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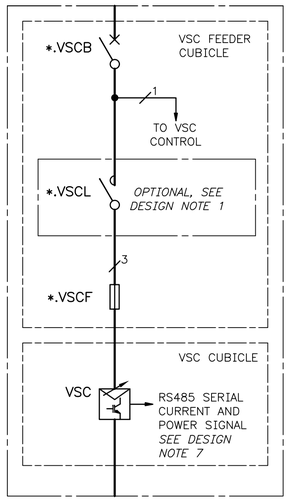
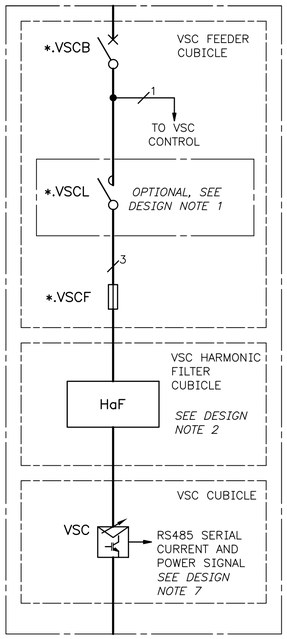



## VSC ONLY

1.0A – 150.5A
(OUTDOOR ENVIRONMENT)

*(SEE DESIGN NOTES 3 AND 6)*




## HARMONIC FILTER AND VSC

1.0A – 31.9A
(OUTDOOR ENVIRONMENT)

1.0A – 150.5A
(TEMPERATURE CONTROLLED ENVIRONMENT)

*(SEE DESIGN NOTES 3 AND 6)*

## CODE SCHEDULE

| | |
|---|---|
| dVdT | dV/dT FILTER |
| HaF | HARMONIC FILTER |
| VSC | VARIABLE SPEED CONTROLLER |
| VSCB | VARIABLE SPEED CONTROLLER CIRCUIT BREAKER |
| VSCF | VARIABLE SPEED CONTROLLER FUSE |
| VSCL | VARIABLE SPEED CONTROLLER LINE CONTACTOR |

## SERIAL COMMUNICATIONS

*SEE INSTRUCTIONS FOR USE NOTE 8*

| PROTOCOL OPTIONS | CARD NUMBER | ORDERING CODE OPTION |
|---|---|---|
| PROFIBUS DP V1 | MCA 101 | A0 |
| PROFINET | MCA 120 | AL |
| MODBUS TCP | MCA 122 | AQ |

## POWER EQUIPMENT SCHEDULE

| CODE | MOTOR FULL LOAD CURRENT | SPECIFICATION |
|---|---|---|
| VSCB | 1.0A – 31.9A | SCHNEIDER ELECTRIC, COMPACT NSX100B, : 100A WITH MICROLOGIC 2.2, 40A TRIP UNIT |
| | 32.0A – 62.1A | SCHNEIDER ELECTRIC, COMPACT NSX100B, : 100A WITH MICROLOGIC 2.2, 100A TRIP UNIT |
| | 62.2A – 76.5A | SCHNEIDER ELECTRIC, COMPACT NSX160B, : 160A, WITH MICROLOGIC 2.2, 100A TRIP UNIT |
| | 76.6A – 90.1A | SCHNEIDER ELECTRIC, COMPACT NSX160B, : 160A, WITH MICROLOGIC 2.2, 160A TRIP UNIT |
| | 90.2A – 125.0A | SCHNEIDER ELECTRIC, COMPACT NSX250B, : 250A, WITH MICROLOGIC 2.2, 160A TRIP UNIT |
| | 125.1A – 150.5A | SCHNEIDER ELECTRIC, COMPACT NSX250B, : 250A, WITH MICROLOGIC 2.2, 250A TRIP UNIT |
| VSCF | 1.0 – 5.8A | BUSSMANN, CM32FC : 32A WITH GEC, NIT10 : 10A FUSE LINK |
| | 5.8 – 12.8A | BUSSMANN, CM32FC : 32A WITH GEC, NIT16 : 16A FUSE LINK |
| | 12.9 – 31.9A | BUSSMANN, CM63FC : 63A WITH GEC, TIS50 : 50A FUSE LINK |
| | 32.0 – 37.4A | BUSSMANN, CM63FC : 63A WITH GEC, TIS63 : 63A FUSE LINK |
| | 37.5 – 51.9A | BUSSMANN, CM100FC : 100A WITH GEC, TIS80 : 80A FUSE LINK |
| | 52.0 – 62.1A | BUSSMANN, CM100FC : 100A WITH GEC, TIS100 : 100A FUSE LINK |
| | 62.2 – 76.5A | SIBA, 21 189 08 : URB–U NH00–DIN80 1000V WITH SIBA, 20 282 20–160 : 160A, CLASS aR, NH000–DIN80 |
| | 76.6 – 90.1A | SIBA, 21 189 08 : URB–U NH00–DIN80 1000V SIBA, 20 282 20–200 : 200A, CLASS aR, NH000–DIN80 |
| | 90.2A – 150.5A | SIBA, 21 189 08, NH00, DIN80, : 400A, 1000V SIBA, 20 282 20–250 : 250A, CLASS aR, NH000–DIN80 |
| HaF | 1.0 – 8.0A | DANFOSS, 130B1229 (AHF005) / 130B1027 (AHF010) |
| | 8.1 – 12.8A | DANFOSS, 130B1231 (AHF005) / 130B1058 (AHF010) |
| | 12.9 – 20.4A | DANFOSS, 130B1232 (AHF005) / 130B1059 (AHF010) |
| | 20.5 – 27.2A | DANFOSS, 130B1233 (AHF005) / 130B1089 (AHF010) |
| | 27.3 – 31.9A | DANFOSS, 130B1238 (AHF005) / 130B1094 (AHF010) |
| | 32.0 – 37.4A *(FUTURE)* | DANFOSS, 130B1239 (AHF005) / 130B1111 (AHF010) |
| | 37.5 – 51.9A *(FUTURE)* | DANFOSS, 130B1241 (AHF005) / 130B1180 (AHF010) |
| | 52.0 – 62.1A *(FUTURE)* | DANFOSS, 130B1247 (AHF005) / 130B1201 (AHF010) |
| | 62.2 – 76.5A *(FUTURE)* | DANFOSS, 130B1248 (AHF005) / 130B1204 (AHF010) |
| | 76.6 – 90.1A *(FUTURE)* | DANFOSS, 130B1249 (AHF005) / 130B1207 (AHF010) |
| | 90.2 – 150.5A *(FUTURE)* | DANFOSS, 130B1250 (AHF005) / 130B1213 (AHF010) |
| VSC | 0 – 1.0A | DANFOSS, FC–202PK37T4E66H1XGCXXXSXXXX**BXCXRXXDX |
| | 1.1 – 1.4A | DANFOSS, FC–202PK55T4E66H1XGCXXXSXXXX**BXCXRXXDX |
| | 1.5 – 1.9A | DANFOSS, FC–202PK75T4E66H1XGCXXXSXXXX**BXCXRXXDX |
| | 2.0 – 2.4A | DANFOSS, FC–202P1K1T4E66H1XGCXXXSXXXX**BXCXRXXDX |
| | 2.5 – 3.3A | DANFOSS, FC–202P1K5T4E66H1XGCXXXSXXXX**BXCXRXXDX |
| | 3.4 – 4.5A | DANFOSS, FC–202P2K2T4E66H1XGCXXXSXXXX**BXCXRXXDX |
| | 4.6 – 5.8A | DANFOSS, FC–202P3K0T4E66H1XGCXXXSXXXX**BXCXRXXDX |
| | 5.9 – 8.0A | DANFOSS, FC–202P4K0T4E66H1XGCXXXSXXXX**BXCXRXXDX |
| *SEE DESIGN NOTE 8* | 8.1 – 10.4A | DANFOSS, FC–202P5K5T4E66H1XGCXXXSXXXX**BXCXRXXDX |
| | 10.5 – 12.8A | DANFOSS, FC–202P7K5T4E66H1XGCXXXSXXXX**BXCXRXXDX |
| | 12.9 – 20.4A | DANFOSS, FC–202P11KT4E66H1XGCXXXSXXXX**BXCXRXXDX |
| | 20.5 – 27.2A | DANFOSS, FC–202P15KT4E66H1XGCXXXSXXXX**BXCXRXXDX |
| | 27.3 – 31.9A | DANFOSS, FC–202P22KT4E66H1XGCXXXSXXXX**BXCXRXXDX |
| | 32.0 – 37.4A | DANFOSS, FC–202P30KT4E66H1XGCXXXSXXXX**BXCXRXXDX |
| | 37.5 – 51.9A | DANFOSS, FC–202P37KT4E66H1XGCXXXSXXXX**BXCXRXXDX |
| | 52.0 – 62.1A | DANFOSS, FC–202P45KT4E66H1XGCXXXSXXXX**BXCXRXXDX |
| | 62.2 – 76.5A | DANFOSS, FC–202P55KT4E66H1XGCXXXSXXXX**BXCXRXXDX |
| | 76.6 – 90.1A | DANFOSS, FC–202P75KT4E66H1XGCXXXSXXXX**BXCXRXXDX |
| | 90.2 – 125A | DANFOSS, FC–202P90KT4E66H1XGCXXXSXXXX**BXCXRXXDX |
| | 125.1 – 150.5A | DANFOSS, FC–202P90KT4E66H1XGCXXXSXXXX**BXCXRXXDX |

## DESIGN NOTES

1. *INCLUDE VARIABLE SPEED CONTROLLER LINE CONTACTOR FOR APPLICATIONS REQUIRING MOTOR DECONTACTORS AND/OR EMERGENCY STOP PUSHBUTTONS, OTHERWISE LINE CONTACTOR NOT INSTALLED AND THE VSC TO REMAIN CONTINUOUSLY ENERGISED*
2. *A HARMONIC FILTER SHALL BE INSTALLED IF NECESSARY TO COMPLY WITH HARMONIC DISTORTION LIMITS SPECIFIED IN DS22, SECTION 7*
3. *SINE–WAVE FILTERS ARE NOT STANDARD FOR SEWAGE PUMP MOTOR APPLICATIONS*
4. *THE USE OF A LINE REACTOR IS CONSIDERED A RARE PROJECT SPECIFIC REQUIREMENT AND DOES NOT FORM PART OF THIS STANDARD DESIGN*
5. *FOR ALL WASTEWATER APPLICATIONS MOTOR THERMAL PROTECTION INTERNAL TO VSC VIA ELECTRONIC THERMAL RELAY (ETR) – TRIPPING CLASS 10*
6. *FOR VSC UPGRADE PROJECTS WHERE EXISTING MOTOR CABLES ARE NOT IN ACCORDANCE WITH DS22 SECTION 10.2, OR EXISTING MOTOR INSULATION NOT RATED FOR USE WITH VARIABLE SPEED CONTROLLERS, A SINE–WAVE FILTER MAY BE REQUIRED. FOR SINE–WAVE FILTER SELECTIONS REFER MN01–13–1.3 OR MN01–14–1.3*
7. *CURRENT AND POWER SIGNALS FROM VSC TO SCADA CAN BE OUTPUT IN THE FOLLOWING OPTIONAL FORMS :*
   - *4–20mA ANALOGUE SIGNALS OR*
   - *MODBUS RS–485 SERIAL DATA SIGNALS OR*
   - *ETHERNET SERIAL DATA SIGNALS (VIA OPTIONAL PROTOCOL COMMUNICATIONS CARD)*

   *THIS PROJECT SPECIFIC REQUIREMENT SHALL BE DETERMINED BY THE DESIGN ENGINEER IN ASSOCIATION WITH OPERATIONAL TECHNOLOGY*
8. *IF A SERIAL COMMUNICATIONS CARD IS REQUIRED, THE SERIAL COMMUNICATION PROTOCOL IS PROJECT SPECIFIC AND EFFECTS THE VSC ORDERING CODE. THE AVAILABLE OPTIONS ARE SHOWN IN THE SERIAL COMMUNICATIONS TABLE. REPLACE THE ASTERISKS IN THE ORDERING CODE AT POSITIONS 29 AND 30 TO SUIT THE REQUIRED PROTOCOL CARD*

## VSC DESIGN CRITERIA

1. *MAXIMUM OUTPUT CURRENT OF VSC IN AN OUTDOOR MK 8 VSC VENTILATED CUBICLE IS LIMITED TO MAXIMUM 125A AT MAXIMUM AMBIENT TEMPERATURE OF 50°C*
2. *MAXIMUM OUTPUT CURRENT OF VSC IN AN OUTDOOR MK 8 VSC VENTILATED CUBICLE IS LIMITED TO MAXIMUM 150.5A AT MAXIMUM AMBIENT TEMPERATURE 45°C*
3. *MAXIMUM OUTPUT CURRENT OF VSC IN THE RANGE 150.6 TO 263A REQUIRES A TEMPERATURE CONTROLLED ENVIRONMENT. (PLANNED FUTURE DESIGN)*

| ISSUE | DATE | GRID | REVISION | DRN | REC | APPD |
|---|---|---|---|---|---|---|

DESIGN SURVEY NONE | VERTICAL DATUM NONE | COORDINATE SYS NONE | ASCON SURVEY NONE | DES REF | DES CALC S GILMOUR | DES CHD T LIU | DRN SA MEMORY | Q.C. CHD P HARVEY

NORTH POINT

SUBMITTED 16/06/2023 SA MEMORY (SIGNED) SENIOR TECHNICAL ADVISOR – ELECT

RECOMMENDED 16/06/2023 S GILMOUR (SIGNED) SENIOR ENGINEER – ELECTRICAL

APPROVED 16/06/2023 T LIU (SIGNED) PRINCIPAL ENGINEER – ELECTRICAL

**ENGINEERING**

WATER CORPORATION

ELECTRICAL STANDARD SWITCHBOARD DESIGNS
SMALL PUMP STATIONS
PRIMARY DESIGN – POWER DIAGRAM TEMPLATE OPTIONS
MOTOR STARTERS – WASTEWATER – PART 3 (VARIABLE SPEED)

FILE | PROJECT | PLAN MN01–12–1.3 | CAD | ISSUE A | ORIGINAL SHEET SIZE A1 | MF

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