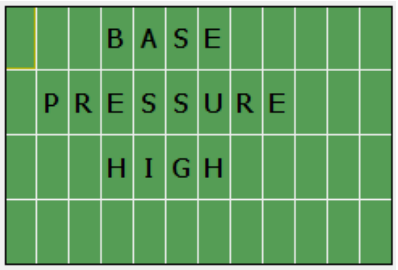



Low limit for activator pressure can be set at the parameter “Off”.

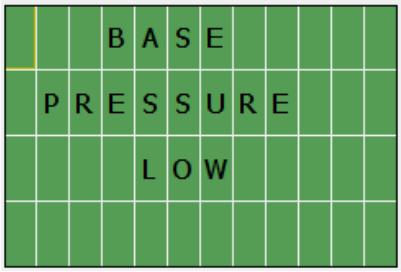
For Ex:- Let the low limit for base pressure is set at “148” bar. When pressure falls below 148bar, fault occurs. Fault gets cleared only if pressure resumes above “150”bar (On parameter). The pressure limit can be changed using up/down arrow keys.

**FAULT MESSAGES:-**

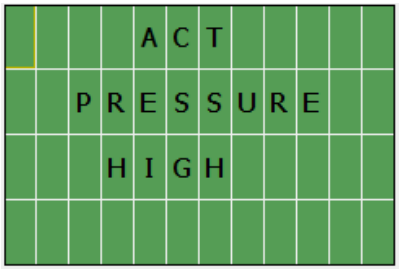
- If base pressure rises beyond the set pressure limit, Base pressure high message gets displayed as shown below.



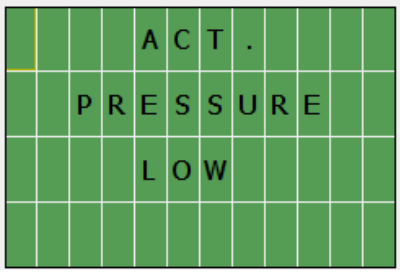

- If base pressure falls below the set pressure limit, Base pressure low message gets displayed as shown below.



- If activator pressure rises beyond the set pressure limit, activator pressure high message gets displayed as shown below.

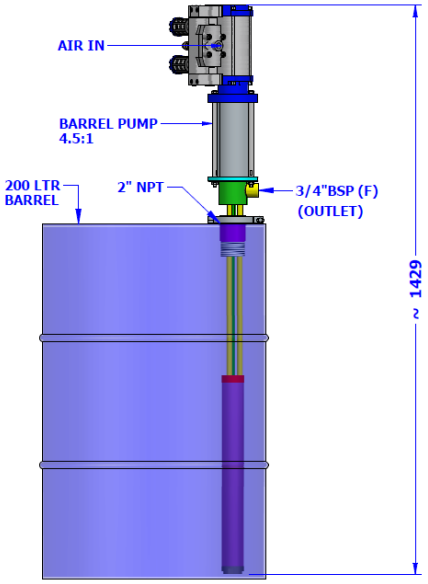



- If activator pressure falls below the set pressure limit, activator pressure low message gets displayed as shown below.

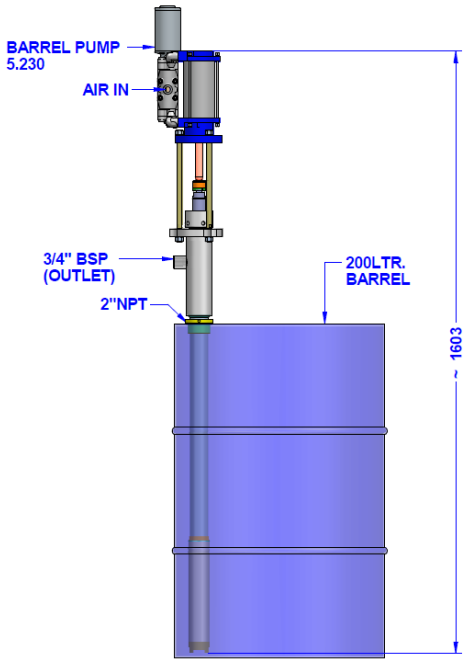


# TYPICAL INSTALLATION

**Barrel Transfer Pump 4.5:1**
**(For Moisture Sensitive Material)**




**Barrel Length Pump 5.230**
**(For General Liquid)**




## INSTALLATION

1.Screw the bung adapter tightly into the bunghole of the drum.
2.Install an air line filter on air line to remove harmful dirt and moisture from the compressed air supply.
3.Connect air supply to the pump.
4. Always connect a ground wire to the air motor.
The pump installation is complete.

## OPERATION

### Daily startup procedures

1. Connect air supply to the Transfer pump.
2. Turn on the main air supply.
3. Slowly increase the air pressure by air regulator until the transfer pump run slowly.

Use the Air regulator to control the pump speed.

**Daily shutdown procedures**

1. Slowly decrease the air pressure until zero.
2. Disconnect the air line.

**<u>For extended period shutdown</u>**

Flush, disassemble and thoroughly clean the Transfer pump before storing in a dry place.

## MAINTANANCE

**WARNING:** TO AVOID PERSONAL INJURY, ALWAYS DISCONNECT THE AIR COUPLER AND RELIVE ALL THE AIR AND HYDRAULIC PRESSURES BEFORE SERVICING THE PUMP.

**Disassembly**

1. Place the transfer pump in a vice.
2. Remove the suction seat.

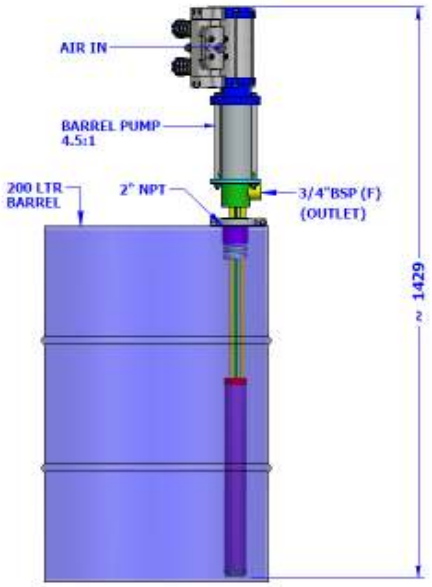
If the unit requires more than installation of a repair kit, it is usually quicker and least expensive to send the unit in for repair.

# TROUBLE SHOOTING

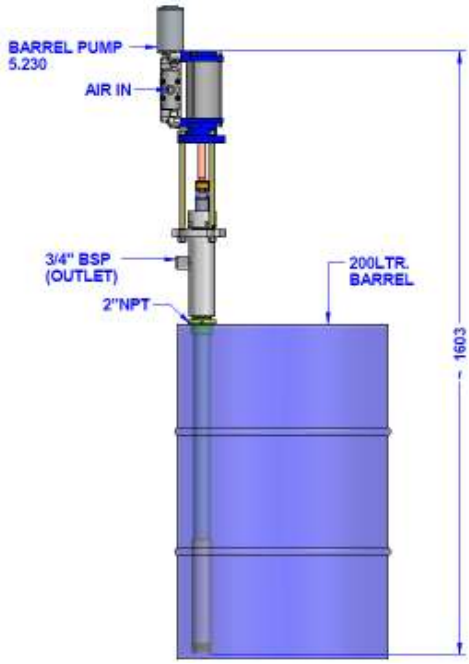
| MALFUNCTION | Pump does not start/stops during operation | Pump does not suck or only insufficien tly | Spray pressure too low | Pump operates irregularly | Pump operates although spray gun is closed | Pump transp orts materi al into the rinsing agent | Regulator frozen |
|---|---|---|---|---|---|---|---|
| **AIRMOTOR** | Press sensing valve provided on control block Clean regulator, replace defective parts if necessary | | | Clean regulator, replace defective parts if necessary | | | Compressed air too moist, stroke frequency too high, ambient temperature too low. |
| **HYDRAULIC PART** | | Not sufficiently ventilated, loose suction connection | | Not sufficiently ventilated, loose suction connection | Not sufficiently ventilated, loose suction connection | | |
| **SUCTION AND TRANSFER VALVE** | | Worn or blocked, replace defective parts | | Worn or blocked, replace defective parts | Replace worn or defective parts | | |
| **PACKINGS** | | Leaking piston and packing | | Leaking piston and packing | | Leakin g packing | |
| **FILTER** | Filter mesh blocked, check where and clean out | Filter mesh blocked, check where and clean out | Filter mesh blocked, check where and clean out | | Drain valve open. | | |
| **COMPRESSED AIR LINE** | Volume flow too low, air pressure too low. | | Volume flow too low, air pressure too low. | | | | |
| **MATERIAL HOSE** | Blocked, check where and clean out | Blocked, check where and clean out | Blocked, check where and clean out | | | | |

# TYPICAL INSTALLATION

**Barrel Transfer Pump 4.5:1**
**(For Moisture Sensitive Material)**




**Barrel Length Pump 5.230**
**(For General Liquid)**




## INSTALLATION

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The pump installation is complete.

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1. Connect air supply to the Transfer pump.
2. Turn on the main air supply.
3. Slowly increase the air pressure by air regulator until the transfer pump run slowly.

Use the Air regulator to control the pump speed.

**Daily shutdown procedures**

1. Slowly decrease the air pressure until zero.
2. Disconnect the air line.

**<u>For extended period shutdown</u>**

Flush, disassemble and thoroughly clean the Transfer pump before storing in a dry place.

**MAINTANANCE**

**WARNING:** TO AVOID PERSONAL INJURY, ALWAYS DISCONNECT THE AIR COUPLER AND RELIVE ALL THE AIR AND HYDRAULIC PRESSURES BEFORE SERVICING THE PUMP.

**Disassembly**

1. Place the transfer pump in a vice.
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| MALFUNCTION | Pump does not start/stops during operation | Pump does not suck or only insufficien tly | Spray pressure too low | Pump operates irregularly | Pump operates although spray gun is closed | Pump transp orts materi al into the rinsing agent | Regulator frozen |
|---|---|---|---|---|---|---|---|
| **AIRMOTOR** | Press sensing valve provided on control block Clean regulator, replace defective parts if necessary | | | Clean regulator, replace defective parts if necessary | | | Compressed air too moist, stroke frequency too high, ambient temperature too low. |
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| **PACKINGS** | | Leaking piston and packing | | Leaking piston and packing | | Leakin g packing | |
| **FILTER** | Filter mesh blocked, check where and clean out | Filter mesh blocked, check where and clean out | Filter mesh blocked, check where and clean out | | Drain valve open. | | |
| **COMPRESSED AIR LINE** | Volume flow too low, air pressure too low. | | Volume flow too low, air pressure too low. | | | | |
| **MATERIAL HOSE** | Blocked, check where and clean out | Blocked, check where and clean out | Blocked, check where and clean out | | | | |

# OPERATION

1) I3 "ON" == Q1 ON

2) I4 "ON" == Q2A ON

3) I5 "ON" == Q2B ON

4) I1 "ON" == PRS MONOTORING ON
   FOR LP[ OR HP " Q3 AND Q4"ON
   FLT ACK === Q4 OFF
   I1 "OFF" === Q3 ALSO OFF

5) I3 AND I4 "ON" == Q4 ON (HOOTER)

6) I3 AND I5 "ON" == Q4 ON

## ***PREVENTIVE MAINTENANCE (ELECTRICAL)***

- Keep the electrical control panel and junction boxes free from any debris and dust.
- Electrical connections should not be loosened. It may leads to spark.
- Identify components running hot or not according to specifications: Transformers, motors, bearings and wires almost always run hot before they fail. Predictive maintenance can avoid asset failure.
- Make sure that mounting fasteners and locking is secure.
- Check for wear of wiring insulation.
- Repair or replace the terminal blocks that are damaged or corroded.
- Make sure that all lamps are functioning well.
- Check the physical condition, operation and functionality of the Breakers, switches and component parts.
- Pitted contacts shall be replaced.
- Visually inspect for physical damage, moisture, overheating and cleanliness.
- Inspect and remove dust from busses, connectors, supports and Enclosure surfaces. A vacuum cleaner or dry compressed air may be used.
- Identify loose connections: Loose connections can cause power fluctuations to devices, devices to operate erratically and uneven load distribution between wires.

OP292-V04

# selec

**TC513A / TC513AX / TC221A / TC203AX / TC303A / TC303AX**

**Operating Instructions**


## SPECIFICATIONS

**Display**
3 digit, 7 segment digital display
**LED Indications**
R: Control output ON
**Keys**
3 keys for digital setting

**INPUT SPECIFICATIONS**
**Input Signal**
Thermocouple (J,K,T,R,S) / RTD (Pt100)
**Sampling time**
250 ms
**Input Filter (FTC)**
0.2 to 10.0 sec
**Resolution**
Fixed 1° resolution
**Temperature Unit**
°C / °F selectable
**Indication Accuracy**
For TC inputs: 0.25% of FS ±1°
For R & S inputs: 0.5% of F.S ± 2°
(20 min of warm up time for TC input)
For RTD inputs: 0.1% of FS ±1°

**FUNCTIONAL SPECIFICATIONS**
**Control Method**
1) PID control with auto tuning
2) ON-OFF control
**Proportional Band (P)**
1 to 400°
**Integral Time (I)**
0.0 to 99.9 min
**Derivative Time (D)**
0 to 999 sec
**Cycle Time**
0.1 to 99.9 sec
**Hysteresis Width**
0.1 to 99.9°
**Manual Reset Value**
-19.9 to 19.9°

**CONTROL OUTPUT** (Relay or SSR user selectable)*
**Relay contact (SPST)** (For TC513A,TC221A,TC303A)
10 A @ 250V AC / 30V DC, resistive
**Relay contact (SPDT)** (For TC513AX, TC203AX, TC303AX)
10 A @ 250V AC / 30V DC, resistive
**SSR Drive Output (Voltage Pulse)**
12V DC, 50 mA

* Not applicable for TC513A,TC221A,TC303A

**POWER SUPPLY**
**Supply Voltage**
85 to 270V AC/DC (AC: 50 or 60 Hz )
OPTIONAL - 24V AC/DC
**Power Consumption**
5 VA max @230V AC
**Temperature**
Operating: 0 to 50°C ; Storage: -20 to 75°C
**Humidity (non-condensing)**
95% RH
**Weight**
TC513A/TC513AX : 129 gms
TC221A/TC203AX : 180 gms
TC303A/TC303AX : 240 gms

## SAFETY PRECAUTIONS

All safety related codifications, symbols and instructions that appear in this operating manual or on the equipment must be strictly followed to ensure the safety of the operating personnel as well as the instrument.

If the equipment is not handled in a manner specified by the manufacturer it might impair the protection provided by the equipment.

Read complete instructions prior to installation and operation of the unit.

**WARNING:** Risk of electric shock.

### WIRING GUIDELINES

**WARNING:**
1. To prevent the risk of electric shock power supply to the equipment must be kept OFF while doing the wiring arrangement. Do not touch the terminals while power is being supplied.
2. To eliminate electromagnetic interference use short wire with adequate ratings; twists of the same in equal size shall be made. For the input and output signal lines, be sure to use shielded wires and keep them away from each other.
3. Cable used for connection to power source, must have a cross section of 1mm$^2$ or greater. These wires shall have insulation capacity made of at least 1.5kV.
4. When extending the thermocouple lead wires, always use thermocouple compensation wires for wiring. For the RTD type, use a wiring material with a small lead resistance (5Ω max per line) and no resistance differentials among three wires.
5. A better anti-noise effect can be expected by using standard power supply cable for the instrument.

### MAINTENANCE

1 The equipment should be cleaned regularly to avoid blockage of ventilating parts.
2. Clean the equipment with a clean soft cloth . Do not use Isopropyl alcohol or any other cleaning agent.

### INSTALLATION GUIDELINES

1. This equipment, being built-in-type, normally becomes a part of main control panel and in such case the terminals do not remain accessible to the end user after installation and internal wiring.

2 Do not allow pieces of metal, wire clippings, or fine metallic fillings from installation to enter the product or else it may lead to a safety hazard that may in turn endanger life or cause electrical shock to the operator.

3. Circuit breaker or mains switch must be installed between power source and supply terminals to facilitate power 'ON' or 'OFF' function. However this switch or breaker must be installed in a convenient position normally accessible to the operator.
4. Use and store the temperature controller within the specified ambient temperature and humidity ranges as mentioned in this manual.

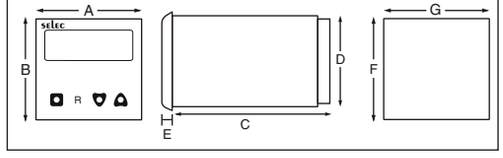
## CAUTION

1. When powering up for the first time, disconnect the output connections.
2. Fuse Protection: The unit is normally supplied without a power switch and fuses. Make wiring so that the fuse is placed between the mains power supply switch and the controller. (2 pole breaker fuse- rating: 275V AC,1A for electrical circuitry is highly recommended)
3. Since this is a built-in-type equipment (finds place in main control panel), its output terminals get connected to host equipment. Such equipment shall also comply with basic EMI/EMC and other safety requirements like BSEN61326-1 and BSEN61010 respectively.
4. Thermal dissipation of equipment is met through ventilation holes provided on chassis of equipment. Such ventilation holes shall not be obstructed else it can lead to a safety hazard.
5. The output terminals shall be strictly loaded to the manufacturer specified values/range.

## MECHANICAL INSTALLATION

NEW

| Outline dimensions (in mm) | Panel cutout dimensions (in mm) |
|---|---|



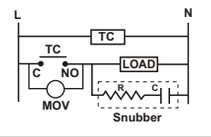
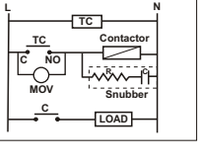

| MODELS / DIM | A | B | C | D | E | F | G |
|---|---|---|---|---|---|---|---|
| TC513A/TC513AX | 52 | 52 | 94 | 45 | 4 | 46 | 46 |
| TC221A/TC203AX | 72 | 72 | 83.7 | 67 | 4.5 | 69 | 69 |
| TC303A/TC303AX | 96 | 96 | 73 | 90.5 | 5 | 92 | 92 |

1. Prepare the panel cutout with proper dimensions as shown above.
2. Remove the clamp from the controller and push the controller into the panel cutout. Insert the clamp from the rear side until the main unit is securely fit into the panel.
3. The equipment in its installed state must not come in close proximity to any heating sources, caustic vapors, oils, steam, or other unwanted process by-products.
4. Use the specified size of crimp terminals (M3.5 screws) to wire the terminal block. Tighten the screws on the terminal block using the tightening torque within the range of 1.2 N.m.
5. Do not connect anything to unused terminals.

**EMC Guidelines:**
1. Use proper input power cables with shortest connections and twisted type.
2. Layout of connecting cables shall be away from any internal EMI source.

### LOAD CONNECTIONS

1. The service life of the output relays depends on the switching capacity and switching conditions. Consider the actual application conditions and use the product within the rated load and electrical service life.
2. Although the relay output is rated at 10 amps it is always necessary to use an interposing relay or contactor that will switch the load. This avoids damage to the controller in the event of a fault short developing on the power output circuit.
3. Always use a separate fused supply for the "power load circuit"and do not take this from the live and neutral terminals supplying power to the controller.

| For load current less than 0.5A | For bigger loads, use interposing relay / contactor |
|---|---|
|  |  |



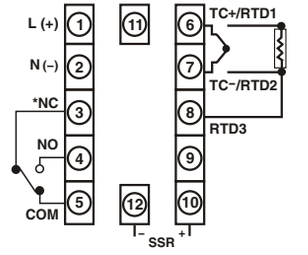
### ELECTRICAL PRECAUTIONS DURING USE

Electrical noise generated by switching of inductive loads can create momentary disruption, erratic display, latch up, data loss or permanent damage to the instrument.

**To reduce noise:**

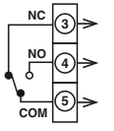
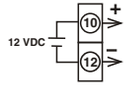
a) Use of snubber circuits across loads as shown above, is recommended.
b) Use separate shielded wires for inputs.

## TERMINAL CONNECTIONS



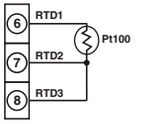

*NC contact valid only for TC513AX

**Control Output**

| Relay Output | SSR Drive Output |
|---|---|
|  |  |



**Measured Value Input**

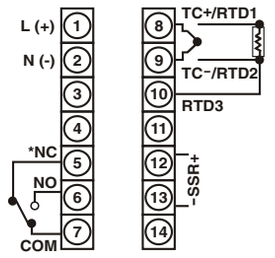
| Thermocouple (J, K, T, R, S) | RTD (Pt100) |
|---|---|
|  |  |
| Connect thermocouple sensor according to polarity shown. | For 2-wire RTD input short terminals 7 and 8 |



**For TC513A/TC513AX**

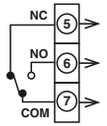
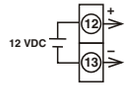
## TERMINAL CONNECTIONS

### For TC221A/TC203AX

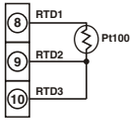



*NC contact valid only for TC203AX

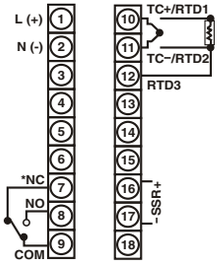
**Control Output**

| Relay Output | SSR Drive Output |
|---|---|
|  |  |

**Measured Value Input**

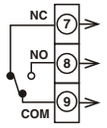
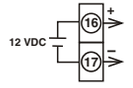
| Thermocouple (J, K, T, R, S) | RTD (Pt100) |
|---|---|
|  |  |
| Connect thermocouple sensor according to polarity shown. | For 2-wire RTD input short terminals 9 and 10. |

### For TC303A/TC303AX

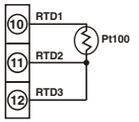



*NC contact valid only for TC303AX

**Control Output**

| Relay Output | SSR Drive Output |
|---|---|
|  |  |

**Measured Value Input**

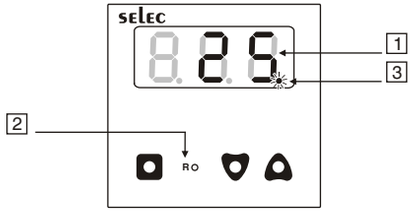
| Thermocouple (J, K, T, R, S) | RTD (Pt100) |
|---|---|
|  |  |
| Connect thermocouple sensor according to polarity shown. | For 2-wire RTD input short terminals 11 and 12 |

**WARNING: Please check the power supply voltage and controllers output type ordered (with reference to the order code) before installation.**

**Use only the correct thermocouple wire or compensating cable from the probe to instrument terminals avoiding joints in the cable if possible.**
**Failure to use the correct wire type will lead to inaccurate readings.**

**Ensure that the input sensor connected at the terminals and the input type set in the temperature controller configuration are the same.**

## FRONT PANEL DESCRIPTION




| | |
|---|---|
| 1 Process-value (PV) / Parameter name display | 1) Displays a process value (PV).<br>2) Displays the parameter symbols at parameter setting mode for 1 sec and then parameter values.<br>3) Displays PV error conditions. (refer Table 2) |
| Set-value (SV) | 4) Displays a set value (SV) when key pressed. |
| 2 Control output indication | The LED is lite when the control output is ON |
| 3 Tune | Auto tune: Decimal point blinks with faster speed. |

## FRONT KEYS DESCRIPTION

| Functions | Key press |
|---|---|
| **Online** | |
| To view Level 1 | Press key for 3 seconds. |
| To view Level 2 | Press key for 3 seconds. |
| To view Protection Level | Press + keys for 3 seconds. |
| To view and change setpoint value | Press to view the setpoint. Press + / key to change the setpoint. |
| **Programming Mode** | |
| To view parameters on the same level. | Or key once to view the next or previous function in operational menu. |
| To increase or decrease the value of a particular parameter. | + to increase and + to decrease the function value. **Note:** Parameter value will not alter when respective level is locked. |

NOTE: The unit will auto exit programming mode after 30 seconds of inactivity.

**OR**

By pressing the or or + keys for 3 sec.

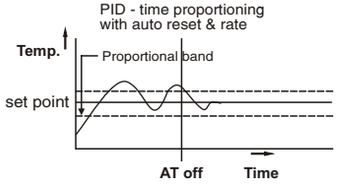
## USER GUIDE

**1. Display Bias:**
This function is used to adjust the PV value in cases where it is necessary for PV value to agree with another recorder or indicator, or when the sensor cannot be mounted in correct location.

**2. Filter Time Constant**
The input filter is used to filter out quick changes that occur to the process variable in a dynamic or quick responding application which causes erratic control. The digital filter also aids in controlling processes where the electrical noise affects the input signal. Larger the value of FTC entered, greater the filter added and the slower the controller reacts to the process and vice versa.

**3. Auto tuning:**
The Auto-tuning function automatically computes and sets the proportional band (P), integral time (I),Derivative time (D), ARW% and cycle time (CY.T) as per process characteristics.

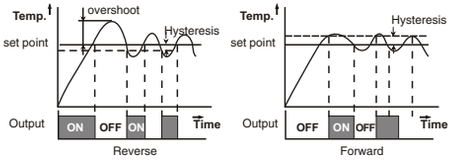
- ***Decimal point of LSD flashes at faster speed while auto-tuning is being performed.***
- ***At the completion of Auto-tuning, the decimal point stops blinking.***



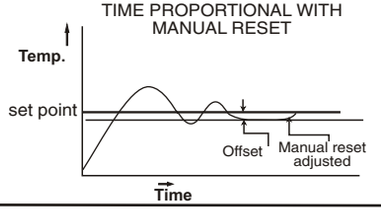

- If the power goes OFF before auto-tuningis completed, auto-tuning will be restarted at next power ON.
- If auto-tuning is not completed after 3-4 cycles, the auto-tuning is suspected to fail. In this case, check the wiring & parameters such as the control action, input type, etc.
- Carry out the auto-tuning again, if there is a change in set point or process parameters.

**4. ON/OFF control action (For Reverse Mode):**
The relay is 'ON' up to the set temperature and cuts 'OFF' above the set temperature. As the temperature of the system drops, the relay is switched 'ON' at a temperature slightly lower than the set point.

**HYSTERESIS:**
The difference between the temperature at which relay switches 'ON' and at which the relay switches 'OFF' is the hysteresis or dead band.




**5. Manual Reset (for PID control & I=0):**
After some time the process temperature settles at some point and there is a difference between the set temperature & the controlled temperature. This difference can be removed by setting the manual reset value equal & opposite to the offset.




## CALIBRATION ACCURACY DECLARATION

Product is tested & calibrated by automatic technique. The calibration of this instrument is done as per following accuracy :

For TC inputs: 0.25% of FS ±1°
For R & S inputs: 0.5% of F.S ± 2°
(20 min of warm up time for TC input)
For RTD inputs: 0.1% of FS ±1°

**Sources calibrated against:**
Kusam-meco, model 405, Sr.No.:104446

**Initial calibration is valid for 18 months after the Month/Year of manufacturing which is mentioned on order code label.**

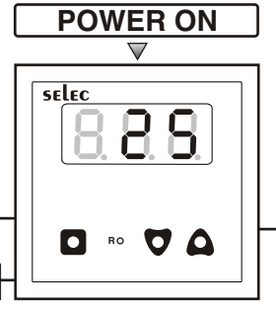
## CONFIGURATION INSTRUCTIONS

**KEY FUNCTIONS**

- ▲ ⇨ Press for 3 sec to enter Level 2
- Press once to view next parameter in configuration menu
- ▼ ⇨ Press for 3 sec to enter Level 1
- Press once to view previous parameter in configuration menu
- ▲ + ▼ ⇨ Press for 3 sec to enter protection Level
- ■ + ▲ or ■ + ▼ ⇨ Allows the user to increase or decrease associated parameter value
- ▲ or ▼ or ▲ + ▼ ⇨ To exit configuration menu press any of these keys for 3 sec

## OPERATIONAL MENU

*REQUIRED PARAMETER SETTING IS SHOWN IN LEVEL 1 DISPLAY CONDITION COLUMN*




**Level 1**

| Display (For 1sec) | Description | Default Value | Range | Display Condition |
|---|---|---|---|---|
| inP | Input type (Refer Table 1) | J | J/K/T/R/S/RTD | RTD — |
| Unt | Temperature unit | °C | °C/°F | C — |
| SP.L | Set point low limit | -199 | Min range of sensor selected to SP.H | 00 — |
| SP.H | Set point high limit | 750 | SP.L to Max range of sensor selected | 100 — |
| FtC | Filter time constant (Refer user guide) | 1.0 | 0.2 to10.0 sec | 1.0 — |
| Act | Control action | rE | RE/FD | rE — |
| Cnt | Control logic | PId | PID/ONF | ONF — |
| Any | Anti reset windup% | 25 | 1 to 100 % | For CNT=PID |
| rSt | Factory default (Reset all) | no | NO/YES | NO — |

**Level 2**

| Display (For 1sec) | Description | Default Value | Range | Display Condition |
|---|---|---|---|---|
| tUn | Tune (Refer user guide) | OFF | OFF/ON | For CNT=PID |
| P | Proportional band | 10 | 1 to 400° | For CNT=PID |
| I | Integral time | 2.0 | 0.0 to 99.9 min | For CNT=PID |
| d | Derivative time | 30 | 0 to 999 sec | For CNT=PID |
| Cy.A | Cycle time mode | AUt | AUT/US.F | For CNT=PID |
| Cy.t | Cycle time | 15.0 | 0.1 to 99.9 sec | For CNT=PID |
| HyS | Hysteresis | 1.0 | 0.1 to 99.9° | For CNT=ONF |
| oAn.P | Manual reset (Refer user guide) | 0.0 | -19.9 to 19.9° | For CNT=PID & I=0 |
| dS.b | Display bias (Refer user guide) | 0.0 | -19.9 to 19.9° | — |

**Protection Level**

| Display (For 1sec) | Description | Default Value | Range | Display Condition |
|---|---|---|---|---|
| SP | Lock setpoint | UnL | UNK/LCK | — |
| LU1 | Lock Level 1 | UnL | UNK/LCK | — |
| LU2 | Lock Level 2 | UnL | UNK/LCK | — |

**Note**

1. Locking parameters (LV1 or LV2 or SP) will not permit change in the value of respective level parameters.
2. Continuos operation of ■ +▲/▼keys for SP or other parameters makes Update speed faster in 3 stages after 3 seconds.

**Programming Setpoint (Online):** Default: 50

Range: SP.L to SP.H

To view setpoint: Press the ■ key.
To increase/decrease setpoint: Press ■ +▲/▼keys.

### INPUT RANGES (Table 1)

**FOR RTD**

| Input | | Ranges |
|---|---|---|
| Pt100 | °C | -150 to 850 |
| | °F | -199 to 999 |

**FOR THERMOCOUPLE**

| Input | | Ranges |
|---|---|---|
| J | °C | -199 to 750 |
| | °F | -199 to 999 |
| K | °C | -199 to 999 |
| | °F | -199 to 999 |
| T | °C | -199 to 400 |
| | °F | -199 to 750 |
| R & S | °C | 0 to 999 |
| | °F | 32 to 999 |

### ERROR DISPLAY (Table 2)

When an error has occured, the display indicates error codes as given below.

| Error | Meaning | Control Output Status |
|---|---|---|
| S.br | Sensor break / Over range condition | OFF |
| S.rE | Sensor reverse / Under range condition | OFF |


**Selec Controls Pvt. Ltd.**

(Specifications are subject to change, since development is a continuous process)

**Telephone: +91-22-40394200 / 40394202**
**Fax: +91-22-28471733**
**Toll free: 1800 227 353**
**Website: www.selec.com**
**Email: sales@selec.com**

# TECHNICAL SPECIFICATIONS

## Barrel Transfer Pump

| | |
|---|---|
| Part No. | 29 009 000 03 |
| Output (Continuous duty) | 21 Ltrs/Min |
| Output (Intermediate duty) | 42 Ltrs/Min |
| Cycles per ltrs. | 5 |
| Cycle per Gal. | 19 |
| Pressure ratio | 4.5:1 |
| Stroke Length | 120 mm |
| Air motor Piston ϕ | 80mm |
| Air inlet pressure max | 6 Bar |

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| Air inlet pressure max | 6 Bar |

# TECHNICAL SPECIFICATION

## POLYUREA SPRAY SYSTEM - 2K/270/110X2

| | |
|---|---|
| **Type** | **2K/270/110x2** |
| **Mixing Ratio** | **1 :1** |
| **Transfer Ratio** | **55:1** |
| **Output Per Cycle** | **220 cc** |
| **Air motor Piston Ø** | **270 mm** |
| **Spray Volume @ 40 cycles/min** | **8.8 ltr/min** |
| **Air In Max** | **6 bar** |
| **Max. Pressure** | **330 bar** |
| **Air consumption N ltr @ 40 cycles/min** | **3850** |
| **Inline Heaters** | **7kw x 2nos.** |
| **Temperature Range** | **Up to 100˚ C** |
| **Power Supply** | **415 VAC-3 phone 50 Hz 5 wire R-Y-B-N-E copper flexible 6sq.mm x 5 core cable for incoming feeder** |

# WARNING AND SAFETY INSTRUCTIONS

EQUIPMENT IS FOR PROFESSIONAL USE ONLY

## ⚠ WARNING

HIGH PRESSURE DEVICE FOR PROFESSIONAL USE ONLY
Read and understand instruction manual before use and maintenance. Observe on warnings.

Do not use spray materials containing reactive solvents with equipment containing aluminum, galvanized or zinc coated wetted parts. e.g. Dichloromethane and ethylene chloride can chemically react with aluminum and galvanized or zinc coated parts and cause explosion hazard.

## ⚠ WARNING

**Do not process flammable, explosive, toxic or otherwise hazardous materials without first performing an appropriate hazard analysis.**

VR Coatings cannot be an expert in the chemical and biological properties of the infinite number of materials that could be processed in this machine. As sold by VR Coatings, this machine is not designed to safely process hazardous materials unless additional precautions are not taken.
Before processing any material that are (or can react to become) flammable, explosive, toxic or otherwise hazardous, the user must perform a thorough hazard analysis and risk assessment of the entire process and determine the best way to deal with the hazard(s) identified, including contingency plans for dealing with processing errors and object conditions.

**It is compulsory to**
**-know the product and possible hazards.**
**-store the product to be used in the appropriate areas.**
**-keep the product used during dispensing in a suitable container.**
**-Dispose the product according to the regulation of hazardous products in force in the country where the product is used.**
**-Wear protective equipment designed for that use.**
**-wear glasses, gloves, shoes clothes and mask for breath.**

## ⚠ WARNING

SKIN INJECTION HAZARD. Protect hands and body from high-pressure fluids. Relieve pressure before disconnecting hydraulic or other lines and tighten all connections before applying pressure. In case of accidental skin injection, seek immediate" Surgical Treatment". Failure to follow this warning can result in amputation or serious injury.

- NEVER attempt to force the flow of fluid backward through the gun with your finger, hand or hand-held object against the gun nozzle.

- Before flushing system, always remove spray tip and adjust fluid pressure to lowest possible setting.

WARNING: The paint hose can develop leaks from wear, kinking, abuse etc. A leak is capable of injecting fluid into the skin; therefore the paint hose should be inspected before use. NEVER attempt to plug a hose with any part of your body, adhesive tape or any other makeshift device. Do not attempt to repair a spray hose. Instead, replace it with a new-grounded hose. You must see to it that the following points are followed for hoses, accessories or any other hardware:

- Comply with manufacturer's recommendations.
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- must not show any leaks, kinks, and sign of wear and should be factory fitted and pressure tested.

An air pressure safety valve forms an integral part of the air motor or air regulator and must not be altered or tampered with.

**⚠ WARNING**

**COMPONENT RUPTURE** The system is capable of producing high pressure all components in the system must have a maximum working pressure capacity, not less than the pressure rating of the pump.
**SERVICING** Before servicing, cleaning or removing any part, always shut off power source, carefully release pressure in fluid portions of the system and set safety locks on guns and equipment

**⚠ WARNING**

High velocity flow of material through equipment may create static electricity. All equipment being sprayed must be properly grounded to prevent sparking, which may cause fire or explosion.

Due to static electricity potential generated by the high velocity of fluid through the pump, hose and tip, sparking may occur and the system may be hazardous. This can result in an explosion and/or fire, if every part of the spray equipment is not properly grounded. Be sure that both the object being sprayed and the airless equipment are grounded. This can be done by attaching a static wire to water piping or building structural members known to be earthen. If the hose does not contain a static electricity conductor, a static wire must be attached from the spray gun to the earth.

## ⚠ CAUTION

Before any adjustment, inspection, maintenance, cleaning, removing work always shut off the power source, carefully release pressure in fluid of the system and set safety locks on guns.

## ⚠ CAUTION

FLUSHING/CLEANING

Always flush the unit into a separate metal container with the spray tip removed and the gun held firmly against the side of container to assure proper grounding and prevent static discharge, which could cause serious bodily injury.

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FLUSHING/CLEANING

Always flush the unit into a separate metal container with the spray tip removed and the gun held firmly against the side of container to assure proper grounding and prevent static discharge, which could cause serious bodily injury.

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**An airless spray gun requires that fluid be introduced to it at very high pressure. Fluids under high pressure, from spray or leaks, can penetrate the skin and inject substantial quantities of toxic fluid into the body. If not promptly and properly treated, the injury can cause tissue death or gangrene and may result in serious, permanent disability or amputation of the wounded part. Therefore extreme caution must be exercised when using any airless spray equipment.**

**IF YOU ARE INJECTED, SEE A PHYSICIAN IMMIDIATELY. DO NOT TREAT AS A SIMPLE CUT!**
**<u>NOTE TO PHYSICIAN</u>:**
Injection into the skin is a serious, traumatic injury. It is important to treat the injury surgically as soon as possible. Do not delay treatment to research toxicity. Toxicity is concerned with some exotic coatings injected directly in to the bloodstream. Consultation with a plastic surgeon or a reconstructive hand surgeon may be advised

- NEVER attempt to force the flow of fluid backward through the gun with your finger, hand or hand-held object against the gun nozzle.

- Before flushing system, always remove spray tip and adjust fluid pressure to lowest possible setting.

WARNING: The paint hose can develop leaks from wear, kinking, abuse etc. A leak is capable of injecting fluid into the skin; therefore the paint hose should be inspected before use. NEVER attempt to plug a hose with any part of your body, adhesive tape or any other makeshift device. Do not attempt to repair a spray hose. Instead, replace it with a new grounded hose. You must see to it that the following points are followed for hoses, accessories or any other hardware :

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**SERVICING** Before servicing, cleaning or removing any part, always shut off power source, carefully release pressure in fluid portions of the system and set safety locks on guns and equipment

**PRESSURE RELEASE PROCEDURE**
A **Set trigger safely in a locked position.**
B **Shut off pump( Close main air supply valve and back-off air regulator ).**
C **Release fluid pressure from entire system (Open drain valve) and trigger gun.**
D **Reset trigger safely in a locked position.**

## ⚠ WARNING

High velocity flow of material through equipment may create static electricity. All equipment being sprayed must be properly grounded to prevent sparking, which may cause fire or explosion.

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## ⚠ CAUTION

Before any adjustment, inspection, maintenance, cleaning, removing work always shut off the power source, carefully release pressure in fluid of the system and set safety locks on guns.

ALWAYS follow the coating or solvent manufacturer's safety precautions and warnings. Never spray flammable material near open flames, pilot lights or any other source of ignition.

If you experience any static sparking or slight shock while using the equipment, stop spraying immediately. Check the entire system for proper grounding. Do not use the system again until the problem has been corrected.
Follow material supplier's instructions carefully and ensure adequate ventilation of working area to prevent health hazards.

## ⚠ CAUTION

### FLUSHING/CLEANING

Always flush the unit into a separate metal container with the spray tip removed and the gun held firmly against the side of container to assure proper grounding and prevent static discharge, which could cause serious bodily injury.

## ⚠ CAUTION

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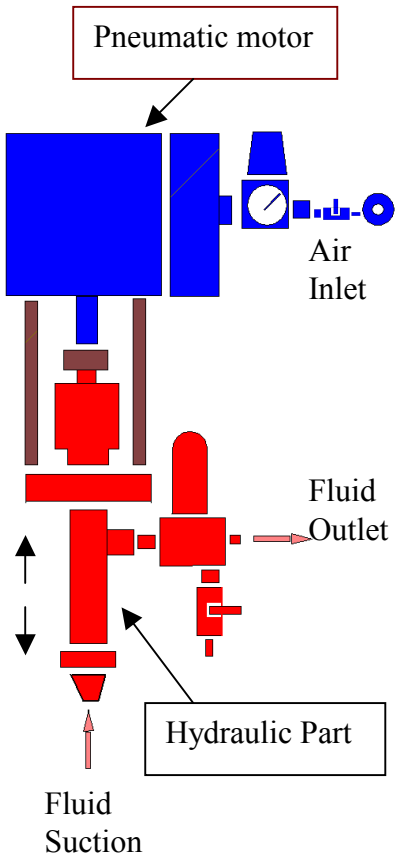
Before servicing/removing any part always shut off power source and release pressure in fluid portions of the system.

## ⚠ CAUTION

DO NOT START PUMP IF GUARD IS NOT AT "UP"POSITION.
TO SET "UP"POSITION-hold by hands push upward till it locks in ball catch.
TO SET "DOWN"POSITION-Push downward**.**
**FINGURE OR HANDS PINCH HAZARD.KEEP HANDS CLEAR.** Before servicing/removing any part always shut off power source and release pressure in fluid portions of the system.

# OPERATING INSTRUCTIONS

## GENERAL DESCRIPTION:




**Pneumatic piston Pumps** are made for spraying, Dispensing, and transferring of various types of liquid/semi solid. Theses pumps are mainly used for airless/air assisted spraying of coating materials and dispensing /transferring of paints, oil, ink, sealants adhesives, wax, grease, solvents etc. and incorporate the following essential parts:
Airless Pump : Pneumatic motor with Control Unit, Hydraulic parts, Suction device, mounting plate ,etc.
Accessories: HP (High Pressure) hose, HP Filter, Trolley, Spray gun, Spray nozzle, etc.
Optional : Circulating unit, special accessories depending on applications.

The various pump versions are identified as follows:
e.g.: TIGER 30.150
Double stroke Volume in CC (150)
The above is intended to obtain the following data: s

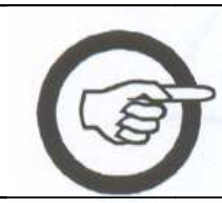
Material Pressure :Pressure Input x Transmission Ratio

Displaced Volume :Double Stroke Volume x No. Of double stroke/ min. E.g. 50 double strokes/min.)

The pump works double acting and self-priming and serves to transfer the spray material to the spray gun by making it pass through a filter and a high pressure hose. Its differential piston, which is located in the hydraulic portion of the pump, moves upwards and downwards in the working cylinder (1 cycle = 1 double stroke = 1 upward and 1 downward stroke). The displacement piston features a layer of hard chrome of about 200 microns to protect against wear. The suction and delivery ball valve feature tungsten carbide seat.

The pump is equipped with an oil cup containing a solvent, which is intended to lubricate the piston and to prevent paint residues from incrustation. The packing need to be readjusted manually by tightening the upper packing take up nut which is designed as oil cup.

The actual spray performance depends on both spray nozzle size and selected spray pressure; increased material flow results in both spray nozzle size and air consumption.



Make sure that pump does not work too fast and / or too long when idling in order to prevent damage to sealing and valves.

All airless spraying units are equipped with capacity sieving filters. There are different mesh sizes to match according to the airless nozzle. Please see **Nozzle Chart** for appropriate type of nozzle.
In case of high delivery transfer pumps separate filters cartridge type or bag type can be used. Filter size depends upon the fluid, which is handled, and application requirements.

## TWO COMPONENT HOT AIRLESS SPRAY EQUIPMENT -

Two Component Spray Equipment are used where curing time is very fast ranging from few seconds to several minutes and spraying through standard airless pump is not possible.

For High Performance Protective Coatings which are solvent free and fast curing Two Components Epoxy or PU Coating tar modified or tar free, Two Component Hot Airless Spraying Equipment is a must.

## TWO COMPONENT HOT AIRLESS EQUIPMENT CONSIST OF -

1. Plural Component High Pressure Pump
2. Mixing Block
3. Mixers – Static / Dynamic
4. Flush Pump
5. Heating System
6. Feed pump and supply system
7. Monitoring and control system
8. Spray Guns

## 1. PLURAL COMPONENT HIGH PRESSURE PUMP

This is the core part of Two Component System. It is like a standard Airless Spray Equipment except two or three hydraulic cylinders driven by single common Air Motor.

## 2. MIXING BLOCK / MANIFOLD

Both the components that are individually metered and delivered by Two Component Pump are mixed in this Mixing Block incorporated with numbers of Non Return Valves. Return Line from the Mixing Block goes back to the tank in case of circulated system.

## 3. MIXERS

When fluids are pumped through mixer they are progressively divided and recombined to get mixed. Diameter and length of the mixer depends upon material specifications.

## 4. FLUSH PUMP

This is the standard Airless High Pressure Pump with pressure ratio ranging from 40:1 to 60:1 and output per cycle from 70 to 110cc used in Two Component Systems to rinse the whole system. Selection of flush pump depends on material to be flushed and hose lengths.

## 5. HEATED SYSTEM

This may consist of inline fluid heaters, heated supply containers, heated hoses. VR Coatings offers high pressure inline fluid heaters to heat each individual component to the required temperature. Oil heated Jacketed Containers up to 200 ltr. capacity is also offered by VR Coatings to preheat the component individually as per material specification. It has power up to 12KW and temperature range up to 100°C. This is controlled and monitored by PID based Control Panel.

For long hose lengths materials which have to be sprayed at high temperature, the spray hoses must be heated / insulated. VR Coatings offers hot water system to heat the hose and also provide electrical heated hose. In some cases insulated hose can

be used instead of heated hose again depending on application, material specification and ambient temperature.

## 6. FEED PUMP AND SUPPLY SYSTEM

Feeding pumps are used to feed the component from supply tank to Two Component pump. VR Coatings offers various feed pumps from its standard transfer pump range depending on the material specifications.

Separate feed pumps can be used to transfer material from supplier's drum to supply containers of Two Component System. Drumpress with Hoisting Unit can be used for transferring high viscous materials.

Agitators may also be used depending upon the application and type of the material. VR Coatings offers electrical driven high torque agitator for viscous material. Pneumatic agitators are also available where torque requirement is less.

## 7. MONITORING AND CONTROL SYSTEM

The monitoring system is required for safeguarding against incorrect mixing ratio for Two Component System. When pressure exceeds or drops surpassing the tolerance setting that are set by operator, while spraying the system automatically shut downs. When there is malfunctioning in the system and is manifested by surpassing set limits the system automatically switches off. These malfunctions may be because of internal / external leakage's, material deficiency, damaged seal etc. Automatic 'switching off' of the system prevents incorrect mixing ratio and reworks.

## 8. SPRAY GUNS

Trigger operated and insulated handle spray guns are used to apply coatings manually. For automatic spraying pneumatically operated automatic guns are used.

## OTHER ACCESSORIES

A flexible HP hose serves as connection between pump and spray gun. Its inside wall consists of either Nylon or Teflon; it also contains an electrical conductor in order to permit electrostatic charges to discharge through the grounded pump.

**⚠ WARNING**

**COMPONENT RUPTURE** The system is capable of producing high pressure, all components in the system must have a maximum working pressure capacity not less than the pressure rating of the pump.

A large number of different nozzles are available. See **Nozzle Chart**.

## MOUNTING OF ANY AIRLESS PUMP

Any pumping unit should be installed in a way to make it easily accessible for cleaning and maintenance purposes.

In the case of wall mounting, assure that pump is vertically installed and fastened by using the holes on the mounting plate.

All pumps are equipped with a grounding point. It is compulsory that the ground lead be connected to this point.

**⚠ WARNING**

High velocity flow of material through equipment may create static electricity. All equipment being sprayed must be properly grounded to prevent sparking, which may cause a fire or explosion.

Make sure that sufficient compressed air is available when connecting the pump to the air supply net.

Insure inside diameter of the connection tube between compressed air delivery point and airless unit is sufficient for required capacity.

## COMMISSIONING AND OPERATING

### 1. General Information

Present pump is suitable for any kind of coatings/ material such as primers, basic coats, lacquers, dispersion paints, caustics, bituminous mastics etc.,

Depending on their physical and chemical characteristics, other types of spray media can be used e.g. cements, fillers, deadening agents and so forth.

Two component paints, PU material, PES material, acid hardening material or other media containing filler such as asbestos, ground cork and silicates require special attention prior to use.

We do not recommend the application of coarse bodied or abrasive fluids using the airless method. These would include sand filled wall coatings, coatings with coarse fibrous, various types of adhesives.

**⚠ WARNING**

**Do not process** flammable, explosive, toxic or otherwise **hazardous materials without first performing an appropriate hazard analysis.**
**It is compulsory to**
**-know the product and possible hazards.**
**-store the product to be used in the appropriate areas.**
**-keep the product used during dispensing in a suitable container.**
**-Dispose the product according to the regulation of hazardous products in force in the country where the product is used.**
**-Wear protective equipment designed for that use.**
**-wear glasses, gloves, shoes clothes and mask for breath.**

2. In case of doubt, please contact for correct equipment recommendations.

**Setting up**

- Hold oil cup/coupling guard by hand and push downwards in versions provided with this type of guard.
- Check for top lubricant to maximum level in pump lubrication chamber or oil-cup or packing take-up nut.
- Lift oilcup guard in upward direction till it locks in ball catch.

**⚠ CAUTION**

FINGURE OR HANDS PINCH HAZARD. KEEP HANDS CLEAR. Before servicing/removing any part always shut off power source and release pressure in fluid portions of the system.
Ensure coupling guard is always at UP position while pump is working.

- Check high-pressure filter screen element. Mesh opening should be smaller than bore tip size used.
- The Table below should be used as a guideline only. We suggest that you do not use any filter element when spraying materials containing fibrous.

| **Mesh size an element marking (opening)** | **Tip size** | **Coating material to be sprayed** |
|---|---|---|
| M 200<br>084 mm/ 0.0033'') | < 0.3 mm<br>0.011" | Clear lacquer, varnishes, and hammer tone. |
| M 150<br>mm/0.0039") | >0.3 mm<br>0.011'' | Primer, filler, red oxide. |
| M 100<br>mm/0.0057) | >0.3 mm<br>0.011'' | Primer, filler, red oxide. |
| M 70<br>(0.250 mm/0.0098") | >0.5 mm<br>0.016'' | Iron mica, red oxide. |
| M 50<br>(0.320 mm/0.0125") | >0.6 mm<br>0.023'' | Latex paint, bodied coatings. |

- Connect high-pressure fluid hose and gun and connect air supply to air regulator.

| ⚠ CAUTION | |
|---|---|
|  | **Have Trigger Lock engaged at all times when not spraying/in use.** |

## Grounding

Connect the other end of the grounding wire provided on machine to the earth ground. Always use electrically conductive hoses.

## Flushing Of Complete Two Component System.

The unit has been factory tested using an oil emulsion. To avoid contamination of the coating material to be sprayed, be sure the emulsion is flushed from the system before spray operation begins by using a compatible solvent.

**Do as follows:**

- Close main air supply valve and back-off all air regulators.
- Close drain valve located at high-pressure filter at outlet manifold..
- Insert suction hose and tube or fluid end into compatible solvent.
- Place drain hoses from drain valves into container, open both drain Valves, if system having return lines open return line valves instead of drain valves and put line ends in container

**Note:** If system is already loaded with both components then take two separate containers to collect drain.

- Open main air supply valve and slowly open-air regulators to max. 2 bar (30 psi) of feed pumps. open air regulator of main plural component pump to max 2 bar.

**Note:** Pump cycles slowly and circulates fluid via drain hose or return line back into the container.

- Close Drain valves/return line valves. Point gun into container ensuring contact between gun and metal container- then trigger the gun.

**Note:** The pump will cycle slowly and circulate fluid via gun back into the container.

- Close gun and increase air regulator setting of two component pump to maximum pressure allowed. Check all connections for leaks.

**Note:** Maximum fluid pressure will vary according to the model of pump selected.

- Close main air supply valve and back-off air regulator.

- Open drain valves / return line valves relieve system pressure completely. Finally trigger the gun again shortly to ensure that there is no pressure retained in the fluid hose

**⚠ CAUTION**

CAUTION : drain valves, return valves, supply valves shall be always closed or opened simultaneously of both components: otherwise system will unbalance and raise high pressure In one line.

- Remove suction hose and tube or fluid end from solvent container, wipe clean . Point gun into the container, ensuring good contact with the container Trigger the Gun .Slowly open-air regulators to max. 2 bar (30 psi) of feed pumps. open air regulator of main plural component pump to max 2 bar .Remove complete solvent via gun and return lines

**⚠ CAUTION**

FLUSHING/CLEANING

Always flush the unit into a separate metal container with the spray tip removed and the gun held firmly against the side of container to assure proper grounding and prevent static discharge which could cause serious bodily injury.

**MATERIAL LOADING AND OPERATING.**

- Take individual components to be mixed and sprayed in respective feed containers, manually or by separate transfer pumps or (if material is highly viscous) may be by drumpress unit.
- Close Drain valves on filters at outlet manifold.
- Open return line valves. Increase feed pumps air pressure gradually till material flows properly. Collect return material in separate containers instead of main feed tank till its solvent free.
- Start flushing pump loaded with compatible solvent and keeps pressurized for immediate flushing of mixed material whenever required.
- Before opening supply valves, open flush valve and flush for few seconds. Close flushing Valve. Close return line valves and

- open supply line valves and Trigger the spray gun. Take mixed material in a separate container and increase pressure till you

get proper mixing and atomization. Insure the pressures on the pressure gauges are stable before applying on substrate.

**NOTE :**

- There is pressure difference in upward and downward stroke due to use of feed pumps. As well as difference in both component pressures because of typical and efficient mixing block design.
- Set upper and lower pressure limits on either the gauges or pressure controllers provided for monitoring.
- Upper pressure limit shall be about 20 bar more than the stall pressure and lower limit shall be below about 20 bar than lowest working/spraying pressure. These parameters can be varied depending upon material specifications and application.

NOTE: Do not stop while spraying when pot life is very short. If you Stop, immediately close supply lines open return lines and flush the mixed material.

- Start monitoring system by switching on the monitoring switch on the control panel.
- Automatic switching off closes supply valves, opens return lines and flush valve and fault indication lamp will glow. Operator has to immediately flush the mixed material. Switch off monitoring. Identify and rectify the problem and start the system again as mentioned above.

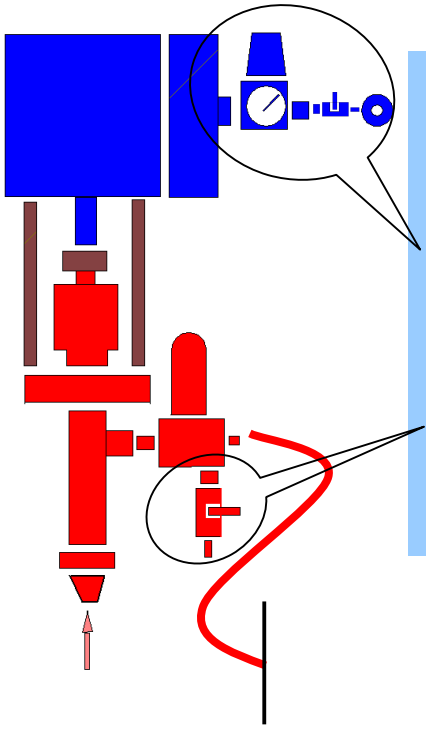
## OPERATING REMOTE PNEUMATIC CONTROLLS.

- Refer circuit diagram of pneumatic control panel.
- To switch on supply valves and to switch off return line valves or vice versa. Operated hand lever of 3/2 way DC valve as shown in figure on Pneumatic Panel.
- To switch on flushing operate hand lever of 3/2 way DC valve as shown in figure. Flushing valve will only operate when supply line valves are closed and return line valves are open.

**NOTE** : Immediately flush the mixed material when you STOP Spraying

# TROUBLE SHOOTING CHART RELATED TO MIXING.

| PROBLEM | CAUSE | SOLUTION |
|---|---|---|
| **Mixing ratio incorrect** | Return line valve leaking | Check and clean valve seats, if worn out replace. |
| | | Insure sufficient air pressure to valves. |
| | | Check pneumatic circuit. |
| | External leakages through joints | Tighten the joints. Replace worn out sealings |
| | Hydraulic Part valve seat leakages | Remove and clean valve seats. |
| | Feeding Container empty | Refill the container |
| | | |
| Solvent is mixing in sprayed material. | Flushing valve leaking | Check and clean valve seats. Replace if there are worn out parts. Check & clean non return valves in mixing block. |
| Spray pressure is low at high air inlet pressure | Choking in fluid line filters | Check filters. Clean the filter and replace element if necessary. |
| | Choking in hoses | Replace choked hoses. |
| | Choking in mixing block | Clean the mixing block and service it. |
| | Choking in Static Mixer | Clean or replace. |
| | Required material temperature not achieved | Circulate the heated material till required temperature reaches . |
| | | Check whether any heating element is failed. Correct it or replace. |
| | | |
| Mixed Material is not flushing out | Hardened material in the mixing block or in the static mixer or in the hose and gun | Clean the mixing block with compatible solvent; service it as necessary. Clean static mixer, gun and hose. Replace hose if cleaning not possible. |
| | Solvent pump pressure is low | Increase pump air pressure |
| | Flushing valve not opening fully | Insure sufficient air pressure to valve. |
| | Solvent container empty | Refill the solvent supply. |
| | The solvent in compatible with the material | Change to a compatible solvent |
| | | |



**PRESSURE RELEASE PROCEDURE**

A **Set trigger safely in a locked position.**

B **Shut off pump( Close main air supply valve and back-off air regulator ).**

C **Release fluid pressure from entire system Open drain valve and trigger gun.**

D **Reset trigger safely in a locked position.**

**Spray Pattern Control**

**⚠ CAUTION**

Have Gun **Trigger Lock** engaged at all times when not actually spraying.

When installing **spray tip** be sure that **Gasket** is correctly used between gun tip and spray tip.With Gun in the "**Open"**(triggered) position, increase the air regulator setting until the correct spray pattern is achieved.

**Note:** Use the lowest air pressure possible that will give proper fluid atomization and spray pattern.Excessive or higher pressures show no improved result, but will cause reduced system component life, and will waste material.

**POST-OPERATIONAL HANDLING:**

Actuate gun in order to evacuate pressure from pump. Remove nozzle and clean it.

Lacquer may remain in the pump up to 48 hours. This should however be avoided when using two component materials or any other material liable to self-cure quickly.

Incase of protracted downtimes, evacuate pump, refill with solvent and leave as such. Clean HP filter if necessary.

- **Shut Down Procedure**
  Flush the mixed material, shut-off flush valve. Actuate gun in order to evacuate pressure from pump. Follow Procedure as listed under "**Flushing**", however use regular **Recommended lubricating oil** without additives instead of solvent, if the pump is to be put into storage.
  Back-off (relief) air regulator completely.
  Close main airs supply valve.

**MAINTENANCE:**

- Daily - if compressed air is wet - drain oil and water separator with pressure on and blow out water at least twice daily.
- Check fog oiler for correct adjustment (droplet metering) and oil s level. Refill if required.
  **Note:** Severe operating conditions may cause frosting of Air motor. To prevent, fill fog oiler with mixture of 50:50 regular Recommended lubricating oil and Glycol.

- Check or top-up level of lubricant in pump packing take-up nut.
  **Note:** Change lubricant every 50 hours of operation, earlier in oil cup pumps. Discoloration of lubricant indicates packing wear or failure. This will affect pump performance. If necessary, renew upper packing set.
- Clean and inspect filter elements in filter screen housing and high-pressure filter at least daily, based on quality of product to be sprayed.
- Do not kink or bend high-pressure fluid hose to less than four-inch radius.
- Loosen threaded connections or hose couplings of the unit or system only when essential. This will help prevent hardened materials getting into the system, which could malfunction.

- Displacement piston in lowest (DOWN) position at all times to prevent material from hardening on the fluid piston or rod.

# TECHNICAL SPECIFICATIONS

| Name | Type | Ratio | Output/ cycle(cc) | Air motor piston ϕ mm | Stroke length mm | Approximate Weight (kg) | Recommended spray volume/ minute (lt.) | Air inlet pressure Max (bar | Output Pressure Max. (bar) | Air consumption N lt./ min. Max. |
|---|---|---|---|---|---|---|---|---|---|---|
| **TIGER** | 30.70 | 30:1 | 70 | 110 | 120 | 19 | 3.5 | 8 | 240 | 900 |
| | 40.110 | 40:1 | 110 | 160 | 120 | 24 | 5.5 | 8 | 320 | 1900 |
| | 12.150 | 12:1 | 150 | 110 | 120 | 22 | 7.5 | 6 | 72 | 900 |
| | 28.20 | 28:1 | 20 | 80 | 70 | 15 | 2 | 6 | 168 | 450 |
| | 30.150 | 30:1 | 150 | 160 | 120 | 23 | 6 | 8 | 240 | 1900 |
| | 28.40 | 28:1 | 40 | 80/110 | 120/70 | 17 | 2 | 6 | 168 | 450 |
| | 60.70 | 60:1 | 70 | 160 | 120 | 21 | 3.5 | 6 | 360 | 1400 |
| | 16.70 | 16:1 | 70 | 80 | 120 | 17 | 3.5 | 8 | 128 | 450 |
| | 12.150 | 12:1 | 150 | 110 | 120 | 24 | 7.5 | 6 | 720 | 900 |
| **RHINO** | 45.210 | 45:1 | 210 | 230 | 120 | 62 | 5.5 | 6 | 270 | 3000 |
| | 60.150 | 60:1 | 150 | 230 | 120 | | 6 | 6 | 360 | 3000 |
| | 30.275 | 30:1 | 275 | 230 | 120 | 62 | 10 | 6 | 280 | 3000 |
| | 45.275 | 45:1 | 275 | 270 | 120 | 70 | 7.5 | 6 | 270 | 4000 |
| | 60.210 | 60:1 | 210 | 210 | 120 | 70 | 5.5 | 6 | 360 | 3000 |
| | 55.275 | 55:1 | 275 | 300 | 120 | 67 | 7.5 | 6 | 330 | 5000 |
| | 75.210 | 75:1 | 210 | 300 | 120 | 67 | 5.5 | 6 | 450 | 5000 |
| **HIPPO** | 4.90 | 4:1 | 90 | 60 | 70 | 8 | 1.8 | 6 | 24 | 100 |
| | 2.900 | 2:1 | 900 | 110 | 120 | 28 | 30 | 6 | 12 | 480 |
| | 5.900 | 5:1 | 900 | 160 | 120 | 30 | 30 | 6 | 30 | 4000 |
| | 3.400 | 3:1 | 400 | 080 | 120 | 22 | 15 | 6 | 18 | 300 |
| **ELEPHANT** | 04.2000 | 4:1 | 2000 | 230 | 120 | 78 | 40 | 6 | 24 | 1200 |
| | 04.3400 | 4:1 | 3400 | 230 | 200 | | 70 | 6 | 24 | 2000 |
| | 02.4000 | 2:1 | 4000 | 230 | 120 | 105 | 80 | 6 | 12 | 1200 |
| | 02.6500 | 2:1 | 6500 | 230 | 200 | 110 | 130 | 6 | 12 | 2000 |

## CHEETAH

| Type | 2k -350 / 79X79X150 | 2k –350 / 110x110x110 | 2k –350 / 110x110x79 | 2k –350 / 110x110x58 | 2k –350 / 150x150x32 |
|---|---|---|---|---|---|
| Mixing Ratio * | 1:1 | 2:1 | 3:1 | 4:1 | 10:1 |
| Transfer Ratio * | 70:1 | 65:1 | 70:1 | 75:1 | 60:1 |
| Output per Cycle | 300 cc | 340 cc | 300 cc | 280 cc | 332 cc |
| Air Motor Piston | 350 mm | 350 mm | 350 mm | 350 mm | 350 mm |
| Stroke Length | 120 mm | 120 mm | 120 mm | 120 mm | 120 mm |
| Recommended Spray Vol/Min | 7.5 ltr. | 8.5 ltr. | 7.5 ltr. | 7 ltr. | 8 ltr. |
| Air Inlet Pressure Max. | 6 bar | 6 bar | 6 bar | 6 bar | 6 bar |
| Output Pressure Max. | 420 bar | 390 bar | 420 bar | 450 bar | 360 bar |
| Air Consumption N ltr./min Max. | 6800 | 6800 | 6800 | 6800 | 6800 |

*Other ratios on request

# TROUBLE SHOOTING

| MALFUNCTION | Pump does not start/stops during operation | Pump does not suck or only insufficien tly | Spray pressure too low | Pump operates irregularly | Pump operates although spray gun is closed | Pump trans ports mater ial into the rinsin g agent | Regulator frozen |
|---|---|---|---|---|---|---|---|
| **AIMOTOR** | Press sensing valve provided on control block Clean regulator, replace defective parts if necessary | | | Clean regulator, replace defective parts if necessary | | | Compressed air too moist, stroke frequency too high,ambient temperature too low. |
| **HYDRAULIC PART** | | Not sufficiently ventilated, loose suction connection | | Not sufficiently ventilated, loose suction connection | Not sufficiently ventilated, loose suction connection | | |
| **SUCTION AND TRANSFER VALVE** | | Worn or blocked, replace defective parts | | Worn or blocked, replace defective parts | Replace worn or defective parts | | |
| **PACKINGS** | | Leaking piston and packing | | Leaking piston and packing | | Leaki ng packi ng | |
| **FILTER** | Filter mesh blocked, check where and clean out | Filter mesh blocked, check where and clean out | Filter mesh blocked, check where and clean out | | Drain valve open. | | |
| **COMPRESSED AIR LINE** | Volume flow too low, air pressure too low. | | Volume flow too low, air pressure too low. | | | | |
| **PRESSURE REGULATOR VALVE (AIR)** | Air pressure too low | | Air pressure too low | | | | |
| **SUCTION SET** | | Filter mesh blocked | | Filter mesh blocked | Filter mesh blocked | | |
| **MATERIAL HOSE** | Blocked, check where and clean out | Blocked, check where and clean out | Blocked, check where and clean out | | | | |
| **ATOMIZER** | Orifice of spray cap blocked | | Orifice spray too large | | | | |
| **MATERIAL BEING USED** | Viscosity too high | | | | | | |

# INDEX

# WARRANTY

VR Coatings warrants all equipments manufactured by us, as long as it is bearing original identification plate, to be free from defects in material and workmanship for a period of one year from ex-works date. VR Coatings will repair or replace any part of the equipment proven defective. The warranty applies only when the equipment is installed, operated and maintained in accordance with VR Coatings written recommendations.

Warranty claims found to be defective shall be verified and confirmed by VR Coatings.

Our warranty does not cover and VR Coatings shall not be liable for any malfunction, damages, or fair wear and tear caused by faulty installation, misuse, abrasion, corrosion, inadequate or improper maintenance, negligence, tempering, accident or incorporation of non VR Coatings parts, non observance of VR Coatings recommendations.

This warranty only consists of replacing the parts returned to our plant prepaid transportation and proven defective by us. If inspection of the equipment /part does not discloses any defect in material or workmanship, repairs will be made at a reasonable charge, which charges may includes the cost of parts, labor and transportation. VR Coatings shall not be liable for any losses resulting from a production breakdown.

Material bought in equipment, which is sold but not manufactured by VR Coatings, will be subject to the manufacturer's warranty. VR Coatings will provide purchaser with reasonable assistance in making any claim for breach of these warranties.

| Date of sales |
|---|

# NOTES

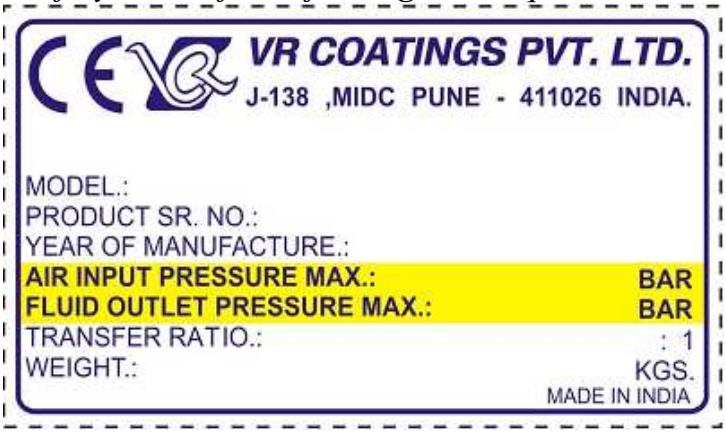
# SAFETY LABELS AND NAMEPLATE


Label on pump label no.W.01


Label on pump provided with coupling guard Label no.W.02


Label on pump provided without coupling guard Label no.W.03

*Safety labels free of charge on request*




Name Plate

# WARNING AND SAFETY INSTRUCTIONS

EQUIPMENT IS FOR PROFESSIONAL USE ONLY

**⚠ WARNING**

HIGH PRESSURE DEVICE FOR PROFESSIONAL USE ONLY
Read and understand instruction manual before use and maintenance. Observe on warnings.

Do not use spray materials containing reactive solvents with equipment containing aluminum, galvanized or zinc coated wetted parts. e.g. Dichloromethane and ethylene chloride can chemically react with aluminum and galvanized or zinc coated parts and cause explosion hazard.

**⚠ WARNING**

**Do not process flammable, explosive, toxic or otherwise hazardous materials without first performing an appropriate hazard analysis.**

VR Coatings cannot be an expert in the chemical and biological properties of the infinite number of materials that could be processed in this machine. As sold by VR Coatings, this machine is not designed to safely process hazardous materials unless additional precautions are not taken.
Before processing any material that are(or can react to become) flammable, explosive, toxic or otherwise hazardous, the user must perform a thorough hazard analysis and risk assessment of the entire process and determine the best way to deal with the hazard(s) identified, including contingency plans for dealing with processing errors and object conditions.

**It is compulsory to**
**-Know the product and possible hazards.**
**-Store the product to be used in the appropriate areas.**
**-Keep the product used during dispensing in a suitable container.**
**-Dispose the product according to the regulation of hazardous products in force in the country where the product is used.**
**-Were protective equipment designed for that use.**
**-Were glasses, gloves, shoes clothes and mask for breath.**

## ⚠ WARNING

SKIN INJECTION HAZARD. Protect hands and body from high pressure fluids. Relieve pressure before disconnecting hydraulic or other lines and tighten all connections before applying pressure. In case of accidental skin injection, seek immediate" Surgical Treatment". Failure to follow this warning can result in amputation or serious injury.

**An airless spray gun requires that fluid be introduced to it at very high pressure. Fluids under high pressure, from spray or leaks, can penetrate the skin and inject substantial quantities of toxic fluid into the body. If not promptly and properly treated, the injury can cause tissue death or gangrene and may result in serious, permanent disability or amputation of the wounded part. Therefore extreme caution must be exercised when using any airless spray equipment.**

**IF YOU ARE INJECTED, SEE A PHYSICIAN IMMIDIATELY. DO NOT TREAT AS A SIMPLE CUT!**
**<u>NOTE TO PHYSICIAN</u>:**
Injection into the skin is a serious, traumatic injury. It is important to treat the injury surgically as soon as possible. Do not delay treatment to research toxicity. Toxicity is concerned with some exotic coatings injected directly in to the bloodstream. Consultation with a plastic surgeon or a reconstructive hand surgeon may be advised

- NEVER attempt to force the flow of fluid backward through the gun with your finger, hand or hand-held object against the gun nozzle.

- Before flushing system, always remove spray tip and adjust fluid pressure to lowest possible setting.

WARNING: The paint hose can develop leaks from wear, kinking, abuse etc. A leak is capable of injecting fluid into the skin; therefore the paint hose should be inspected before use. NEVER attempt to plug a hose with any part of your body, adhesive tape or any other makeshift device. Do not attempt to repair a spray hose. Instead, replace it with a new grounded hose. You must see to it that the following points are followed for hoses, accessories or any other hardware:

- Comply with manufacturer's recommendations.

- Withstand the pressure ranges with correct safety factor.

- Must not show any leaks, kinks, sign of wear and should be factory fitted and pressure tested.

An air pressure safety valve forms an integral part of the air motor or air regulator and must not be altered or tampered with.

## ⚠ WARNING

**COMPONENT RUPTURE** The system is capable of producing high pressure all components in the system must have a maximum working pressure capacity, not less than the pressure rating of the pump.
**SERVICING** Before servicing, cleaning or removing any part, always shut off power source, carefully release pressure in fluid portions of the system and set safety locks on guns and equipment

**PRESSURE RELEASE PROCEDURE**
A **Set trigger safely in a locked position.**
B **Shut off pump (**Close **main air supply valve and back-off air regulator).**
C **Release fluid pressure from entire system (Open drain valve) and trigger gun.**
D **Reset trigger safely in a locked position.**

## ⚠ WARNING

High velocity flow of material through equipment may create static electricity. All equipment being sprayed must be properly grounded to prevent sparking, which may cause fire or explosion.

Due to static electricity potential generated by the high velocity of fluid through the pump, hose and tip, sparking may occur and the system may be hazardous. This can result in an explosion and/or fire, if every part of the spray equipment is not properly grounded. Be sure that both the object being sprayed and the airless equipment are grounded. This can be done by attaching a static wire to water piping or building structural members known to be earthen. If the hose does not contain a static electricity conductor, a static wire must be attached from the spray gun to the earth.

## ⚠ CAUTION

Before any adjustment, inspection, maintenance, cleaning, removing work always shut off the power source, carefully release pressure in fluid of the system and set safety locks on guns.

ALWAYS follow the coating or solvent manufacturer's safety precautions and warnings. Never spray flammable material near open flames, pilot lights or any other source of ignition.

If you experience any static sparking or slight shock while using the equipment, stop spraying immediately. Check the entire system for proper grounding. Do not use the system again until the problem has been corrected.
Follow material supplier's instructions carefully and ensure adequate ventilation of working area to prevent health hazards.

## ⚠ CAUTION

### FLUSHING/CLEANING

Always flush the unit into a separate metal container with the spray tip removed and the gun held firmly against the side of container to assure proper grounding and prevent static discharge, which could cause serious bodily injury.

## ⚠ CAUTION

**FINGURE OR HANDS PINCH HAZARD. KEEP HANDS CLEAR OF MOVING PARTS COUPLING AND PISTONS**

Before servicing/removing any part always shut off power source and release pressure in fluid portions of the system.

## ⚠ CAUTION

DO NOT START PUMP IF GUARD IS NOT AT "UP"POSITION.
TO SET "UP"POSITION-hold by hands push upward till it locks in ball catch.
TO SET "DOWN"POSITION-Push downward**.**
**FINGURE OR HANDS PINCH HAZARD. KEEP HANDS CLEAR.** Before servicing/removing any part always shut off power source and release pressure in fluid portions of the system.

## ⚠ CAUTION

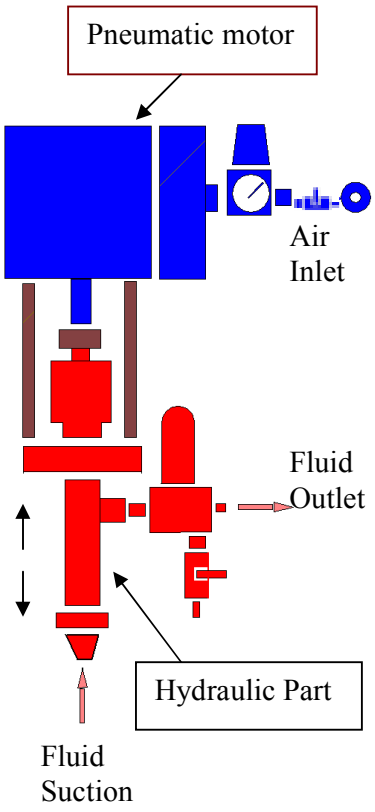
Ensure that temperature of hot fluid used in the equipment shall not exceed 80% of the self-ignition temperature of the gases/solvent vapour in explosive atmosphere, in which equipment is used.

## ⚠ CAUTION

Check the compatibility of the solvent used in the equipment with the materials of wetted parts.

# OPERATING INSTRUCTIONS

## GENERAL DESCRIPTION:




**Pneumatic piston Pumps** are made for spraying, Dispensing, and transferring of various types of liquid/semi solid. Theses pumps are mainly used for airless/air assisted spraying of coating materials and dispensing /transferring of paints, oil, ink, sealants adhesives, wax, grease, solvents etc. and incorporate the following essential parts:
Airless Pump : Pneumatic motor with Control Unit, Hydraulic parts, Suction device, mounting plate ,etc.
Accessories: HP (High Pressure) hose, HP Filter, Trolley, Spray gun, Spray nozzle, etc.
Optional : Circulating unit, special accessories depending on applications.

The various pump versions are identified as follows:
e.g.: TIGER 30.150
Double stroke Volume in CC (150)
The above is intended to obtain the following data: s

Material Pressure : Pressure Input x Transmission Ratio

Displaced Volume : Double Stroke Volume x No. Of double stroke/ min. E.g. 50 double strokes/min.)

The pump works double acting and self-priming and serves to transfer the spray material to the spray gun by making it pass through a filter and a high pressure hose. Its differential piston, which is located in the hydraulic portion of the pump, moves upwards and downwards in the working cylinder (1 cycle = 1 double stroke = 1 upward and 1 downward stroke). The displacement piston features a layer of hard chrome of about 200 microns to protect against wear. The suction and delivery ball valve feature tungsten carbide seat.

The pump is equipped with an oil cup containing a solvent, which is intended to lubricate the piston and to prevent paint residues from incrustation. The packing need to be readjusted manually by tightening the upper packing take up nut which is designed as oil cup.

The actual spray performance depends on both spray nozzle size and selected spray pressure; increased material flow results in both spray nozzle size and air consumption.

Make sure that pump does not work too fast and / or too long when idling in order to prevent damage to sealing and valves.

All airless spraying units are equipped with capacity sieving filters. There are different mesh sizes to match according to the airless nozzle. Please see **Nozzle Chart** for appropriate type of nozzle.
In case of high delivery transfer pumps separate filters cartridge type or bag type can be used. Filter size depends upon the fluid, which is handled, and application requirements.

**TWO COMPONENT HOT AIRLESS SPRAY EQUIPMENT-**

Two Component Spray Equipment are used where curing time is very fast ranging from few seconds to several minutes and spraying through standard airless pump is not possible.

For high performance protective coatings which are solvent free and fast curing two components Epoxy or PU coating tar modified or tar free, two component hot airless spraying equipment is a must.

**TWO COMPONENT HOT AIRLESS EQUIPMENT CONSIST OF-**

1. Plural component high pressure pump
2. Mixing block
3. Mixers-Static/Dynamic
4. Flush pump
5. Heating system
6. Feed pump and supply system
7. Monitoring and control system
8. Spray guns

## 1. PLURAL COMPONENT HIGH PRESSURE PUMP

This is the core part of two component system. It is like standard airless spray equipment except two or three hydraulic cylinders driven by single common air motor.

## 2. MIXING BLOCK / MANIFOLD

Both the components that are individually metered and delivered by two component pump are mixed in this mixing block incorporated with numbers of non return valves. Return line from the mixing block goes back to the tank in case of circulated system.

## 3. MIXERS

When fluids are pumped through mixer they are progressively divided and recombined to get mixed. Diameter and length of the mixer depends upon material specifications.

## 4. FLUSH PUMP

This is the standard airless high pressure pump with pressure ratio ranging from 40:1 to 60:1 and output per cycle from 70 to 110cc used in two component system to rinse the whole system. Selection of flush pump depends on material to be flushed and hose lengths.

## 5. HEATED SYSTEM

This may consist of inline fluid heaters, heated supply containers, heated hoses. VR Coatings offers high pressure Inline fluid heaters to heat each individual component to the required temperature. Oil heated jacketed containers up to 200 ltr. capacity is also offered by VR Coatings to preheat the component individually as per material specification. It has power up to 12KW and temperature range up to 100°C. This is controlled and monitored by PID based control panel.

For long hose lengths materials which have to be sprayed at high temperature, the spray hoses must be heated/ insulated. VR Coatings offers hot water system to heated/ insulated. VR Coatings offers hot water system to

heat the hose and also provide electrical heated hose. In some cases insulated hose can be used instead of heated hose again depending on application, material specification and ambient temperature.

## 6. FEED PUMP AND SUPPLY SYSTEM

Feeding pump are used to feed the component from supply tank to two component pump. VR Coatings offers various feed pumps from its standard transfer pump range depending on the material specifications.

Separate feed pumps can be used to transfer material from Suppliers drum to supply containers of Two Component System. Drumpress with Hoisting unit can be used for transferring high viscous materials.

Agitators may also be used depending upon the application and type of the material. VR Coatings offers electrical driven high torque agitator for viscous material. Pneumatic agitators are also available where torque requirement is less.

## 7. MONITORING AND CONTROL SYSTEM

The monitoring system is required for safeguarding against incorrect mixing ratio for Two Component System. When pressure exceeds or drops surpassing the tolerance setting that are set by operator, while spraying the system automatically shut downs. When there is malfunctioning in the system and is manifested by surpassing set limits the system automatically switches off. These malfunctions may be because of internal/ external leakages, material deficiency, damaged seal etc. Automatic ‘switching off’ of the system prevents incorrect mixing ratio and reworks.

## 8. SPRAY GUNS

Trigger operated and insulated handle spray guns are used to apply coatings manually. For automatic spraying pneumatically operated automatic guns are used.

## OTHER ACCESSORIES

A flexible HP hose serves as connection between pump and spray gun. Its inside wall consists of either Nylon or Teflon; it also contains an electrical conductor in order to permit electrostatic charges to discharge through the grounded pump.

**⚠ WARNING**

**COMPONENT RUPTURE** The system is capable of producing high pressure; all components in the system must have a maximum working pressure capacity not less than the pressure rating of the pump.

A large number of different nozzles are available. See **Nozzle Chart**.

## MOUNTING OF ANY AIRLESS PUMP

Any pumping unit should be installed in a way to make it easily accessible for cleaning and maintenance purposes.

In the case of wall mounting, assure that pump is vertically installed and fastened by using the holes on the mounting plate.

All pumps are equipped with a grounding point. It is compulsory that the ground lead be connected to this point.

**⚠ WARNING**

High velocity flow of material through equipment may create static electricity. All equipment being sprayed must be properly grounded to prevent sparking, which may cause a fire or explosion.

Make sure that sufficient compressed air is available when connecting the pump to the air supply net.

Insure inside diameter of connection tube between compressed air delivery point and airless unit is sufficient for required capacity.

## COMMISSIONING AND OPERATING

### 1. General Information

Present pump is suitable for any kind of coatings/ material such as primers, basic coats, lacquers, dispersion paints, caustics, bituminous mastics etc.,

Depending on their physical and chemical characteristics, other types of spray media can be used e.g. cements, fillers, deadening agents and so forth.

Two component paints, PU material, PES material, acid hardening material or other media containing filler such as asbestos, ground cork and silicates require special attention prior to use.

We do not recommend the application of coarse bodied or aggressive fluids using the airless method. These would include sand filled wall coatings, coatings with coarse fibrous, various types of adhesives.

## ⚠ WARNING

**Do not process** flammable, explosive, toxic or otherwise **hazardous materials without first performing an appropriate hazard analysis.**
**It is compulsory to**
**-know the product and possible hazards.**
**-store the product to be used in the appropriate areas.**
**-keep the product used during dispensing in a suitable container.**
**-Dispose the product according to the regulation of hazardous products in force in the country where the product is used.**
**-Wear protective equipment designed for that use.**
**-wear glasses, gloves, shoes clothes and mask for breath.**

2. In case of doubt, please contact for correct equipment recommendations.

**Setting up**

- Hold oil cup/coupling guard by hand and push downwards in versions provided with this type of guard.
- Check for top lubricant to maximum level in pump lubrication chamber or oil-cup or packing take-up nut.
- Lift oil cup guard in upward direction till it locks in ball catch.

## ⚠ CAUTION

FINGURE OR HANDS PINCH HAZARD. KEEP HANDS CLEAR. Before servicing/removing any part always shut off power source and release pressure in fluid portions of the system.
Ensure coupling guard is always at UP position while pump is working.

- Check high-pressure filter screen element. Mesh opening should be smaller than bore tip size used.
- The Table below should be used as a guideline only. We suggest that you do not use any filter element when spraying materials containing fibrous.

| Mesh size an element marking (opening) | Tip size | Coating material to be sprayed |
|---|---|---|
| M 200<br>(0.084 mm/ 0.0033'') | < 0.3 mm<br>0.011" | Clear lacquers, varnishes, and hammer tone. |
| M 150<br>(0.099mm/0.0039") | >0.3 mm<br>0.011'' | Primer, filler, red oxide. |
| M 100<br>(0.145mm/0.0057) | >0.3 mm<br>0.011'' | Primer, filler, red oxide. |
| M 70<br>(0.250 mm/0.0098") | >0.5 mm<br>0.016'' | Iron mica, red oxide. |
| M 50<br>(0.320 mm/0.0125") | >0.6 mm<br>0.023'' | Latex paint, bodied coatings. |

- Connect high-pressure fluid hose and gun and connect air supply to air regulator.

**⚠ CAUTION**

**Have Trigger Lock engaged at all times when not spraying/in use.**

**Grounding**

Connect the other end of the grounding wire provided on machine to the earth ground. Always use electrically conductive hoses.

**Flushing of Complete Two Component System**

The unit has been factory tested using an oil emulsion. To avoid contamination of the coating material to be sprayed, be sure the emulsion is flushed from the system before spray operation begins by using a compatible solvent.

**Do as follows:**

- Close main air supply valve and back-off air regulator.
- Close drain valve located at high-pressure filter manifold.
- Insert suction hose and tube or fluid end into compatible solvent.

- Place drain hoses from drain valves into container, open both drain Valves, if system having return lines open return line valves instead of drain valves and put line ends in container
  **Note:** If system is already loaded with both components then take two separate containers to collect drain.
- Open main air supply valve and slowly open-air regulators to max. 2 bar (30 psi) of feed pumps. Open air regulator of main plural component pump to max 2 bar.
  **Note:** Pump cycles slowly and circulates fluid via drain hose or return line back into the container.
- Close Drain valves/ return line valve. Point gun into container ensuring contact between gun and metal container then trigger the gun.
  **Note:** The pump will cycle slowly and circulate fluid via gun back into the container.
- Close gun and increase air regulator setting of two component pump to maximum pressure allowed. Check all connections for leaks.
  Note: Maximum fluid pressure will vary according to the model of pump selected.
- Close main air supply valve and back-off air regulator.
- Open drain valves/ return line valve relieve system pressure completely. Finally trigger the gun again shortly to ensure that there is no pressure retained in the fluid hose.

**⚠ CAUTION**

CAUTION : drain valves, return valves, supply valves shall be always closed or opened simultaneously of both components: otherwise system will unbalance and raise high pressure In one line.

- Remove suction hose and tube or fluid end from solvent container, wipe clean. Point gun into the container, ensuring good contact with the container Trigger the gun. Slowly open air regulators to max. 2 bar (30 psi) of feed pumps. Open air regulators to main plural component pump to max 2 bar. Remove complete solvent via gun and return lines+

**⚠ CAUTION**

## FLUSHING/CLEANING

Always flush the unit into a separate metal container with the spray tip removed and the gun held firmly against the side of container to assure proper grounding and prevent static discharge which could cause serious bodily injury.

## MATERIAL LOADING AND OPERATING

- Take individual components to be mixed and sprayed in respective feed containers, manually or separate transfer pump or (if material is highly viscous) may be by drumpress unit.
- Close drain valves on filters at outlet manifold.
- Open the return valves. Increase feed pumps air pressure gradually till material flows properly. Collect return material in separate containers instead of main feed tank till its solvent free.
- Start flushing pump loaded with compatible solvent and keeps pressurized for immediate flushing of mixed material whenever required.
- Before opening supply valves, open flush valve and flush for few seconds. Close flushing valve. Close return line valves and open supply line valves and Trigger the spray gun. Take mixed material in a separate container and increase till you get proper mixing and atomization. Insure the pressures on the pressure gauges are stable before applying on substrate.

**NOTE:**

- There is pressure difference in upward and downward stroke due to use of feed pumps. As well as difference in both component pressures because of typical and efficient mixing block design.
- Set upper and lower pressure limits on the gauges or pressure controllers provided for monitoring.
- Upper pressure limit shall be about 20 bar more than the stall pressure and lower limit shall be below about 20 bar than lowest working/spraying pressure. These parameters can be varied depending upon material specifications and application.

**Note**: Do not stop while spraying when pot life is very short. If you stop, immediately close supply lines open return lines and flush the mixed material.

Note: Do not stop while spraying when pot life is very short. If you stop, immediately close supply lines open return lines and flush the mixed material.

- Start monitoring system by switching on the monitoring switch on the control panel.
- Automatic switching off closes supply valves, open return lines and flush valve and indication lamp will glow. Operator has to immediately flush the mixed material. Switch off monitoring. Identify and rectify the problem and start the system again as mentioned above.

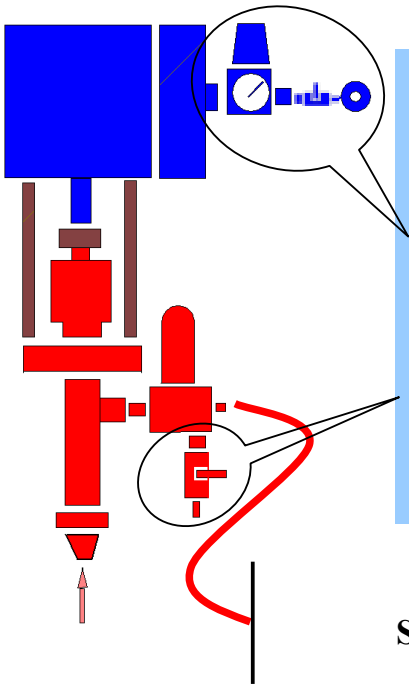
**OPERATING REMOTE PNEUMATIC CONTROLLS**

- Refer circuit diagram of pneumatic control panel.
- To switch on supply valves and to switch off return line valves or vice versa. Operated hand lever of 3/2 way DC valve as shown in figure on pneumatic panel.
- To switch on flushing operate hand lever of 3/2 way DC valve as shown in figure. Flushing valve will only operate when supply line valves are closed and return line valves are open.

**Note**: Immediately flush the mixed material when you STOP spraying

# TROUBLE SHOOTING CHART RELATED TO MIXING

| PROBLEM | CAUSE | SOLUTION |
|---|---|---|
| Mixing ratio incorrect | Return line valve leaking | Check and clean valve seats, if worn out replace. |
| | | Insure sufficient air pressure to valves. |
| | | Check pneumatic circuit. |
| | External leakages through joints | Tighten the joints. Replace worn out sealing's |
| | Hydraulic part valve seat leakages | Remove and clean valve seats |
| | Feeding container empty | Refill the container |
| | | |
| Solvent is mixing in sprayed material | Flushing valve leaking | Check and clean valve seats. Replace if there are worn out parts. Check & clean non return valves in mixing block. |
| Spray pressure is low at high air inlet pressure | Choking in fluid line filters | Check filters. Clean the filter and replace element if necessary. |
| | Choking in hoses | Replace choked hoses. |
| | Choking in static mixer | Clean or replace |
| | Required material temperature not achieved | Circulate the heated material till required temperature reaches |
| | | Check whether any heating element is failed. Correct it or replace. |
| | | |
| Mixed material is not flushing out | Hardened material in the mixing block or in the static mixer or in the hose and gun | Clean the mixing block with compatible solvent, Service it as necessary. Clean static mixer, gun and hose. Replace hose if cleaning not possible. |
| | Solvent pump pressure is low | Increase pump air pressure |
| | Flushing valve not opening fully | Insure sufficient air pressure to valve |
| | Solvent container empty | Refill the solvent supply |
| | The solvent in compatible with the material | Change to a compatible solvent |



## PRESSURE RELEASE PROCEDURE

A **Set trigger safely in a locked position.**

B **Shut off pump( Close main air supply valve and back-off air regulator ).**

C **Release fluid pressure from entire system**
**Open drain valve and**
**trigger gun.**
D **Reset trigger safely in a locked position.**

## Spray Pattern Control

**⚠ CAUTION**

Have Gun **Trigger Lock** engaged at all times when not actually spraying.

When installing **spray tip** be sure that **Gasket** is correctly used between gun tip and spray tip. With Gun in the "**Open"** (triggered) position, increase the air regulator setting until the correct spray pattern is achieved.

**Note:** Use the lowest air pressure possible that will give proper fluid atomization and spray pattern. Excessive or higher pressures show no improved result, but will cause reduced system component life, and will waste material.

## POST-OPERATIONAL HANDLING:

Actuate gun in order to evacuate pressure from pump. Remove nozzle and clean it.
Lacquer may remain in the pump unto 48 hours. This should however be avoided when using two component materials or any other material liable to self-cure quickly.
Incase of protracted downtimes, evacuate pump, refill with solvent and leave as such. Clean HP filter if necessary.

- **SHUT DOWN PROCEDURE**

  Flush the mixed material, shut-off flush valve. Actuate gun in order to evacuate pressure from pump. Follow procedure as listed under "Flushing", however use regular Recommended lubricating oil without additives instead of solvent, if the pump is to be put into storage.
  Back-off (relief) air regulator completely.
  Close main airs supply valve.

**MAINTENANCE:**

- Daily - if compressed air is wet - drain oil and water separator with pressure on and blow out water at least twice daily.
- Check fog oiler for correct adjustment (droplet metering) and oil s level. Refill if required.
  **Note:** Severe operating conditions may cause frosting of Air motor. To prevent, fill fog oiler with mixture of 50:50 regular recommended lubricating oil and Glycol.
  Check or top-up level of lubricant in pump packing take-up nut & tighten oil cup if required.
  **Note:** Change lubricant every 50 hours of operation, earlier in oil cup pumps. Discoloration of lubricant indicates packing wear or failure. This will affect pump performance. If necessary, renew upper packing set.
- Clean and inspect filter elements in filter screen housing and high-pressure filter at least daily, based on quality of product to be sprayed.
- Do not kink or bend high-pressure fluid hose to less than four-inch radius.
- Loosen threaded connections or hose couplings of the unit or system only when essential. This will help prevent hardened materials getting into the system, which could malfunction.

- Displacement piston in lowest (DOWN) position at all times to prevent material from hardening on the fluid piston or rod.

# Technical Specifications

| Name | Type | Ratio | Output/cycle(cc) | Air motor piston ϕ mm | Stroke length mm | Approximate Weight (kg) | Recommended spray volume/ minute (lt.) | Air inlet pressure Max. (bar) | Output Pressure Max. (bar) | Air consumption N lt./ min. Max. |
|---|---|---|---|---|---|---|---|---|---|---|
| **TIGER** | 30.70 | 30:1 | 70 | 110 | 120 | 19 | 3.5 | 8 | 240 | 900 |
| | 40.110 | 40:1 | 110 | 160 | 120 | 24 | 5.5 | 8 | 320 | 1900 |
| | 12.150 | 12:1 | 150 | 110 | 120 | 22 | 7.5 | 6 | 72 | 900 |
| | 28.20 | 28:1 | 20 | 80 | 70 | 15 | 2 | 6 | 168 | 450 |
| | 30.150 | 30:1 | 150 | 160 | 120 | 23 | 6 | 8 | 240 | 1900 |
| | 28.40 | 28:1 | 40 | 80/110 | 120/70 | 17 | 2 | 6 | 168 | 450 |
| | 60.70 | 60:1 | 70 | 160 | 120 | 21 | 3.5 | 6 | 360 | 1400 |
| | 16.70 | 16:1 | 70 | 80 | 120 | 17 | 3.5 | 8 | 128 | 450 |
| | 12.150 | 12:1 | 150 | 110 | 120 | 24 | 7.5 | 6 | 720 | 900 |
| | 14.20 | 14.1 | 20 | 60 | 70 | 13 | 1.2 | 6 | 84 | 250 |
| | 14.40 | 14.1 | 40 | 60 | 120 | 15 | 1.2 | 6 | 84 | 250 |
| **RHINO** | 45.210 | 45:1 | 210 | 230 | 120 | 62 | 5.5 | 6 | 270 | 3000 |
| | 60.150 | 60:1 | 150 | 230 | 120 | 60 | 6 | 6 | 360 | 3000 |
| | 30.275 | 30:1 | 275 | 230 | 120 | 62 | 10 | 6 | 280 | 3000 |
| | 45.275 | 45:1 | 275 | 270 | 120 | 70 | 7.5 | 6 | 270 | 4000 |
| | 60.210 | 60:1 | 210 | 210 | 120 | 70 | 5.5 | 6 | 360 | 3000 |
| | 55.275 | 55:1 | 275 | 300 | 120 | 67 | 7.5 | 6 | 330 | 5000 |
| | 75.210 | 75:1 | 210 | 300 | 120 | 67 | 5.5 | 6 | 450 | 5000 |
| | 75.275 | 75:1 | 275 | 350 | 120 | 67 | 7.5 | 6 | 450 | 5000 |
| **HIPPO** | 4.90 | 4:1 | 90 | 60 | 70 | 8 | 1.8 | 6 | 24 | 100 |
| | 2.900 | 2:1 | 900 | 110 | 120 | 28 | 30 | 6 | 12 | 480 |
| | 5.900 | 5:1 | 900 | 160 | 120 | 30 | 30 | 6 | 30 | 4000 |
| | 3.400 | 3:1 | 400 | 080 | 120 | 22 | 15 | 6 | 18 | 300 |
| **ELEPHANT** | 4.2000 | 4:1 | 2000 | 230 | 120 | 78 | 40 | 6 | 24 | 1200 |
| | 4.3400 | 4:1 | 3400 | 230 | 200 | | 70 | 6 | 24 | 2000 |
| | 2.4000 | 2:1 | 4000 | 230 | 120 | 105 | 80 | 6 | 12 | 1200 |
| | 2.6500 | 2:1 | 6500 | 230 | 200 | 110 | 130 | 6 | 12 | 2000 |

**CHEETAH**

| Type | 2k-350/ 79x79x150 | 2k-350/ 110x110x110 | 2k-350 / 110x110x79 | 2k-350/ 110x110x58 | 2k-350/ 150x150x32 |
|---|---|---|---|---|---|
| Mixing Ratio* | 1:1 | 2:1 | 3:1 | 4:1 | 10:1 |
| Transfer Ratio* | 70:1 | 65:1 | 70:1 | 75:1 | 60:1 |
| Output per cycle | 300 cc | 340 cc | 300 cc | 280 cc | 332 cc |
| Air Motor Piston | 350 mm | 350 mm | 350 mm | 350 mm | 350 mm |
| Stroke Length | 120 mm | 120 mm | 120 mm | 120 mm | 120 mm |
| Recommended spray Vol/min | 7.5ltr. | 8.5ltr. | 7.5 ltr. | 7 ltr. | 8 ltr. |
| Air Inlet Pressure Max. | 6 bar | 6 bar | 6 bar | 6 bar | 6 bar |
| Output Pressure Max. | 420 bar | 390 bar | 420 bar | 450 bar | 360 bar |
| Air consumption N ltr./min Max. | 6800 | 6800 | 6800 | 6800 | 6800 |

# TROUBLE SHOOTING

| MALFUNCTION | Pump does not start/stops during operation | Pump does not suck or only insufficien tly | Spray pressure too low | Pump operates irregularly | Pump operates although spray gun is closed | Pump trans ports mater ial into the rinsin g agent | Regulator frozen |
|---|---|---|---|---|---|---|---|
| **AIMOTOR** | Clean regulator, replace defective parts if necessary | | | Clean regulator, replace defective parts if necessary | | | Compressed air too moist, stroke frequency too high, ambient temperature too low. |
| **HYDRAULIC PART** | | Not sufficiently ventilated, loose suction connection | | Not sufficiently ventilated, loose suction connection | Not sufficiently ventilated, loose suction connection | | |
| **SUCTION AND TRANSFER VALVE** | | Worn or blocked, replace defective parts | | Worn or blocked, replace defective parts | Replace worn or defective parts | | |
| **PACKINGS** | | Leaking piston and packing | | Leaking piston and packing | | Leaki ng packi ng | |
| **FILTER** | Filter mesh blocked, check where and clean out | Filter mesh blocked, check where and clean out | Filter mesh blocked, check where and clean out | | Drain valve open. | | |
| **COMPRESSED AIR LINE** | Volume flow too low, air pressure too low. | | Volume flow too low, air pressure too low. | | | | |
| **PRESSURE REGULATOR VALVE (AIR)** | Air pressure too low | | Air pressure too low | | | | |
| **SUCTION SET** | | Filter mesh blocked | | Filter mesh blocked | Filter mesh blocked | | |
| **MATERIAL HOSE** | Blocked, check where and clean out | Blocked, check where and clean out | Blocked, check where and clean out | | | | |
| **ATOMIZER** | Orifice of spray cap blocked | | Orifice spray too large | | | | |
| **MATERIAL BEING USED** | Viscosity too high | | | | | | |

# WARRANTY

VR Coatings warrants all equipments manufactured by us, as long as it is bearing original identification plate, to be free from defects in material and workmanship for a period of one year from ex-works date. VR Coatings will repair or replace any part of the equipment proven defective. The warranty applies only when the equipment is installed, operated and maintained in accordance with VR Coatings written recommendations.

Warranty claims found to be defective shall be verified and confirmed by VR Coatings.

Our warranty does not cover and VR Coatings shall not be liable for any malfunction, damages, or fair wear and tear caused by faulty installation, misuse, abrasion, corrosion, inadequate or improper maintenance, negligence, tempering, accident or incorporation of non VR Coatings parts, non observance of VR Coatings recommendations.

This warranty only consists of replacing the parts returned to our plant prepaid transportation and proven defective by us. If inspection of the equipment /part does not discloses any defect in material or workmanship, repairs will be made at a reasonable charge, which charges may includes the cost of parts, labor and transportation. VR Coatings shall not be liable for any losses resulting from a production breakdown.

Material bought in equipment, which is sold but not manufactured by VR Coatings, will be subject to the manufacturer's warranty. VR Coatings will provide purchaser with reasonable assistance in making any claim for breach of these warranties.

# NOTES

# INDEX

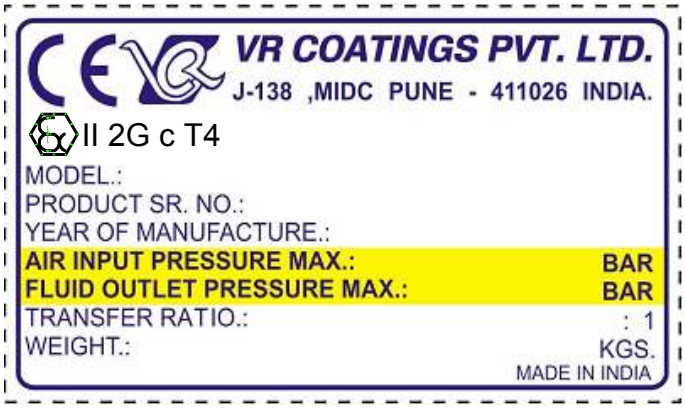
# SAFETY LABELS AND NAMEPLATE


Label on pump label no.W.01


Label on pump provided without coupling guard Label no.W.02


Label on pump provided with coupling guard Label no.W.03

*Safety labels free of charge on request*



OP292-V04

# selec

**TC513A / TC513AX / TC221A / TC203AX / TC303A / TC303AX**

**Operating Instructions**


## SPECIFICATIONS

**Display**
3 digit, 7 segment digital display
**LED Indications**
R: Control output ON
**Keys**
3 keys for digital setting

**INPUT SPECIFICATIONS**
**Input Signal**
Thermocouple (J,K,T,R,S) / RTD (Pt100)
**Sampling time**
250 ms
**Input Filter (FTC)**
0.2 to 10.0 sec
**Resolution**
Fixed 1° resolution
**Temperature Unit**
°C / °F selectable
**Indication Accuracy**
For TC inputs: 0.25% of FS ±1°
For R & S inputs: 0.5% of F.S ± 2°
(20 min of warm up time for TC input)
For RTD inputs: 0.1% of FS ±1°

**FUNCTIONAL SPECIFICATIONS**
**Control Method**
1) PID control with auto tuning
2) ON-OFF control
**Proportional Band (P)**
1 to 400°
**Integral Time (I)**
0.0 to 99.9 min
**Derivative Time (D)**
0 to 999 sec
**Cycle Time**
0.1 to 99.9 sec
**Hysteresis Width**
0.1 to 99.9°
**Manual Reset Value**
-19.9 to 19.9°

**CONTROL OUTPUT** (Relay or SSR user selectable)*
**Relay contact (SPST)** (For TC513A,TC221A,TC303A)
10 A @ 250V AC / 30V DC, resistive
**Relay contact (SPDT)** (For TC513AX, TC203AX, TC303AX)
10 A @ 250V AC / 30V DC, resistive
**SSR Drive Output (Voltage Pulse)**
12V DC, 50 mA

* Not applicable for TC513A,TC221A,TC303A

**POWER SUPPLY**
**Supply Voltage**
85 to 270V AC/DC (AC: 50 or 60 Hz )
OPTIONAL - 24V AC/DC
**Power Consumption**
5 VA max @230V AC
**Temperature**
Operating: 0 to 50°C ; Storage: -20 to 75°C
**Humidity (non-condensing)**
95% RH
**Weight**
TC513A/TC513AX : 129 gms
TC221A/TC203AX : 180 gms
TC303A/TC303AX : 240 gms

## SAFETY PRECAUTIONS

All safety related codifications, symbols and instructions that appear in this operating manual or on the equipment must be strictly followed to ensure the safety of the operating personnel as well as the instrument.

If the equipment is not handled in a manner specified by the manufacturer it might impair the protection provided by the equipment.

Read complete instructions prior to installation and operation of the unit.

**WARNING:** Risk of electric shock.

### WIRING GUIDELINES

**WARNING:**
1. To prevent the risk of electric shock power supply to the equipment must be kept OFF while doing the wiring arrangement. Do not touch the terminals while power is being supplied.
2. To eliminate electromagnetic interference use short wire with adequate ratings; twists of the same in equal size shall be made. For the input and output signal lines, be sure to use shielded wires and keep them away from each other.
3. Cable used for connection to power source, must have a cross section of 1mm$^2$ or greater. These wires shall have insulation capacity made of at least 1.5kV.
4. When extending the thermocouple lead wires, always use thermocouple compensation wires for wiring. For the RTD type, use a wiring material with a small lead resistance (5Ω max per line) and no resistance differentials among three wires.
5. A better anti-noise effect can be expected by using standard power supply cable for the instrument.

### MAINTENANCE

1 The equipment should be cleaned regularly to avoid blockage of ventilating parts.
2. Clean the equipment with a clean soft cloth . Do not use Isopropyl alcohol or any other cleaning agent.

### INSTALLATION GUIDELINES

1. This equipment, being built-in-type, normally becomes a part of main control panel and in such case the terminals do not remain accessible to the end user after installation and internal wiring.

2 Do not allow pieces of metal, wire clippings, or fine metallic fillings from installation to enter the product or else it may lead to a safety hazard that may in turn endanger life or cause electrical shock to the operator.

3. Circuit breaker or mains switch must be installed between power source and supply terminals to facilitate power 'ON' or 'OFF' function. However this switch or breaker must be installed in a convenient position normally accessible to the operator.
4. Use and store the temperature controller within the specified ambient temperature and humidity ranges as mentioned in this manual.

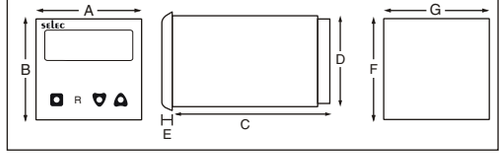
## CAUTION

1. When powering up for the first time, disconnect the output connections.
2. Fuse Protection: The unit is normally supplied without a power switch and fuses. Make wiring so that the fuse is placed between the mains power supply switch and the controller. (2 pole breaker fuse- rating: 275V AC,1A for electrical circuitry is highly recommended)
3. Since this is a built-in-type equipment (finds place in main control panel), its output terminals get connected to host equipment. Such equipment shall also comply with basic EMI/EMC and other safety requirements like BSEN61326-1 and BSEN61010 respectively.
4. Thermal dissipation of equipment is met through ventilation holes provided on chassis of equipment. Such ventilation holes shall not be obstructed else it can lead to a safety hazard.
5. The output terminals shall be strictly loaded to the manufacturer specified values/range.

## MECHANICAL INSTALLATION

NEW

| Outline dimensions (in mm) | Panel cutout dimensions (in mm) |
|---|---|



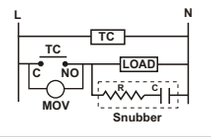
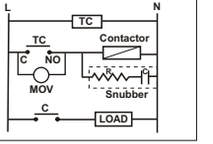

| MODELS / DIM | A | B | C | D | E | F | G |
|---|---|---|---|---|---|---|---|
| TC513A/TC513AX | 52 | 52 | 94 | 45 | 4 | 46 | 46 |
| TC221A/TC203AX | 72 | 72 | 83.7 | 67 | 4.5 | 69 | 69 |
| TC303A/TC303AX | 96 | 96 | 73 | 90.5 | 5 | 92 | 92 |

1. Prepare the panel cutout with proper dimensions as shown above.
2. Remove the clamp from the controller and push the controller into the panel cutout. Insert the clamp from the rear side until the main unit is securely fit into the panel.
3. The equipment in its installed state must not come in close proximity to any heating sources, caustic vapors, oils, steam, or other unwanted process by-products.
4. Use the specified size of crimp terminals (M3.5 screws) to wire the terminal block. Tighten the screws on the terminal block using the tightening torque within the range of 1.2 N.m.
5. Do not connect anything to unused terminals.

**EMC Guidelines:**
1. Use proper input power cables with shortest connections and twisted type.
2. Layout of connecting cables shall be away from any internal EMI source.

### LOAD CONNECTIONS

1. The service life of the output relays depends on the switching capacity and switching conditions. Consider the actual application conditions and use the product within the rated load and electrical service life.
2. Although the relay output is rated at 10 amps it is always necessary to use an interposing relay or contactor that will switch the load. This avoids damage to the controller in the event of a fault short developing on the power output circuit.
3. Always use a separate fused supply for the "power load circuit"and do not take this from the live and neutral terminals supplying power to the controller.

| For load current less than 0.5A | For bigger loads, use interposing relay / contactor |
|---|---|
|  |  |



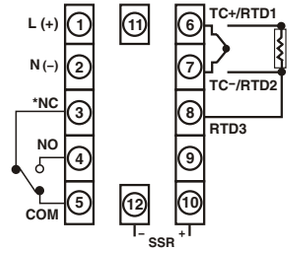
### ELECTRICAL PRECAUTIONS DURING USE

Electrical noise generated by switching of inductive loads can create momentary disruption, erratic display, latch up, data loss or permanent damage to the instrument.

**To reduce noise:**

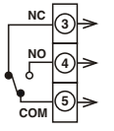
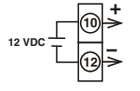
a) Use of snubber circuits across loads as shown above, is recommended.
b) Use separate shielded wires for inputs.

## TERMINAL CONNECTIONS



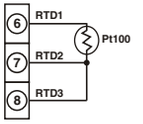

*NC contact valid only for TC513AX

**Control Output**

| Relay Output | SSR Drive Output |
|---|---|
|  |  |



**Measured Value Input**

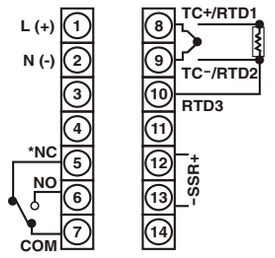
| Thermocouple (J, K, T, R, S) | RTD (Pt100) |
|---|---|
|  |  |
| Connect thermocouple sensor according to polarity shown. | For 2-wire RTD input short terminals 7 and 8 |



**For TC513A/TC513AX**

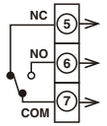
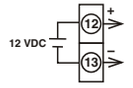
## TERMINAL CONNECTIONS

### For TC221A/TC203AX

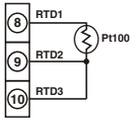



*NC contact valid only for TC203AX

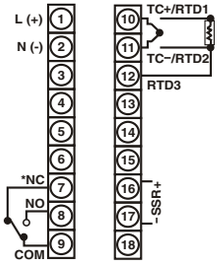
**Control Output**

| Relay Output | SSR Drive Output |
|---|---|
|  |  |

**Measured Value Input**

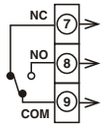
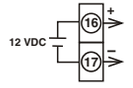
| Thermocouple (J, K, T, R, S) | RTD (Pt100) |
|---|---|
|  |  |
| Connect thermocouple sensor according to polarity shown. | For 2-wire RTD input short terminals 9 and 10. |

### For TC303A/TC303AX

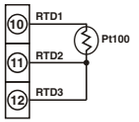



*NC contact valid only for TC303AX

**Control Output**

| Relay Output | SSR Drive Output |
|---|---|
|  |  |

**Measured Value Input**

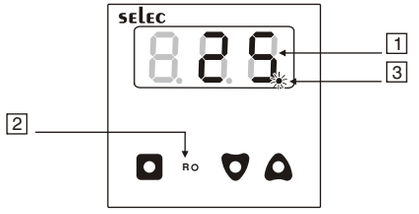
| Thermocouple (J, K, T, R, S) | RTD (Pt100) |
|---|---|
|  |  |
| Connect thermocouple sensor according to polarity shown. | For 2-wire RTD input short terminals 11 and 12 |

**WARNING: Please check the power supply voltage and controllers output type ordered (with reference to the order code) before installation.**

**Use only the correct thermocouple wire or compensating cable from the probe to instrument terminals avoiding joints in the cable if possible.**
**Failure to use the correct wire type will lead to inaccurate readings.**

**Ensure that the input sensor connected at the terminals and the input type set in the temperature controller configuration are the same.**

## FRONT PANEL DESCRIPTION




| | |
|---|---|
| 1 Process-value (PV) / Parameter name display | 1) Displays a process value (PV).<br>2) Displays the parameter symbols at parameter setting mode for 1 sec and then parameter values.<br>3) Displays PV error conditions. (refer Table 2) |
| Set-value (SV) | 4) Displays a set value (SV) when key pressed. |
| 2 Control output indication | The LED is lite when the control output is ON |
| 3 Tune | Auto tune: Decimal point blinks with faster speed. |

## FRONT KEYS DESCRIPTION

| Functions | Key press |
|---|---|
| **Online** | |
| To view Level 1 | Press key for 3 seconds. |
| To view Level 2 | Press key for 3 seconds. |
| To view Protection Level | Press + keys for 3 seconds. |
| To view and change setpoint value | Press to view the setpoint. Press + / key to change the setpoint. |
| **Programming Mode** | |
| To view parameters on the same level. | Or key once to view the next or previous function in operational menu. |
| To increase or decrease the value of a particular parameter. | + to increase and + to decrease the function value. **Note:** Parameter value will not alter when respective level is locked. |

NOTE: The unit will auto exit programming mode after 30 seconds of inactivity.

**OR**

By pressing the or or + keys for 3 sec.

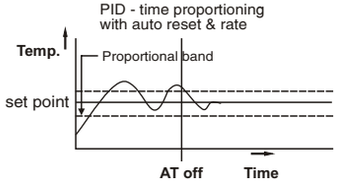
## USER GUIDE

**1. Display Bias:**
This function is used to adjust the PV value in cases where it is necessary for PV value to agree with another recorder or indicator, or when the sensor cannot be mounted in correct location.

**2. Filter Time Constant**
The input filter is used to filter out quick changes that occur to the process variable in a dynamic or quick responding application which causes erratic control. The digital filter also aids in controlling processes where the electrical noise affects the input signal. Larger the value of FTC entered, greater the filter added and the slower the controller reacts to the process and vice versa.

**3. Auto tuning:**
The Auto-tuning function automatically computes and sets the proportional band (P), integral time (I),Derivative time (D), ARW% and cycle time (CY.T) as per process characteristics.

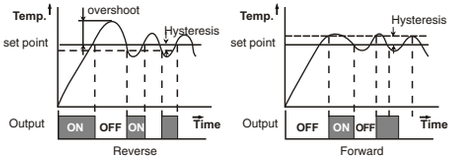
- ***Decimal point of LSD flashes at faster speed while auto-tuning is being performed.***
- ***At the completion of Auto-tuning, the decimal point stops blinking.***



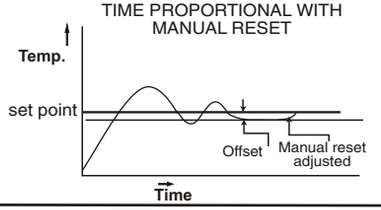

- If the power goes OFF before auto-tuningis completed, auto-tuning will be restarted at next power ON.
- If auto-tuning is not completed after 3-4 cycles, the auto-tuning is suspected to fail. In this case, check the wiring & parameters such as the control action, input type, etc.
- Carry out the auto-tuning again, if there is a change in set point or process parameters.

**4. ON/OFF control action (For Reverse Mode):**
The relay is 'ON' up to the set temperature and cuts 'OFF' above the set temperature. As the temperature of the system drops, the relay is switched 'ON' at a temperature slightly lower than the set point.

**HYSTERESIS:**
The difference between the temperature at which relay switches 'ON' and at which the relay switches 'OFF' is the hysteresis or dead band.




**5. Manual Reset (for PID control & I=0):**
After some time the process temperature settles at some point and there is a difference between the set temperature & the controlled temperature. This difference can be removed by setting the manual reset value equal & opposite to the offset.




## CALIBRATION ACCURACY DECLARATION

Product is tested & calibrated by automatic technique. The calibration of this instrument is done as per following accuracy :

For TC inputs: 0.25% of FS ±1°
For R & S inputs: 0.5% of F.S ± 2°
(20 min of warm up time for TC input)
For RTD inputs: 0.1% of FS ±1°

**Sources calibrated against:**
Kusam-meco, model 405, Sr.No.:104446

**Initial calibration is valid for 18 months after the Month/Year of manufacturing which is mentioned on order code label.**

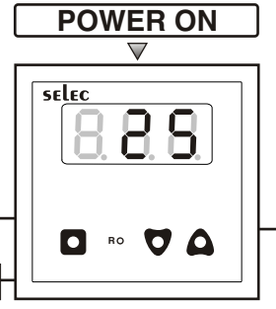
## CONFIGURATION INSTRUCTIONS

**KEY FUNCTIONS**

- ▲ ⇨ Press for 3 sec to enter Level 2
- Press once to view next parameter in configuration menu
- ▼ ⇨ Press for 3 sec to enter Level 1
- Press once to view previous parameter in configuration menu
- ▲ + ▼ ⇨ Press for 3 sec to enter protection Level
- ■ + ▲ or ■ + ▼ ⇨ Allows the user to increase or decrease associated parameter value
- ▲ or ▼ or ▲ + ▼ ⇨ To exit configuration menu press any of these keys for 3 sec

## OPERATIONAL MENU

*REQUIRED PARAMETER SETTING IS SHOWN IN LEVEL 1 DISPLAY CONDITION COLUMN*




**Level 1**

| Display (For 1sec) | Description | Default Value | Range | Display Condition |
|---|---|---|---|---|
| inP | Input type (Refer Table 1) | J | J/K/T/R/S/RTD | RTD — |
| Unt | Temperature unit | °C | °C/°F | C — |
| SP.L | Set point low limit | -199 | Min range of sensor selected to SP.H | 00 — |
| SP.H | Set point high limit | 750 | SP.L to Max range of sensor selected | 100 — |
| FtC | Filter time constant (Refer user guide) | 1.0 | 0.2 to10.0 sec | 1.0 — |
| Act | Control action | rE | RE/FD | rE — |
| Cnt | Control logic | PId | PID/ONF | ONF — |
| Any | Anti reset windup% | 25 | 1 to 100 % | For CNT=PID |
| rSt | Factory default (Reset all) | no | NO/YES | NO — |

**Level 2**

| Display (For 1sec) | Description | Default Value | Range | Display Condition |
|---|---|---|---|---|
| tUn | Tune (Refer user guide) | OFF | OFF/ON | For CNT=PID |
| P | Proportional band | 10 | 1 to 400° | For CNT=PID |
| I | Integral time | 2.0 | 0.0 to 99.9 min | For CNT=PID |
| d | Derivative time | 30 | 0 to 999 sec | For CNT=PID |
| Cy.A | Cycle time mode | AUt | AUT/US.F | For CNT=PID |
| Cy.t | Cycle time | 15.0 | 0.1 to 99.9 sec | For CNT=PID |
| HyS | Hysteresis | 1.0 | 0.1 to 99.9° | For CNT=ONF |
| oAn.P | Manual reset (Refer user guide) | 0.0 | -19.9 to 19.9° | For CNT=PID & I=0 |
| dS.b | Display bias (Refer user guide) | 0.0 | -19.9 to 19.9° | — |

**Protection Level**

| Display (For 1sec) | Description | Default Value | Range | Display Condition |
|---|---|---|---|---|
| SP | Lock setpoint | UnL | UNK/LCK | — |
| LU1 | Lock Level 1 | UnL | UNK/LCK | — |
| LU2 | Lock Level 2 | UnL | UNK/LCK | — |

**Note**

1. Locking parameters (LV1 or LV2 or SP) will not permit change in the value of respective level parameters.
2. Continuos operation of ■ +▲/▼keys for SP or other parameters makes Update speed faster in 3 stages after 3 seconds.

**Programming Setpoint (Online):** Default: 50

Range: SP.L to SP.H

To view setpoint: Press the ■ key.
To increase/decrease setpoint: Press ■ +▲/▼keys.

### INPUT RANGES (Table 1)

**FOR RTD**

| Input | | Ranges |
|---|---|---|
| Pt100 | °C | -150 to 850 |
| | °F | -199 to 999 |

**FOR THERMOCOUPLE**

| Input | | Ranges |
|---|---|---|
| J | °C | -199 to 750 |
| | °F | -199 to 999 |
| K | °C | -199 to 999 |
| | °F | -199 to 999 |
| T | °C | -199 to 400 |
| | °F | -199 to 750 |
| R & S | °C | 0 to 999 |
| | °F | 32 to 999 |

### ERROR DISPLAY (Table 2)

When an error has occured, the display indicates error codes as given below.

| Error | Meaning | Control Output Status |
|---|---|---|
| S.br | Sensor break / Over range condition | OFF |
| S.rE | Sensor reverse / Under range condition | OFF |


**Selec Controls Pvt. Ltd.**

(Specifications are subject to change, since development is a continuous process)

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