ITEM	QTY.	PART NO.	DESCRIPTION

S1

S4

DHW

S5

Hydronic
Tank

R4
P3

S7

R1

W   R6

M   R5

R9

P4

R10   P1

P2

S3

R3

S2

VFS5-100

S6

SIZE	FSCM NO		DWG NO	REV
SCALE	1 : 1			SHEET 1 OF 2

FlowRotor
GDSA2
GDSA1

S1 S2 S3 S4 S5 S6 S7 S8 S9 S10 S11 S12 | S13/ IMP1 | S14/ IMP2 | S15/ IMP3 | CS10 | PWM1 17 0-10V | PWM2 18 0-10V | PWM3 19 0-10V | PWM4 20 0-10V | VBus

GND | VBus GND

GDSD2
GDSD1

R14-A | R14-M | R14-R

R13 R12 R11 R10 R9 R8 R7 R6 R5 R4 R3 R2 R1 | L' | L

N
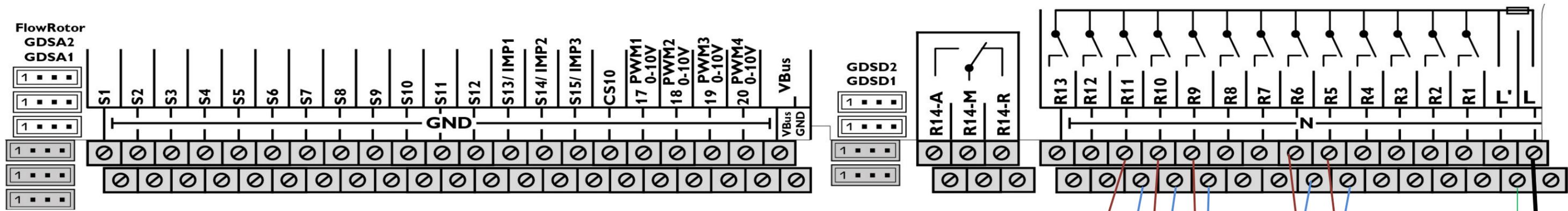
Function Block 1 (R6): When S4 is less than a temperature value, R6 is activated. → 2-way valve open.

Function Block 2 (R5): When S5 is less than a temperature value, R5 is activated.→ 2-way valve open.

Function Block 3 (R13): When S3 is ready & ΔT between S3 and S4 existing, R13 is activated.
Function Blcok 4 (R12): When S3 is ready & ΔT between S3 and S5 existing, R12 is activated.
Function Block 5 (R11): When either R13 or R12 is activated, R11 is activated.

Function Block 6 (R8): When S6 is ready & ΔT between S6 and S4 existing, R8 is activated.
Function Block 7 (R7): When S6 is ready & ΔT between S6 and S5 existing, R7 is activated.
Function Block 8 (R9): When either R8 or R7 is activated, R9 is activated.

Function Block 9 (R3): When S3 is ready & ΔT between S3 and S6 existing, R3 is activated.

Function Block 10 (R4): When S7 reaches a certain temperature value, and ΔT between S7 and S4 existing, and also when R6 is activated, then R4 is activated.

Function Block 1 and 2: When DHW tank calls for heat, R6 is activated; when hydronic tank Calls for heat, R5 is activated.

Function block 3,4,5: When Solar Storage tank is ready and there are Delta T between S3~S4, and/or S3~S5, your P1 (R10) starts working

Function Block 6,7,8: When 1100 Gal underground tank is ready, and there are Delta T between S6~S4, and/or S6~S5, you P4 (R9) starts working

NC

NO

DPDT relay

P1

P4

Relay R10 is Manually Set up 120V constantly. DPDT relay's NO switch is built inline; so P1 pump only runs when R11 is activated, R11 charges DPDT relay coils, DPDT relay closes NO switch and then P1 pump gets 120V from R10 (NC switch is opened at this moment) ; P4 pump only runs when R9 is activated and R11 is not activated.

If R11 and R9 are both activated, P1 runs and P4 does not run because R11 drives the DPDT relay coils and NO is closed and NC is opened in the DPDT relay.

120V

When your controller is powered as 120V, R1 to R13 will be able to provide 120V to your device.

If your pump is 120V and more than 1A, please use SSR relay. Less than 1A, devices directly work with MX controler.

Only R14 is a dry contact.
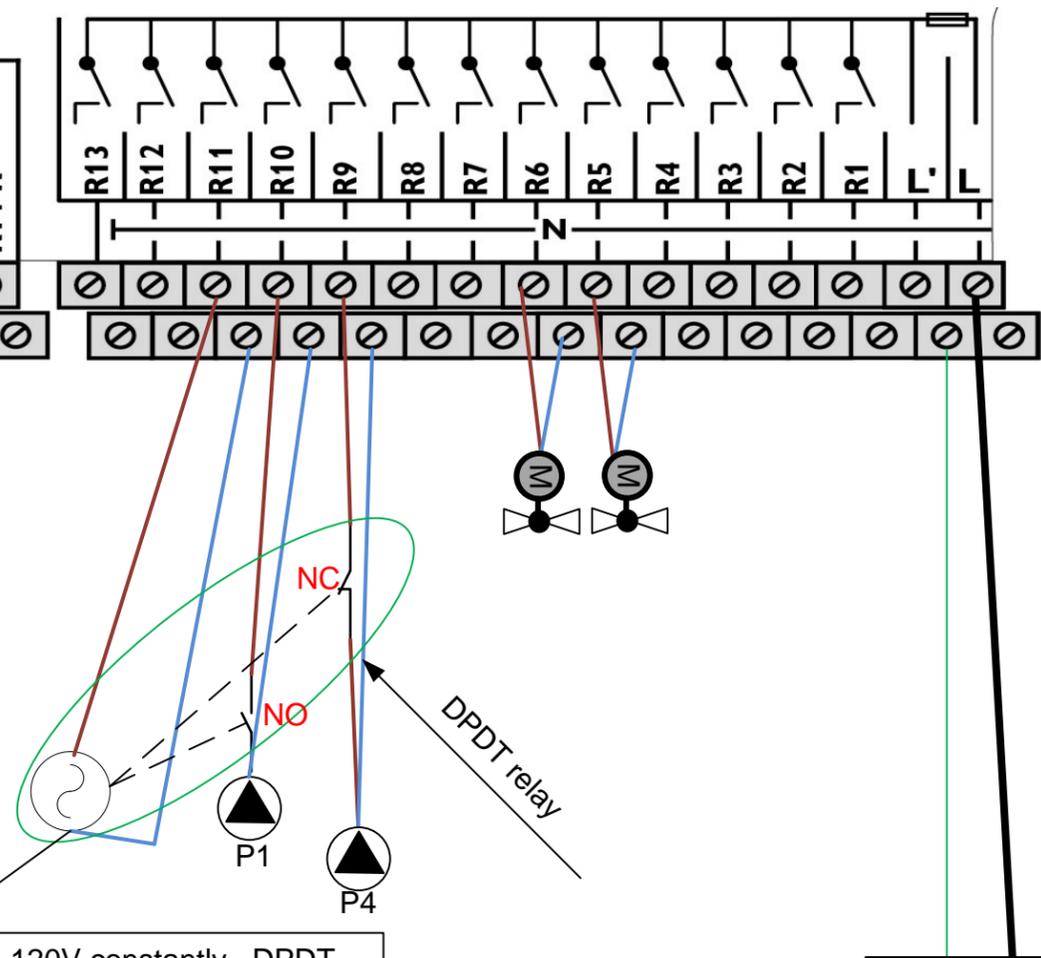
Function Block 1:

When solar storage tank is ready (S3 temp value is high enough) , and there is delta T between S3 and S4 existing, R13 is activated.

Function Block 2:

When solar storage tank is ready(S3 temp value is high enough), and there is Delta T between S3 and S5 existing, R12 is activated.

Function Block 3:

R11 will be activated, when either R13 or R12 is activated. (it could be only R13 is activated, could be only R12 is activated, or could be both R13 and R12 activated, then R11 will be activated)—this means whichever the DHW or hydronic tank is calling for heat, R11 will be activated; or both DHW and Hydronic tank call for heat, R11 will be activated.

Parallel Relay Function 1:

R6// R11 (R6 works for a 3-way valve).

Parallel Relay Function 2:

R2// R11 (R2 works for a 3-way valve).

[As long as load pump starts working only because solar storage tank is GOOD, the two three-way valves are both activated]**

Function Block 4:

When solar storage tank is ready, (S3 temp value is higher enough), and there is Delta T between S3 and S6, Relay R3 is activated.

Function Block 5:

When 1100GAL Underground tank is ready, (S6 temp value is high enough), and there is Delta T between S6 and S4 existing, relay R8 is activated.

Function block 6:

When 1100GAL Underground tank is ready, (S6 temp value is high enough), and there is Delta T between S6 and S5 existing, relay R7 is activated.

Function block 7:

R9 is activated, when either R8 or R7 is activated (idea is same as Function Block 3).

Function block 8:

R4 activation has two basic conditions:

1) S7 has to reach certain temperature and there is Delta T between S7 and S4 (pre-heat HEX, to make sure S7 temperature value is higher than S4); also
2) when either R11 or R9 is working.

Then R4 will be activated.

Function block 9:

R5 will be activated when either R11 or R9 is activated.

Please let **normally open (NO)** ports of both 3 way diverting valves toward 1100 GAL tank(as shown on the diagram). The two valves work with R6 and R2 relays (see electrical diagram) . When energy is supplied from solar storage tank (S3), the valve will be energized, the valves open to DHW/hydronic tank.

Logic explanation:

When solar storage tank is ready, S3 is high enough,->

and there is delta T between S3 and S4, and/or Delta T between S3 and S5, →

Relay R11 will be activated-> it charges DPDT relay's coil, and closes the DPDT relay's **NO** switch. The **NC** switch will be opened at the same time.

[The DPDT's Normally Open (NO) switch connects in line of load pump (DHW & hydronic heating tank) at relay R10, and I set up R10 constantly supplies 120V. (Manual ON mode)**]**

[The DPDT's Normally Close (NC) switch connects inline of load pump at relay R9, R9 has Auto operation mode, different from R10]**

If now, solar storage tank is NOT good to supply energy, while 1100 GAL tank is ready to supply energy, and there is Delta T between S6 and S4, and/or Delta T between S6 and S5, →R9 is activated, since NC switch is built in line, load pump still starts running. **[** R11 is Not activated, DPDT's NO switch is OPEN (showing on the electrical diagram)]**

The circulation pump R4: I insert a S7 at the HEX so that the HEX will be pre-heated by heat source, so when S7 reaches certain satisfied temperature value and there is Delta T between S7 and S4-> ALSO, either R11 or R9 is activated, the R4 is activated. (Circulation pump runs).

R5 is for the 2-way zone valve, as long as either R9 or R11 is activated, R5 is activated too.

[R11 does not directly connect to the load pump, and its activation will drive the load pump; R9 directly connects to the same load pump and its activation will drive the load pump→ R11 and R9 could

be activated simultaneously, because solar storage tank and 1100 GAL tank could be good to supply energy simultaneously, but as long as R11 is activated, the DPDT will close NO switch and open NC switch]**